

Appendix B

Summary of Information Regarding Occidental Site Chemistry Resulting from Past Shipyard Activities

INTRODUCTION AND CONTENTS

The Historical Facts Demonstrate That the Ship Building, Maintenance, and Dismantling Activities (and Related Waste Disposal/Incineration) Occurring At and Near the Occidental Site Were Significant Sources of the PCBs, Dioxins/Furans, PAHs, Metals, and Other Compounds Detected at the Occidental Site

This Appendix to the Site Characterization Report for the Occidental Site provides a summary of historical information regarding chemistry resulting from shipyard activities at and near the Occidental Site. Such shipyard activities included: (a) ship construction, waste disposal, waste incineration, and creation of the “Navy/Todd Dump” at the Occidental Site by the United States and Todd Shipyards Corporation during World War One and World War Two; (b) ship maintenance and dismantling by the United States at the Naval Station Tacoma after World War Two; and (c) subsequent ship dismantling by the United States and Zidell Dismantling Corporation, among other activities. Such activities were significant sources of the PCBs, dioxin/furans, PAHs, metals, and other compounds detected at the Occidental Site.

This Appendix summarizes evidence derived from historical information, photographs, data, and other sources located in the National Archives, Tacoma Public Library, submissions to EPA and Ecology, and other public records. The underlying source materials are described below, and have been provided previously to the United States (the National Oceanic and Atmospheric Administration and the Department of the Interior) and to Ecology, in their capacities as Commencement Bay Natural Resource Trustees. The Commencement Bay Natural Resource Trustees have relied upon the underlying source materials in their Hylebos Waterway natural resource damage (“NRD”) settlement process, and have made those materials publicly accessible on their website.¹ The same materials were relied upon in the Hylebos Waterway cleanup allocation process.

In both the Hylebos NRD and Hylebos cleanup allocation contexts, these source materials have been used by the Trustees and by independent allocation consultants to attribute significant releases of hazardous substances to the ship building, maintenance, and dismantling (and related waste disposal/incineration) activities that occurred at and near the Occidental Site. The United States has accepted both the NRD and cleanup allocations in settlement negotiations, and has entered into consent decrees to address the United States’ NRD and cleanup liabilities that were premised upon the environmental impacts of the United States’ various activities in the Mouth area of the Hylebos Waterway. For the United States’ NRD consent decree, see *State of Washington, et al. v. United States of America*, Civil Action No. 06-05225RJB (U.S. District Court for the

¹ See source materials accessible at: <http://www.cbrestoration.noaa.gov/hylebos2.html> (under “Comments Received--Draft Proposal” the materials can be reviewed by following the seventy-six links under “Bakemeier, R.F. for Occidental”).

Western District of Washington). For the United States' "cashout" consent decree pertinent to the Hylebos cleanup, see *United States of America v. Mary Jane Anderson, et al.*, Civil Action No. C03-5107RBL (U.S. District Court for the Western District of Washington).

Many of the source materials summarized in this Appendix have been provided to EPA and/or Ecology in other contexts (or have actually been generated by EPA or Ecology). In particular, this Appendix contains summaries of the underlying source materials in the following categories, beginning at the following page numbers of this Appendix:

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A. A Chronology of the “Occidental Site’s” Ship-Related Industrial History

The following is a chronology of the ship-related industrial history in the area of the Occidental Site that is based upon the cited source materials, all accessible at: <http://www.cbrestoration.noaa.gov/hylebos2.html> (under “Comments Received--Draft Proposal” the materials can be reviewed by following the seventy-six links under “Bakemeier, R.F. for Occidental”). The events are addressed in more detail below in Section B, in the context of a description of the source materials that provide much of the historical background.

1917-1925 World War One Ship Building

Todd Seattle Dry Docks, Inc., a predecessor to Todd Shipyards Corporation, constructed and operated a shipyard at the Occidental Site (located at 401 Alexander Avenue and at a portion of 605 Alexander Avenue known as the "North Ten Acres") for

the construction of ships during and after World War One. The U.S. Maritime Commission and the U.S. Navy supervised the work at the yard.

1925-1939 Ship Building and Shipyard Demolition

The shipyard continued to exist in the 1920s and 1930s, but little is known about its activities. Some structures were demolished. In 1937, Occidental Chemical Corporation's predecessor (Hooker Electrochemical Company) ("Hooker") purchased the "North Ten Acres" of 605 Alexander Avenue.

1939-1946 World War Two Ship Building

In 1939, Seattle-Tacoma Shipbuilding Corporation ("STSC") (a Todd Shipyards Corporation subsidiary) under contract with the U.S. Maritime Commission began construction of a shipyard at the end of the Hylebos/Blair Peninsula that during World War Two occupied essentially all of the peninsula north of Eleventh Street, with the exception of the Hooker chemical plant at 605 Alexander Avenue and a petroleum storage/distribution facility located at 709 Alexander Avenue. STSC, later renamed Todd Pacific Shipyards, operated the shipyard from 1939 to 1946. The U.S. Navy began supervising work at the yard by May of 1942, and perhaps earlier. During World War Two, the Navy and Todd used Hooker's "North Ten Acres" at 605 Alexander Avenue for a variety of shipyard activities, including: a "scrap disposal yard," waste incineration, vehicle maintenance (including a 2000-gallon fuel tank on the shoreline), and a sewer system that discharged to the Hylebos. In 1945, shipyard wastes were dumped on uplands and on the shoreline and partially pushed into the Hylebos Waterway. This area is now described as the "Navy/Todd Dump" at the Occidental Site.

1946-1958 U.S. Naval Station Tacoma

Following World War Two, the Navy used most of the Mouth of the Hylebos Waterway area and adjacent upland properties (then called the "Naval Station Tacoma") for mothballing, berthing, maintaining, and/or dismantling Navy ships. The "North Ten Acres" of 605 Alexander Avenue (including the "Navy/Todd Dump") used by the Navy/Todd shipyard during the war was returned to Hooker and was incorporated into its operations. However, the Naval Station Tacoma continued to use the sewer system at the "North Ten Acres" that discharged to the Hylebos.

