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# TECHNICAL MEMORANDUM

**TO:** Mr. Christopher Maurer, PE  
Site Manager, Washington State Department of Ecology

**DATE:** June 17, 2008

**FROM:** Mr. Thomas Cammarata, LG, LHG  
Geochemist, Sound Environmental Strategies

**SUBJECT:** Sediment Quality  
TOC Holdings Co. Facility No. 01-427 and 01-600  
2737, 2750, and 2805 West Commodore Way  
Seattle, Washington  
VCP No: NW 1705

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Sound Environmental Strategies Corporation (SES) has prepared this Technical Memorandum on behalf of TOC Holdings Co. (TOC) to respond to the Washington State Department of Ecology's (Ecology) request that TOC conduct a sediment quality investigation off-shore of the TOC Facility #01-427 and #01-600 located at 2737, 2750, and 2805 West Commodore Way in Seattle, Washington (herein referred to as the Property) (Figures 1 and 2). The request for a sediment quality investigation was presented in an Opinion Letter dated May 7, 2007 prepared by Ecology after completing a review of reports documenting remedial investigations conducted at the Property by others between 1997 and 2004. In the Opinion Letter, Ecology requested that sediment samples be collected near the product pipeline on both sides and both ends and upstream of the Shipping Terminal Wharf dock (the dock) located off-shore of the Property (Figure 2).

The purposes of this Technical Memorandum is to present Ecology with a summary of chemistry and biological test results for sediments samples collected proximate to the dock by Ecology in 1995 and 1997 and to provide Ecology with a rationale as to why additional sediment

sampling is not warranted proximate to the dock and upstream of the dock. This Technical Memorandum includes a brief description and history of the Property and SES's current understanding of the sediment quality proximate to dock and in Salmon Bay.

### **PROPERTY DESCRIPTION**

The Property includes a Former Bulk Terminal and Water Front Area that occupies upland and waterfront portions of Salmon Bay at 2737 and 2750 West Commodore Way (Figure 2). A pipeline utility corridor extends north from the lower tank yard of the Former Bulk Terminal beneath the West Commodore Way right-of-way (ROW) to the dock at the Water Front Area. A railroad loading dock associated with the Former Bulk Terminal extends across the west property boundary shared with ASKO Hydraulic at 2805 West Commodore Way (Figure 2). The pipeline utilidor and a former barrel inclines angle north across the Former Bulk Terminal, pass under the surface of West Commodore Way, and appears between the north embankment of the ROW and the dock at the shoreline of the Waterfront Area. The pipeline utilidor houses petroleum pipelines that delivered petroleum products to the Water Front Area. The former barrel inclines consisted of conveyance ramps that transported 55-gallon drums containing petroleum products to the Water Front Area. For a period of 3 months in 1967 the drums contained a mixture of diesel and pentachlorophenol (PCP) (Figure 2).

TOC leases aquatic land off-shore of the Water Front Area from the Washington State Department of Natural Resources (DNR). The DNR land is 26 feet under water and 195 feet from the shoreline and includes a portion of the dock (Figure 2).

### **PROPERTY HISTORY**

TOC acquired the Waterfront Area and the Former Bulk Terminal in 1941. By 1944, TOC had developed a petroleum bulk storage plant at Former Bulk Terminal. The Former Bulk Terminal included a headquarters office building, a row of warehouses constructed on a railroad loading dock that extended west onto the ASKO Hydraulic property. Historical maps indicate that fourteen aboveground storage tanks (ASTs) containing petroleum products were located in the Former Tank Yard and at the Former Bulk Terminal (Figure 2).

Petroleum products were delivered to the Property via railroad and ship and stored in 14 bulk ASTs located in the Former Tank Yard. The approximate capacities of the bulk ASTs ranged

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from 0.5 to 2.2 million gallons each. The Water Front Area was used for staging of 55-gallon drums containing petroleum prior to loading on to ships (Figure 2).

