CB NT file
1.8.S.S.1
9/02/99

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
1200 Sixth Avenue
Seattle, Washington 98101

September 2, 1999

Reply to
Attn of: ECL-111

Paul Fuglevand
Dalton, Olmsted and Fuglevand
11711 Northcreek Parkway S., Suite D101
Bothell, Washington 98011

RE: Source Control Section; Pre-Remedial Design Evaluation Report

Dear Mr. Fuglevand:

In my September 2, 1999 letter regarding comments to the Hylebos Cleanup Committee's Pre-Remedial Design Evaluation Report, I indicated I would send comments on the source control section of the report under separate cover. Those comments are enclosed.

I have also attached Ecology's draft Milestone 3 and 4 reports for Head of Hylebos Waterway for your information in finalizing the report. Feel free to use information from these draft reports in finalizing the source control section, and to cite them in your report. However, please do not distribute these drafts too widely, as we hope to be distributing the final reports soon.

Feel free to call me at 553-2140 if you have any questions.

Sincerely,

Allison Hiltner
Remedial Project Manager

cc: Kris Flint, EPA
Dave Smith, Ecology

USEPA SF
1382378

Printed on Recycled Paper

Section 2.1 Source Control
Hylebos Waterway Pre-Remedial Design Evaluation Report

1st paragraph: Delete last sentence.

Delete last paragraph in this section and replace with the following:

*"As of July 1999 source control is complete for the nine major sources and 16 of the 19 remaining other sources around the waterway. EPA and Ecology have also conducted an assessment of recontamination potential from surface water and groundwater pathways for potential sources at the head of the Hylebos Waterway and will conduct a similar assessment for sources at the mouth of the Hylebos Waterway. Table 2.1 from the 1998 Striplin report has been updated to show the current status of these potential sources."*

Note: I have attached a copy of the DRAFT Milestone 3 and 4 source control status reports for the head of the Hylebos Waterway. (Note that there will be several attachments to the final version that I have not included here.) Feel free to cite these as references - our goal is to finalize these before the final PRDE report is issued.

Revised Table 2.1

| Adjacent Property Owner | Station | Report Section[1] | Indicator Compounds[2] | Possible Source Needing Investigation[1] | Current Status[3] |
|---|---|---|---|---|---|
| **SEGMENT 1** | | | | | |
| Subtidal | 1104(s) | 6 | PAH | surface sediment, stormwater | To be addressed in RA for sediments. Stormwater source control addressed by NPDES permits. |
| Manke Lumber | 1213I | 9 | arsenic | bank soils | Being addressed as part of WDG Cleanup Action Plan and Operations, Maintenance & Monitoring Plan (OM&MP) (for stormwater control & treatment) under Agreed Order with Ecology. |
| J & G Corp | 1212I | 9 | copper, TBT, dimethyl phthalate | bank & upland soils | Contaminated upland soils removed in 1997as part of prospective purchaser agreement. Bank soils to be addressed in sediment RA. |
| (former) Tacoma Boat | 1216I, 1217I | 4, 9 | metals, fluoranthene, TBT | bank & upland soils, stormwater | Addressed in 1998 as part of prospective purchaser agreement with EPA and Ecology. |
| Weyerhaueser, Manke, Louisiana Pacific | upper turning basin | 8 | wood waste | debris from log rafting & handling | Addressed as part of WDG Cleanup Action Plan - including removal of whole logs (phase 1), and smaller wood debris (phase 2). OM&MP has additional monitoring for deposition of logs/debris as part of source control. |
| **SEGMENT 2** | | | | | |
| USG | 2201SM, 2202I | 9 | metals, PAH | bank soils & anthropogenic material | Contaminated bank soils and anthropogenic material removed in 1997 - 1998 under MTCA Consent Decree. |
| Elf Atochem | SSS06I, 2203SM | 5,7,9 | PCBs, DDTs | anthropogenic material | To be addressed as part of sediment RA. |
| General Metals | 2211I, 2212I | 5 | PCBs | bank soils | Contaminated soils capped in 1998 under removal order with EPA. |
| **SEGMENT 3** | | | | | |
| Oline | 3214I, 3218SM | 5 | PCBs | bank & upland soils | Contaminated soils, source materials, and bank sediments removed in 1998 under MTCA Consent Decree. |
| **SEGMENT 4** | | | | | |
| Subtidal Stn. | 4101S | 6 | PAHs | surface sediment & stormwater | Contaminated sediments to be addressed (through natural recovery) as part of sediment RA. |

| Adjacent Property Owner | Station | Report Section[1] | Indicator Compounds[2] | Possible Source Needing Investigation[1] | Current Status[3] |
|---|---|---|---|---|---|
| Simon & Sons | 4206I | 9 | BEP | bank soils | Contaminated bank soils to be addressed as part of MTCA Consent Decree with Ecology. |
| Taylor Way Properties | 4205I | 5 | PCBs | bank soils | Upland soils to be addressed under an Agreed Order with Ecology. Bank sediments to be addressed as part of sediment RA. |
| Sound Refining | 3221I, 4207I | 9 | metals | bank soils | Contaminated bank sediments to be addressed as part of sediment RA. |
| **SEGMENT 5** | | | | | |
| PoT/USN & Marine Corps | 5212I | 9 | ethylbenzene | bank soils | Contamianted bank sediments to be addressed as part of sediment RA, or under an order with Ecology. |
| TPCHD Outfall #5 | IHS-14A | 4 | arsenic, zinc | stormwater | Contaminated sediments to be addressed (through natural recovery) as part of sediment RA. |
| (former) PRI NW | 5210SM | 7,9 | chlorinated organics, PAHs, mercury, lead | bank soils | Being addressed under separate CERCLA removal order for bank & subtidal cleanup. |
| Occidental Chemical | 5205I-5209I | 5,7,9 | chlorinated organics, PCBs, metals, PAHs | bank soils | Being addressed under separate CERCLA removal order for bank & subtidal cleanup. |
| AK-WA, former PoT | 5201I-5203(, 5215I, PIY-1SM | 4,5,9 | PCBs, PAHs, metals, organics | bank soils, wastewater & stormwater | AK-WA no longer in business at this location. Contaminated bank sediments to be addressed as part of sediment RA. |

1 Striplin 1998 references sections of the Hylebos Waterway Pre-RD Recontamination Report (Striplin 1998) where specific sources are discussed. Although the Striplin report was finalized in 1998, the column labeled "Possible Source Needing Investigation" was initially written in 1996. Many of the possible sources have been addressed since then.

2 Indicator compounds for further investigation of the potential for recontamination are either chemicals or chemical groups in intertidal sediments that exceed the SQO (for properties discussed in Section 9; SEA 1999) or chemicals at properties discussed in Sections 4 thought 8 in SEA (1998).

3 August 1999 draft Milestone 3 and 4 reports for Head of Hylebos Waterway (Ecology, 1999), and Hiltner - comments from EPA & Ecology re draft Hylebos Waterway Pre-Remedial Design Evaluation Report - Revised Agency Review Draft (Striplin, 1999).

(NOTE: I left out "reason for further investigation" to save space – this does not mean you should delete it from your table)

8/99 draft



**DRAFT**

Source Control Status Report for Major Sources to the Head of Hylebos Waterway Problem Area

Milestone 3: Source Control Remedial Action Implemented for Major Sources

Introduction

This Milestone 3 report identifies: (1) actions implemented to control **major** sources of problem chemicals to the Head of Hylebos Waterway Problem Area, and (2) information demonstrating that source control is complete for those sources. Major sources are those that have been identified as such in the Commencement Bay Nearshore/Tideflats Record of Decision and the Integrated Action Plan. Major sources are also listed in the Milestone 1 Source Control Status Reports for each problem area. Control of the major sources is important because these sources are most directly linked with current sediment impacts.

Source control actions are those physical changes (e.g., construction, soil removal) that represent elimination and/or reduction, to the extent practicable, of those contaminant sources that are most directly linked to existing sediment impacts. These actions eliminate or reduce to the extent practicable, all known sources of problem chemicals that could potentially contaminate sediments.

This Milestone Report does not address all intertidal areas (from 0-12 feet MLLW) that are potential sources of contamination to the waterway. Depending on the type and extent of contaminants in the bank areas, these areas have been addressed under Ecology's source control actions or will be addressed as part of sediment cleanup. This determination is made jointly by EPA and Ecology on a case-specific basis. Where intertidal cleanup has occurred under an Ecology order or Consent Decree, the cleanup is described in this report.

Other Source Control Milestone Reports for the Head of Hylebos Waterway Problem Area

The Milestone 1 Report (submitted to EPA May 4, 1993) identified all potential and confirmed ongoing sources of problem chemicals to the Head of Hylebos Waterway Problem Area. The Milestone 1 Report listed nine major sources:

Kaiser Aluminum (metal fabricator),
Elf Atochem 3009 Taylor Way (inactive log sort yard),
Elf Atochem 2901 Taylor Way (manufactured chlorine-based chemicals),
General Metals (metal scrap yard),
Wasser Winters (inactive log sort yard),
Louisiana Pacific (operating log sort yard),
Tacoma Boat (large shipyard),
B&L Landfill (drains to Hylebos Creek), and
Blair Backup Property (inactive log sort yard).

The Milestone 1 report listed eight other confirmed sources. Administrative actions are in place to control these sources, and those actions are described in a Milestone 4 Report for the Head of Hylebos Problem Area, submitted to EPA concurrently with this report.

Ecology submitted the Milestone 2 Report for the Head of Hylebos Waterway Problem Area to EPA May 19, 1993. The Milestone 2 Report described administrative actions in place to control the major sources.

Milestone 5 is achieved when source control is complete for all ongoing confirmed sources.

Source Control Remedial Actions Implemented for Major Sources

1. Elf Atochem at 3009 Taylor Way (MTCA Consent Decree)

Description of Site and Contamination

Elf Atochem's property at 3009 Taylor Way was used as a log sort yard from 1964 until 1986. In 1983-1984, Ecology sampled runoff from the 3009 Taylor Way site and concluded that it was a source of seven problem chemicals to the Head of Hylebos Waterway Problem Area: arsenic, copper, lead, zinc, antimony, phenol, and 4-methylphenol (Norton and Johnson, 1984).

During normal log sort yard operations, wood waste (principally bark) was produced by loading and unloading logs within the yard. Various materials, including ASARCO slag, were brought in as ballast to help stabilize the natural soils in areas of heavy vehicular traffic.

Ecology believes that the phenol and 4-methylphenol originated from the biological decomposition of wood waste, and that the metals are leached out of the ASARCO slag by the acidic conditions attributed to biological decomposition products of the wood waste. The mechanical grinding of the slag by truck traffic pulverized it, creating smaller particles that increased the surface area available to leach metals. Further investigations conducted by Pennwalt (now Elf Atochem) showed that the pathway of greatest concern was surface water runoff, although ground water also showed some limited contamination as well (ENSR, 1989).

Source Control Actions

In June 1987, Ecology and Pennwalt (now Elf Atochem) signed a Consent Decree (#872-01198-1) to provide a framework for a remedial investigation and a feasibility study (alternative cleanup options). Ecology approved Atochem's remedial investigation report and feasibility study in 1991 (ENSR, 1989; ENSR, 1991). In December 1991, Ecology issued a Cleanup Action Plan, and in December 1992, a MTCA Consent Decree (# 92-2-11351-7) was signed by Ecology and four Potentially Liable Parties requiring those parties to implement the Cleanup Action Plan. Groundwater cleanup objectives were set at 0.04 ppm for arsenic, 0.01

ppm for copper and lead (practical quantification limit), 0.10 ppm for zinc, and 5.8 ppm for phenol (practical quantification limit). No standards were set for stormwater, but annual monitoring was required to determine if an NPDES permit would be needed (none was required).

The Cleanup Action Plan required the following activities to be conducted:

1. consolidate and cap slag and contaminated wood waste and soil with a 100-mil geotextile liner;

2. dispose of uncontaminated metal debris at a nearby construction waste landfill;

3. fence off woodwaste and slag pile to restrict access;

4. grade the site to divert all surface water runoff to a single discharge point for post-cleanup monitoring of the runoff;

5. plant the site (including the capped areas), with grass to minimize erosion;

6. monitor ground water quarterly for arsenic, copper, lead, zinc, and phenol from four wells (one on each side of the containment cell) at a depth of 15 feet;

7. monitor surface water every two years for arsenic, copper, lead, zinc, and phenol from the outfall draining the ditch bordering the Pennite plant site.

In addition, the future use of the site is restricted to industrial applications.

Steps 1-5 were completed by October 1992, and steps 6-7 (post-cleanup monitoring) is ongoing.

Source Control Effectiveness

Groundwater monitoring results for the well located adjacent to the waterway have shown no exceedances of the cleanup standards since 1995, although the practical quantification limit that could be achieved for copper was 0.025 ppm instead of 0.01 ppm. Attachment 1 has the raw data (Boateng, 1995-1997).

Metals concentrations in stormwater from the three most recent sampling events (1993, 1995 and 1997) are summarized below:

Concentrations were as follows (Boateng, 1995-1997):

| Problem Chemical | Date Sample was Collected | Concentration (ppb) | Marine Chronic Water Quality Criteria (ppb) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Arsenic | 12/9/93 | 16, 16 (duplicate) | 36 |
| | 11/10/95 | 17 | |
| | 3/19/97 | 22, 22 (duplicate) | |
| Copper | 12/9/93 | 58, 22 (duplicate) | 3.1 |
| | 11/10/95 | not detected (PQL is 25) | |
| | 3/19/97 | not detected (PQL is 25) | |
| Lead | 12/9/93 | 13, 8 (duplicate) | 8.1 |
| | 11/10/95 | not detected (PQL is 2) | |
| | 3/19/97 | not detected (PQL is 1) | |
| Zinc | 12/9/93 | 41, 42 (duplicate) | 81 |
| | 11/10/95 | 50 | |
| | 3/19/97 | not detected (PQL is 20) | |

EPA conducted analyses of the potential for groundwater and stormwater to contaminate sediments and provided their findings in two reports that are appended to this Milestone Report. For Elf Atochem 3009 Taylor Way, the existing information suggests no potential for groundwater to contaminate sediments, and no potential for stormwater to contaminate sediments. This site is no longer considered a source of problem chemicals to Hylebos Waterway sediments.

2. Elf Atochem at 2901 Taylor Way (MTCA Consent Decree)

Description of Site and Contamination

Elf Atochem manufactured chlorine-based chemicals until 1997. Currently its only operations consist of transloading chlorate (no production). From the 1940s to the 1970s the company's predecessor (Pennwalt) also manufactured arsenic-based pesticides. By 1987 the facility had accumulated many environmental problems. One of those problems, the historic on-site burial of arsenic-based sludges, resulted in subsurface seepage of arsenic to the Head of Hylebos Waterway Problem Area. Some of the contaminated ground water flowed to the waterway via underground drain lines (no connection to surface), so the lines were plugged in 1985.

