GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name	***COMMENCEMENT BAY - PROJECT 5 (Asarco)***	***ProjectID:*** 10-15
Last Updated:	08/24/02	

City:	Tacoma
County:	Pierce
State:	WA
Country:	USA
Bodies of Water:	Commencement Bay at southern end of Puget Sound; intertidal areas; 7 inland waterways
US EPA Region:	X
Status (Active, Complete, or Monitoring Only):	Active
Date On NPL:	1983
ROD/ESD Date:	1989; 2000
Operable Unit:	OU-6 (sediments/groundwater)
Areas of Concern (length or acres):	The marine sediments of interest comprise about 52.5 acres, are directly offshore of the Asarco facility, and extend approximately 1,000 feet offshore into Commencement Bay.
Other Characteristics of Water Body:	As described in the ROD (Reference A-877): "OU-06 includes marine sediments that extend approximately 1,000 feet offshore into Commencement Bay. Intertidal and subtidal slopes range from relatively flat to steep inclines (slopes to approximately 50 percent). The steepest submarine slopes were generally formed by placing molten slag directly into the water where it hardened in massive forms. Water depths in the steepest gradient areas within OU-06 are up to approximately 300 feet deep . . ." "Strong tidally generated currents are characteristic of the area. Analysis of storm wave and tidal current conditions at the Site shows currents as high as 3.3 feet per second (ft/sec), or 1 meter per second (m/sec), occur near the bottom with tidal and wave forces acting in the same direction. Nearshore tidal currents could be higher, up to 4 ft/sec (1.24 m/sec). The predominant flow patterns are westerly north of the Facility and southeasterly to the south of it. Water movement within the Yacht Basin is considerably less than that within adjacent areas outside the basin." "The marine sediments . . . seaward of the Facility generally consist of coarse-grained material. Sediments inshore of the Breakwater Peninsula in the Yacht Basin tend to be more fine-grained."
Contaminants of Concern:	arsenic, copper, lead, zinc
Source of Contamination:	As described in the ROD (Reference A-877): "Past smelting operations at the Asarco Facility have resulted in contamination of soil, groundwater, surface water, and marine sediments. Wastes generated by the former smelter, particularly slag, have acted as a continuing source of contamination to groundwater and marine sediments."
Contaminated Area Physical Characteristics:	As described in the ROD (Reference A-877): "Slag was produced as a waste product during the smelting of copper from arsenic- and lead-bearing ores. The slag at the Site is generally composed of dark brown iron-rich silicates that include metals such as arsenic, copper, and lead. The slag is similar in appearance to volcanic rock. It is either massive or granular, depending on the way it was processed and placed on the Site. Massive slag is present where molten slag was poured directly into the water of Commencement Bay. Contact with the cold water solidified the molten material in place. Granular slag was intentionally produced by passing molten slag through cold water streams to produce a sand- to gravel-sized material. This granular slag was then used as fill material throughout the Facility. The slag was used to extend the shoreline by approximately 500 feet outward into Commencement Bay. In addition,

the Breakwater Peninsula is comprised entirely of slag . . ."

"Although numerous sediment samples at the site contain high concentrations of metals and metalloids, there is site-specific evidence (e.g., pore water chemistry, pore water bioassays, sequential extraction of slag) that bulk sediment chemistry results are not indicative of actual toxicity or are a reliable measure of the extent and magnitude of contaminant effects. This is because the bioavailability of metals and metalloids in slag to potential receptors may be low. Therefore the chemistry may have high concentrations yet the biological community could be healthy."

Type of Regulatory Action: Superfund. Final.

Overall Status Summary: The Commencement Bay Nearshore/Tideflats (CB/NT) site was placed on the NPL in 1983 and an RI/FS at the site was completed in 1988. The RI/FS identified types and levels of chemicals of concern in sediments and developed priority areas based on the potential impact of these chemicals on humans and wildlife. In 1989, EPA issued a ROD that designated two OUs: source control (OU-5) to focus efforts on controlling upland sources and discharges to the Bay and sediment remediation (OU-1) to focus on cleanup of contaminated sediments at the CB/NT. The Washington Department of Ecology is the lead agency for source control and EPA is the lead agency for sediment remediation.