1960-2002 Shipyard for Building, Maintaining, Repairing and Dismantling Ships

The Port of Tacoma purchased most of the Naval Station Tacoma property from the United States government in 1960, and has since leased portions of the property to many businesses, including several ship-related businesses. From 1960 to 1984, Zidell Dismantling operated at 401 Alexander Avenue; from 1969 to 1987, Tacoma Boat Building operated at 401 Alexander Avenue; and from 1986 to 1997, AK-WA

Shipbuilding operated at 401 Alexander Avenue. The U.S. Army Reserve also has used facilities at 401 Alexander Avenue for many years. The United States government retained ownership of portions of the Hylebos/Blair Peninsula near Eleventh Street for the U.S. Naval and Marine Corps Reserve and its homeport for vessels.²

B. Historical Information, Photographs, Data, and Other Evidence Substantiating the Facts Summarized in this Appendix.

Historical evidence from the National Archives, Tacoma Public Library, submissions to EPA and Ecology, and other public records demonstrates conclusively that decades of ship construction, painting, maintenance, abrasive blasting, berthing, bilge-dumping, and demolition were significant sources of the PCBs, dioxins/furans, PAHs, phthalates, and metals (antimony, arsenic, cadmium, chromium copper, lead, mercury, nickel, TBT, zinc, etc.) detected at the Occidental Site. Those activities also likely contributed to releases of some VOCs (trichloroethylene, HCB, HCBD, etc.) given the documented use and disposal of solvents, etc.

In the source materials accessible at:

<http://www.cbrestoration.noaa.gov/hylebos2.html> (under “Comments Received--Draft Proposal” the materials can be reviewed by following the seventy-six links under “Bakemeier, R.F. for Occidental”), Occidental provided the historical information, photographs, data, and other evidence described below that substantiate the facts and conclusions set forth in this Appendix. These materials include: (a) extensive evidence regarding the history and hazardous substances pertinent to the Occidental Site area's ship-related industrial activity (items 1 through 8, below); (b) U.S. Navy reports regarding the presence of PCBs throughout many materials and fluids used in Navy ships (item 9); (c) EPA guidelines regarding hazardous substances released by shipyards (item 10); (d) data and diagrams showing the locations of PCBs and metals detected in the 401 Alexander Avenue stormwater sewer system discharging to the Hylebos Waterway (item 11); (e) articles and descriptions of Congressional hearings regarding the environmental problems caused by Navy ship dismantling (items 12 through 14); (f) data and information from other Navy facilities demonstrating releases of PCBs, PAHs, metals, and other chemicals found at the Occidental Site (items 15 and 16); and (g) materials regarding Ecology's concerns about extensive Navy spills of oil, fuel, and hazardous substances in Puget Sound (item 17).

² The United States also retained the real property at 721 Alexander Avenue for use by the United States Air Force as a petroleum and fuel storage and distribution facility called the “Tacoma Fuel Storage Station” for several years until that property was purchased by the Port of Tacoma.

1. The Report on a Search of National Archives Documents Relevant to the Use and Disposal of Hazardous Substances by Shipyard Activities at and Near the Occidental Site

This report provides some information regarding the development of 401 Alexander Avenue by Todd (in conjunction with the United States) for World War I shipbuilding, but focuses primarily upon the extensive World War II activities under the ownership/control of Todd Shipyards and the United States, as well as the subsequent use of the site as the United States Naval Station--Tacoma until 1960. It should be noted that the World War II activities, the Naval Station, and other military operations, expanded well beyond 401 Alexander Avenue to encompass almost the entire Hylebos/Blair peninsula north of Eleventh Street. Those activities were conducted on the "North Ten Acres" of 605 Alexander Avenue, as well as on 721 Alexander Avenue and 1100 Alexander Avenue (later the location of the U.S. Navy and Marine Corps Reserve Center), and other properties along Alexander Avenue. For nearly two decades, portions of the Occidental Site and much of the surrounding area were the location of United States government activities that contributed significantly to the chemistry detected at the Occidental Site.

During World War I, the shipyard at 401 Alexander Avenue and at the "North Ten Acres" of 605 Alexander Avenue was one of the largest in the world, employing as many as 10,000 people at the peak of its activity. In the early 1920s, approximately twenty-five cargo ships, three fast cruisers and a passenger liner were built at the shipyard. Maps and photographs show a shipyard with seven shipways extending into Commencement Bay, and several large structures including a joiner and paint shop, a sheet metal shop, a boiler shop, a blacksmith shop, a machine shop, a shear and punch shop, and a foundry, as well as numerous smaller storage sheds, a transformer house and fuel oil tanks.

Substantial ship construction activities also occurred at the shipyard during World War II. From 1939 to 1945, eighty-five keels were laid and eighty-two ships were launched, including fifty-six escort aircraft carriers, and several cargo ships, gasoline tankers, army transports, destroyer tenders and seaplane tenders. At the peak of operations, the shipyard occupied nearly the entire peninsula at the Mouth of the Hylebos, and employed more than 28,000 people. Although the shipyard structures had been demolished and rebuilt since World War I, the new yard's basic design appears to have been similar to that of the original shipyard. During World War II, there were eight shipways (extending into Commencement Bay), four outfitting piers (one located along the Hylebos, two extending into Commencement Bay and one located along the Wapato, which is now known as the Blair Waterway) and a commissioning pier (located along the Hylebos). The yard itself consisted mainly of two large steel fabricating and assembly shops, a shops building, a main office and warehouse building, a sheet metal shop, a paint and oil building, a hospital and inspection building, a restaurant building, and several transformer houses.

Documents available from the National Archives reveal that the Tacoma shipyard used numerous hazardous substances in its operations during World War I and World War II. In particular, records indicate that the yard had many sources of the following substances that have been detected at the Occidental Site and in the nearby sediments and shoreline of the Hylebos Waterway's Mouth area:

PCBs. Sources of PCBs at the shipyard included transformers, various construction materials, hydraulic fluids and greases. The use of transformers containing PCBs was common at shipyards of this era. According to maps, reports, and photographs from the World War II shipyard, transformer houses were located immediately adjacent to the Hylebos bulkhead line just east of the Shops Building and southeast of the Paint and Oil Building, along each shipway and on the three outfitting piers. Records from the Port of Tacoma confirm the presence of PCBs in transformers located at 401 Alexander Avenue, and provide evidence of PCB releases from those transformers (see Port 104(e) response to EPA, item 6, below). PCBs were also present in numerous construction materials (including wool felt insulation, electrical cables, plastics, rubber and paints) that were used in ship construction at that time. In comments submitted to EPA during PCB rulemaking proceedings, the Navy has acknowledged that PCBs were used in many materials found throughout Navy ships (see item 9, below).

Metals. Numerous substances used throughout the yard contained metals. Paints contained lead, mercury, copper, zinc, chromium, nickel, and/or tributyl-tin. Welding materials contained lead, chromium and iron oxides. Abrasive blasting utilized slag that likely contained copper, arsenic and other heavy metals (see indexes of World War II ship components, item 2, below).

VOCs. Solvents containing VOCs were used throughout the shipyard. The U.S. Bureau of Ships indexes of specifications for ship components confirm that trichloroethylene and other solvents were used on Navy ships (see item 2, below).

PAHs. Petroleum and oils were used in connection with various activities that took place throughout the yard. Petroleum and oil fuels were used to operate vehicles, cranes and other machinery. A vehicle maintenance building and a 2000-gallon fuel tank were located on the shoreline of the "North Ten Acres" of 605 Alexander Avenue (see "North Ten Acres" real estate records, item 3, below). Oils were also used to lubricate machinery throughout the yard (see item 2, below, and Ecology Complaints regarding Navy fuel and oil spills, item 17, below).