Further work conducted during Atochem's remedial investigation (ICF 1990) showed that arsenic was seeping into the waterway at a rate of about 14.5 lbs/day, and that it was bound in a very alkaline matrix, which created major challenges for treatment. The investigation also discovered two localized plumes of volatile organics: (1) within the arsenic plume where the "7E" wells are located, and (2) a separate small area far north of the arsenic plume where the "3A" wells are

located (see map, Attachment 2). The "7E" plume includes one Head of Hylebos problem chemical: tetrachloroethene. Concentrations exceed the human health Water Quality Standard of 8.85 ppb (based on consumption of organisms). The "3A" plume does not include Head of Hylebos problem chemicals (only chloroform, which is not a problem chemical).

NOTE: In 1996, Elf Atochem discovered a third plume of volatile organics where the "3C" wells are located (see Attachment 2). This plume contains tetrachloroethene, a Head of Hylebos problem chemical, but the plume does not extend to Hylebos Waterway. A separate treatment system was built in 1996 to treat the groundwater, and the effluent is discharged to the sanitary sewer.

Source Control Actions

In June of 1987, Elf Atochem and Ecology signed a Water Quality (90.48) Consent Decree (# 87-2-01199-0) requiring Elf Atochem to conduct a remedial investigation, write a feasibility study describing alternative cleanup options, and implement Ecology's preferred option. In 1991, Ecology approved Atochem's remedial investigation report and feasibility study (ICF Technology, Inc., 1990). The results of the investigation are described above. The preferred cleanup option chosen by Ecology was as follows:

1. excavate 1,300 tons of arsenic sludge and haul it to the hazardous waste facility at Arlington, Oregon;

2. install a sheet pile barrier wall 600 feet long by 30 feet deep adjacent to the shoreline as an interim measure to slow the flow of ground water into the waterway;

3. install a ground water extraction and treatment system capable of removing arsenic in its highly alkaline matrix and chlorinated organics; and

4. route waste water from the plant, stormwater from the site, and effluent from the groundwater treatment system through a single outfall with a multi-port diffuser.

Consent Decree (# 92-2-01756-1) was signed in June 1992, which contained a compliance schedule to construct the outfall/diffuser by November 1993.

No cleanup standards were established for groundwater. Instead, Elf Atochem was required to demonstrate that hydrogeologic containment had been achieved (no flow of arsenic-contaminated groundwater to the waterway). In 1992, Ecology approved Atochem's post-cleanup groundwater monitoring plan (ICF, 1992). The plan requires Atochem to monitor water levels and dissolved metals from 32 shallow aquifer wells, 22 intermediate aquifer wells, and one deep well triannually (monthly before 1996) to determine the extent to which the plume is hydraulically contained. Head of Hylebos problem chemicals monitored include arsenic, copper, zinc, nickel, and antimony.

Atochem is also required to monitor volatile organic compounds (VOC's) from nine shallow wells, seven intermediate wells, and two deep wells triannually (monthly before 1996). Head of Hylebos problem chemicals monitored include tetrachloroethene, chlorinated benzenes, xylene, and ethylbenzene.

Ecology issued Atochem an NPDES permit (# WA-000311-5) for the discharge of treated groundwater, stormwater, process wastewater, and cooling water. It was renewed in January 1998. Shortly after the permit was renewed, Atochem decided to route the waste water from the treatment plant to the sanitary sewer (permission received from the City of Tacoma). This left the outfall discharging only stormwater and cooling water.

The latest NPDES permit includes effluent limits for two Head of Hylebos problem chemicals at the outfall: arsenic and antimony. Both the average monthly and maximum daily limit for arsenic is 10 ppb. The average monthly limit for antimony is 8.1 ppb (no maximum daily limit). There are no limits for volatile organics at the outfall. However, as indicated above, the only waste streams discharged are cooling waters and stormwater, neither of which would be expected to contain volatile organics. The permit also requires that Elf Atochem prepare an updated solid waste control plan (done), acute and chronic effluent toxicity characterization reports (due August 30, 2000), an updated treatment system operating plan (done), and an updated spill plan (done).

By March 1993, steps 1-4 listed above were completed. Post-cleanup monitoring is ongoing.

Source Control Effectiveness

Data used to evaluate hydraulic containment includes concentrations of arsenic in the wells located at the ends of the sheet pile barrier, pumping rates, and groundwater pH data (an indicator of net flow direction). These data are provided in Attachment 2 (from most recent triannual report (DE&S, 1997)).

In 1995 and 1996 Elf Atochem installed new pumping wells in the intermediate aquifer and added 94 feet of sheet pile barrier. At this time, Ecology believes that hydraulic containment has been achieved for both the shallow and intermediate aquifers.

The NPDES permit requirements have been met and no permit limit exceedances have been observed with regard to problem chemicals. However, the practical quantification limit for arsenic (50 ppb) has routinely been above the permit limit (10 ppb).

EPA conducted analyses of the potential for groundwater and stormwater to contaminate sediments and provided their findings in two reports that are appended to this Milestone Report. For Elf Atochem 2901 Taylor Way, the existing information suggests no potential for groundwater to contaminate sediments (because the groundwater gradient is landward), and no

potential for stormwater to contaminate sediments. This site is no longer considered a source of problem chemicals to Hylebos Waterway sediments.

3. General Metals (1902 Marine View Drive; MTCA Consent Decree; NPDES Permit)

Description of Site and Contamination

This industrially zoned, 26-acre site was part of the tideflats until it was filled in 1965. During the period from 1965 to 1981, the site was used to stage logs and load timber for export. It was also used for recycling ferrous and nonferrous metals. Since 1981, the facility has been operated exclusively for ferrous scrap metal recycling. Operations primarily involve the purchase, preparation, processing, storage and shipment of ferrous scrap. The facility annually processes and recycles in excess of 300,000 gross tons of scrap metal.

Ecology inspected the facility on December 18, 1986. Samples of surface water runoff were collected and analyzed. Based on the results of this inspection, Ecology determined that a more detailed investigation was needed, From July 1988 to August 1989, General Metals submitted site investigation reports to Ecology (Street-Edwards/Emcon, Inc., 1988; Street Edwards/Emcon, Inc., 1989). Data in these reports showed that the surface soil contained elevated levels of PCBs, arsenic, copper, lead, and zinc. Surface runoff contamination was found to exist site-wide in varying concentrations for PCBs, copper, lead, and zinc. Concentrations of total copper, lead, zinc, and PCBs in surface runoff averaged about three orders of magnitude higher than chronic water quality criteria. The quality of ground water 10.5 feet deep was much better than surface runoff, but metals and PCBs were still above marine acute water quality criteria in several ground water samples. In addition, pentachlorophenol was found above marine acute water quality criteria in some ground water samples.

Source Control Actions

Three administrative actions were taken from 1987-1989: an Ecology order in 1987 (# DE 87-5185), an amended order in 1988, and a stipulated agreement in 1989. These actions collectively required General Metals to perform the following tasks: write a dangerous waste management plan; conduct a remedial investigation and feasibility study addressing all pathways of contamination to the waterway; conduct a treatability study for storm water runoff; submit a NPDES permit application for discharge of treated storm water; design and install a storm water treatment system; and develop a new site drainage plan. The results of the remedial investigation are summarized above.

In 1991, Ecology developed a Cleanup Action Plan to address additional work needed and signed a MTCA Consent Decree (#91-2-04341-3) with General Metals requiring the company to implement the Cleanup Action Plan. The Cleanup Action Plan required General Metals to take the following actions:

1. pave the site over a five-year period (1992-1995);

2. regrade the site and install a drainage system to collect storm water from the areas to be paved.

3. develop a Best Management Practices plan to minimize or eliminate the release of hazardous substances from the site; and

4. conduct semi-annual monitoring of arsenic, copper, lead, zinc, nickel, PCBs, and pentachlorophenol in ground water for five years before completion of cap construction and five years after completion of cap construction to evaluate the effectiveness of the cap.

Groundwater cleanup standards in the Consent Decree were set at or below the marine chronic water quality standard: 13 ppb for arsenic, 3.1 ppb for copper, 6 ppb for lead, 8 ppb for nickel, 81 ppb for zinc, 0.03 ppb for PCBs. and 8 ppb for pentachlorophenol. If the practical quantification limit (PQL) is higher, then the standard is the PQL.

In 1990, Ecology issued a NPDES permit (WA-004044-4) for discharge of treated storm water. The permit was renewed in 1995. Details on monitoring requirements and limits for problem chemicals are as follows:

| Problem Chemical | Average Monthly Effluent Limit (ppm)[1] | Maximum Daily Effluent Limit (ppm) | Sampling Frequency | Sample Type |
|---|---|---|---|---|
| Copper | 0.13 | 0.17 | Weekly | Composite |
| Zinc | 1.09 | 1.55 | Weekly | Composite |
| Lead | 0.28 | 0.37 | Weekly | Composite |
| PCBs | 0.005 | 0.007 | Weekly | Composite |

1/ The average monthly effluent limitation is defined as the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges over a calendar month divided by the number of daily discharges measured during that month.

In addition, General Metals is required to conduct an acute whole effluent toxicity test on the effluent by the year 2000 (to include in the application for permit renewal), and a sediment monitoring plan six months before conclusion of the Superfund sediment cleanup activities in Hylebos Waterway.

In 1990, General Metals installed a storm water treatment system (coagulation, flocculation, sedimentation) with a design capacity of 200 gallons per minute. General Metals is in compliance with their NPDES permit and received a national EPA stormwater award for the treatment system in October, 1995.

By 1996, all regulatory requirements described above had been implemented. General Metals capped the entire site with a low permeability asphalt and large aggregate industrial surface. The storm water from the capped area is being collected by a drainage system and treated in the storm water treatment system before discharge into the Hylebos Waterway.

Source Control Effectiveness

Concentrations of problem chemicals monitored in the treated stormwater have generally been about an order of magnitude below the effluent limits, with no exceedances in the last two years. Exceedances of an oil and grease effluent limit (10 ppm, maximum daily value) occurred on 5/1/98 (32 ppm), 2/1/98 (13 ppm), 8/1/97 (24 ppm), and 6/1/96 (12 ppm). Oil and grease may contain PAHs (a Hylebos Waterway problem chemical), and therefore effluent limit exceedances are potentially relevant to this report. However, the frequency and magnitude of exceedances were not sufficient to result in a notice of correction.

On December 17, 1997, the stormwater treatment system was bypassed for about 20 minutes to mitigate flooding due to torrential rains. Although the system's tanks still had nearly 65 percent of their total capacity available for water storage, the capacity of the pump at the lift station was insufficient to manage the rate of rainfall during the most intense part of the storm. This resulted in a petroleum sheen observed on the west side of the facility. In response to this event, General Metals replaced pumps at two of the lift stations with higher capacity pumps, and increased the frequency of removal of residual oil in the main collection sump and catch basins.

General Metals sampled groundwater semi-annually from eight pairs of wells for the constituents listed above between 1988 and 1998. Each pair of wells includes a shallow and a deep well. Four of these well pairs are located close to Hylebos Waterway (map included in Attachment 3 (EMCON, 1992)). Attachment 3 contains data from each well from 1988-1998 (Schnitzer Steel, 1998). Data are below cleanup standards in each of these wells for copper, lead, zinc, nickel, and PCBs. For arsenic, all but three wells have been below cleanup standards since March 1996. The three exceptions are 7-shallow, 7-deep, and 8-shallow, which have consistently contained arsenic above the cleanup standard of 13 ppb. Since March 1996, concentrations ranged from 12-28 ppb for well 7-shallow, 35-99 ppb for 7-deep, and 21-33 ppb for 8-shallow.

In 1997 and 1998, General Metals sampled a seep to further characterize the quality of groundwater entering Hylebos Waterway. Attachment 3 summarizes data from seep samples taken 3/25/97 and 4/24/98 and provides a map showing the seep location ($J^2$ & Associates, 1988). Copper, arsenic, and zinc concentrations were higher than marine chronic water quality standards. Lead, nickel, and PCBs were not detected, although the detection limit for PCBs (5-7 ppb) was higher than the marine chronic water quality standard (0.03 ppb). It is unclear why the seep and well data correspond so poorly, other than location.

EPA conducted analyses of the potential for groundwater and stormwater to contaminate sediments and provided their findings in two reports that are appended to this Milestone Report. For General Metals, the existing information suggests no potential for groundwater to contaminate sediments and a low potential for stormwater (zinc) to contaminate sediments. This site is no longer considered a source of problem chemicals to Hylebos Waterway sediments.

4. Wasser Winters Log Sort Yard (1602 Marine View Drive; MTCA Agreed Order and Consent Decree)

Description of Site and Contamination

The "Wasser Winters" site is a 12.56 acre vacant log sort yard owned by the Port of Tacoma (Port). It is located at the mouth of Hylebos Creek. From May 1, 1972 to November 1, 1984 the Port leased the property to the Wasser & Winters Company for use as a log sorting facility. From August 16, 1977 to November 1, 1980, slag from the ASARCO smelter in Ruston was placed on the site as roadway ballast. In 1983 and 1984 Ecology sampled runoff from this and other log sort yards and found high levels of arsenic, copper, lead, and zinc (Norton and Johnson, 1984). Ecology believes that the elevated concentrations of these metals found in storm water runoff on this and other log yards are the result of chemical leaching and mechanical pulverization of the slag during normal sort yard operations.

In 1987 the Port conducted an investigation of the site, consisting of surface water monitoring, soil sampling and ground water monitoring (Street, Edwards, and Associates, 1987). High concentrations of arsenic (21,600 ppb), copper (10,200 ppb), lead (5,900 ppb) and zinc (11,900 ppb) were confirmed in surface water runoff. Soil samples indicated levels of these metals significantly above background. Ground water monitoring (three samples from each of eleven wells) showed that concentrations of arsenic, lead, and zinc were below water quality standards, and copper was mildly above its water quality standard. The copper concentrations ranged from <1 to 10 ppb, and the chronic water quality standard is 3.1 ppb.

The Port conducted a more detailed investigation in 1992, which provided results consistent with those previously collected. That is, surface water runoff contains elevated levels of arsenic, copper, lead and zinc, and soil concentrations of these metals exceed the Model Toxics Control Act (MTCA) Method A Industrial Soil Standards at many locations across the site. Ground water concentrations of these metals are generally very low (Kennedy/Jenks Consultants, 1993a and 1993b).

Source Control Actions

In March 1987, the Port signed a Consent Order (# DE 86-S156) with Ecology to perform a preliminary site characterization (described above) (Street, Edwards, and Associates, 1987). In February 1991, the Port signed a MTCA Agreed Order (# DE 91-S248) with Ecology to

complete a Remedial Investigation/Feasibility Study (RI/FS). The goal of this study was to delineate the horizontal and vertical extent of soil metals contamination, to confirm previous ground water monitoring results, and to evaluate remedial alternatives for the site (investigation results described above). Ecology received the RI/FS reports in March and May 1993 (Kennedy/Jenks Consultants, 1993a and 1993b).