In addition, the ROD selected the remedial actions to be used at eight of the nine contaminated sediment problem areas identified as being the most contaminated. These problem areas include: (1) Mouth of Hylebos Waterway, (2) Head of Hylebos Waterway, (3) Sitcum Waterway, (4) St. Paul Waterway, (5) Middle Waterway, (6) Mouth of Thea Foss Waterway, (7) Head of Thea Foss Waterway, and (8) Wheeler-Osgood Waterway. The ninth problem area, an area offshore from the Asarco Smelter, is addressed by a separate ROD and is the subject of this Overall Status Summary. Problem areas (1) and (2) are in this Database as Project ID 10-01; problem area (3) is in this Database as Project ID 10-05; problem area (5) is Project ID 10-11; and problem areas (6), (7), and (8) are Project ID 10-08.

The remainder of this Overall Status Summary comprises descriptive text quoted from the 2000 ROD for OU-6 (Reference A-877) for the ninth problem area. The paragraphs of quoted descriptive text are assembled to provide an Overall Status Summary narrative, but do not appear consecutively or necessarily in the same sequence in the ROD.

"From 1890 through 1912, the Facility was a lead smelter and refinery. Asarco, Inc., purchased the property in 1905. By-products of the smelting operations were refined to produce other marketable products, such as arsenic, sulfuric acid, and liquid sulfur dioxide. Asarco ended operations at the Facility in 1986."

"The site is located on the northeast side of the Point Defiance Peninsula and borders Commencement Bay. The general area consists of steep slopes extending down to Commencement Bay producing bluffs along portions of the shoreline."

"The onshore portion of the Facility is approximately 67 acres in size. In addition, approximately 30 acres of offshore intertidal and subtidal lands are under Asarco ownership. The State of Washington also owns a portion of the offshore lands within OU-06. State-owned aquatic lands are managed by the Washington State Department of Natural Resources."

"Surface water features within the Facility boundaries include springs and seeps which emanate from the face of the shoreline bluff from shallow groundwater bearing strata, and impoundments in drainage bottoms south and west of the main plant complex. Elevation across the Facility

ranges from sea level to as high as 250 feet above mean sea level. Steep drainages are located in the vicinity of railroad tracks that cross the Facility in an east-west direction. There are areas of dense vegetation, primarily on steep drainage slopes and along the bluff slope above Commencement Bay."

"Much of the Facility was constructed on slag fill, a waste byproduct of smelting arsenic- and lead-bearing ores. The slag fill was used to modify and extend the pre-existing shoreline by approximately 500 feet into Commencement Bay. In addition, the Breakwater Peninsula is composed of slag. The slag beneath the Breakwater Peninsula is up to 125 feet thick."

"Since 1987, Asarco has completed two phases of demolition activities at the Facility. Structures in the stack area associated with copper smelting and the production of both arsenic trioxide and metallic arsenic were demolished in 1987 and 1988. The majority of the remaining buildings and structures, including the smelter stack, were demolished during the period of 1992 to 1994. Much of the Facility (where historical manufacturing processes were located) has been leveled and, to some extent, graded. Remedial actions required by the OU-02 ROD (for the upland portion of the facility) began in 1999 when construction of the On-Site Containment Facility began. The remaining remedial action required for OU-02 and OU-06 (groundwater/sediments) will extend through 2005."

"EPA identified the Selected Remedy for OU-02 in a 1995 ROD (EPA, March 1995). Remediation of OU-02 . . . will be essential to the successful cleanup and long-term protection of groundwater and marine sediments included in OU-06. For example, OU-02 contaminants leaching to underlying groundwater in OU-06 are transported by prevailing groundwater flow to Commencement Bay where they are discharged and threaten marine water and sediments. Similarly, erosion and transport of slag particles from the nearshore areas of OU-02 into Commencement Bay result in deposition of these materials onto, and eventual mixing with, existing sediments."