During wartime, in particular, Naval shipbuilding operations generally emphasized the rapid production of ships, with little concern about environmental consequences. This was particularly true after the bombing of Pearl Harbor, as the shipyards scrambled to rebuild the Pacific Fleet. Documents concerning operations during World War One and World War Two show that the Tacoma shipyard was no exception to this general rule. Waste disposal systems were primitive and much of the waste simply went into the Occidental Site and the Hylebos Waterway. During World War Two, the Navy

installed catch basins and drainage lines to the Hylebos Waterway (see National Archives Report and Maps);(see "North Ten Acres" real estate records). No precautions were taken to prevent transformers from leaking on to the piers, and materials from transformers were routinely dumped onto the ground or into the water. Hazardous substances were also released in other ways, such as through overspraying of paints, discarding of debris from construction areas, and the maintenance of equipment.

2. Navy Indexes of Ship Component Specifications from World War II Construction

Historical evidence from the National Archives includes two indexes of specifications for Navy ship components prepared by the U.S. Bureau of Ships for the Navy during World War II (dated 1942 and 1944). Those indexes identify numerous components containing the hazardous substances that have been detected at the Occidental Site. For example, those indexes identify the following components: antimony, slabs; barometers, mercurial; batteries; cables, electric, insulated; cadmium, ingots; carbon, tetrachloride; copper; cuprous oxide; diesel fuel oil; disinfectant, cresolic; disinfectant, germicide and fungicide; electrodes, copper-nickel alloy; felt, wool (described by the Navy in its PCB rulemaking comments as a particular problem) (see item 9 below); oil, transformer; paints (including anti-fouling, chlorinated, fire-retardant, and heat-resisting); phenolic-materials; pipe, lead; primer, zinc chromate; solder, lead; thermometers, mercurial; trichlorethylene; varnish, phenolic; xylene; and zinc (in various forms). The indexes also list equipment that contained, or distributed, hazardous substances and fluids, such as hydraulic equipment, paint sprayers, insecticide sprayers, and transformers.

3. Historical Photographs and Real Estate Records of Operations at 401 Alexander Avenue, Including the "Navy/Todd Dump" on the "North Ten Acres" of 605 Alexander Avenue at the Occidental Site

Photographs obtained from the archives at the Tacoma Public Library primarily depict the Navy/Todd shipbuilding activities during World War II, and reveal the disposal of wastes directly to the Occidental Site and the Hylebos Waterway. The photographs have been divided into the following three groups: (a) Navy/Todd Shipbuilding During World War II and the Post-War Naval Station—Tacoma; (b) Ships Built by the U.S. Navy and Todd (1940-43); and (c) Extensive Contamination of the Hylebos Shoreline by the U.S. Navy and Todd During World War II, While Operating on the Occidental Property (the creation of the "Navy Todd Dump" on the "North Ten Acres" of 605 Alexander Avenue at the Occidental Site). The historical photographs show the lack of waste control at the Navy/Todd shipyard during the World War Two operations.

The "North Ten Acres" of 605 Alexander Avenue were the location of very significant waste incineration and disposal on the property, near the Hylebos shoreline, and into the Hylebos Waterway. According to the historical real estate records, Hooker purchased the "North Ten Acres" from a Todd Shipyards entity in 1937. However, shortly thereafter (in 1941), the property was needed for the shipyard war effort. The property was leased for use by Todd and the United States Government. Todd and the Navy installed various facilities in the "North Ten Acres," including: a "scrap disposal yard," a waste incinerator, a vehicle maintenance building on the shoreline (including a 2000-gallon fuel tank), and a sewer system that included catch basins and drainage lines to the Hylebos.

The historical photographs show the creation of the "Navy/Todd Dump" on the shoreline of the Hylebos at the "North Ten Acres." Copies of some representative photographs taken on August 29, 1945, and February 20, 1946, show the creation of the "Navy/Todd Dump" in 1945. Near the waste incinerator on the shoreline, shipyard wastes were dumped and pushed into the shoreline area and waterway. The "Navy/Todd Dump" is depicted on an October 1945 map of the shipyard (see National Archives Report, Map 3). Copies of two aerial photographs taken on April 27, 1944, and on January 1, 1946, show conditions "before" and "after" the creation of the "Navy/Todd Dump" at the shoreline. This area was the disposal site for PCB-laden materials, incinerator residues, and other hazardous substances from ship construction. The sampling of that shoreline area has confirmed the disposal of PCBs and dioxins/furans in that dump, as well as the presence of lead, PAHs, VOC residue, cadmium, copper, antimony, nickel, zinc, and other hazardous substances.

A fourth group of photographs shows the Zidell Dismantling operations at 401 Alexander Avenue during the mid-1970s, revealing extensive piles of scrap metal at the Occidental Site and on the Hylebos shoreline. The scrap was obtained from the dismantling of Navy vessels, as well as other ships and equipment. Much of the dismantling (and releases of hazardous substances to the Occidental Site and to the Hylebos Waterway) occurred immediately adjacent to the shoreline of 401 Alexander Avenue. This caused chemicals (PCBs, PAHs, metals, etc. to be released to the property and shoreline, and those chemicals have been detected in Occidental Site sampling.

4. Newspaper Articles Regarding 401 and 605 Alexander Avenue

Some articles from the Tacoma Public Library describe the history of 401 and 605 Alexander Avenue. Two articles in particular provide information regarding the shipbuilding that occurred during World War One (March 10, 1957, and June 27, 1969). The articles indicate that, during World War One, the shipyard employed 10,000 people. Between 1917 and 1921, twenty-six ships were constructed, including "three 10,000-ton scout cruisers, including the Omaha. . . ." The other two were the Milwaukee and Cincinnati.

The articles also identify the types and names of ships constructed during World War Two. Between "1,500 and 2,000 men" were involved in building "five C-1 type cargo vessels." Two larger troop transport vessels were built—the Frederick Funston and the James O'Hara. Then, five tankers were constructed. "But the No. 1 product was to be the escort aircraft carriers—baby flattops. Sixty-two of the escort carriers were to be built in the next few years. In addition three destroyer tenders were constructed." It was estimated that 33,000 workers were employed in the shipyard during World War Two.³ Other vessels built at the shipyard are identified in the photographs discussed above (see item 3).

The articles describe the storage and scrapping of more than thirty of the escort carriers (flattops) at and near the Occidental Site by the Navy in the 1950s. Following World War II, the Navy converted the Tacoma shipyard into a berthing station for deactivated and mothballed warships. In 1946, the Navy designated the site as the U.S. Naval Station, Tacoma. Twenty-eight ships were berthed at the station following the war, and approximately 1300 people worked there. The Navy also used the site to ship military cargo. During the Korean War, five the ships berthed at the Naval Station were reactivated.