By August, 1993, Ecology developed a Cleanup Action Plan and signed a MTCA Consent Decree (# 93-2-08693-3) with the Port of Tacoma requiring the Port to implement the Cleanup Action Plan. The Cleanup Action Plan required the Port to:

1. remove contaminated soil from a 100-foot streamside buffer area, leaving behind no soil exceeding 200 ppm arsenic and 1,000 ppm lead (MTCA Industrial cleanup level), and backfill with clean fill (landscaping grade soil);

2. consolidate 13,000-14,000 cubic yards of contaminated site material in the central 4 acres of the site, including contaminated soil from the buffer area;

3. with the exception of the 100-foot buffer, pave the site to prevent precipitation from leaching metals into Hylebos Waterway via surface runoff and subsurface flow;

4. install a stormwater collection system;

5. develop a post-cleanup monitoring plan to be approved by Ecology; and

6. limit the site to industrial use (deed restriction).

Ecology approved the post-cleanup monitoring plan in 1993 (Kennedy/Jenks, 1993c). The plan required the Port to:

1. monitor ground water quarterly the first year and semi-annually thereafter for total and dissolved arsenic, copper, lead, and zinc;

2. monitor surface water quality from the outfall draining the cap (discrete grab samples taken over 30-minute intervals over a 2-4 hour period and composited on a flow-proportioned basis);

3. monitor surface water quality from the buffer area if any runoff is observed;

Groundwater cleanup objectives were set at the marine chronic water quality standards: 36 ppb for arsenic, 3.1 ppb for copper (10 ppb if the practical quantification limit is higher than 3.1 ppb), 8.1 ppb for lead (10 ppb if the practical quantification limit is higher than the numerical criteria of 3.1 ppb), and 81 ppb for zinc. No standards were set for stormwater, but monitoring was required to determine if an individual NPDES permit would be needed.

The cleanup activities were completed by October 1993 to Ecology's satisfaction.

Source Control Effectiveness

Soil was excavated from the buffer area in four phases to allow for confirmation soil sampling between phases. Fifty-four surface soil samples were originally taken during the remedial investigation. Up to three feet of soil were removed where high metal concentrations were observed. Nine confirmation samples were taken where signs of arsenic slag were still evident. All samples contained lead and arsenic below cleanup standards. However, three samples contained arsenic at 130-150 ppm (cleanup standard was 200 ppm), so an additional 2-3 feet of soil was excavated in these areas. After another round of confirmational soil sampling, more excavation was determined appropriate in three locations. After another 1.5 feet of soil was removed in these locations, the confirmation samples contained no detectable arsenic. This work is described in more detail in Kennedy/Jenks (1994).

Attachment 4 provides post-cleanup groundwater monitoring results from 1994 to 1998 in graphic form (well locations also included on map) (Kennedy/Jenks, 1998). The map shows four post-cleanup monitoring wells, two of which are located adjacent to Hylebos Creek and a third is located adjacent Hylebos Waterway. Concentrations of metals in these wells have been below cleanup levels with two exceptions:

1. one of the wells next to the creek showed a trend toward increasing arsenic concentrations above the cleanup standard between 2/94 and 8/97 (from 50-150 ppb), followed by a decrease in arsenic concentration to 90 ppb on 6/98 (still above cleanup level); and

2. all of the wells showed a spike in zinc concentrations from well below the cleanup standard (5-20 ppb) to above the cleanup standard on 12/97 (130-150 ppb); however, this spike was followed by a 6/98 concentration of 5 ppb.

Runoff from the paved part of the site in May and November, 1994, contained arsenic, copper, lead, and zinc below water quality standards, with the exception of copper, which was 29-33 ppb in May and 3-9 ppb in November (Kennedy/Jenks, 1995). The marine chronic water quality standard for copper is 3.1 ppb. The data are presented on graphs in Attachment 4. No runoff was observed on the buffer area, so post-cleanup surface water sampling was not possible.

EPA conducted analyses of the potential for groundwater and stormwater to contaminate sediments and provided their findings in two reports that are appended to this Milestone Report. For Wasser Winters, the existing information suggests no potential for groundwater to contaminate sediments and no potential for stormwater to contaminate sediments. This site is no longer considered a source of problem chemicals to Hylebos Waterway sediments.

5. Louisiana-Pacific Log Sort Yard (3701 Taylor Way; MTCA Consent Decree)

Description of Site and Contamination

Louisiana-Pacific Corporation currently operates a log sort yard adjacent to its Tacoma lumber mill. In the late 1970s and early 1980s, slag from the ASARCO smelter in Ruston was placed on the site as roadway ballast. In 1983 and 1984 Ecology sampled runoff from this and other log sort yards and found high levels of arsenic, copper, lead, and zinc (Norton and Johnson, 1984). Ecology believes that the elevated concentrations of these metals found in storm water runoff on this and other log sort yards are the result of chemical leaching and mechanical pulverization of the slag during normal sort yard operations.

In 1987, Louisiana Pacific found elevated levels of arsenic, copper, lead and zinc in surface water runoff (see Table 1). Soil concentrations of these metals were measured at levels significantly above background (CH2M-Hill, 1987). Ground water quality was found to not be significantly affected by contamination present on-site (CH2M-Hill, 1989) (see Table 1).

Measured Levels of Contaminants of Concern at the Louisiana Pacific Site and Marine Chronic Water Quality Criteria

| Contaminant | Surface Water Maximum Measured, ppb (CH2M-Hill, 1987) | Ground Water Range Measured, ppb (CH2M-Hill, 1989) | Marine Chronic Water Quality Criteria, ppb |
|---|---|---|---|
| total arsenic | 3850 | 4-7 | 36 |
| dissolved arsenic | | 4-7 | 36 |
| total copper | 1030 | 11-33 | 3.1 |
| dissolved copper | | <3 (below detection) | 3.1 |
| total lead | 310 | <1 (below detection) | 8.1 |
| dissolved lead | | <1 (below detection) | 8.1 |
| total zinc | 1800 | 37-91 | 81 |
| dissolved zinc | | 11-31 | 81 |

Source Control Actions

In June 1987, Ecology issued an order (# DE 87-S190) under Chapter 90.48 RCW requiring a site investigation (results described above). This order was later amended to also require a ground water investigation (results described above) and a feasibility study. A feasibility study examining cleanup alternatives was submitted to Ecology in April 1989 (Louisiana Pacific, 1989). In May 1990, Ecology issued a MTCA Enforcement Order (# DE 90-S170) requiring Louisiana-Pacific to evaluate the effectiveness of capping as a cleanup technology and to prepare

a preliminary cap design. Louisiana-Pacific complied with this order and submitted the required reports in July and October 1990.

A Cleanup Action Plan for the site was issued by Ecology in October 1992. This plan required the following remedial actions:

1. cap the entire log yard area with roller compacted concrete of suitable strength and low permeability characteristics to prevent infiltration of storm water into underlying slag/soil and minimize erosional transport of metal containing soils;

2. design and construct a storm water collection system that provides sedimentation and oil/water separation;

3. implement best management practices, including regular sweeping of the log deck, inspection/maintenance of the cap, and inspection/maintenance of the storm water collection and treatment system;

4. conduct quarterly monitoring of groundwater for arsenic, copper, lead, and zinc (no soil confirmation sampling required because all contaminated soil was capped); and

5. placement of a deed restriction for industrial use only.

The cleanup action plan's groundwater cleanup standards were set at the marine chronic water quality standards: 36 ppb for arsenic, 3.1 ppb for copper (or 10 ppb if the practical quantification limit is higher than 3.1 ppb), 8.1 ppb for lead (or 10 ppb if the practical quantification limit is higher than 8.1 ppb), and 81 ppb for zinc. The soil cleanup standards were 200 ppm for arsenic and 1000 ppm for lead, based on the industrial soil cleanup standards in MTCA (Model Toxics Control Act),

In December 1992, Ecology issued a MTCA Enforcement Order (# DE 92TC-S312) to Louisiana Pacific for the remedial design and cleanup of the site. By October 1993, cleanup construction was successfully completed and post-construction monitoring started. Groundwater is being monitored quarterly.

Stormwater is regulated under the NPDES Baseline Industrial Stormwater Permit program. The permit requires that a pollution prevention plan be developed. Louisiana Pacific has both developed and implemented the plan through construction and operation of the stormwater system that provides for sedimentation and oil/water separation. No stormwater monitoring is required under the permit at this time.

Source Control Effectiveness

Average concentrations of arsenic, copper, lead, and zinc in groundwater show no exceedances of the cleanup standards for samples analyzed at appropriate detection limits (samples taken on and after 12/15/94) (Roy Jensen and Associates, 1998). Data and a map are provided in Attachment 5.

EPA conducted analyses of the potential for groundwater and stormwater to contaminate sediments and provided their findings in two reports that are appended to this Milestone Report. For Louisiana Pacific, the existing information suggests no potential for groundwater to contaminate sediments. No post-cleanup stormwater data were available for the analysis. However, the source of stormwater contamination (metallic slag) is no longer in contact with stormwater, so Ecology believes this site is no longer a source of problem chemicals to Hylebos Waterway sediments.

Also see the Head of Hylebos Milestone 4 report for information regarding woodwaste source control requirements.

6. Tacoma Boatbuilding Company, Yard #1 (1840 Marine View Drive; NPDES Permit)

Description of Site and Contamination

Tacoma Boatbuilding's Yard #1 operated from 1969 to 1996, when it ceased operations. The property is located on the northeast shore of the Hylebos Waterway. Operations at the yard were those associated with steel and aluminum shipbuilding and repair. Activities included hull and structural welding, metal cutting, machining, sandblasting, painting, carpentry, pipefitting, electronic equipment installation and repair, and electrical wiring. These activities were conducted at two marine launch ways, two fabrication and assembly buildings, two trade shops, a machine shop, a paint and sandblasting building and on the outside areas of the facility.

Data collected by Tacoma Boatbuilding in 1991 showed that contaminants, particularly copper, lead and zinc, were being transported from the yard to Hylebos Waterway. Concentrations of metals from two outfalls (one sample from each) ranged from 63-226 ppb for copper, 38-69 ppb for lead, and 917-6,780 ppb for zinc.

Source Control Actions

In 1989, Ecology requested that the company submit an application for an NPDES permit. Tacoma Boatbuilding claimed that they did not discharge pollutants to waters of the state and that no waste discharge permit was required for their operations. On August 16, 1989, Ecology issued the following enforcement actions:

Order No. DE 89-S140, which addressed the provisions of RCW 90.48.080 and RCW 90.48.320, pertaining to pollution of the waters of the state.

Order No. DE 89-S142, which addressed violations of the Dangerous Waste Regulations set forth in Chapter 113-303 WAC.

Penalty No. DE 89-S126, which imposed fines in the amount of $55,000.00 for the violations set forth in order DE 89-S142.

Tacoma Boatbuilding appealed all of the above actions. In February 1991, Tacoma Boatbuilding and Ecology signed a Consent Order (# DE 90-S280) requiring Tacoma Boatbuilding to submit an NPDES permit application.

In March 1993, Ecology issued NPDES Permit #WA-004063-1 to Tacoma Boatbuilding and in October, 1996, Ecology issued enforcement order #DE96TC-S353 requiring Tacoma Boatbuilding to implement specific source control actions and remove spent sandblast grit from the property. The company was in bankruptcy and could only complete a few actions. Once operations terminated at the site (1997), the NPDES permit was terminated.

In June, 1998, Ecology signed a MTCA Consent Decree (#98-2-07617-3) with a prospective purchaser (Ace Tank) to clean up the sandblast grit at the site. Prospective purchaser agreements permit parties to buy, clean up, and develop contaminated sites without assuming the potentially undefined cleanup liability that may accompany site ownership. Ace Tank was seeking liability protection from Ecology, EPA, and the Natural Resource Trustees. The Consent Decree required Ace Tanks to perform the following actions:

1. remove, excavate, dispose, and/or recycle sandblast grit from upland areas, the bank, launchway, and certain intertidal areas;

2. backfill with clean sand/gravel, as needed, to restore the original slopes;

3. investigate and clean out, if necessary, storm drains;

4. remove and replace a stormwater outfall pipe;

5. sample soil and sediment to confirm that cleanup goals have been met; and

6. place deed restrictions on the property, limiting future activities to those which will not disturb sediments at the piers, under the dock, and at the launchway.

Cleanup levels were set at the Commencement Bay Sediment Quality Objectives. Cleanup work started in June, 1998. All actions listed above were completed by October, 1998. Intertidal

cleanup work was conducted as far waterward as was possible with upland excavation equipment during low tides (out to 0 ft in front of the marine railway and out to the pier elsewhere).

Source Control Effectiveness

Three confirmation soil samples were taken along the bank and 21 confirmation sediment samples were taken in the intertidal areas before backfilling occurred. All confirmation samples were below sediment cleanup levels (Dalton, Olmstead, and Fuglevand, 1998).

EPA conducted analyses of the potential for groundwater and stormwater to contaminate sediments and provided their findings in two reports that are appended to this Milestone Report. For Tacoma Boatbuilding, no post-cleanup data were available for the analyses. However, the source of stormwater contamination (grit/paint) was removed , so Ecology believes this site is no longer a source of problem chemicals to Hylebos Waterway sediments.

7. B&L Landfill (Milton; MTCA Consent Decree)

Description of Site and Contamination

The B&L woodwaste landfill was active in the 1970s and early 1980s. It occupied 18.1 acres of land that drains to Hylebos Creek near and southeast of I-5 (between Fife Way and Puget Power Access Road), in a mixed residential/agricultural and wetland area. It received scrapings from several log sort yards located in Tacoma. The scrapings contained wood bark, rock, and ASARCO slag. The slag had been used at unpaved log sort yards as road bed ballast. The mechanical grinding of the slag by truck traffic pulverized it, creating smaller particles, which increased the surface area available to leach metals. The wood waste provides an acidic environment to further facilitate metal leaching. The mixture of wood waste and slag particles was found to contain elevated levels of arsenic (8.6-530.ppm), copper (320-2020 ppm), lead (200-860 ppm), and zinc (580-2400 ppm).

In 1989, Murray Pacific conducted an investigation of the site (Kennedy/Jenks/Chilton and Applied Geotechnology 1990a). The results showed that leachate was seeping into ditches surrounding the site and flowing into Hylebos Creek, and that this leachate was the primary pathway of contamination to the creek. Ditch sediments from 12 locations contained metals at the following levels: arsenic at 0.39-20,000 ppm, copper at 14-190 ppm, lead at 5-240 ppm, and zinc at 17-1,50.0 ppm.

Source Control Actions

In February, 1989, Ecology signed a MTCA Consent Decree (# 89-2-00319-3) with Murray Pacific Corporation (a contributing log yard owner and a potentially liable party) requiring Murray Pacific to perform a Remedial Investigation and Feasibility Study (RI/FS). Results of the

RI are described above. Ecology approved the RI/FS report in September 1990 (Kennedy/Jenks/ Chilton and Applied Geotechnology, Inc., 1990a; Kennedy/Jenks/Chilton and Applied Geotechnology, Inc., 1990b).