During TOCs tenure at the Property, petroleum products were routinely transported off the Property. The methods used to transport petroleum products off the Property included:

- Piped overhead to the Loading Racks and into tanker trucks.
- Pumped from USTs into fleet vehicles.
- Piped through the pipeline utilidor to the dock to fuel ships.
- Drummed at the shed at the Former Bulk Terminal and conveyed down the barrel incline to the dock for shipping, empty drums were returned via a separate incline.

USTs were formerly located next to the north end of the headquarter office at Former Bulk Terminal for fueling TOC fleet vehicles. In 1991, two USTs with capacities of 4,000 gallons and containing gasoline and diesel were replaced with a combined 3,000-gallon capacity UST containing gasoline and a 1,000-gallon capacity UST containing diesel. All USTs were removed in 2006 including a 3,000-gallon capacity UST containing a mixture of ethanol and toluene that was also located at the north end of the Former Tank Yard.

In 1967, wood preservative was prepared at the Former Bulk Terminal by mixing PCP with diesel. The preservative was then drummed for shipment and use overseas. The PCP Mixing Area was located at the west end of the Lower Tank Yard (Figure 2).

TOC historically used sheds located in the Water Front Area for vehicle repair and equipment lube activities. A used oil UST associated with repair and lube activities was located beneath the driveway west of the sheds, and west of the pipeline utilidor.

The machine shop at ASKO Hydraulic property was constructed in the late 1960s for the purpose of fleet vehicle repairs. TOC occupied and utilized the machine shop for engine repairs until 1974, when the machine shop was leased to Precision Engineering Specialists. ASKO Hydraulic has leased the machine shop from TOC Holdings Co. since 1976 and uses it for machining aerospace parts.

## **ON-SHORE ENVIRONMENTAL CONDITIONS**

Environmental investigations conducted at the Property between 1997 and 2004 by others included subsurface investigations of soil and groundwater quality at the ASKO Hydraulics, Waterfront Area, and the Former Bulk Terminal (Figure 2). A detailed discussion of on-shore environmental conditions is presented in the *Final Cleanup Action Plan for Petroleum-Impacted Soil and Groundwater 2737 West Commodore Way Seattle, Washington*, dated May 2004, prepared by Foster Wheeler Environmental Corporation and the *Supplemental Remedial Investigation Report Seattle Terminal Properties TOC Holding Co. Facility Nos. 01-427 and 01-600, 2737, 2750, and 2805 West Commodore Way, Seattle Washington* prepared by SES (in preparation).

## **SEDIMENT QUALITY – SALMON BAY**

The Property is located on the south shore of Salmon Bay, a narrow body of water located between Lake Union to the east and the Puget Sound to the west (Figures 1 and 2). Numerous industries are located along the shores of Salmon Bay, including marinas, dock facilities, and combined sewer overflows. In 1995 and 1997 Ecology conducted sediment quality investigations in Salmon Bay to evaluate the toxicity of the sediments. During both of these investigations sediment samples were collected proximate to the dock off-shore of the Property (Figure 2). A summary of chemical and biological test results for Ecology sediment quality investigations in Salmon Bay and off-shore of the Property is presented below.

### **1995 SEDIMENT QUALITY INVESTIGATION**

In 1995 Ecology collected sediment samples from 29 areas in Salmon Bay and analyzed the samples for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and tributyltins (TBT). Sediment sample 3B was collected between the dock and shore of the Property (Figure 2). A detailed discussion of sediment quality results from the 1995 investigation is presented in *Chemical Contaminants in Salmon Bay Sediments Results of Phase II Sampling*, dated November 1996, prepared by Ecology. A summary of chemical test results for sediment sample collected by Ecology in 1995 are as follows:

- All eight metals were detected in sediment samples collected from Salmon Bay, with exception of cadmium which was not detected at concentrations above the laboratory

reporting limit in five sediment samples. Sediment sample 3B, collected by Ecology, between the dock and the shore of the Property, ranked number 4 out of 29 in overall metals concentrations for all sediment samples collected (Figure 2). Concentrations of arsenic, lead, mercury, and copper in sediment sample 3B exceeded Freshwater Sediment Quality Values (FSQVs) guidelines presented in the *Phase II Report: Development and Recommendations for SQVs for Freshwater Sediments in Washington State*, dated September 2003, prepared by Ecology. Concentrations of remaining metals in sediment sample 3B were below applicable FSQVs;