"In 1996, EPA formed the Asarco Sediments Groundwater Task Force (Task Force) to address the relationship between groundwater and sediment contamination. The Task Force addressed two questions:

1. "Does groundwater that is discharging from the Facility negatively impact the marine sediments and waters of Commencement Bay?"

2. "Would a sediment cap remain stable (e.g., stay in place) in the presence of strong currents in this part of Commencement Bay?"

"The first question was addressed by the Task Force. The Task Force evaluated the impacts of discharging groundwater on the marine sediments and waters of Commencement Bay. The second question was addressed by the placement and monitoring of a pilot-scale sediment cap to determine how well the test cap would physically remain in place over a 2-year period (Parametrix, February 2000). The pilot-scale cap was constructed offshore of the Facility, immediately northeast of the Fine Ore Bins building. The purpose of the cap was to determine the physical, chemical, and biological characteristics of two sediment plots, one with a thickness of 30 centimeters and the other with a thickness of 60 centimeters."

"The Selected Remedy for marine sediments includes the following elements:

- Dredge contaminated sediment in the Yacht Basin and place the dredged sediment beneath a low-permeability soil cap to be constructed on the upland portion of the Facility (i.e., OU-02).

The sediments will be contained under the low-permeability cap at an elevation such that groundwater will not come in contact with the sediment.

- Monitor the dredged area in the Yacht Basin to verify that it does not become recontaminated.

- Cap contaminated sediments in selected offshore areas.

- Monitor the sediment caps to confirm that they remain in place, continue to isolate the underlying contaminated sediment, become recolonized with healthy biological communities, and do not become recontaminated.

- Use institutional controls to prevent activities that could damage the sediment caps.

- Monitor the areas outside the capped and dredged areas to confirm that these areas meet RAOs."

"No remedial action is planned for sediments offshore of the Breakwater Peninsula area (approximately 85,000 square yards or 17.5 acres). Sediments within this area are within the Contaminant Effects Area. However, no remedial action is planned because of inherent engineering/construction impracticability associated with this area. The presence of steep slopes (as much as 50 percent slope) make capping or dredging infeasible. Further, the stability of a cap on such a steep slope is questionable. In addition, dredging is not possible because the entire Breakwater Peninsula would need to be removed since it is constructed entirely of slag (up to 125 feet thick)."

"An area approximately 75,000 square yards (15.5 acres) will be dredged in the Yacht Basin because it was determined to be a severely impacted area. It is estimated that approximately 1 to 2 feet of material (up to 50,000 cubic yards) will require removal. The exact depth of dredging will be based upon information obtained from core samples that are collected during the summer of 2000. Post-dredging confirmatory sampling will also be required . . ."

"The dewatered sediments are currently scheduled to be placed beneath the upland low-permeability cap no later than November 30, 2004 as stipulated by "Amendment Number One" to the Asarco Smelter Consent Decree (Lodged in the District Court of Washington, June 2000) and "Modification Agreement" signed by EPA and Asarco (EPA, November 1999)."

"Capping is the Selected Remedy for the Nearshore/Offshore and Northshore areas. Capping is the Selected Remedy because it will isolate contaminated materials from the benthic organisms. Capping is the most practicable solution given the constraints associated with the depth of sediment contamination and the character of the subtidal slopes. Approximately 88,000 square yards (18 acres) of existing contaminated sediments within the severely impacted portion of the Nearshore/Offshore area (including the sediment under and adjacent to the existing piers) will be capped with a minimum of 3 feet of clean sediment. Approximately 7,000 square yards (1.5 acres) of the severely impacted portion of the Northshore area will also be capped with a minimum of 3 feet of clean sediment . . . The borrow source(s) for the cap material will be determined during remedial design and will originate from either a marine (in-water) or upland source."