Ecology then prescribed a cleanup action in a Cleanup Action Plan issued October, 1991. The plan was then followed by a MTCA Enforcement Order (# DE 92TC-S214) to ASARCO, Executive Bark, and Murray Pacific Corporation in June, 1992, requiring the parties to implement the Cleanup Action Plan.

The Cleanup Action Plan included the following requirements:

1. consolidate soils, woodwaste, and ditch sediments exceeding MTCA cleanup standards into an 11-acre mound

2. replace the excavated ditch sediments with clean fill (back to the original elevation);

3. install a leachate collection system at the base of the mound;.

4. install a multi-layer RCRA equivalent cap system, including a geosynthetic clay liner and a 40-mil PVC membrane liner;

5. plant the site with grass;.

6. install a storm water collection system, monitoring well system, and perimeter fence; and

7. conduct post-cleanup monitoring, including quarterly analyses of arsenic and lead in the ditch and ground water associated with the site.

Ecology set groundwater cleanup levels as: 0.005 ppm for arsenic and lead (0.01 ppm if the practical quantification limit is higher than 0.005 ppm), 0.32 ppm for nickel, and 9.60 ppm for phenol. These were based on Method A MTCA groundwater cleanup levels for protection of drinking water.

Ecology set surface water cleanup levels as: 0.005 ppm for arsenic, (0.01 ppm if the practical quantification limit is above 0.005 ppm), 0.003 ppm for lead (0.01 ppm if the practical quantification limit is above 0.003 ppm), 0.012 ppm for copper, and 2.56 ppm for phenol. These were based on state freshwater chronic water quality standards.

Ecology set ditch sediment cleanup levels as: 20 ppm for arsenic, 390 ppm for copper, and 250 ppm for lead. These were based on Method A MTCA residential soil cleanup levels.

Steps 1-6 were completed by June, 1994, and step 7 (post-cleanup monitoring) is ongoing.

Source Control Effectiveness

The most recent groundwater monitoring results indicate that cleanup objectives are being exceeded in nine wells. Concentrations of arsenic in these wells range from 9 ppb to 2,600 ppb (Hydrometrics, 1994-1998). When these exceedances were observed in the mid-1990s, Ecology required the PLPs to implement a more rigorous and extensive monitoring program for groundwater. Ecology will be making a decision this fall on future work efforts needed, based on the accumulated data. There is no direct connection between the contaminated groundwater and Hylebos Waterway due to the large distance between the two. Although the relationship between the contaminated groundwater and Hylebos Creek is unquantified, extensive sampling of Hylebos Creek water and sediments has indicated that the creek is not confirmed source of problem chemicals to Hylebos Waterway sediments (Washington State Department of Ecology, 1993). In addition, data in the table presented below indicate that concentrations of metals in water from the ditch next to B&L (which flows to Hylebos Creek) decreased markedly after the cleanup, and have remained low.

| Parameter (totals) | Highest pre-cleanup water concentrations (ppb) from all (3) sample locations | | | | Highest post-cleanup water concentrations (ppb) from all (1-3) sample locations | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10/89 | 11/89 | 1/90 | | 1/94 | 5/94 | 8/94 | 12/94 | 3/95 | 6/95 | 12/95 | 3/96 |
| Arsenic | 170 | 3,400 | 230 | | 58 | 95 | 104 | 9 | 41 | 160 | 13 | 25 |
| Copper | 12 | 16 | 21 | | <5 | <1 | 7 | 6 | 4 | 18 | 7 | 3 |
| Lead | 13 | 6 | 6 | | <5 | <3 | 3 | <2 | <2 | <2 | <2 | <2 |

Quarterly surface water samples taken since 3/96 are consistent with the post-cleanup levels shown above.

No post-cleanup ditch sediment samples have been analyzed because the contaminated ditch sediments were replaced with clean fill.

B&L Landfill is no longer considered a confirmed source of problem chemicals to Hylebos Waterway sediments.

8. Blair Backup Property (2902 Taylor Way; EPA Administrative Order on Consent; portion of site was former Cascade Timber Yard #2)

Description of Site and Contamination

The Blair Backup Property is about 85 acres in size. With the exception of buildings along Taylor Way, the property is currently vacant. The Cascade Timber Yard #2, which was identified as a source in the CBN/T Record of Decision, was a log storage yard that operated on about 17 acres of the Blair Backup Property periodically since about 1974. Although some Asarco slag

was used at this log yard, available information suggests that Asarco slag was not present in large enough quantities to indicate that it was used as ballast material (Hart Crowser, 1992a). This portion of the Blair Backup Property was also occupied by the Ohio Ferro-Alloy chromium and ferrosilicate manufacturing plant from about 1941 until at least 1971. Chromium slag and charcoal briquettes associated with that plant were found onsite. Storm water runoff from this 17-acre portion of the Blair Backup Property discharges to Hylebos Waterway, apparently via Kaiser Ditch.

Source Control Actions

The Blair Backup Property is one of six Puyallup Land Settlement Properties that was transferred from the Port of Tacoma (the Port) to the Puyallup Tribe pursuant to the August 27, 1988 Puyallup Land Settlement Agreement. The Settlement Agreement required the Port to perform cleanup actions on property to be transferred from the Port to the Tribe in order to assure that such property complies with applicable federal and state contamination laws and can be used for commercial and industrial purposes. In 1989, the Settlement Agreement was incorporated into federal law and state law. To implement the Settlement Agreement, the Port entered into a Memorandum of Agreement (MOA; March 21, 1990) with the Puyallup Tribe, EPA and Ecology. Among other things, the MOA set forth a process for investigating and cleaning up the properties.

For the Blair Backup Property, the Port prepared an investigation report (Hart Crowser, 1992a), an Analysis of Alternatives Report (Hart Crowser 1992b), and a Cleanup Plan for the Blair Backup Property. All documents were reviewed and approved by the Tribe, EPA and Ecology.

On March 9, 1993, EPA and the Port signed an Administrative Order on Consent (U.S. EPA Docket No. 1093-03-05-106) to implement the Cleanup Plan for the Blair Backup Property. All cleanup actions occurred on the 17-acre portion of the property that was formerly occupied by the Cascade Timber 42 Log Yard and the Ohio Ferro-Alloy manufacturing plant.

Chemical contaminants at the site included arsenic, chromium, and PAHs. The cleanup objectives at the Blair Backup Property were to minimize:

1. direct contact with PAH-contaminated charcoal briquettes and associated soils;

2. direct contact through inhalation of the chromium slag/soil mixture in the OFA Area;

3. direct contact with sandblast grit; and

4. the mobilization and transport of chromium slag particulates and sandblast grit from the Property in surface water discharges.

As part of the cleanup effort, the Port:

1. excavated and disposed of buried charcoal briquettes (which contain PAHs) at an off-site location, in compliance with a Petition for Exemption from State of Washington Dangerous Waste Regulations;

2. excavated the onsite sandblast grit and placed it in a 7-acre area of the property on buffer material above the existing chromium slag and soil mixture;

3. placed other contaminated material from the Blair Waterway Property (a second Land Settlement Property) on a buffer in the same area and capped that area with an asphalt-geotextile cap and a wearing course;

4. covered the remaining 10-acre portion of the OFA/Cascade Timber #2 Area that was not capped with asphalt with 2 feet of sand and gravel to minimize direct contact with the material; and

5. installed and maintained an adequate storm drainage network, implemented a ground water monitoring program, and started implementing a long-term operation and maintenance plan for the cover and cap; and

Institutional controls prevent use of shallow ground water as a drinking water supply, restrict surface and subsurface work in the covered and capped area, and restrict onsite use to industrial uses,

**NEED GROUNDWATER CLEANUP LEVELS AND FREQUENCY OF MONITORING, Plus information about soil cleanup levels and measurements.**

The cleanup was completed by July 1993 to EPA's satisfaction. The cleanup cut off the source of problem chemicals to stormwater, which was the concern that caused the site to be considered a confirmed source of problem chemicals to the waterway.

Source Control Effectiveness

Groundwater data show no significant changes from pre-cleanup levels, with the exception of elevated levels of arsenic in two wells during the dry season (Hart Crowser, 1996). Groundwater data are summarized in Attachment 6.

EPA conducted analyses of the potential for groundwater and stormwater to contaminate sediments and provided their findings in two reports that are appended to this Milestone Report. For Blair Backup, the existing information suggests no potential for groundwater to contaminate sediments. No post-cleanup stormwater data were available for the analysis. However, the

source of stormwater contamination (metallic slag) is no longer in contact with stormwater, so Ecology believes this site is no longer a source of problem chemicals to Hylebos Waterway sediments.

9. Kaiser Aluminum and Chemical Co. (MTCA Consent Decree; 3400 Taylor Way, Tacoma)

Description of Site and Contamination

Kaiser operates a primary aluminum smelter and wire mill on Taylor Way in Tacoma. The company operated a wet scrubber system to control hydrogen fluoride gases from 1950 until 1974. Waters from this air pollution control system were directed to settling basins on the plant property. Sludges that formed in the bottom of the settling basins contain high levels of polycyclic aromatic hydrocarbons (PAHs). Low molecular weight PAHs (LPAH) and high molecular weight PAHs (HPAH) are problem chemicals in the Head of Hylebos Waterway Problem Area. During 24 years of operation, approximately 82,000 cubic yards of PAH-contaminated sludge were deposited in the settling basins. The depth of sludge varied between 6 and 12 feet deep. The PAH sludge, if characterized today, would designate as dangerous waste due to its carcinogenic properties.

In 1990 Ecology concluded that the only ongoing pathway of PAH contamination from the Kaiser property to the Hylebos Waterway was storm water carrying contaminated sludge particles through the Kaiser Ditch from the settling basins. Prior to remediation, PAHs were found in the Kaiser Ditch sediments at concentrations ranging from 13.5 to 205.9 ppm (total PAHs)(Kaiser Aluminum, 1990). Ground water adjacent to the sludge basins showed no detectable PAH contamination (practical quantitation limit = 10 ppb).

Source Control Actions

On July 12, 1990, Kaiser signed a MTCA Consent Decree (#90-2-06209-6) with Ecology, which required Kaiser to consolidate and clean up the PAH-contaminated sludges and soils on Port of Tacoma and Kaiser property (including Kaiser Ditch) as follows:

1. Drain existing basins to an infiltration basin and dry them to serve as containment cells for contaminated sludge/soil.

2. Transfer contaminated soil to the drained basins and cap the soil with a geotextile liner followed by two feet of clean soil and grass. Regrade land surrounding the basins to route storm water away from the basins and into the infiltration basin.

3. Remove contaminated sediments from Kaiser Ditch.

4. Reroute outfall 001 (which drained to Kaiser Ditch before the cleanup) to the Hylebos Waterway via a 20-inch pipeline.

5. Monitor the water quality from outfall 001, 003, and 004 under its NPDES permit.

6. Restrict the future use of the site to industrial uses through a deed restriction.

The soil cleanup standard established by the consent decree for the upland properties was 14.2 ppm carcinogenic PAH compounds, which is based on the MTCA industrial cleanup levels. Ecology used the Commencement Bay Sediment Quality Objectives as cleanup standards for the Kaiser Ditch (5.2 ppm for low molecular weight PAHs and 17.0 ppm for high molecular weight PAHs). Kaiser was also required to monitor PAHs in groundwater from eight monitoring wells installed around the basins semiannually for five years and annually thereafter. No groundwater cleanup objectives were set because pre-cleanup groundwater concentrations were below the practical quantification limit.

The upland portion of the sludge consolidation and cleanup was completed in 1991. The bottoms of the basins were contaminated with up to 10 feet of PAH sludge. However, groundwater is not affected as indicated below. The rerouting of Kaiser's outfall 001 and the cleanup of the Kaiser Ditch was completed in the summer of 1992. By July 1992, all aspects of the cleanup were complete.

Kaiser has a NPDES permit (#WA-000093-0) authorizing discharges of process waste water from the plant and storm water from the site. The plant has four discharge points, three of which drain into the Hylebos Waterway. Outfall 001 discharges stormwater and noncontact cooling water to Hylebos, and outfalls 003 and 004 discharge stormwater only to Hylebos. Ecology renewed Kaiser's NPDES permit on March 23, 1990, and then modified the permit on February 14, 1992. The permit modification was issued as a Water Quality Order (# DE 92-WQIO26), which required Kaiser to:

1. conduct a whole effluent acute toxicity study;
2. conduct a whole effluent chronic toxicity study;
3. prepare a sediment baseline study; and
4. determine the dilution ratio of effluent to receiving water at the edge of the dilution zone provided for Outfall 001.

Only outfall 001 has effluent limits. Details on monitoring requirements and limits for problem chemicals for outfall 001 are as follows:

| Parameter | Units | Maximum Daily (limit) | Monitoring Frequency | Sample Type |
|---|---|---|---|---|
| Benzo(a)Pyrene | Ppm | 0.01 | Weekly | 24 hr comp |

| | | | | |
|---|---|---|---|---|
| PCB's | Ppm | 0.003 | Quarterly | Grab |
| Nickel | Ppm | 0.01 | Weekly | 24 hr comp |
| Copper | Ppm | No limit | Weekly | 24 hr comp |

Benzo(a)pyrene is the only problem chemical monitored at outfalls 003 and 004. The permit requires Kaiser to sample these outfalls three times in October and three times in March each year (grab sample), and one sample each month from April through September if storm events occur.

Ecology is in the process of renewing Kaiser's permit.

Source Control Effectiveness

Three post cleanup confirmation soil samples were taken along each of thirteen transects across the ditch. At each transect, one sample was taken at the bottom of the ditch, one was taken on each bank, and the three samples were composited. None of the thirteen composited samples exceeded the cleanup standards.

Groundwater down gradient of the basins has not contained PAHs above the practical quantification limit in any of the post-cleanup samples (Practical Quantitation Limit = 10 ppb).

During the history of the NPDES permit (since modification in 1992), Kaiser has not exceeded their effluent limits for problem chemicals. Chronic whole effluent toxicity tests revealed chronic toxicity to Ceriodaphnia dubia, but none of the problem chemicals included in the permit were measured in the effluent above water quality criteria (benzo(a)pyrene, PCBs, nickel, copper). Due to the chronic toxicity findings, Ecology issued Kaiser a Water Quality enforcement order (#DE 99WQ-I016) in April, 1999, which requires Kaiser to develop an analysis of alternative stormwater treatment methods by September, 1999. Ecology will select a preferred treatment method, which Kaiser must construct by September, 2000.

EPA conducted analyses of the potential for groundwater and stormwater to contaminate sediments and provided their findings in two reports that are appended to this Milestone Report. For Kaiser, the existing information suggests no potential for groundwater to contaminate sediments, and a ??????? potential for stormwater (**WHICH DRAINS?**) to contaminate sediment by benzo(a)pyrene. However, once the stormwater treatment system is installed (September 1999), Ecology expects no potential for sediment contamination. In addition, Ecology will continue to monitor this site closely through its NPDES permit.

REFERENCES

1. Boateng, 1995-1997. Groundwater and surface water sampling reports. Letters from Boateng to Mr. Frederick Wolf, Elf Atochem. 3009 Taylor Way.