- High molecular weight polyaromatic hydrocarbons (HPAHs) and low molecular weight polyaromatic hydrocarbons (LPAHs) were the most frequently detected SVOCs in sediment samples collected by Ecology in Salmon Bay. The concentrations of HPAHs and LPAHs in sediment sample 3B exceeded the median concentrations of HPAHs and LPAHs for all sediment samples collected but were below applicable FSQVs. Concentrations of all remaining SVOCs in sediment sample 3B were below applicable FSQVs;
- PCBs were detected in all sediment samples collected by Ecology in Salmon Bay. The concentration of PCBs in sediment sample 3B was less than the median PCB concentration of all sediment samples collected. The concentration of PCBs in sediment sample 3B was below the applicable FSQV; and
- TBT was detected in all sediment samples collected by Ecology in Salmon Bay, with the exception of the sediment sample 5B, collected upstream of the dock. The concentration of TBT in sediment sample 3B was less than the median TBT concentration for all sediment samples. There are no bulk sediment FSQV for TBT.

### **1997 Sediment Quality Investigation**

In 1997 Ecology collected sediment samples from 27 areas in Salmon Bay and analyzed the samples for metals, SVOCs, and TBT. Bioassays were conducted on 20 sediment samples collected. Sediment sample 3B2, collected at the west end of the Shipping Terminal Wharf, was analyzed for metals, SVOCs, PCBs, and TBT only (Figure 2). Bioassays were performed on sediment 3B3, collected at the east end of the Terminal Wharf. Bioassay test included 10-day *Hyalella azteca* survival, 10-day *Chironomus tentans* growth and survival, and 15-minute *Vibrio fischeri* luminescence. Sediment sample 3B3 was also analyzed for metals, SVOCs, and TBT. A detailed discussion

of sediment quality results from the 1997 investigation are presented in *Concentrations of Chemical Contaminants and Bioassay Response to Sediments in Salmon Bay, Seattle – Results of Phase III Sampling*, dated December 2000, prepared by Ecology. A summary of chemical and biological test results for all sediment samples collected by Ecology in 1997 were as follows:

- All eight metals were detected in sediment samples collected from Salmon Bay, with exception of cadmium which was not detected at concentrations above the laboratory reporting limit in two sediment samples. Sediment sample 3B2 ranked 10 out of 27 in overall metals concentrations for all sediment samples collected (Figure 2). Sediment sample 3B3 ranked 3 out of 27 in overall metals concentrations for all sediment samples collected (Figure 2). Concentrations of arsenic, mercury, cadmium, copper, and zinc in sediment samples 3B2 and 3B3 exceeded applicable FSQVs. The concentration of lead in sediment sample 3B2 was below the FSQV. The concentration of lead in sediment sample 3B3 exceeded the FSQV. Concentrations of remaining metals in sediment samples 3B2 and 3B3 were below applicable FSQVs ;
- HPAHs and LPAHs were the most frequently detected SVOCs in sediment samples collected. The concentrations of HPAHs and LPAHs in sediment sample 3B2 exceeded the median concentrations for HPAHs and LPAHs for all sediment samples collected. Concentration of HPAHs and LPAHs were below applicable FSQVs. The concentrations of HPAHs and LPAHs in sediment sample 3B3 were below the median concentrations for HPAHs and LPAHs for all sediment samples collected. Concentrations of HPAHs and LPAHs were below the applicable FSQVs. Concentrations of bis (2-ethylhexyl) phthalate, indeno (1,2,3-cd) pyrene, dibenzo (a,h) anthracene, and benzo (ghi) perylene in sediment sample 3B2 exceeded applicable FSQVs;
- Six sediment samples collected by Ecology in Salmon Bay were analyzed for PCBs. Samples 3B2 and 3B3 were not analyzed for PCBs. PCBs were detected in five of the six sediment samples analyzed;