Remedial Action Planned: ☑

Risk Assessment: ☑

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Last Updated: 08/24/02

Remedial Action Implemented:	☐
Status of Dredging	☐
PRPs:	☑
Contacts:	☑
References:	☑
Modeling:	☐
Fishing Advisory:	☐

Key Conditions: capping, dedicated landfill or CDF, dredging, natural recovery, post monitoring, tidal fluctuations

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Target Sediment Cleanup Standards (TSCS):

For the Yacht Basin dredging area: arsenic 93 ppm, copper 390 ppm, lead 450 ppm, and zinc 410 ppm

How TSCS Established:

As described in the ROD (Reference A-877): "Remediation cleanup levels identified for the marine sediments at OU-06 are based upon the characteristics of each specific area and the type of remedy selected for that area. The sediment cleanup levels will also be used to measure compliance under the long-term monitoring program. The State of Washington's SMS (WAC 173-340), including the Sediment Quality Standards (SQS), the Cleanup Screening Levels (CSL), and the biological impact conditions determined by the preponderance-of-evidence approach will be used as cleanup levels for sediment. The specific remedy units and their corresponding cleanup levels are summarized in Table 12-2 and are described below:

- Capping for the Nearshore/Offshore and Northshore Areas: The cleanup levels for these areas have been derived from the results of the preponderance-of-evidence approach, which has also been used to define the extent of active remediation (capping). For long-term monitoring, the SQS will be applied to ensure that the cap is supporting a healthy and diverse biological community.

- Dredging for the Yacht Basin: The cleanup levels selected for the Yacht Basin will be the SMS. These will be used to determine the vertical and horizontal extent of the active remediation (dredging). RI data suggest that fine-grained sediments like those present in the Yacht Basin do not typically exhibit biological effects when arsenic and copper concentrations are below the CSL. Therefore, the CSL criteria for these metals will be used as their cleanup levels. RI data also suggest that biological effects in fine-grained sediments may be more sensitive to sediment with zinc and lead contaminants. Therefore, the SQS have been selected as cleanup levels for these two metals. The above-referenced cleanup levels for arsenic, copper, lead, and zinc will also be used during long-term monitoring to ensure that the RAOs are met in the Yacht Basin."

Target Bank and Floodplain Cleanup Levels (if applicable):

Other Target:

Environmental Sample Data References:

- ***Sediment:***
- ***Water:***
- ***Fish:***

Estimated Target Volume:

Up to 50,000 cy targeted for dredging from 15.5 acres in the Yacht Basin; 19.5 acres of contaminated sediments targeted for capping with three feet of clean material.

Planned Disposal Method:

As described in the ROD (Reference A-877): "Material dredged from the Yacht Basin will be contained temporarily on the upland portion of the Facility and dewatered. Dewatered sediments will be permanently contained in an upland location in the central part of the Facility. Sediments contained in the upland location will be permanently covered with the low-permeability cap being installed across the Facility under the OU-02 remedial action. Effluent derived from the dewatering of dredged material will be discharged into the Yacht Basin or into Commencement Bay in accordance with BMPs and applicable water quality requirements. The specific sediment dewatering methods and requirements for management of discharges from dewatering effluent will be defined during remedial design and implemented during