The Navy actively maintained ships berthed at the Naval Station, scraping, abrasive blasting and repainting of the ships' upper hulls to prevent corrosion. The ships were berthed along the outfitting and commissioning piers, at 401 Alexander and other locations in the Hylebos Mouth area. Scaling and painting took place along these piers. These activities would have resulted in the discharge of paints, abrasive blasting slags, and other materials at the Occidental Site. The routine maintenance of Navy ships also would have involved the discharge of wastes to the Hylebos as bilges were pumped, PCB-containing oils and greases were changed and dumped, cleaning solvents were discarded, and other wastes were generated and disposed.

As discussed in a section below (item 6) the Navy has acknowledged that it "may have" also dismantled some ships during this post-World War II period. According to the Navy's 104(e) responses to EPA, this activity took place in the area south of Pier #3 (at the Occidental Site on the Hylebos Waterway, adjacent to 401 and 605 Alexander; the pier is now call called Pier #25 by the Port of Tacoma). As discussed below, these short of ship dismantling activities involved the release of large quantities of hazardous substances.

³ One of the photographs verifies employment of 28,879 workers in August of 1943.

5. Navy Ships Moored at 709 Alexander Avenue (at the former "PRI" dock).

According to an undated Memorandum of Understanding between the U.S. Navy and Fletcher Oil Company (the long-term owner and operator of the former "PRI Northwest property "located at 709 Alexander Avenue), the Navy moored ships at the "PRI" dock. Historical observations and aerial photographs indicate that the Navy moored its vessels there frequently and for many years, both during the Naval Station Tacoma era (1946 to 1960) and the subsequent Reserve Center era (located at 1100 Alexander Avenue). Undoubtedly bilge dumping and other releases from the Navy ships contributed the PAHs and other compounds detected at the Occidental Site.

6. The 104(e) responses provided to EPA by the United States Navy, Todd Shipyards, the Port of Tacoma, and Zidell Dismantling

(a) The United States Navy 104(e) response. The response contained remarkably little information regarding a facility that the United States evidently controlled during World War I, definitely controlled/operated during World War II, and continuously owned/operated for nearly twenty years until 1960. The Navy acknowledged that it "obtained control of production at the shipyard" in October of 1942, although the facts described in the National Archives Report indicate that operational control was assumed earlier (p. 7). The Navy indicated that "[t]he shipyard may have been used for dismantling and retrofitting [sic] of Liberty and Victory ships from about 1946 to 1948" (p. 7). "Based on aerial photos [the Navy] believe[d] this [ship dismantling] occurred in the area south of Pier 3" (p. 7)—that is the pier located at the Occidental Site on the Hylebos Waterway adjacent to 401 and 605 Alexander Avenue. During the period following World War II, "the facility provided berthing space for ships of the reserve fleet . . . [which] were deactivated, preserved, and stored for future use." (p. 7).

As indicated above (in item 1), the World War II shipyard and subsequent Naval Station Tacoma occupied most of the Hylebos/Blair Peninsula, including portions, and surrounding the rest, of the Occidental Site . Pier #3 stretched the length of 401 Alexander Avenue on the Hylebos. Other Navy piers were located on 1100 Alexander Avenue (the "Commissioning Pier"). The Navy also operated an incinerator on the waterfront of 1100 Alexander Avenue during the 1940s and 1950s. It is likely that materials were released into the Waterway and along the shoreline near the incinerator, as was the case near the World Way II incinerator located on the "North Ten Acres" of 605 Alexander Avenue.

In the 1960s, the U.S. Navy and Marine Corps constructed a Reserve Training Center on a portion of 1100 Alexander Avenue, which operated for many years until it was closed recently and the property was transferred to the Port. The Reserve Center used the old Commissioning Pier, and served as the homeport for Navy vessels, which were maintained and repaired as necessary. These activities involved the use of paints, oils,

fuels, solvents, batteries and PCB-laden transformers. Historical aerial photographs confirm that submarines were berthed there at times in the 1950s and 1960s. Until 1976, oily bilge water from the vessels was discharged directly into the Hylebos. Surface runoff from the Reserve Center was also discharged to the Hylebos via storm drains. And, problems associated with releases of oils and fluids from vehicle fleet maintenance have been documented in Ecology reports. In 1994, a failure of the underground storage tank system resulted in petroleum contamination on the property. In 1995, Ecology inspectors also observed a five-foot high pile of aggregate material containing elevated levels of arsenic, copper, lead and zinc near the Hylebos shoreline.

The Navy 104(e) response contained information regarding various oil spills and the generation of hazardous substances (including tetrachloroethylene) at the Naval and Marine Corps Reserve Center located at 1100 Alexander Avenue (pp. 11-13). It contained information regarding the oily wastewaters discharged to the Hylebos generated by the vessels homeported at Site 60 (p. C-6). And, it indicated that, as of 1982, there was a PCB transformer at the Reserve Center, "adjacent to the Hylebos Waterway" (p. C-6). An attachment (Appendix D) to the response described the floating ship repair facility stationed at the Reserve Center, which included "a machine shop, valve and pump shop, welding shop, electric shop, carpentry shop, sheetmetal and pipe shop, and sail loft" (p. 11). The valve and pump shop contained a sand blaster, and equipment used to repair heat exchangers (p. D-5). The floating facility also repaired engines, as well as electrical and hydraulic systems (p. D-11).

(b) The Todd Shipyards 104(e) response. This response also contained remarkably little information regarding the facility that Todd owned and operated for over thirty years. Excerpts from a published "book [called Every Kind of Shipwork] that contains a chronology of Todd's history through 1981" revealed some significant information. First, the book described the development of the shipyard from 1916 through World War I, and the types of ships constructed. Second, it is evident that the United States controlled World War I operations at the shipyard, in much the same manner it did during World War II:

Before Todd Shipyards Corporation was six months old [Todd] found [a new] location: a tract of undeveloped shoreline on Commencement Bay at Tacoma, near the head of the Sound. . . . A 12,000-ton floating drydock was already under construction at Seattle, to be towed to Tacoma when the new yard was ready to receive it. That the whole plan was still a relatively modest one at the start of 1917 is made clear by Todd's own statement two years later that "a small construction business was contemplated as a feeder for a repair business." In a few weeks things would take a very different turn.

The most important factor in altering and accelerating Todd's plans, apart from the declaration of war itself, was the establishment on April 17, 1917,

of the Emergency Fleet Corporation to serve as the ship construction and acquisition arm of the United States Shipping Board. Its broad duties, under the Shipping Act of 1916 as amplified by further legislation of June, 1917, also included the acquisition and if necessary the requisition and construction of shipyards. Under these extraordinary powers, on August 3, it requisitioned all steel merchant vessels over 2,500 tons under construction or on order anywhere in the United States. . . .