- TBT was detected in all sediment samples collected. Concentrations of TBT in samples 3B2 and 3B3 were less than the median TBT value for all sediment samples. There are no bulk sediment FSQV for TBT; and
- All sediment samples for which bioassays were performed, had statistically significant bioassay responses for one or more tests relative to the reference sediment sample. Sediment sample 3B3 showed significant test results in three of four bioassays. Bioassays were not performed on sediment sample 3B2.

## CONCLUSIONS

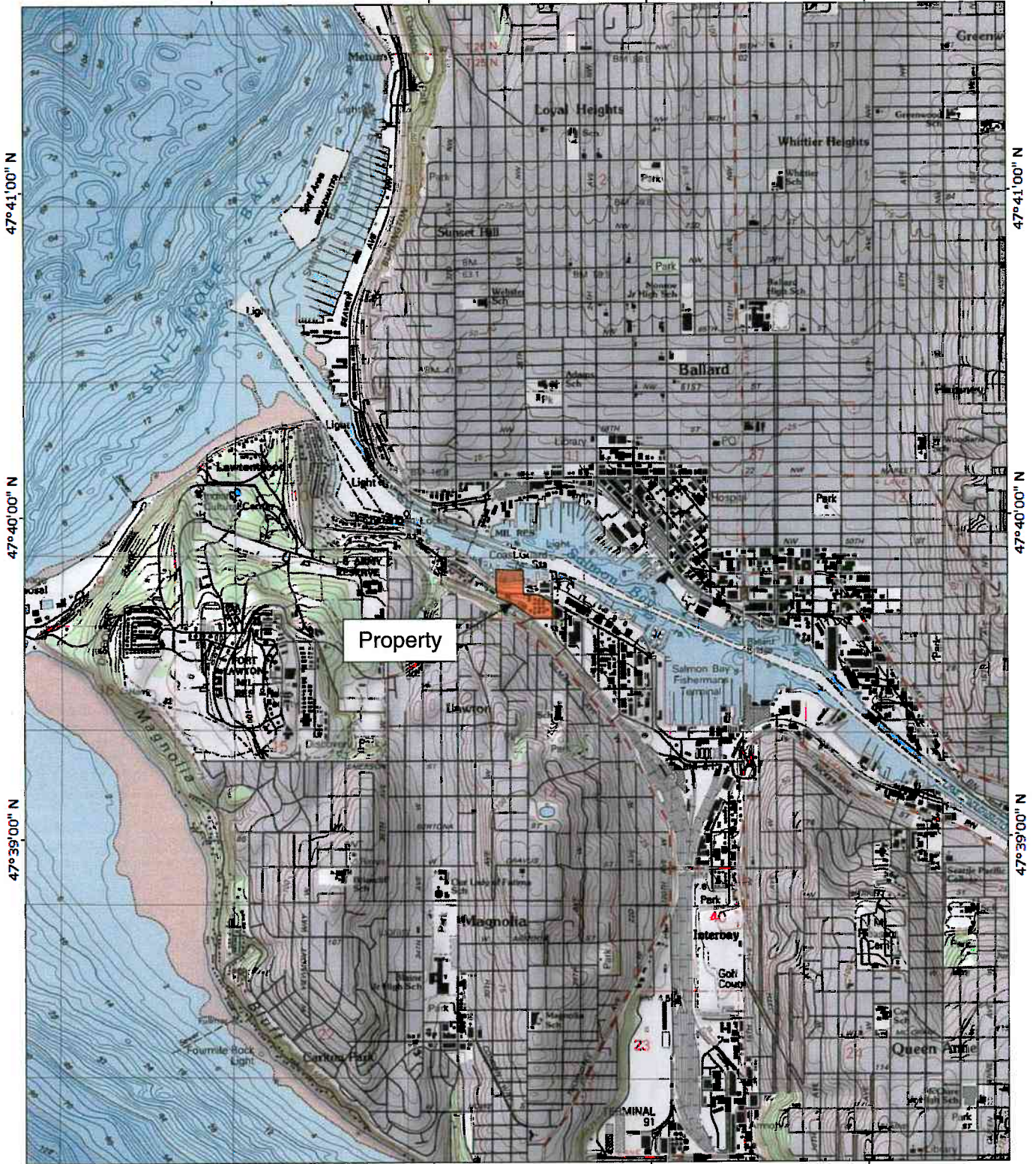
Three sediments samples were collected by Ecology proximate to the dock off-shore of the Property (Figure 2). The chemical and biological test results indicate that four sediment samples contained concentrations of select metals and PAHs that exceed applicable FSQVs. Bioassay results on one sediment sample collected proximate to the dock show statistically significant toxicity. These chemical and biological test results for the threesamples collected proximate the dock are similar to results for other sediment samples collected by Ecology in Salmon Bay during the 1995 and 1997 sediment investigation.