	construction."
Estimated Calendar Time to Implement Remedy:	
Estimated Time to Implement Remedy:	
Estimated Cost to Implement Remedy:	The estimated present worth cost for the sediment remedy (dredging 15.5 acres and capping 19.5 acres) is $17.4 million.
Stated Remedial Action Objectives (and Source):	As described in the ROD (Reference A-877): "Restore and preserve aquatic habitats by limiting and/or preventing the exposure of environmental receptors to sediments with contaminants above Washington State SMS (WAC 173-204)." "The RAO for sediment is based upon predicted offshore uses . . . and is consistent with ARARs." "The RAO protects human health by restricting and limiting contaminant concentrations available to marine biological resources that could be a source of seafood for recreational and subsistence users." "The RAO protects marine life in sediments of Commencement Bay by limiting exposure to contaminated sediments by capping and dredging and by inhibiting discharge of contaminated groundwater to the bay."
Measures of Success to be Used:	As described in the ROD Responsiveness Summary (Reference A-877): "EPA will depend on a tiered sampling approach for determining if additional action in the Yacht Basin is necessary after initial dredging is complete. As discussed in Asarco's comment above, it is anticipated that the sediment below 1 to 2 feet in the Yacht Basin does not contain chemical concentrations above state Sediment Quality Standards (however, an exception may be immediately next to the Breakwater Peninsula). Should conditions warrant, however, EPA may require placement of a cap over a dredged surface as one possible option for remediating parts of the Yacht Basin. Contingencies for addressing these types of situations will be developed during the remedial design."
Planned Monitoring and Restoration:	As described in the ROD (Reference A-877): "Monitoring will occur on a long-term, regular basis after the remedial action is complete to verify the performance of each remediation area and the adjacent areas. This remedy is being selected because long-term monitoring of the offshore sediment cap will be necessary to confirm that the cap is isolating the contaminated sediments from marine life. Long-term monitoring is planned over a period of decades." "Long-term monitoring will occur off the Breakwater Peninsula since it cannot be remediated due to technical impracticability." "Long-term monitoring will also occur in those areas adjacent to the active remediation areas (the Moderate Impacts Area and the Contaminant Effects Area), where RI findings indicate exceedances of the SMS biological criteria. Monitoring is necessary to evaluate if long-term biological change is occurring in these areas, to monitor the long-term effectiveness of the sediment remedy, and to ensure the RAOs are being met. These evaluations will be conducted in accordance with the SMS and the preponderance-of-evidence approach . . . These areas will be monitored over a long duration so trends can be identified and responded to as necessary." "An Operation, Maintenance, and Monitoring Plan (OMMP) will be prepared as part of the

remedial design and implemented as part of the remedial action."

As described in the EPA Responsiveness Summary (Reference A-877): "The Operations, Maintenance, and Monitoring Plan (OMMP) will have a duration of decades. The minimum duration of the monitoring period will be determined during development of the OMMP. Extension of the monitoring beyond the minimum period will be dependent on the monitoring results and associated decision rules will be determined by EPA."

Agency Position on Sediment Removal (and Source):

The following quoted text has been extracted from various sections within the ROD (Reference A-877). The text paragraphs are not numbered in the ROD and do not necessarily appear consecutively in the ROD.

1. "The Breakwater Peninsula area comprises the sediments east of the Breakwater Peninsula, which is approximately 85,000 square yards or 17.5 acres. The sediment depth off the Breakwater Peninsula in some areas is almost 100 feet deep (within 200 feet from shore). The subtidal slope in this area can be up to 50 percent. The stability of a cap on such steep slopes is questionable, and the construction of a nearshore facility on such a slope would be very difficult (e.g., making a berm stable on a steep slope is difficult). In addition, dredging is not possible because the entire peninsula would need to be removed to provide a post-dredging slope that is flat enough to be stable. Although capping or dredging of the Breakwater Peninsula is not feasible, shoreline armoring will be placed in the intertidal areas where possible, as part of the OU-02 remedy. This will greatly reduce the erosion of slag in this high-energy area."

2. "Natural Recovery was evaluated as part of the RI/FS (Parametrix, December 1996). Evaluations determined that recovery of the sediments to concentrations lower than the cleanup levels would not occur within a reasonable time frame as defined by the SMS (i.e., less than 10 years). Natural Recovery cannot occur within a reasonable time frame because there is not sufficient sedimentation in this area to cover existing contaminated sediment within the 10-year time frame. The Natural Recovery alternatives are not considered protective of the environment because they would not prevent aquatic organisms from coming into contact with the contaminants for many years, if ever. Therefore, the natural recovery alternatives are not evaluated further under the nine criteria."

3. "Capping is the most protective alternative in the Nearshore area, where the depth of contamination is very deep because the shoreline is constructed of slag. Dredging of this area would be difficult due to concerns regarding the stability of subtidal slopes. Furthermore, dredging would inevitably encounter and expose the slag that is impracticable to remove in its entirety. Therefore, the highest degree of protectiveness would be provided by capping the contaminated sediments in the Nearshore, Offshore, and Northshore areas with cleanup sediment imported from another location (note that the Northshore area may be dredged depending on remedial design considerations.)"