. . . Apparently it was decided in anticipation of the government's action to lay down at Seattle none of the British ships or the first ten "Cascades" – all 7,500-tonners henceforth known as E.F.C. Design No. 1014 – [and instead build them at Tacoma].

These developments, reinforced by the [United States'] Emergency Fleet Corporation's insistence that the new Commencement Bay yard be expanded and devoted entirely (naval work excepted) to the construction of standard freighters, so altered the original scale of planning at Tacoma that the local preferred stockholders took alarm and insisted that the company buy them out. This was done, followed by enormous additional outlays to complete a major shipbuilding plant which, less than eight months after the fleet requisition, launched its Hull No. 1, the freighter Chebaulip. . . .

As was the case with the Emergency Fleet program generally, the unexpected termination of the war left Tacoma's contracts far less than half completed. Yet its tally of deliveries before November 11, 1918, measured up favorably to those of other yards. . . . Of 34 ships assigned to it (12 of which were subsequently cancelled), plus the five for Britain and the requisitioned Masuda, it had launched seven and delivered six before the Armistice. All of the remainder were completed by July, 1920, except that Todd elected to finish two of the cancelled hulls for its own account. [This totals 30 ships built at Tacoma between 1917 and 1920.]

(pp. 39-42). The book went on to describe the completion of three combat cruisers (the Omaha, the Milwaukee, and the Cincinnati) for the United States in the early 1920s, and the construction of passenger liners until 1924. (pp. 58, 64, 66). The shipyard was mothballed in 1925, and stood "idle until February, 1933, when, to save taxes as the Depression deepened, the decaying structures which had launched an emergency fleet were razed—all except one small building which would stand watch on Todd's Commencement Bay tidelands until it came time to build a new shipyard [six years later in 1939]" (p. 66).

(c) The Port of Tacoma 104(e) response. The Port of Tacoma purchased the shipyard from the U.S. government in 1960 and has since leased portions of the property to several ship building and dismantling businesses, including Zidell Dismantling,

Tacoma Boatbuilding, and AK-WA Shipbuilding. The response identified some of the tenants that have used 401 Alexander Avenue since 1960. It indicated that:

Oil from the transformers containing PCB's has been transported and disposed as part of routine port maintenance activities. Manifests detailing the individual transport and disposal quantities and concentrations are located in facilities/environmental files at the Port.

(response to item #9). A Notification of Dangerous Waste Activities was submitted to EPA by the Port in 1989, describing the disposal of PCB contaminated materials resulting from the cleanup of external transformer surfaces and oils apparently released from transformers at 401 Alexander Avenue. As described in the National Archives Report, and as discussed below in the section regarding the Port's 401 Alexander Avenue stormwater catch basin studies (see item 10), transformers historically were located on the piers immediately adjacent to (and over) the Hylebos at and near the Occidental Site.

(d) The Zidell Dismantling 104(e) response. Between 1960 and 1984, Zidell Dismantling leased the former naval shipyard at 401 Alexander Avenue and operated it as a ship dismantling facility (from 1960 to the mid-1970s), and as a shipbuilding and repair facility (from the mid-1970s until 1984). Zidell dismantled large Navy ships, moored at outfitting Pier #3 on the Hylebos. These ship dismantling activities caused substantial hazardous substance releases to the Occidental Site and to the Hylebos Waterway. The 104(e) response acknowledged that the ships dismantled by Zidell could have contained transformers and PCBs (pp. 5-6). The response discussed the removal of waste oils and sludges from vessels, and related spills (pp. 5-6, 8-9). According to correspondence from the City of Tacoma to WDOE, which referred to waste oil transferred by Zidell to the Taylor Way Properties site on the Hylebos in Segment 4:

The waste oil was pumped from an old aircraft carrier vessel that was to be scrapped by Zidell [sic] Dismantling of Tacoma. This waste oil was to be used for furnace fuel but it contained fire retardant so it would not burn.

March 28, 1990, memorandum from Ron Robinson of the Washington Department of Ecology ("Ecology") to Urban Bay Action Team. This information provides strong indication that Zidell handled waste oils containing PCBs at 401 Alexander Avenue and that such PCB-laden oils from a Navy aircraft carrier were transferred to the Taylor Way Properties site adjacent to Segment 4. Upland shoreline, and Hylebos sediments at that site primarily contain PCBs.

7. Zidell Dismantling documents obtained from Ecology and EPA files

During dismantling operations in the 1960s and early 1970s, Zidell Dismantling salvaged valuable materials, but other materials (including materials acknowledged by the Navy to contain PCBs, such as fluids, insulation, coatings, plastics and other non-metallic materials) (see item 9 below) were often simply dumped onto the ground or in the water. Bilge wastes containing PCB-laden oils and greases were typically released into the waterway, along with any residual oils and fuels in the ship not salvaged prior to dismantling. Such activities are confirmed by contemporaneous reports from Ecology inspections. These documents reflect ongoing problems with oil spills to the Hylebos, and poor practices causing contamination. The waste disposal and oil spills occurred at the Occidental Site, at and immediately adjacent to 401 and 605 Alexander Avenue, causing releases of PCBs, PAHs, metals, phalates, and other chemicals.

8. AK-WA Shipyards documents obtained from Ecology and EPA files

From 1986 to 1997, AK-WA Shipbuilding operated a ship repair and steel fabrication facility located on a portion of 401 Alexander Avenue. The facility included a main building (housing administrative offices and machine, paint, sheet metal, electrical, pipe, steel, carpenter, and rigger shops), a wooden dry dock, and a mooring pier. Wastes typically encountered in this sort of operation include spent abrasive blasting material (copper slag in this case), hydroblasting wastewater (which would likely contain metals), paint and solvents. Stormwater and hydroblasting runoff flowed into the Occidental Site and the Hylebos Waterway. Again, releases of hazardous substances are confirmed by Ecology reports.

These documents reflect ongoing problems causing releases to the Occidental Site and to the Hylebos, such as oil spills, blowing sandblasting grit, NPDES permit violations for various parameters (Oil and Grease, Total Suspended Solids, Total Recoverable Copper, and Total Recoverable Zinc), and diesel fuel. The documents indicate the use of a variety of solvents in AK-WA's work, and concerns expressed by Ecology inspectors regarding handling of solvents.