2. CH2M-Hill, 1987. Site investigation report. Prepared for Louisiana Pacific Corporation, Tacoma Facility. October, 1987.

3. CH2M-Hill, 1989. Groundwater investigation report. Submitted to Washington State Department of Ecology. March, 1989.

4. Dalton, Olmstead, and Fuglevand, 1998. Progress report and summary of performance monitoring results, Tacoma Boatbuilding Cleanup. July 23, 1998.

5. EMCON, 1992. General Metals monitoring plan.

6. ENSR, 1989. Remedial investigation, revised final report, 3009 Taylor Way Site, Tacoma, WA. Consent Decree #87-2-01198-1. Three volumes. Prepared for Pennwalt Corporation. August 1989.

7. Hart Crowser, 1992a. Final investigation report, Blair Backup Property, Port of Tacoma, WA. Prepared for Port of Tacoma. January 29, 1992.

8. Hart Crowser, 1992b. Analysis of alternatives, Blair Backup property, Port of Tacoma, WA. Prepared for Port of Tacoma. November 19, 1992.

9. Hart Crowser, 1996. Status Report No. 6, Groundwater compliance monitoring, OFA/Pennwalt Area, Blair Backup Property, Port of Tacoma, Washington. Prepared for the Port of Tacoma. December 31, 1996.

10. Hydrometrics, 1994-1998. Quarterly status reports, B&L Landfill.

11. ICF Technology, Inc. 1990. Final remedial action plan for the Penite Site at the Atochem North America Tacoma Facility. Prepared for Atochem North America, 2901 Taylor Way, Tacoma, WA. December 1990.

12. ICF Technology, Inc. 1992. Groundwater monitoring plan, Atochem North America, inorganic chemical division, Tacoma plant. April 1992.

13. $J^2$ & Associates, Inc. 1998. Groundwater seep sampling report. Letter to Mr. Tim Todd, Schnitzer Steel of Tacoma, Inc. Dated June 17, 1998.

14. Kaiser Aluminum, 1990. Pre-construction sampling program for "Kaiser Ditch". Analytical results. Kaiser Aluminum -- Tacoma Works. March 8, 1990.

15. Kennedy/Jenks/Chilton and Applied Geotechnology, Inc. 1990a. Focused remedial investigation, B&L Landfill, Milton, WA. Prepared for Murray Pacific Corporation, February, 1990.

16. Kennedy/Jenks/Chilton and Applied Geotechnology, Inc. 1990b. Focused feasibility study, B&L Landfill, Milton, WA. Prepared for Murray Pacific Corporation. September 1990.

17. Kennedy/Jenks Consultants, 1993a. Remedial investigation/feasibility study. Wasser & Winters log sort yard site, Port of Tacoma, Tacoma, WA. Prepared for the Port of Tacoma. March 1993.

18. Kennedy/Jenks Consultants, 1993b. Supplemental soil investigation. Wasser & Winters log sort yard site. May 1993.

19. Kennedy/Jenks Consultants, 1993c. Final engineering and design report, Wasser & Winters site log sort yard site (revised). October 22, 1993.

20. Kennedy/Jenks Consultants, 1994. Closure report. Wasser & Winters site. January 1994.

21. Kennedy/Jenks Consultants, 1995. Quarterly confirmation monitoring report, November 1994 - Fourth Quarter. Former Wasser & Winters log sort yard site. Port of Tacoma. February 8, 1995.

22. Kennedy/Jenks Consultants, 1998. Confirmation monitoring report - 30 December 1997. Former Wasser & Winters log sort yard site. Port of Tacoma. September 21, 1998.

23. Louisiana Pacific, 1989. Louisiana Pacific Corporation Tacoma log sort yard feasibility study. Submitted to the Washington State Department of Ecology. April, 1989.

24. Louisiana Pacific, 1989b. Supplement to the final feasibility study. Submitted to the Washington State Department of Ecology. May, 1989.

25. Norton and Johnson, 1984. Completion report on WQIS project 1 for the Commencement Bay Nearshore/Tideflats remedial investigation: assessment of log sort yards as metals sources to Commencement Bay Waterways, November 1983 - June 1984.

26. Roy Jensen and Associates. 1998. Groundwater sampling and analysis. June, 1998.

27. Schnitzer Steel, 1997. Letter to Mohsen Kourehdar, Washington State Department of Ecology. Groundwater monitoring Data submitted per requirements in Consent Decree # 91-2-04341-3.

28. Street Edwards, and Associates. 1987. Wasser Winters\Port of Tacoma preliminary site characterization and interim remediation feasibility study. Prepared for the Port of Tacoma. April 13, 1987.

29. Street Edwards/Emcon, Inc. 1988. Preliminary remedial investigation, General Metals of Tacoma, Inc., Tacoma, WA. Prepared for General Metals of Tacoma, Inc. July 18, 1988. Two volumes.

30. Street Edwards/Emcon, Inc. 1989. General Metals of Tacoma continuing remedial investigation. Prepared for General Metals of Tacoma, Inc. August 10, 1989. Two volumes.

31. Washington State Department of Ecology. 1993. Milestone 1 source control status report for Head of Hylebos Problem Area: Commencement Bay Nearshore/Tideflats Superfund Site. May 4, 1993.

Mardraft

DRAFT

# Milestone 4: Administrative Actions in Place for All Sources

## Purpose and Background

Milestone 4 is met when administrative actions are in place for all sources of problem chemicals to the Head of Hylebos Waterway Problem Area.

Source control actions are those physical changes (e.g., construction, soil removal) that represent elimination and/or reduction, to the extent practicable, of those contaminant sources that are most directly linked to existing sediment impacts. Ultimately, these actions eliminate or reduce to the extent practicable, all known sources of problem chemicals that could potentially contaminate sediments.

All ongoing confirmed sources are listed in the Milestone 1 Report for the Head of Hylebos Waterway Problem Area, issued May 4, 1993. No additional sources have been identified to date. However, Ecology and EPA have decided to also include in this report information on source control related to woodwaste from log sort yards. Excessive accumulations of woodwaste in part of the Head of Hylebos ("Hylebos Wood Debris Site") has resulted in reduced diversity and abundance of benthic organisms, resulting in an exceedance of Washington State Sediment Management Standards (narrative criteria).

Ecology recognizes that additional sources may appear as new businesses locate near the Head of the Hylebos Waterway. Ecology will conduct routine inspections to identify any new potential source control problems.

The approach to controlling sources of problem chemicals to the Head of Hylebos Waterway Problem Area is provided in an EPA document titled "Source Control Strategy -- Commencement Bay Nearshore/Tideflats Superfund Site" (May 1992).

This Milestone Report does not address all intertidal areas (from 0-12 ft. MLLW) that are potential sources of contamination to the waterway. Depending on the type and extent of contaminants in the bank areas, these areas will be addressed under Ecology's source control actions or as part of sediment cleanup. This determination has been made jointly by EPA and Ecology on a case-specific basis. If the intertidal area was addressed by Ecology as part of a source control cleanup action, it is discussed in this report.

## Other Source Control Milestone Reports for the Head of Hylebos Waterway Problem Area

The Milestone 1 Report (submitted to EPA May 4, 1993) identified all confirmed ongoing sources of problem chemicals to the Head of Hylebos Waterway Problem Area. The Milestone 1 Report listed nine major sources and eight other sources. Major sources are

those that have been identified as such in the Commencement Bay NS/TF Record of Decision and the Integrated Action Plan.

The Milestone 2 Report describes the administrative actions in place to control the major sources. Ecology submitted the Milestone 2 Report for the Head of Hylebos Waterway Problem Area to EPA May 19, 1993.

The Milestone 3 Report is issued when source control actions are complete for major sources. Ecology is submitting the Milestone 3 Report for the Head of Hylebos Waterway to EPA concurrently with this Milestone 4 Report.
Milestone 5 is achieved when source control is complete for all ongoing confirmed sources.

## Administrative Actions in Place for Major Sources

Major sources are those that have been identified as such in the Commencement Bay NS/TF Record of Decision and the Integrated Action Plan. There are nine major sources for the Head of Hylebos Waterway Problem Area:

Kaiser Aluminum (metal fabricator),
Elf Atochem -- 3009 Taylor Way (inactive log sort yard),
Elf Atochem -- 2901 Taylor Way (chlorine-based chemicals),
General Metals (metal scrap yard),
Wasser Winters (inactive log sort yard),
Louisiana Pacific (operating log sort yard),
Tacoma Boat (inactive large shipyard),
B&L Landfill (drains to Hylebos Creek), and
Blair Backup Property (inactive log sort yard).

The Milestone 3 Letter Report describes administrative actions in place for all major sources. It was issued to EPA concurrently with this report.

## Administrative Actions in Place for Other Sources

The Milestone 1 report also lists eight other confirmed sources:

Modutech Marine,
Jones-Goodell,
Hylebos Marina,
Nordlund Boat,
U.S. Gypsum Interiors,
Murray Pacific Log Yard #1,
U.S. Gypsum Landfill, and
Don Oline Marine View Drive Autofluff.

Sources of wood debris include Louisiana Pacific (arsenic-contaminated soil cleanup described separately as a major source in the Milestone 3 report), Weyerhauser, and Manke Lumber. Although not a onfirmed source to Hylebos Waterway sediments, the BPA/Occidental site on Fife Ditch was cleaned up under a MTCA Consent Decree in 1998.

The Milestone 1 Report for the Head of Hylebos Problem Area lists one site as "pending" consideration as a confirmed source (Petroleum Reclaiming Services). A "pending" status means that the Washington Department of Ecology (Ecology) needs further information before deciding whether the property is an ongoing source of problem chemicals to the waterway. By October, 1993, Ecology had enough information to make a decision. In a letter dated October 4, 1993, Ecology sent EPA an addendum to the Milestone 1 Report for the Head of Hylebos Waterway Problem Area indicating that Petroleum Reclaiming Services was not considered a confirmed ongoing source of problem chemicals to the Head of Hylebos Waterway Problem Area.

1. Modutech Marine (2218 Marine View Drive; NPDES Permit)

Description of Site and Contamination

Modutech Marine, Inc. is a boat construction and repair facility that has operated at 2218 Marine View Drive since 1983. At one time, waste sandblast grit from sand blasting of boat hulls was spread on roads and surfaces in certain areas of the site. Ecology sampled grit deposits near the shoreline and near the sandblast shed in February 1991, and detected copper, lead, zinc, mercury, LPAH, HPAH, phenol, and bis (2-ethylhexyl) phthalate. Ecology also detected 9.2 ug/kg of PCBs in a sample at the northwest corner of the property in an area that appeared to contain auto shredder residue (ASR). The MTCA Method A, Industrial Cleanup level for PCBs is 10 mg/kg. Ecology inspectors looked for visual indications of the ASR during site inspections on June 17, 1992 and December 30, 1992. No ASR was observed. However, the area where the fluff was originally identified was covered by fiberglass boat molds, so access was difficult. Modutech reported digging in that area when removing the large stockpile of sandblast grit, and did not observe any ASR.

Before 1993, wash water from boat hull hydroblasting discharged to the Hylebos Waterway. The site is unpaved. Storm water from the north part of the site enters the Hylebos Waterway through a swale that discharges just south of Tacoma storm outfall # 23. At this time there are no other stormwater structures on the site

Source Control Actions

In a letter of August 28, 1992, Ecology requested Modutech to take measures to stop contaminants from spent sandblast grit from reaching the Hylebos Waterway. Modutech agreed to remove spent grit from the site, clean up residual grit on the marine railway and along the intertidal bank area of the site, and implement best management practices for grit management and boat work. Ecology also commented on a shoreline development permit for Modutech in a letter of January 6, 1992, requesting that the permit be conditioned with requirements to identify and remove any sandblast grit that may be uncovered during site improvement activities. The shoreline development permit was for retention of covered moorage, paving the parking area, developing a stormwater swale, and developing a 3:1 slope vegetated buffer zone along the shoreline.

An Ecology site inspection of December 30, 1992 showed that Modutech had removed several truckloads of grit from an old dump area at the north end of the site, from the roadway along the shore, and from around the boat prep shed and sandblast shed. The bulk of the grit, at the north end of the site, had been removed with a backhoe until clean packed sand was observed. The area was then backfilled with clean gravel. The grit along the roadway and around the sheds had been removed with an industrial vacuum. Some surface grit in the northwest corner of the site was also vacuumed. Grit around the marine railway had also been cleaned up at the time of the December 30 inspection.

In a letter dated January 6, 1993, Ecology requested Modutech to dig test pits within a proposed drainage swale and along part of the shoreline that Modutech planned to regrade to a 3:1 slope for a vegetated buffer zone. Ecology observed test pits within the swale area on August 26, 1993, and within the vegetated buffer zone area on September 21, 1993. No sandblast grit was observed. By the time of the August, 1993 inspection, residual sandblast grit in the intertidal zone had been removed. During a 1994 inspection, Ecology observed that the last of the sandblast grit on the site was scraped up and was awaiting removal. This area of grit was immediately behind the office, in a boat mold storage area. The boat molds had been moved and the grit removed with a vacuum. In the January 6, 1993 letter, Ecology also asked Modutech to describe how they plan to deal with any grit discovered when bank regrading took place. The bank work was delayed until recently. In September, 1998, Modutech sent Ecology a letter explaining that any sandblast grit found during the bank restoration work will be removed, tested, and hauled to an appropriate disposal site. Bank work is scheduled to take place within a year from now.

An Ecology site inspection report from 1991 noted that auto shredder residue (ASR) had been discovered in the northwest

corner of the property. This was sampled and found to contain 9.2 ppm PCB's. The MTCA Method A Industrial Cleanup level is 10 ppm. Ecology inspectors looked for visual indications of the ASR during site inspections on June 17, 1992 and December 30, 1992. No ASR was observed. However, the area where the fluff was originally identified was covered by fiberglass boat molds, so access was difficult. Modutech reported digging in that area when removing the large stockpile of sandblast grit and did not observe any ASR. Two intertidal sediment samples taken in front of Modutech for the Hylebos Waterway Cleanup Committee (Striplin Environmental Associates, 1995) contained 100 and 305 ppb PCB's; the Commencement Bay Sediment Quality Objective (CBSQO) is 300 ppb. However, sediment from the same location showed no adverse impacts to aquatic life when tested in bioassays (Striplin Environmental Associates, 1995).

Modutech is covered under the general NPDES stormwater permit for small boatyards. Ecology first issued Modutech a Small Boatyard Permit (#WAG-03-1016) on April 1, 1993 and renewed the permit on January 9, 1998. The permit requires Modutech to:

1. implement best management practices to keep hull scrapings from contact with the waterway directly or indirectly via precipitation,

2. treat or recycle hull wash water; and

3. conduct monitoring of oil and grease, total suspended solids, and copper in stormwater (quarterly in the renewed permit). The permit contains no effluent limits.

Modutech ceased discharge of pressure wash wastewater to the Hylebos Waterway in March of 1993, after installing a closed loop recycle system for treatment of the water. Modutech is adequately implementing BMPs to prevent contaminants from the boat repair and maintenance operation from reaching Hylebos Waterway. As a result of these actions, Modutech is in compliance with their NPDES permit.