4. "None of the alternatives involve treatment of the sediments. Treatment is not proposed for the sediments for several reasons. First, in order to treat the sediments, they must be removed. This is difficult in the Nearshore/Offshore area of OU-06 since the contaminated sediments are located in water up to approximately 150 feet deep. Therefore, the chance of leaving contamination behind is very high. Second, since slag was poured to create the shoreline in portions of the Nearshore area, dredging in this area would be difficult due to slope stability issues. Third, the net benefit of treating the sediments is questionable as slag particles within the sediment matrix are already in a relatively immobile form (e.g., the slag does not tend to be bioavailable). Fourth, costs associated with treatment of the Yacht Basin sediments prior to upland containment above the groundwater table and under a low-permeability cap would be

disproportionate to the incremental benefit that may achieved if the sediments were contained under an upland cap without treatment."

5. "The Yacht Basin has relatively shallow water and gentle subtidal slopes such that dredging in this area can be accomplished. However, the presence of piers and pilings may slow the work and require the use of hand operated suction dredge equipment. A nearshore confined aquatic disposal (CAD) facility is also feasible but would require more engineering controls. Confined upland disposal of sediment at OU-02 would be more easily implemented than the nearshore confinement alternative because the upland work is already underway and space has been made available under the OU-02 low-permeability soil cap."

"Due to navigational concerns, capping was not considered possible for the Yacht Basin because a sediment cap would decrease the depth of the water and potentially interfere with marine navigation."

6. "The Selected Remedy for the Yacht Basin is Alternative 2D, dredging and upland disposal. Dredging is the Selected Remedy for the Yacht Basin because it would remove the contaminated material, and removal tends to be a more controlled remedy than in-water containment. Furthermore, without prior dredging, capping in the marina is not possible because the cap would interfere with and be damaged by navigation."

"An area approximately 75,000 square yards (15.5 acres) will be dredged in the Yacht Basin because it was determined to be a severely impacted area. It is estimated that approximately 1 to 2 feet of material (up to 50,000 cubic yards) will require removal. The exact depth of dredging will be based upon information obtained from core samples that are collected during the summer of 2000. Post-dredging confirmatory sampling will also be required to verify that contaminated sediments have been adequately removed. If all of the contaminated sediments in the Yacht Basin cannot be practicably dredged or if slag is encountered, then the remaining contaminated sediment areas will be capped in place to the extent practicable."

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Last Updated: 08/24/02

RA Type: Human Health and Ecological

RA Status: Complete

RA Objectives:

Company Performing RA: Roy F. Weston, Inc.

RA Reference Report:

RA Summary and Conclusions: As described in the ROD (Reference A-877):

1. "A human health screening risk assessment was performed to address risks attributed to consumption of fish taken from water at and adjacent to the Site (Roy F. Weston, October 1996). It was assumed that human consumption of fish was the most likely and only route of exposure associated with contaminated sediment and surface water of Commencement Bay. Only ingestion was considered because dermal contact with the sediments or respiratory exposure to sediment vapors was considered improbable for saturated sediment. It was also assumed that fishing for demersal resident finfish (e.g., sole, sculpin, etc.) would be similar to the fishing opportunities and access provided at the public pier (south of the Asarco Facility on Ruston Way). Salmon were not addressed, as these fish are transient and mobile."

"Samples of rock sole (whole body and fillets) were collected from five areas near the Asarco shoreline as well as from one reference area near Brown's Point. Rock sole wee selected because they are one of the few species that could be readily obtained at the Site and are year-round residents within the area. All of the samples wee analyzed for several metals. The samples from Brown's Point were used to represent background conditions and assess if concentrations of metals in the fish from the water offshore of Asarco are above background levels. Because the sample fish catch was limited and because only one background sample was available, this assessment was considered a screening analysis."