A 1993 report entitled "Engineering Report for Recycling of Hydroblasting Effluent," indicated that between 1986 and 1992, "wastewater from the hydroblasting operation [at AK-WA] was discharged directly to the Hylebos Waterway without treatment" (p. 6). "The primary contaminants in the untreated effluent [were] heavy metals (up to 41,000 ug/1 Total Recoverable Copper and 13,000 ug/1 Total Recoverable Zinc)" (p. 6). Each ship that was hydroblasted created about 7,000 gallons of wastewater (p.6). In August of 1992, AK-WA installed a treatment plant to treat the hydroblasting effluent before discharge to the City of Tacoma sanitary sewer system (p. 6). However, in January of 1994, "AK-WA reported illegal discharges. . . of approximately 2,430 gallons of [untreated] hydroblasting water" (January 28, 1994 Inspection Report, p. 2).

9. Navy Reports Regarding the Presence of PCBs Throughout Many Materials and Fluids Used in Navy Ships

(a) United States Navy Comments dated August 7, 1991, on the EPA's Advance Notice of Proposed Rulemaking on PCBs. The Navy's comments indicated, inter alia:

From the time of passage of [TSCA] until 1989, the Navy believed that PCBs were to be found primarily in electrical transformers, capacitors, and in hydraulic fluid. . . . In April 1989, during submarine inactivation work, the Navy discovered that a type of wool felt insulating material widely used on Naval vessels contained PCBs in high concentrations (typically 15 percent to 30 percent by weight)

Subsequent to the Navy's April 1989 discovery, extensive shipboard testing has been conducted to determine the extent of PCB use on Naval vessels. In addition to the previously known uses, this testing has shown that many common materials contain PCBs in concentrations above 50 parts per million (ppm). These materials, which in many cases were off-the-shelf, commercial products at the time of purchase, include plastics, paints, small rubber parts, adhesive tape, and insulating materials, such as the insulation in electrical cabling. Additionally, because of the widespread use of PCBs in a variety of applications, many equipment and ship metallic surfaces remain contaminated with PCBs.

As an example of the widespread use of PCBs, Navy surveys since October 1990 on 57 older surface ships and craft have shown that 56 of the vessels contain materials with PCB concentrations greater than 50 ppm, or surface contamination greater than 10 [ppm].

(p. 3). The comments went on to discuss the widespread use of the PCB-contaminated felt in Navy vessels:

The PCB wool felt previously installed in ventilation duct gaskets and other applications poses a considerable dilemma. There is a very large amount of this material on board Naval vessels (on the order of 10,000 gaskets on an aircraft carrier).

(p. 4). Testing has revealed that materials in contact with the PCB felt also become contaminated:

When older vessels are dismantled for purposes of recycling the hull, PCB-containing wool felt is removed and disposed of as PCB waste. The remaining steel hull, however, is contaminated with residual PCBs from contact with the wool felt. The PCB contamination levels found on hull

sections range up to 20,000 ug/100cm² in spots, with much lower levels over most of the hull.

(p. 10).⁴ Obviously, the comments described the disposal of felt and the decontamination of hulls (and scrap metal), only as implemented since 1989, when the Navy first discovered the PCB contamination. The extensive dismantling of ships at the Occidental Site, first by the Navy and then by Zidell, occurred long before the discovery of ubiquitous PCB contamination in Navy vessels. Given the photographic and documented evidence of waste disposal practices by the Navy and by Zidell, such dismantling activities must have released very significant volumes of PCBs and PCB-impregnated wastes to the Occidental Site.

The Navy comments also went on to discuss other sources of PCB contamination on ships:

One example is electrical cabling which contains PCBs at fairly low concentrations in the solid plastic insulating material around the wires. The PCB concentration in this electrical cabling is normally less than 500 ppm taking the plastic insulating material as the "whole," and less than 50 ppm taking the cable as the "whole."

(p. 6). As might be expected by the qualification that the cabling "normally" does not exceed 500 ppm, the comments acknowledged that levels greater than 500 ppm had been detected (pp. 6-7).

The comments only briefly expanded upon the fact that PCBs have been detected in paints used by the Navy. Such contamination was described in hull paints (p. 11) and in "mine cable coated with a solid anti-fouling compound containing both PCBs and mercury" (p. 19). The presence of PCBs in anti-fouling paints particularly implicates the hull maintenance work performed at the post-war Naval Station and by AK-WA Shipbuilding—the removal of hull paints undoubtedly contaminated the Occidental Site with PCBs and metals.

The testing results described in the Navy comments are corroborated by information contained in a reported legal case involving PCB contamination in an aircraft carrier originally commissioned in 1943. USS CABOT/DEDALO Museum Foundation, et al. v.

⁴ The Navy comments demonstrated the enormity of PCB contamination encountered in dismantling ships. The comments indicated that "during the dismantlement of the ex-USS SCAMP at Puget Sound Naval Shipyard [in Bremerton, Washington], PCB decontamination of hull steel to a level of 10 ug/100cm², in accordance with EPA Region X guidance, resulted in several thousand worker-days of contact with PCBs and volatile solvents." (p. 11). The PCB contamination was so widespread in the vessel that the decontamination effort "generated 174, 55-gallon drums of PCB/hazardous waste. . ." (Id.). In submitting these comments to EPA, the Navy evidently was holding out this situation as typical of the Navy fleet as a whole.

United States Customs Service, et al., Civil Action No. 94-2277, 1995 U.S. Dist. Lexis 4068; 41 ERC (BNA) 1020 (E.D. La. 1995). In testing of various components of the ship, "most of the samples tested by the EPA contained PCBs far above 50 ppm—one of the highest levels being 122,000 ppm." Id. at 4.⁵ Those samples included electrical cable components "(i.e., paint, paper, plastic, black material around copper wire, copper wire casing, black outer covering (casing), grey outer covering, gummy materials, plastic wrap, etc.)." Id. Paint samples from electrical cables contained PCBs as high as 605 ppm. Id. at 7. An oil spill on a floor was analyzed to have a PCB content of 275 ppm. Id. at 5.

(b) United States Navy Correspondence and "Compliance Plan Respecting PCBs Aboard Naval Vessels" dated April 1, 1991. This Navy correspondence and PCB Compliance Plan indicates that the PCB-impregnated wool felt discussed above was used in a number of applications, including as acoustical dampening material in submarines, gasket materials in the joints of ventilation ducts, insulating material between dissimilar metals "on all ships," and as machinery mount insulation (Compliance Plan, p. 2). The Navy's concern with its PCB-impregnated wool felt was not limited to the disposal of the felt itself. In the Compliance Plan, the Navy states that:

When felt is removed from ventilation duct work or other sites, the adjacent area formerly in contact with it contains residual PCBs from the felt which itself contains PCBs at a concentration greater than 50 ppm.

Id. at p. 3.

In addition to the contamination problem caused by PCB-impregnated wool felt, the Navy's acute concern with pending PCB regulations also had its genesis in the large amount of PCB-containing electrical cabling found aboard its ships. In 1990, the Navy "discovered that, in many instances, the jackets insulating wire cables on Navy vessels contain PCBs in concentrations greater than 50 ppm" (Compliance Plan, p. 3).