Data Demonstrating Source Control Effectiveness

Stormwater quality is summarized below:

| Date Stormwater Sample Was Taken | Total Suspended Solids (ppm) | Total Recoverable Copper (ppb) |
|---|---|---|
| 10/7/96 (swale) | 39 | 37 |
| 11/12/96 (swale) | 59 | 590 |
| 1/14/97 (swale) | 36 | 720 |
| 1/21/97 (swale) | 13 | 200 |

| | | |
|---|---|---|
| 10/14/97 (swale) | 8 | 100 |
| 5/15/98 (swale) | 11 | 48 |
| 5/15/98 (ways) | 61 | 1,300 |
| 6/10/98 (swale) | 7 | 62 |
| 6/10/98 (ways) | 5 | 1,100 |
| 9/18/98 (swale) | 47 | 180 |
| 9/18/98 (ways) | 71 | 2,700 |

These concentrations of copper exceed the marine chronic and acute water quality standards (both are 2.9 ppb). In addition, an intertidal sediment sample taken in front of Modutech for the Hylebos Waterway Cleanup Committee (Striplin Environmental Associates, 1995) contained 657 ppm copper, which exceeds the Commencement Bay Sediment Quality Objective (CBSQO) of 390 ppm (zinc was at 219 ppm, which is below its CBSQO). However, sediment from the same location showed no adverse impacts to aquatic life when tested in bioassays (Striplin Environmental Associates, 1995). The results of bioassays override chemistry results for determining sediment cleanup needs, so the sediment in front of Modutech is not considered sufficiently contaminated to deserve cleanup action.

Ecology is concerned about the water quality standard exceedances, and is working with small boatyards to find new ways to reduce the metals loading (such as dustless sanders and stormwater treatment).

EPA conducted an analysis of the potential for stormwater to contaminate sediments and provided their findings in a report that is appended to this Milestone Report. For Modutech, the existing information suggests no potential for stormwater to contaminate sediments. This site is no longer considered a source of problem chemicals to Hylebos Waterway sediments.

2. Jones-Goodell (1690 Marine View Drive; voluntary MTCA cleanup)

Description of Site and Contamination

Jones-Goodell operated a 2-acre ship/boatbuilding and repair facility at this site from 1968 until 1995. In June of 1995, they filed for Chapter 7 bankruptcy and are not currently in operation. A marine railway served as a haul-out and work area for repair and painting of boats. Stormwater from the paved front portion of the site discharged into the gravel yard at the back of the site. The storm drain line from this gravel yard appeared to be broken, and the yard contained puddles and muddy areas during Ecology inspections. Stormwater from a small paved area

to the southeast of the building drained to a sump for the old boatwash system.

In 1992 Ecology inspected the site and discovered spent sandblast grit used as fill behind a bulkhead at the marine railway. Erosion had caused some of the grit to leak onto the tide flats of the marine railway. Samples of the grit showed it contained copper at 1290 mg/kg, which exceeded the Commencement Bay Sediment Quality Objective (390 mg/kg).

In 1996 and 1997, a prospective purchaser (Way Conn Properties) conducted an investigation of the site (Dames and Moore, 1996; Dames and Moore, 1997). A grid pattern of twenty-eight soil samples were taken from near-surface soil (0-1.2 feet deep) and were analyzed for problem metals and petroleum hydrocarbons. Two samples contained arsenic above the Commencement Bay Sediment Quality Objective of 57 ppm. One sample contained 510 ppm arsenic, located beneath the concrete slab next to a bottomless boat transfer pit. The other sample contained 100 ppm arsenic, and was located in the middle of the boat transfer pit. Heavy oil, which contains PAHs (problem chemical group) was found above the MTCA Level A Cleanup Level (200 ppm) in four samples (250-570 ppm). Three of those samples were in the boat transfer pit, and the other was located where the highest arsenic concentration was found (under concrete slab next to the boat pit).

Groundwater was sampled for metals analysis at 3-5 feet below ground surface from ten site locations and at 25 feet below ground surface at three site locations. All samples contained Hylebos Waterway problem metals below detection limits, with the exception of two shallow groundwater samples, which contained copper at 25 and 33 ppb.

Source Control Actions

In 1992 Ecology requested Jones-Goodell to remove the grit behind the bulkhead and also to remove sandblast grit that had been observed on the ground around the blasting shed. At a later site visit, Ecology inspectors found that the grit behind the bulkhead had been removed, as had the majority of the piles of grit around the blasting shed (some surface grit remained). No stormwater samples were taken for chemical analysis because once the stormwater flowed onto the gravel yard, there was no apparent location where the water flowed from the yard to the waterway (appeared to all infiltrate or pond).

Jones-Goodell was covered under the general NPDES stormwater permit for small boatyards until they ceased operations. They installed a treatment system for their boat wash wastewater in 1992, consisting of an oil/water separator vault that discharged to the sanitary sewer. The City of Tacoma approved the discharge

to the sanitary sewer in April, 1994. Prior to construction of the vault in 1992, the wash water discharged to Hylebos Waterway. In May, 1992, Ecology inspectors observed paint residue on the concrete portion of the marine railway, and in the shallow trough. Both of these areas are covered with water at high tides.

In 1997, Way Conn Properties excavated all soil from the bottom of the boat transfer pit to a depth of 12-18 inches (exact depth depended on the observed presence of sandblast grit). In addition, the concrete slab was removed and the underlying soil was removed to a depth of 18-24 inches.

Data Demonstrating Source Control Effectiveness

Nine confirmation samples below the limits of excavation contained no problem chemicals above the Commencement Bay Sediment Quality Objectives. On December 8, 1997, Ecology sent Way Conn Properties a letter stating that no further action was needed under MTCA for the upland portion of the property (above +12 MLLW).

The source of stormwater contamination (grit/paint) is no longer in contact with stormwater, so Ecology believes this site is no longer a source of problem chemicals to Hylebos Waterway sediments.

Future Developments at the Site

In August, 1998, Hyland Marine sent Ecology an application for coverage under the General Boatyard Permit to conduct boatyard repair work at the old Jones-Goodell property. The application included plans to construct a washwater recycling system and a stormwater sand filtration trench between the work area and the waterway (1.5 feet deep and 3 feet wide). Ecology has been working with Hyland Marine's consultant on these plans. By 8/99, the site was regraded and paved.

3. Hylebos Marina (1940 Marine View Drive; NPDES Permit)

Description of Site and Contamination

Hylebos Marina includes a boat repair yard which has operated at 1940-1950 Marine View Drive since about the mid 1960's. Lessees within this property include Harbor Service and South Sound Marine. The site includes a haul-out pier, a boat washing facility with a recirculating system for wastewater, and a gravel yard where boats are hauled out and worked on. About 200 boats up to 50 feet in length are worked on at the facility per year.

Site stormwater is discharged to Hylebos Waterway through a ditch at the northwest end of the gravel yard and through a series of catch basins and an outfall in the parking area near the office. In June 1995 the site owners received a shoreline permit for site improvements, including paving of the gravel yard, upgrading the storm drainage system, installing stormwater filtration swales, and construction of another haul-out and boat wash facility.

Source Control Actions

Hylebos Marina is covered under the general NPDES stormwater permit for small boatyards. Ecology first issued Hylebos Marina a Small Boatyard Permit (#WAG-03-1020) on May 26, 1993, and renewed the permit on January 9, 1998. The permit requires Hylebos Marina to:

1. implement best management practices to keep hull scrapings from contact with the waterway directly or indirectly via precipitation;

2. treat or recycle hull wash water; and

3. conduct monitoring of oil and grease, total suspended solids, and copper in stormwater (quarterly in the renewed permit). The permit contains no effluent limits.

Hylebos Marina ceased discharge of pressure wash wastewater to the Hylebos Waterway in 1993, after installing a closed loop recycle system for treatment of the water. Hylebos Marina is adequately implementing BMPs to prevent contaminants from the boat repair and maintenance operation from reaching Hylebos Waterway. As a result of these actions, Hylebos Marina is complying with their NPDES permit.

Data Demonstrating Source Control Effectiveness

Stormwater quality is summarized below:

| Date Stormwater Sample Was Taken | Total Suspended Solids (ppm) | Total Recoverable Copper (ppb) |
|---|---|---|
| 10/18/96 | 25 | 920 |
| 12/5/96 | 10.5 | 259 |
| 5/14/98 | 112 | 2,100 |
| 6/24/98 | 26 | 810 |

These concentrations of copper exceed the marine chronic and acute water quality standards (both are 2.9 ppb). EPA conducted an analysis of the potential for stormwater to contaminate sediments and provided their findings in a report that is

appended to this Milestone Report. For Hylebos Marina, the existing stormwater data suggests a moderate potential for stormwater to contaminate sediments. However, this analysis does not reflect actual sediment data near the facility. Ecology believes it is unlikely that recontamination of sediments will occur after sediment cleanup takes place in Hylebos Waterway because:

(1) two intertidal sediment samples taken in front of Hylebos Marina for the Hylebos Waterway Cleanup Committee (Striplin Environmental Associates, 1995) contained copper at 73 ppm and 94 ppm, and zinc at 82 ppm and 268 ppm, which are below the Commencement Bay Sediment Quality Objectives (CBSQO's) (390 ppm for copper and 410 ppm for zinc); and

(2) sediment from the same location showed no adverse impacts to aquatic life when tested in bioassays (Striplin Environmental Associates, 1995).

Ecology is concerned about the water quality standard exceedances, and is working with small boatyards to find new ways to reduce the metals loading (such as dustless sanders and stormwater treatment).

Ecology no longer considers Hylebos Marina to be an ongoing source of problem chemicals to Hylebos Waterway sediments.

4. Nordlund Boat (1622 Marine View Drive; NPDES Permit)

Description of Site and Contamination

Nordlund Boat has operated a fiberglass boat construction business on this site at 1622 Marine View Drive since 1988. The primary activity at the site is construction and retrofitting of fiberglass pleasure boats. Some repair and painting is also done. The site is paved. Stormwater is routed to a detention basin which drains to Hylebos Waterway.

Source Control Actions

Nordlund is covered under the general NPDES stormwater permit for small boatyards. Ecology first issued Modutech a Small Boatyard Permit (#WAG-03-1025) on November 5, 1993, and renewed the permit on January 9, 1998. The permit requires Nordlund to:

1. implement best management practices to keep hull scrapings from contact with the waterway directly or indirectly via precipitation;

2. treat or recycle hull wash water; and

3. conduct monitoring of oil and grease, total suspended solids, and copper in stormwater (quarterly in the renewed permit). The permit contains no effluent limits.

Nordlund ceased discharge of pressure wash wastewater to the Hylebos Waterway in June of 1995, after installing a closed loop recycle system for treatment of the water. Nordlund is adequately implementing BMPs to prevent contaminants from the boat repair and maintenance operation from reaching Hylebos Waterway. As a result of these actions, Nordlund is complying with their NPDES permit.

Data Demonstrating Source Control Effectiveness

Stormwater quality is summarized below:

| Date Stormwater Sample Was Taken | Total Suspended Solids (ppm) | Total Recoverable Copper (ppb) |
|---|---|---|
| 10/3/97 (south drain) | Not measured | 120 |
| 5/14/98 (south drain) | 5 | 250 |
| 5/14/98 (north drain) | 3 | 30 |
| 7/15/98 (south drain) | 10 | 720 |
| 7/15/98 (north drain) | <3 | 60 |

These concentrations of copper exceed the marine chronic and acute water quality standards (both are 2.9 ppb). EPA conducted an analysis of the potential for stormwater to contaminate sediments and provided their findings in a report that is appended to this Milestone Report. For Nordlund, the existing information suggests no potential for stormwater to contaminate sediments. This site is no longer considered a source of problem chemicals to Hylebos Waterway sediments.

Ecology is concerned about the water quality standard exceedances, and is working with small boatyards to find new ways to reduce the metals loading (such as dustless sanders and stormwater treatment).

5. USG Interiors (2301 Taylor Way; MTCA Agreed Order)

Description of Site and Contamination

USG Interiors (USG) is located on 9.4 acres at 2301 Taylor way, and drains to one stormwater outfall. It is an active rock wool

manufacturing plant, which has been in operation at this location since 1959. The plant produces a product typically referred to as mineral fiber insulation or "rock wool". The product process includes mixing and heating raw materials to a molten state, and extruding these materials under pressure to produce mineral fiber. Between 1959 and 1973, ASARCO slag was used as one of the raw materials. After 1973, steel mill slag and basalt rocks replaced the ASARCO slag as a raw material. Solid waste generated during the mineral fiber production process includes shot, off specification mineral fiber, and a smaller volume of baghouse dust. The shot looks like black, well-graded medium to coarse sand. The baghouse dust is typically gray and has the consistency of dry, loose silt.

Some of these wastes are now landfilled and some are recycled. Before 1973, the wastes were spread on the unpaved property between the plant and the waterway, an area measuring about 250'x275'. The wastes were also found in a berm about 500'x30' on the site (removed in 1996 as part of the cleanup work). One end of the berm was located next to the waterway and the other end was located 500 feet upland.

In June 1992, Ecology took one sample of seep water, one sample of stormwater, and four samples of surficial bank sediments (composited as one) for anaylsis of metals, including those which are problem chemicals in Hylebos Waterway. The data were as follows:

| Problem Metal | Bank Seep Concentration (ppb, total) | Stormwater Concentration at outfall; dry weather (ppb, total) | Marine Chronic Water Quality Standards (ppb) | Bank Sediment Concentration (ppm) | Commencement Bay Sediment Cleanup Objective (ppm) |
|---|---|---|---|---|---|
| Arsenic | 1460 | 563 | 36 | 82 | 57 |
| Copper | 3750 | 98 | 2.9 | 151 | 390 |
| Lead | 2940 | 20 | 8.5 | 152 | 450 |
| Nickel | 34 | 10 | 8.3 | 17 | >140 |
| Zinc | 11300 | 68 | 86 | 485 | 410 |
| Antimony | 452 | 88 | None | 15 | 150 |
| Mercury | 0.45 | 0.05 | 0.025 | 0.058 | 0.59 |

The seep sample contained metals far exceeding water quality standards. Most metals also exceeded water quality standards in stormwater, but to a lesser extent. The bank sediment sample exceeded Commencement Bay Sediment Cleanup Objectives for arsenic and zinc. Sediment samples taken in 1996 at 0-1 foot deep by USG during a pre-cleanup survey of the bank contained much higher metal concentrations (AGI, 1997a); ten samples taken at 0 to -5 feet MLLW contained the following concentration ranges:

Arsenic: 12-2,700 ppb

Copper: 34-3,400 ppb
Lead: 17-4,300 ppb
Zinc: 32-26,000 ppb

It is unclear whether the discrepancy between the 1992 samples and the 1996 samples is due to the difference in depth of samples, location of samples, or both.