". . . The inorganic arsenic level in the Brown's Point sample (0.034 mg/kg) was less than the average of the five samples (0.056, range of 0.022 to 0.083 mg/kg) collected from the waters at and adjacent to the Site, but it was higher than and/or comparable to the level found in two of the five individual Asarco samples (0.022 and 0.038 mg/kg). Arsenic was the only metal evaluated in the risk assessment because it was the only contaminant detected in all of these fish samples that exceeded its respective risk-based screening concentration developed by EPA Region III (EPA, October 1995)."

"For the risk assessment, cancer risks and non-cancer health impacts from inorganic arsenic were estimated using the maximum fish concentration found in the five samples. This maximum arsenic concentration was then used to assess the risk associated with a range of fish ingestion rates (e.g., ingestion rates for subsistence and recreational fisherpersons). The low end of this range (1 gram per day of fish) was selected to represent the consumption of an infrequent sports fisherperson, who might eat fish from the waters at and adjacent to the Site a few times a year. A high-end assumption (292 grams per day of fish over 24 years; 350 days per year) was selected to represent the consumption of a subsistence fisherperson."

"The potential non-cancer health impacts were evaluated by comparing the exposures calculated from eating fish to EPA's Reference Dose (RfD). The RfD represents an exposure level that an individual may be exposed to without experiencing any health impacts. All of the exposures, using the range of ingestion rates (infrequent sports fisherperson ingesting 54 grams/day to subsistence fisherperson ingesting 292 grams/day), were below the RfD for both the Site and reference samples. Therefore, non-cancer health impacts from eating finfish are considered unlikely."

"The potential cancer risks estimated for the sports fisherperson from eating fish taken from water at or adjacent to the Site was about 6x10-6, while the potential cancer risk for the subsistence fisherperson was estimated to be approximately 2x10-4."

"A risk assessment was also done using the Brown's Point reference sample. The estimated cancer risk for a subsistence fisherperson for this reference sample was approximately 7x10-5. Therefore, the cancer risks from consuming fish taken from water at or adjacent to the Site appear to be slightly higher than that from consuming fish from the reference area. This conclusion, however, is somewhat uncertain because of the limited sampling done in the reference area."

2. Based on information obtained during the Asarco Remedial Investigation, EPA recognized that the Asarco OU-06 Site had characteristics that set it apart from other Operable Units in the Commencement Bay/Nearshore Tideflats area. Asarco sediments are different from most other sediments in Commencement Bay due to the presence of slag. Slag has high concentrations of metals, but these metals are bound in a rock-like form, which are not necessarily available to the benthic community. Therefore, the sediment chemistry could have high concentrations, yet the biological community could be healthy. This difference was first noted in the Commencement Bay/Nearshore Tideflats ROD (EPA, September 1989) and later in the Upland Smelter Facility ROD (EPA, March 1995). The difference was further addressed by the Sediment Design Group, with representatives from EPA, Ecology, and NOAA."

"Supplemental marine sampling and analyses conducted at the Asarco Sediments Site (OU-06) in 1989 and 1990 more clearly defined the peripheral areas where biological effects were observed (Parametrix, 1990 and 1991). An additional supplemental marine survey determined that benthos in the Yacht Basin were exhibiting toxic effects; however, it could not be determined what caused these effects. EPA produced a Supplemental Feasibility Study (SFS) that was based on this previously collected data (Roy F. Weston, October 1993)."

"To further define the areas and types of chemicals associated with potential contaminant effects, EPA, Asarco, and agencies participating in the Asarco Sediment/Groundwater Task Force agreed that an expanded RI/FS should be conducted. The chemical and biological data used to complete the SFS and the Expanded RI/FS investigations were obtained from 62 sampling stations in the offshore area. EPA used the data from these 62 sampling stations to characterize potential ecological risks as presented in the Ecological Risk Assessment and Seafood Consumption Screening Risk Assessment (Roy F. Weston, October 1996)."