(c) United States Navy Comments dated April 17, 1995, on the Proposed Rule for Disposal of PCBs. This document contains additional portions of the Navy comments. It is noteworthy that the Navy filed more pages of comments than any other entity to the proposed rule on PCB disposal at issue. The Navy's 919 page submission (the first 29 pages of which are in this document) dwarfed other submissions, and concluded that "the proposed rule will have significant impacts on Navy vessels, facilities and operations . . .," and that "the comprehensive controls proposed by EPA will impact nearly every shipboard maintenance action and add significant costs." These Navy

⁵ The page numbers cited here coincide with the page numbers on the printout, rather than the "Lexis page numbers."

concerns about PCBs arose after decades of Navy ship construction, maintenance, and dismantling at the Occidental Site.

10. EPA Guidelines Regarding Hazardous Substances Released by Shipyards

EPA's December 1979 "Development Document for Proposed Effluent Limitations Guidelines and Standards for the Shipbuilding and Repair Point Source Category" provides general information regarding the types of contamination, discharges, and wastes generated by shipbuilding and repair operations (enclosed in Volume XV). These include spray paints and spent paints removed from hulls (containing "compounds of copper, zinc, chromium, tin and lead, as well as organotin compounds") (pp. 1, 26-29, 48-49), toxics in antifouling paints (pp. 26-31, 49), solid wastes (such as industrial scrap, insulation, welding rods, etc.) (pp. 5, 51), oil/grease/fuel spills (pp. 6, 50), paint and solvent spills (pp. 6, 49), abrasive blasting debris (pp. 6, 22-27, 48-49), tank and bilge cleaning wastes (pp. 22, 48, 51), and ship wastewater discharges (pp. 41-48). This report was prepared ten years before the Navy discovered extensive PCB contamination in its vessels and their components, as discussed above in item 9.

11. PCB and Metals Detected at 401 Alexander Avenue, in the Stormwater Sewers Discharging to the Hylebos Waterway

The source materials contain a compilation of materials regarding PCBs and metals actually detected at 401 Alexander Avenue in the Occidental Site. These include data reports, maps, and photographs showing the transformer stations from which PCBs likely were released. As discussed above in item 8, PCBs also were present in the ship materials used during ship construction and in the ship components demolished at the Occidental Site.

The reports generated during the sampling of the stormwater catch basins at 401 Alexander Avenue provide data regarding the contamination resulting from flows discharging to the Occidental Site and the Hylebos Waterway. Contaminants detected included PCBs, lead, arsenic, mercury, copper, and zinc. According to historical site data, PCBs were detected in the 401 Alexander Avenue storm sewers in 1994-95 after the sewer system was cleaned twice. The sampling was performed to assess the cleaning process. While pre-cleaning data (if any) have not been located, the post-cleaning data showed PCB concentrations as high as 2,050 ppb remained in the sewers even after the second cleaning. The storm sewers discharge to the 401 Alexander Avenue intertidal area via several outfalls. The upland storm sewer catch basins drain the transformer bank area at 401 Alexander Avenue, and feed the sewer line that empties onto the shoreline sampling area where PCBs were detected by the Hylebos Cleanup Committee at 24,000 ppb. The data, maps, diagrams and photographs demonstrate that past operations related to ship construction, maintenance, and

demolition, as well as transformer releases, were significant contributors of PCBs to the Occidental Site.

12. U.S. Navy/Ship Dismantling—Environmental Problems Reported by The Baltimore Sun (Sites that Looked Like One Of "Dante's Levels of Hell")

In December of 1997, the Baltimore Sun newspaper published a series of articles regarding the environmental, health, and safety problems associated with the dismantling of U.S. Navy ships. The complete series is compiled in the source materials (as printed from the Sun's website, and in a reprint; citations below are to the website print-outs) (see the pictures in the reprint). Each article focused upon a different aspect of those problems:

- "The Shipbreakers: Scrapping ships, sacrificing men" focused upon ship salvage operations, such as those that occurred at the Occidental Site ("As the Navy sells off obsolete warships at the end of the Cold War, a little-known industry has grown in America's depressed ports. And where the shipbreaking industry goes, pollution and injured workers are left in its wake.") The article recounted some specific examples of the many hazardous substances related during ship dismantling: (a) PCBs ("PCBs . . . are in everything from electrical insulation to ventilation gaskets to fluorescent lights.") (p. 5 of 12) (this echoes the Navy's own PCB rulemaking admissions to EPA, discussed above as item 8); (b) lead ("A scrapyards along the Northeast Cape Fear River in Wilmington, N.C., was contaminated by asbestos, oil and lead. 'That site looked like one of Dante's levels of hell,' says David Heeter, a North Carolina assistant attorney general.") (p. 2 of 12) (emphasis provided) ("Lead-based paint covers the hull plates.") (p. 5 of 12); and (c) chromates ("Toxic chromates slosh around in ballast tanks.") (p. 5 of 12).
- "The Scrapping" article also recounted the Navy's failure to ensure compliance with environmental laws in its arrangements for disposal of its ships: "The Defense Department has repeatedly sent ships to scrappers who have records of bankruptcies, fraud, payoffs to government inspectors, and environmental and safety violations. The Navy and Defense Department make no serious effort to oversee the scrapping, even though the Navy retains ownership of the vessels. Until recently, only one inspector with little training and experience kept watch on scrapping operations for the entire country." (p. 3 of 12).
- "The Curious Captains of a Reckless Industry," a follow-up article, expanded upon the Navy's lack of care: "The negligence at the scrapyards has been abetted by the Navy's and Defense Department's lack of vigilance. There is virtually no meaningful monitoring of the shipbreaking industry. Prosecutors and regulators

from a disjointed network of agencies, sometimes have stumbled upon violations at individual scrapyards, but the Defense Department agency that administers the scrapping program has done little to address its failings." (p. 2 of 12).