Based on the locations of sediment samples 3B, 3B2, and 3B3, proximate to the dock and location of sediment samples collected upstream of the dock, SES believes that the number and locations of sediment samples collected at the dock and up-stream of dock are sufficient to meet Ecology's request that TOC collect sediment samples proximate to the dock. Chemical and biological test results for sediments 3B, 3B2, and 3B3 also provide sufficient data to evaluate the impact of historical operation and on-shore contamination on sediment quality off-shore of the Property. Therefore, SES requests that Ecology reconsider its request for sediment sampling at the dock and upstream of dock.

Attachments: Figure 1, Property Location Map  
Figure 2, Site Plan Showing Ecology Sediment Sample Locations

cc: Mr. Mark Chandler, TOC Holdings Co.

TC:syh



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Date: April 1, 2008  
 Drawn By: RLH  
 Chk By: TJK  
 SES Project No.: 0440-004-16  
 File ID: 01-600 fig 1 vicinity map.doc

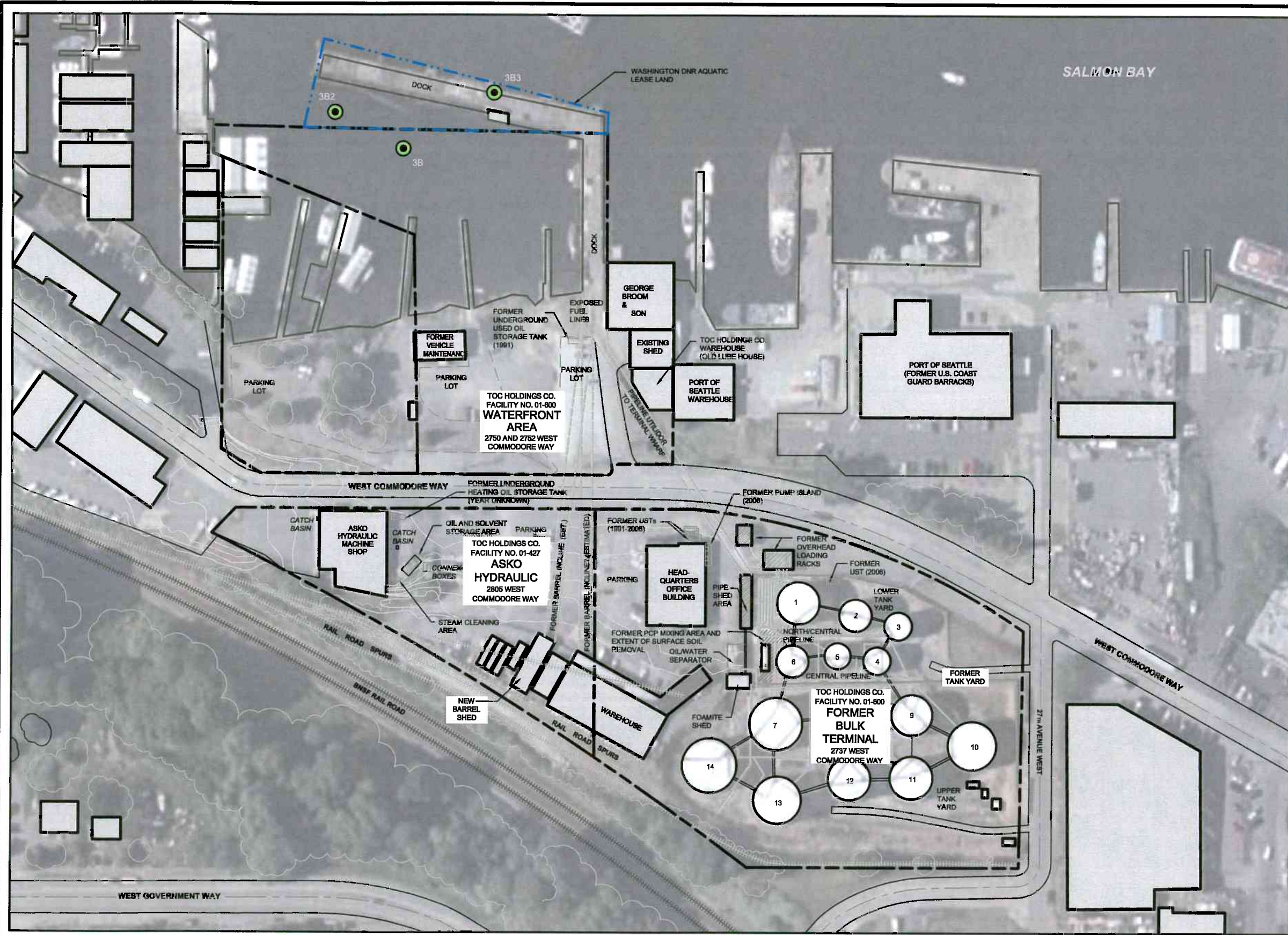
TOC Holdings Co. Facility No. 01-600 & 01-427  