"All of the data and evaluation measures were correlated and used in a "preponderance-of-evidence" approach to more fully identify current and potential impacts and risks to aquatic receptors. Because of the presence of slag, the bulk sediment chemistry results may not be representative of the actual toxicity of the sediments. Based on this difference between sediments at the Asarco Sediments Site and most other sediments in Commencement Bay, the Sediment Design Group relied upon best professional judgment, and gave greater weight to the benthic evaluation than to the chemistry and bioassay data. . . . This was accomplished by developing a range of possible impacts that were based in part upon state SMS biological and chemical criteria. A total of five impact categories were assigned to the Site . . . The relative locations of the categories at the Site were then assembled into three zones called Impact Stations, which are described as follows:

- Non-Impacted/Minimally Impacted Stations: Approximately 61 percent of the stations are within the non-impacted/minimally impacted stations. The non-impacted and minimally impacted stations fall into three subcategories:

- Stations that are considered to be currently unimpacted and pose no potential future risks to the aquatic organisms (e.g., fish and other bottom-dwelling animals) because contaminant concentrations were below state SQS.

- Stations that are considered to have no current impacts, but may have impacts in the future (i.e., these stations have chemical concentrations greater than state standards but biological testing showed no adverse impacts).

- Stations that have a current minimal impact and may have impacts in the future (i.e., these stations had minor biological CSL exceedances, but no chemical CSL exceedances)."

• "Moderately Impacted Stations: Moderately impacted stations are those that have a limited number of adverse biological impacts (i.e., a bioassay result indicated an impact of benthic abundance in a sediment sample that was significantly different from a reference sample), but the overall health of the biological community does not appear to be substantially impacted. For example, there were stations that had chemical and bioassay exceedances above corresponding SMS criteria, but a healthy biological community. These stations included approximately 28 percent of the locations sampled."

• "Severely Impacted Stations: Stations were considered severely impacted when sediment chemical concentrations exceeded CSLs and multiple biological impacts (e.g., more than one biological test exhibited a significant effect) were observed. In addition, every station that had a benthic community structure that indicated a stressed environment was included in this category. Approximately 11 percent of the stations (170,000 square yards or approximately 35 acres) exhibited these characteristics."

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PRP Name: **PRP INFORMATION NOT RELEASED** ***PRPID:***

Street Address:

City:

State:

KEY CONTACTS

Project Name ***COMMENCEMENT BAY - PROJECT 5 (Asarco)*** ***ProjectID:*** 10-15

Last Name: **KEY CONTACT INFORMATION NOT RELEASED** ***Contact ID:***

First Name:

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City:

State:

Postal Code:

Work Phone # : ***Other Phone #:***

Fax # :

Email Address:

Project Name ***COMMENCEMENT BAY - PROJECT 5 (Asarco)*** ***ProjectID:*** 10-15

Reference Type: A ***ReferenceID:*** 877

Title: ***Record of Decision: Commencement Bay Nearshore/Tideflats Superfund Site: Asarco Sediments/Groundwater Operable Unit 06, Ruston and Tacoma, Washington***

Location: AEM

Category: ROD/Proposed Plan/Action Memo/Decision Document

Prepared by/Author: US EPA Region X

Preparer/Author Address: Seattle, WA

Prepared For: July 2000

Date Published:

Key Words and Phrases:

Reference Type: A ***ReferenceID:*** 880

Title: ***Fact Sheet: Asarco Sediments and Groundwater Proposed Plan***

Location: AEM

Category: ROD/Proposed Plan/Action Memo/Decision Document

Prepared by/Author: US EPA Region X

Preparer/Author Address: Seattle, WA

Prepared For: General Public

Date Published: January 2000

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 552

Title: ***$54.3 M Asarco Sediment, Ground Water Plan Adds to Commencement Bay Work***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: Superfund Week

Date Published: January 28, 2000

Key Words and Phrases:

Project Name ***COMMENCEMENT BAY - PROJECT 5 (Asarco)*** ***ProjectID:*** 10-15

ReferenceID: 1083

Reference Type:	C
Title:	***Superfund Work at 40 Sites in Jeopardy as Funding Dries Up***
Location:	AEM
Category:	Site Update
Prepared by/Author:	Michele Delo
Preparer/Author Address:	
Prepared For:	Unknown
Date Published:	2003 circa
Key Words and Phrases:	