- The "Curious Captains" article also contains some revealing information about post-World War II and 1970s ship dismantling (the time frames for such activities at the Occidental Site): "Right after World War II, shipyards around the country . . . scrapped a huge number of surplus ships. In the 1970's, [an opportunistic shipbreaker] realized that another wave of ships . . . was reaching retirement age." (p. 6 of 12). Indeed, the Navy has acknowledged that it "may have" scrapped ships between 1946 and 1960, at the Naval Station Tacoma at the Occidental Site. However, it is curious that, having expressed some uncertainty about those events, the Navy indicated very precisely that such dismantling would have occurred at a particular pier adjacent to 401 and 605 Alexander Avenue at the Occidental Site. Navy 104(e) response to EPA (November 1989), p. 7 (Volume X). It has been established that the Navy arranged for the disposal of its obsolete ships at that same location at the Occidental Site, via Zidell Dismantling in the 1960s and 1970s.
- An article entitled "A Third World Dump for America's Ships?" focused upon the Navy's plan to export ships for dismantling in other countries: "With its American scrapping program entangled in environmental and worker safety problems, criminal charges, bankruptcies and lawsuits, the Navy has decided to drop its old policy. To escape the turmoil in its domestic program, it could simply export its obsolete ships, laden with asbestos, PCBs, lead, toxic sludge and other hazards to South Asia." (p. 2 of 16). The article explained that the Navy plan was temporarily halted by the EPA "PCB export ban," but that a compromise was reached: "Overseas sales of U.S. warships became possible [during the summer of 1997] after [EPA] gave the Navy an exemption from rules banning the export of ships containing PCBs. . . .They were widely used in electric insulators until the 1970s. . . .The export agreement requires the Navy to remove the most hazardous PCBs, those in liquid form. Most others, though used in thousands of ship parts, can remain." (p. 11 of 16).
- A subsequent article, "Broadsides Fired at Navy's Ship-scrapping Program," indicated that on December 18, 1997, "[t]he Navy's troubled ship-scrapping program and its plan to sell warships abroad came under attack. . . from members of Congress and several environmental organizations." (p. 1 of 4). The article described the intention of Representative Gilchrest of Maryland to hold hearings in the U.S. House Coast Guard and Maritime Transportation Subcommittee, to "look into the environmental, health and safety problems linked to the transient shipbreaking industry." (p. 1 of 4).

13. Congressional Hearings Regarding Navy Ship Dismantling Problems

In 1998, Congress did hold hearings regarding the Navy's troubled ship dismantling program. A summary of the hearings from the House of Representatives website is included in the source materials. The summary described the Navy's scrapping procedures ("Typically, a ship scrapping company buys the rights to scrap the government ship. . .," and thus the Navy retains ownership during its disposal.). The summary also summarized events involving the EPA "PCB export ban" and specific instances of environmental problems.

14. Interagency Panel on Ship Scrapping

EPA and the Department of Defense formed an "interagency panel on ship scrapping," as a result of the PCB rulemaking proceedings, the EPA "PCB export ban," and the environmental problems caused by ship dismantling. According to the March 13, 1998, BNA Environment Reporter, the panel held public hearings regarding "the U.S. military's responsibility for worker safety and environmental protection. . . ." The panel, created in December of 1997, focused upon the PCB problem in Navy ships, and was preparing "a report . . . on military and contractor practices at shipyards where vessels are dismantled and sold for scrap." A summary of the panel's activities, obtained from a pertinent website, is included in the source materials.

15. Other Navy Facilities Where PCBs, PAHs, Metals and Other Chemicals Were Released--Puget Sound's Manchester Annex Navy Landfill

The Manchester Annex Superfund Site was used by the Puget Sound Naval Station at Bremerton, Washington for shipyard waste disposal during World War II, and shortly thereafter. The "Landfill Area" is one distinct component of that site. The Site's Record of Decision ("ROD") is included in the source materials. According to the ROD (p. 3), "the majority of the landfilling appears to have occurred between 1946 and 1955. . . . The bulk of the waste included building demolition debris and burnable garbage from the [shipyard], along with scrap metals, steel, old submarine nets, and other debris." As such, the Manchester Annex Site is remarkably similar (in content, time frame, and location) to the Navy/Todd Dump created by the Navy/Todd shipyard at the Occidental Site on the "North Ten Acres" of 605 Alexander Avenue. The data from the Manchester Annex Landfill Area also are remarkably similar to the Navy/Todd Dump in the chemicals that have been detected.

The Manchester Annex ROD's data summary indicates that elevated concentrations of PCBs, dioxins/furans, numerous metals (e.g., antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc, VOC/SVOCs, and PAHs) have been detected in the Landfill area. ROD, Table 2, pp. 49-50. PCBs were detected in 19 of 27 samples, and the maximum concentration was 8,900 ppb. *Id.* "Roughly half of the landfill soil

samples analyzed by [TCLP] exceeded lead toxicity criteria." Id. at p. 9. That landfill extends into the intertidal zone of Puget Sound's Clam Bay. "Erosion of landfill waste materials in the intertidal area. . . , due to tidal action, represents a continuing source of contaminants, primarily metals, PCBs, and dioxins/furans, to the marine environment." Id. The data also indicate exceedances of pesticides (DDD, DDE, and DDT), demonstrating the Navy's use of those substances.

16. Other Navy Facilities Where PCBs, PAHs, Metals and Other Chemicals Were Released – Norfolk Naval Shipyard

In addition to the sites described by The Baltimore Sun articles, other news reports have highlighted the PCB problems encountered at other Naval shipyards. For example, The Virginian-Pilot (Norfolk) reported in an article entitled "EPA: Naval Yard One of Nation's Most Toxic Sites" that the Norfolk Naval Shipyard was proposed for Superfund listing. The chemicals released from the shipyard include PCBs, VOCs, pesticides, and metals. Contaminated areas include "[s]everal landfills. . . including a sanitary landfill used for salvage waste, blasting grit, ash, residential trash, and sludge from the industrial waste water treatment plant. . . ." The article also described "a solvent disposal area." Another landfill "was used for disposal of wastes generated from drydock operations, including blasting grit, paint residues, solvents, and other residues." The article indicated that the Norfolk Naval Shipyard would be the third Navy facility (and fifth military base) in the area to be listed as a Superfund site.

17. Department of Ecology Complaints about Navy Fuel and Oil Spills in Puget Sound

In the recent past, Ecology has been very vocal in its complaints about Navy fuel and oil spills. In August of 1996, Ecology issued a news release highlighting "an ongoing problem with fuel spills from naval vessels in Puget Sound." While the complaints seemed to focus upon the Bremerton naval station, the Ecology concerns were expressed about general Navy operations. "[Ecology's] concern is that naval vessels have significant spill on a regular basis and don't show any signs of improvement." Golob's Oil Pollution Bulletin (September 9, 1996). A Tacoma News Tribune article expanded upon the numerous pertinent spill incidents and resulting penalties. In April of 1997, Ecology issued a report entitled "Oil Spills in Washington State: A Historical Analysis" that again recounted frequent, ongoing problems with Navy vessels and facilities.

Although the Hylebos Waterway and the operations historically located at the Occidental Site were not specifically mentioned in these Ecology materials, this information is relevant to the Occidental Site in that it demonstrates the Navy to be a chronic source of fuel and oil releases to the Puget Sound marine environment, in an era of environmental regulation and agency scrutiny. The Navy engaged in Occidental Site

activities from approximately 1917 to the 1980s, and has operated in the Hylebos Waterway from approximately 1917 to the present, certainly causing nearly continuous discharges during the years when naval ships occupied almost the entire Mouth area and most significantly impacted the Occidental Site. That time period (1941 to 1960) pre-dated the enactment and enforcement of most environmental laws.