 Seattle Terminal Properties  
 2737, 2750, 2752, & 2805 West Commodore  
 Way  
 Seattle, Washington

**FIGURE 1**  
 Property  
 Location  
 Map



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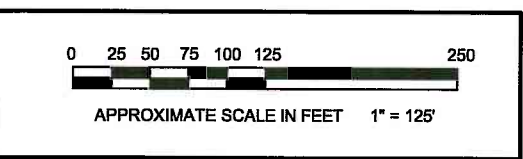
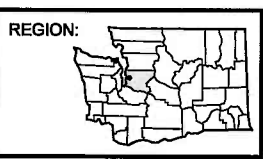
**LEGEND**

- PARCEL BOUNDARY
- RAIL SPUR
- FORMER RAIL SPUR
- TOPOGRAPHIC CONTOUR
- TREES / VEGETATION
- UST  
FORMER UNDERGROUND STORAGE TANK (YEAR REMOVED)
- STRUCTURE
- OUT-BUILDING
- FORMER AST
- AST  
ABOVE-GROUND STORAGE TANK
- SEDIMENT SAMPLE STATION (WASHINGTON STATE DEPARTMENT OF ECOLOGY - 1995 AND 1997)
- WASHINGTON DEPARTMENT OF NATURAL RESOURCES AQUATIC LEASE LAND



DATE: .....03/26/2008  
 DRAWN BY: .....RLH  
 CHECKED BY: .....TJK  
 CAD FILE: .....01-600 F2

PROJECT NAME: .....TOC HOLDINGS CO. FACILITY NO. 01-427 & 01-600  
 SES PROJECT NUMBER:.....0440-004-16  
 STREET ADDRESS:.....2737, 2750, 2752 & 2805 W. COMMODORE WAY  
 CITY, STATE:.....SEATTLE, WASHINGTON



**FIGURE 2**  
 SITE PLAN SHOWING ECOLOGY  
 SEDIMENT SAMPLE STATIONS

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