USG conducted an site investigation in two phases. The Phase I investigation took place in March, 1994. USG's consultant (AGI Technologies) monitored the quality of groundwater in the surface aquifer (4-9 feet below ground surface) from six of eleven wells, and analyzed eight soil samples (0-12 inches deep) for metals. Two of the wells were placed 25-50 feet from the waterway. Seeps were also identified and mapped. Phase I was completed by May 1994 (AGI Technologies, 1994a).

Soil samples at 0-2 and 2-12 inches contained no problem chemicals exceeding Commencement Bay Sediment Quality Objectives (later investigation work discussed below showed that soils are contaminated with metals at lower depths). This means that overland transport of problem chemicals into the waterway via stormwater is not a likely pathway of concern.

Groundwater from the two wells placed 25-50 feet from the waterway contained concentrations of problem metals two or three orders of magnitude lower than the seep concentrations shown in the table above (a major source of metal contamination was later discovered between these wells and the waterway, as discussed below).

Higher arsenic concentrations were observed in groundwater from a well 250 feet from the shoreline (1,900 ppb total) where baghouse dust was likely buried, and from a well 850 feet from the shoreline (1,600 ppb total). Soil and groundwater in this part of the site do not appear to currently impact the Hylebos Waterway via direct seepage or erosion into the waterway, because:

1. the contamination is 250 feet from the waterway,
2. surface soils are not contaminated with problem metals, and
3. wells placed closer to the waterway have much lower metal concentrations.

Phase II investigation work took place in November 1994. AGI Technologies constructed three new wells, including another adjacent to the waterway. AGI sampled the second aquifer (19-29 feet below ground surface)from five wells and the surface aquifer (4-9 feet below ground surface)from nine wells. AGI also sampled water from four seeps, stormwater (one wet-weather sample), and two well boring soil samples from each of seven wells (3-7 feet deep). Ecology also obtained six soil samples from one well (1.5-

7 feet deep). AGI completed Phase II February, 1995 (AGI Technologies, 1995).

Surface aquifer samples showed lower arsenic concentrations than during Phase I samples. Most second aquifer samples were lower still. Stormwater metal concentrations were lower than during the Phase I testing, but it was not clear whether this was due to the storm drain cleaning or variations due to wet/dry weather sampling (see table below). Seep metal concentrations were also lower than during Phase I testing, but continued to be found far above water quality standards (see table below).

| Problem Metal | Bank Seep Concentration (highest from 4 seeps; ppb, total) | Stormwater Concentration at outfall; wet weather (ppb, total) | Marine Chronic Water Quality Standards (ppb) | Commencement Bay Sediment Cleanup Objective (ppm) |
|---|---|---|---|---|
| Arsenic | 590 | 220 | 36 | 57 |
| Copper | 930 | 12 | 2.9 | 390 |
| Lead | 430 | 4 | 8.5 | 450 |
| Nickel | 36 | Not detected | 8.3 | >140 |
| Zinc | 650 | 59 | 86 | 410 |
| Antimony | 240 | Not detected | None | 150 |
| Mercury | Not measured | Not measured | 0.025 | 0.59 |

Each of the 14 well boring soil samples contained arsenic, most (11) at levels below the MTCA Industrial Level A threshold (200 ppm). Three soil samples exceeded this threshold (300 ppm, 386 ppm, and 1,200 ppm). The well containing soil at 1,200 ppm is located where baghouse dust was likely buried, and is also the well where the highest groundwater arsenic concentrations were observed.

Source Control Actions

In 1973, USG voluntarily removed surficial waste material between the plant building and the Hylebos waterway. The extent of residual arsenic remaining in the soil after this removal action is unknown. Some of the waste materials were incorporated into a berm along the northwest property boundary between USG and Murray Pacific. This berm was later removed in 1996 to a landfill as described below. The berm was originally constructed to prevent logs from the adjacent log sort yard from rolling onto the USG property.

On March 1, 1994, USG signed an Agreed Order (# DE93TC-S163) with Ecology requiring USG to conduct a two-phase site investigation (described above).

In April of 1994, USG cleaned out sludge and sediments from its storm drain lines, catch basins, and manholes (AGI Technologies, 1994b). Some of the storm drain system was in poor condition, allowing infiltration of groundwater.

USG continued stormwater monitoring at the outfall from 12/94 until 5/95 (four dry weather samples). Concentrations of arsenic ranged from 340-1000 ppb, which indicated that the drain cleanout was not successful in reducing stormwater contamination. From February-May 1995, USG conducted a video camera survey and dye-testing to determine where groundwater was infiltrating the drain lines. These studies indicated that there were several areas of groundwater infiltration. In May 1995, USG sealed a leaky main line joint 16 feet from the outfall and installed plugs in abandoned laterals.
These measures were not successful; the last of the four stormwater samples was taken after these actions were taken, yet had the highest concentration of arsenic (1,000 ppb) (AGI Technologies, 1996a).

The data from the Phase I and II investigations showed seeps with high concentrations of metals, yet wells place 25-50 feet from the waterway showed far lower concentrations. This information suggested that an unidentified source of metals existed between the waterway and the wells. In addition, the information gained from the storm drain work indicated further work was needed to prevent the drains from transmitting contaminated groundwater to the waterway. If a source of metals were found to exist between the wells and the waterway, removal of that source may solve both the seep and stormwater contamination problems. Therefore, Ecology required USG to conduct a bank investigation. These and other needs were included in an amendment to the Agreed Order, signed in August 1995. The complete set of needs were:

1. investigate contaminated materials within and upon the bank of the Hylebos waterway;

2. manage waste products to prevent discharge of contaminated materials to Hylebos Waterway;

3. take additional actions to prevent infiltration of contaminated groundwater into the stormwater line;

4. reduce loading of contaminated groundwater into the waterway by paving the site;

5. produce and implement a compliance monitoring plan, including a three year schedule for groundwater monitoring; and

6. segregate wastes in an upland berm and remove all materials above the MTCA method A industrial cleanup levels (200 ppm for arsenic) to an appropriate landfill.

USG decided, with Ecology concurrence, to specifically respond to the above needs with the following actions: conduct the bank and berm investigation, take actions needed to remove any source material found in the bank above Commencement Bay Sediment Quality Objectives and then resample the seeps, remove any contaminated soils in the berm (above MTCA method A cleanup levels), replace the storm drain lines, pave the site, and monitor stormwater quality quarterly before and after storm drain replacement work.

In February 1996, USG dug eight test pits at various depths (0-4 feet) on the top of the bank adjacent to the waterway, and eight auger borings into the bank slope, 1-2 feet deep. In May, 1996, USG dug three additional test pits. The test pits revealed the presence of shot extending about 140 feet along the waterway at very high concentrations (up to 2,900 ppm). Copper and zinc concentrations were also very high (highest copper concentration was 6,400 ppm and highest zinc concentration was 22,000 ppm)(AGI Technologies, 1996b).

Twenty-five of the shot samples were also subjected to TCLP leach tests (mild acid). The concentrations of arsenic in the leachate averaged 780 ppb (marine chronic water quality standard is 36 ppb). Four of the samples also had high lead concentrations in the leachate, ranging from 720 to 4,000 ppb (the marine chronic water quality standard is 8.5 ppb).

The bank investigation was highly successful in locating the source of the high concentrations of metals in the seep water (and likely the outfall stormwater as well). Based on visual observations and confirmation lab samples, the aerial extent of the contamination zone was defined. In April 1996, Ecology and USG signed a second amendment to the Agreed Order, which required USG to develop and implement a plan for removing contaminated soil from the bank down to the mean low low water level (MLLW), and replacing it with clean fill. The amended order also required USG to replace storm drain lines and pave the site (after the bank cleanup is completed).

During the summer of 1996, USG removed 4,420 tons of contaminated soil in the upland berm area and disposed of it at two landfills (2380 tons to Envirosafe Services landfill in Idaho, and 3,134 tons to Rabanco landfill)(AGI 1996c). Nineteen post-cleanup confirmation soil samples were taken beneath the excavated area. Each confirmation sample was a composite of five samples taken within one of nineteen segmented areas. Additional excavation was needed in a few areas because arsenic exceeded the MTCA cleanup level (200 ppm, based on MTCA Method A industrial).

Confirmation soil samples taken below the additional excavation area contained arsenic below the cleanup level.

In July 1997, the contaminated bank soils were removed (3,134 tons) and disposed of at Rabanco landfill (Roosevelt, Washington). Thirty-eight post-cleanup confirmation soil samples were taken throughout the excavated area and analyzed for arsenic, copper, lead, and zinc. The excavated area was restored with quarry spalls covered with pit run sand. In addition, topsoil was placed over the sand above the tide influence and seeded with grass. Site grades were returned to approximate previous grades. EPA will address contaminated intertidal sediment remaining below MLLW during their waterway-wide sediment cleanup effort. The bank cleanup and restoration effort was documented in AGI (1997b).

In September, 1998, the site was paved. The storm drain lines were replaced by November, 1998.

Data Demonstrating Source Control Effectiveness

Most post-excavation soil samples in the bank contained metals below the Commencement Bay Sediment Quality Objectives (CBSQO's). In those few locations where CBSQO's were exceeded, USG excavated further until no exceedances were measured. Water sampled from two seeps in April 1998 and April 1999 (both after bank cleanup) contained metals ranging in concentration as follows:

Arsenic: below detection limit (5 ppb) to 90 ppb
Copper: below detection limit (1-20 ppb) to 31 ppb
Lead: below detection limit (3 ppb) to 6.1 ppb
Zinc: below detection limit (1-50 ppb) to 130 ppb

In addition, water sampled from the new storm drain outfall in April 1999 (a dry weather sample) and May 1999 (after a heavy rainfall) contained metals ranging in concentration as follows:

Arsenic: 6-87 ppb
Copper: below detection limit (10 ppb)
Lead: below detection limit (3-4 ppb)
Zinc: 15-150 ppb

EPA conducted analyses of the potential for groundwater and stormwater to contaminate sediments and provided their findings in two reports that are appended to this Milestone Report. For USG, the existing information suggests no potential for groundwater to contaminate sediments and no potential for stormwater to contaminate sediments. This site is no longer considered a source of problem chemicals to Hylebos Waterway sediments.

6. Murray Pacific Log Sort Yard #1 (3502 Lincoln Avenue; MTCA Agreed Order and Consent Decree)

History of Site and Contamination

The Murray Pacific Log Sort Yard #1 is an 18-acre site, located at 3502 Lincoln Avenue, on the corner of Lincoln Avenue and Taylor Way, and adjacent to Hylebos Waterway. The property is owned by Murray Pacific Corporation and has been inactive for several years. Between 1967 and 1985, Murray Pacific Corporation operated the site as a log sort yard. From 1975 through 1980, ASARCO copper smelting slag was used as ballast on site roadways to help support the weight of heavy log sorting equipment. The slag contained arsenic, lead, zinc, and copper, which are problem chemicals for the Head of Hylebos Waterway Problem Area. The grinding of the slag by heavy vehicle traffic, in combination with acidic woodwaste leachate, released metals contained in the slag into the Hylebos Waterway via surface water discharge.

In 1993 ASARCO studied the extent and magnitude of metals contamination in the soil, ditch sediments, surficial waste piles, and surface and groundwaters. The Remedial Investigation report was submitted to Ecology in December 1993 (Hydrometrics Inc., 1993) and the Feasibility Study was submitted to Ecology in February 1994 (Hydrometrics Inc., 1994). Hydrometrics collected 90 soil samples from the surface of the site (from a grid pattern), 20 soil samples at a two-feet depth, and 35 soil samples from 11 wells at depths ranging from 2 to 26 feet below ground surface. About 80% of the surface soil samples contained metals exceeding threshold levels initially selected for the site (Commencement Bay Sediment Quality Objectives within 20 feet of the waterway, and MTCA industrial cleanup standards for the remainder of the site). Soils at depth showed far less widespread contamination. Only about 9% of samples taken below 0.5 feet exceeded the initial threshold levels.

Hydrometrics installed 15 wells to monitor groundwater quality for metals, and also sampled five other pre-existing wells. Thirteen of the wells were installed to measure water quality from the lower aquifer (20-35 feet deep), five were installed in the upper aquifer (5-16 feet deep), and one was installed across both aquifers. Water was sampled quarterly from 2/92 until 9/93. Among six wells close to the waterway, one contained arsenic in the shallow aquifer at levels consistently above marine chronic water quality criteria (MCWQC)(samples averaged 142 ppb arsenic, MCWQC is 36 ppb). A seep sampled from the bank contained arsenic at a similar concentration (200 ppb).

Higher concentrations of arsenic were found in water from two wells located farther from the waterway (225 and 350 feet). Arsenic concentrations ranged from 930 ppb to 8,000 ppb. The wells were located where an old ditch once existed at the northeast boundary of the site (filled in years before the site was investigated). However, two other wells place in the old ditch closer to the waterway did not contain contaminated groundwater.

Before the site was cleaned up, precipitation drained to ponds on site and to a ditch in the southwest portion of the property. This ditch connected to Hylebos Waterway via an 18" storm drain line and was referred to as the "central ditch". Stormwater from this ditch contained high levels of arsenic; it has been sampled during three investigations: Norton and Johnson, (1985), Kennedy/Jenks/Chilton (1987), and Hydrometrics (1993). Norton and Johnson (1985) was an investigation conducted by Ecology. Total concentrations of arsenic measured during these investigations ranged from 560-29,000 ppb (marine chronic water quality standard is 36 ppb).

Hydrometrics took sediment samples from the central ditch in four locations at 0-8", 12", 24", and 36" depths for metals analyses. Average concentrations exceeded Commencement Bay Sediment Quality Objectives for arsenic by a factor of seven. Average concentrations of other metals did not exceed Commencement Bay Sediment Cleanup Objectives. Metal concentrations decreased substantially with depth.

Source Control Actions

In September 1991, Agreed Order # DE 91-S234 was signed between Ecology and the Murray Pacific Corporation and ASARCO, requiring Murray Pacific and ASARCO to conduct a remedial investigation and feasibility study (RI/FS) (described above). Based on these investigations, Ecology determined that 34,000 cubic yards of soil and ditch sediments were sufficiently contaminated to justify remediation. Ecology issued a Cleanup Action Plan in November 1994. The Cleanup Action Plan required Murray Pacific and ASARCO to remove soil, ditch sediments, and wastes exceeding 57 ppm arsenic within 20 feet of the waterway, and 200 ppm arsenic elsewhere. The Cleanup Action Plan also required post-cleanup groundwater monitoring and soil sampling. In 1995, Ecology, Murray Pacific, and ASARCO signed Consent Decree # 95-2-12876-4, which required Murray Pacific and ASARCO to implement the Cleanup Action Plan.

In 1996, the cleanup was completed to Ecology's satisfaction. Murray Pacific and ASARCO voluntarily decided to clean up the

entire site to the MTCA residential standard (20 ppm arsenic) to improve the marketability of the site. Soil containing arsenic between 20 and 100 ppm was removed and disposed of at the ASARCO smelter site (31,000 cubic yards, or 50,000 tons). Soil containing arsenic above 100 ppm was disposed of at the Columbia River landfill in Oregon (91,000 cubic yards, or 146,000 tons). Post-cleanup upland soil sampling (493 samples throughout the site) demonstrated that the MTCA residential cleanup levels had been achieved throughout the site (Hydrometrics, 1996). The excavated soil was replaced with 161,000 tons of clean backfill rock surfacing, and was regraded to drain to an oil-water separator which discharges to Hylebos Waterway. No stormwater sampling was required because only clean fill exists on the site at the surface.

Murray Pacific and ASARCO also volunteered to investigate and clean up intertidal sediments containing arsenic above 57 ppm (the Commencement Bay Sediment Quality Objective) in front of the Murray Pacific site. In 1996, intertidal sediments were removed down to native marsh silts. The area excavated is shown on a map contained in Attachment 1. Twenty-one confirmation soil samples were taken at 50-foot intervals. Based on the results of the confirmation samples, the sampled area was either prepared for backfill or further excavated. All final excavation samples were above the Commencement Bay Sediment Quality Objective for arsenic (Hydrometrics 1996).

Data Demonstrating Source Control Effectiveness

Post-cleanup upland soil sampling demonstrated that the MTCA residential cleanup levels had been achieved throughout the site. Post-cleanup groundwater monitoring data were obtained twice in 1997 (January and July) and twice in 1998 (February and July) from three pairs of new wells. One well from each pair was used to sample the shallow aquifer and the other well was used to sample the deeper aquifer. Two pairs of wells were located near the waterway. Total metals data from these wells are summarized in Attachment 1 (from Shenk and Associates, 1998).

EPA conducted analyses of the potential for groundwater and stormwater to contaminate sediments and provided their findings in two reports that are appended to this Milestone Report. For Murray Pacific #1, the existing information suggests no potential for groundwater to contaminate sediments. No post-cleanup data were available for stormwater. However, the surface of the site is now clean backfill gravel, which prevents any residual metal from contacting stormwater. Therefore, Ecology believes this

site is no longer a source of problem chemicals to Hylebos Waterway sediments.

7. U.S. Gypsum Landfill (U.S. Highway 99; pre-MTCA cleanup)

Description of Site and Contamination

U.S. Gypsum Landfill (also known as USG Corp Highway 99 Site) is a 3-acre site located between US Highway 99 and Interstate 5 west of the Town of Milton. Between 1971 and 1973 this site received baghouse dust comprised chiefly of insulation produced by USG from ASARCO slag. The baghouse dust, which was 10% of the total waste, contained 21.7% arsenic, which is a problem chemical for the Hylebos Waterway Problem Area. Drainage from the site is toward Hylebos Creek.

In 1985, Ecology approved USG's post-cleanup groundwater monitoring plan, which required USG to sampled two wells for groundwater in 1986 (USG, 1984b). If concentrations of arsenic in the wells were below 0.5 ppm, no additional monitoring would be required.

Source Control Actions

In August 1984, Ecology and U.S. Gypsum signed a Consent Order requiring U.S. Gypsum to excavate and remove wastes containing arsenic. USG developed a cleanup plan (USG, 1984a), and Ecology approved it in 1984. The cleanup was completed to Ecology's satisfaction in January 1985. USG removed 28,500 tons of contaminated waste material. Thirty post-cleanup confirmation soil samples were taken, and three tested above the soil cleanup level of 0.5 ppm arsenic. Additional excavation work was conducted in those areas until the cleanup level was achieved.

Data Demonstrating Source Control Effectiveness

The average of two groundwater samples taken in 1986 was below the groundwater cleanup level (also 0.5 ppm), and Ecology determined that additional groundwater sampling was not required. All post-cleanup soil confirmation samples were below the soil cleanup level of 0.5 ppm.

Ecology believes that the actions taken by U.S. Gypsum were sufficient to keep arsenic out of Hylebos Creek. This determination has been verified through analysis of sediment samples taken by the Hylebos Waterway Cleanup Committee from the creek bottom near the Head of Hylebos Waterway (concentrations of

arsenic in the creek bottom did not exceed the sediment quality objective for arsenic).

8. Don Oline Marine View Drive Autofluff (2120 Marine View Drive; MTCA Consent Decree)

Description of Site and Contamination

The waterway side of this property at 2120 Marine View Drive has been used to store old pieces of equipment, tanks, and other miscellaneous junk for an unknown period of time. Two concrete bulkheads exist at the shoreline, where barges are sometimes beached for maintenance. The front of the site, facing Marine View Drive, is leased to Mather Auctioneers.

In 1992, Ecology inspectors discovered automobile shredder residue (ASR), a by-product of the automobile dismantling industry, as a fill material adjacent to Hylebos Waterway. The material was found in a short "bluff" type bank that exposed to erosion from the tides. A sample of the material contained 44 ppm arsenic, 82.1 ppm cadmium, 2820 ppm copper, 4120 ppm lead, 431 pm nickel, 13,700 ppm zinc, and 412 ppb total PCB. With the exception of arsenic and nickel, these concentrations substantially exceed the Commencement Bay Cleanup Objectives (57 ppm for arsenic, 5.1 ppm for cadmium, 390 ppm for copper, 450 ppm for lead, and 300 ppb for PCB). The site owner later dumped concrete rubble along this bluff.

In 1993, Ecology asked Mr. Oline to dig ten test pits to determine the extent of the ASR and to conduct a TCLP leach test on the samples to determine whether the waste designates as dangerous waste. In 1993, the ten pits were dug, six of which contained ASR to a depth of about 4 feet. Soil samples from two of the pits failed the TCLP test for metals (one failed for lead and the other failed for cadmium).

Ecology then requested Mr. Oline to obtain a shoreline permit so that he could remove the material from the shoreline voluntarily. While the permit application was being processed, additional ASR was discovered in the tidal area adjacent to the site. At that point, Ecology determined that a voluntary action would not be appropriate for the site cleanup. Ecology then requested the City of Tacoma to remove the clean up activities from the shoreline permit (which included other site improvements for a different part of the site), and Ecology began to pursue the site as a formal MTCA clean-up.

However, before the formal MTCA process was initiated, General Metals volunteered to conduct a site investigation on the Don Oline site (EMCON Northwest, 1995). The site investigation was

completed in January, 1995, and involved digging 34 upland test pits and 26 intertidal test holes. Two monitoring wells were also installed. The investigation delineated the extent of the ASR, which covered about 1,230 square yards on the upland and 533 square yards in the intertidal zone. The upland ASR was an average of 3 feet thick, and the intertidal ASR averaged about 6 inches thick.

One composite ASR sample from the three test pits was analyzed for total metals. The average metal concentrations from three replicates of the composite were: As (21 ppm), Cd (28 ppm), Cu (1,866 ppm), Pb (1533 ppm), Hg (1.5 ppm), Ni (312 ppm), and Zn (6633 ppm). With the exception of arsenic, each these concentrations exceeded the Commencement Bay Sediment Quality Objectives (provided above).

Soils underlying the ASR in two of the test pits were also sampled for total metals and PCBs. No exceedances of MTCA method A Industrial Soil Cleanup levels or Commencement Bay Sediment Quality Objectives were observed.

Samples from four of the intertidal ASR test holes were analyzed for total cadmium, lead, and PCBs. Average concentrations were 8.9 ppm for cadmium, 1465 ppm for lead, and 610 ppm for PCB. These concentrations exceeded the Commencement Bay Sediment Quality Objectives (provided above). A composite of the four samples was analyzed for total copper (3,890 ppm), mercury (1.3 ppm), nickel (130 ppm) and zinc (3,550 ppm). Copper, mercury, and zinc exceeded the Commencement Bay Sediment Quality Objectives.

The site investigation also included installation of two monitoring wells. Three attempts were made to drill a third monitoring well, but in each case no water was found before encountering gray clay silt at the base of the ASR. Groundwater appeared to occur only sporadically at the site. The groundwater encountered was perched on the gray clayey silt within the ASR only. Groundwater was sampled for total and dissolved arsenic, cadmium, copper, lead, mercury, nickel, zinc, and total PCBs. Total copper, lead, zinc, and nickel exceeded marine chronic water quality criteria (MCWQC) in two or three of the wells. Maximum total metal concentrations observed were: 34 ppb for copper (MCWQC=2.9 ppb), 100 ppb for lead (MCWQC=8.5 ppb), 300 ppb for zinc (MCWQC=76.6 ppb), and 54 ppb for nickel (MCWQC=8.3 ppb). With the exception of nickel, dissolved metal concentrations were below the MCWQC. Total PCBs also significantly exceeded the marine water quality criteria in two wells (concentrations observed were 121 and 41 ppb, and the marine acute water quality criteria for all PCB arochlors combined is 0.21 ppb).

Source Control Actions

General Metals (now owned by Schnitzer Steel) reached an agreement with Don Oline in 1996 regarding additional financial liability for the cleanup. The agreement placed Don Oline in the lead for the cleanup. In 1996, Ecology and Don Oline signed a MTCA Consent Decree (#97-2-09719-9), requiring Don Oline to remove ASR on his property and intertidal ASR down to about 0 feet Mean Lower Low Tide. The cleanup standards for upland soils were 10 ppm for PCBs and cadmium, 1,000 ppm for lead, and 1 ppm for mercury. They were based on MTCA Method A Industrial soil cleanup levels. The intertidal sediment cleanup standards were the Commencement Bay Sediment Quality Objectives for acenaphthene, fluoranthene, fluorene, phenanthrene, bis-(2-ehylhexyl)phthalate, butylbenzylphthalate, dimethylphthalate, di-n-butylphthalate, n-nitrosodiphenylamine, dibenzofuran, cadmium, copper, lead, mercury, nickel, and zinc.

By January, 1998, all upland contaminated soil (1085 tons) was removed and disposed at Rabanco Landfill in Klickitat County. Intertidal sediment (474 tons) was removed as far as a back hoe could reach during low tide and disposed at Hidden Valley Landfill in Pierce County. The extent of excavation in the intertidal area is depicted in Attachment 2. The excavated areas were replaced with clean fill. In the intertidal area, the particle size distribution of the fill was designed to maximize habitat for aquatic organisms ("fish mix"). In addition, a slope resembling the pre-existing bank was re-established (Environmental Partners, 1998).

Data Demonstrating Source Control Effectiveness

For the intertidal work, post-cleanup confirmation sampling was initially conducted on a subset of chemicals to determine if further excavation was needed. Several additional excavation efforts were needed after the first. When the screening test showed no exceedances of the subset of chemicals, then a full suite of chemicals was analyzed as well. If exceedances were observed, then further excavation work was initiated until none of the full suite of chemicals exceeded cleanup standards. Thirty-six sampling locations were used to demonstrate compliance. All final confirmation samples met all of the intertidal cleanup standards (the complete list) unless method detection limits exceeded the standard (this occurred in all cases for n-nitrosodi-phenylamine, and in a few cases for bis-(2-ethylhexylphthalate), di-n-dibutyl-phthalate, and dimethylphthalate) (Environmental Partners, 1998).

The upland work also required multiple excavations, but did not use a subset of chemicals for initial characterization because there were only four chemicals requiring analysis. Nineteen sampling locations were used to demonstrate compliance. All

final confirmation samples met all of the upland cleanup standards (Environmental Partners, 1998).

The Consent Decree did not require post-cleanup groundwater monitoring because:

1. the source of the groundwater contamination was removed;

2. pre-cleanup groundwater samples were taken within the ASR, and now the ASR is gone; and

3. groundwater could not be found beneath the ASR - it was only located within the ASR itself.

This site is no longer considered a source of problem chemicals to the Head of Hylebos Waterway sediments.

9. Woodwaste Sources (Louisiana Pacific, Manke Lumber, and Weyerhauser)

The transport, storage, sorting and transfer of logs within the Head of Hylebos Waterway Problem Area has contributed to the accumulation of bark and wood debris on and in sediments within the Head of Hylebos Waterway Problem Area. Although this has not resulted in exceedances of Head of Hylebos Waterway problem chemicals, it has decreased the diversity and abundance of benthic organisms as determined by studies conducted by the Hylebos Cleanup Committee (Striplin Environmental Associates, 1995). The factors contributing to the decrease in diversity and abundance likely include elevated ammonia, sulfides, and reduced dissolved oxygen that occur as a result of decomposition of the woodwaste.

In December, 1997, Ecology signed a MTCA Agreed Order (#DE 97TC-5437) with Lousiana Pacific, Manke Lumber, and Weyerhauser ("Wood Debris Group") to:

1. determine the horizontal and vertical extent and volume of sediments adversely impacted by wood debris in the Head of Hylebos Waterway Problem Area,

2. develop a feasibility study and a cleanup action plan, and

3. develop and implement a source control plan to ensure that future management practices do not recontaminate sediments after cleanup.

The Wood Debris Group has conducted sampling in support of activity #1, and is working on the source control plan. Cleanup is expected to occur in 1999.

**REFERENCES**

1. AGI Technologies, Inc. 1994a. Phase I - Remedial Investigation, USG Interiors, Inc. 2301 Taylor Way, Tacoma, WA. May 19, 1994.

2. AGI Technologies, Inc. 1994b. Storm Drain Cleaning Summary, Phased Remedial Investigation, USG Interiors Inc. Mineral Fiber Plant, Tacoma, WA. November 15, 1994.

3. AGI Technologies, Inc. 1995. Phase II - Remedial Investigation, USG Interiors, Inc. 2301 Taylor Way, Tacoma, WA. February 23, 1995.

4. AGI Technologies, Inc. 1996a. Final Source Control Plan - Interim Actions. USG Interiors, Inc. 2301 Taylor Way, Tacoma, WA. February 12, 1996.

5. AGI Technologies, Inc. 1996b. Laboratory Data - Berm and Tidebank Soils, USG Interiors, Tacoma, WA.

6. AGI Technologies, Inc. 1996c. Berm evaluation and disposal, USG Interiors, Inc. 2301 Taylor Way, Tacoma, WA. October 23, 1996.

7. AGI Technologies, Inc. 1997a. Work plan - bank cleanup and restoration, USG Interiors, Inc. 2301 Taylor Way, Tacoma, WA. June 12, 1997.

8. AGI Technologies, Inc. 1997b. Bank cleanup and restoration. USG Interiors, Inc. 2301 Taylor Way, Tacoma, WA. December 18, 1997.

9. Dames and Moore. 1996. Soil and Groundwater Characterization. Jones- Goodell Shipbuilding Facility, 1690 Marine View Drive, Tacoma, WA. September 6, 1996.

10. Dames and Moore. 1997. Remedial Action Report. Former Jones-Goodell Shipbuilding Facility, 1690 Marine View Drive, Tacoma, WA. August 22 1997.

11. EMCON Northwest, Inc. 1995. Oline/Mather Auctioneers Site Preliminary Investigation. January 26, 1995.

12. Environmental Partners, 1998. Final Report. Don Oline autofluff site, 2120 Marine View Drive, Tacoma, WA. June 11, 1998.

13. Hydrometrics Inc. 1993. Comprehensive remedial investigation, Murray Pacific log sort yard No. 1, Tacoma,