Table ES-1
Source Control Actions – Lower Duwamish Waterway Early Action Area 4

Potential Sources	Action Items	Parties Involved
Boeing Plant 2		
Potential Historic Sources: Boeing manufactured airplane parts at Plant 2 since 1936. They used a wide range of hazardous chemicals including heavy metals (chrome, zinc, copper, cadmium, and silver); cyanide; mineral acids and bases; petroleum products; PCBs; and chlorinated solvents, such as trichloroethylene. In recent years, the function of Plant 2 shifted toward research and administration. Historical releases in some parts of Plant 2 have been a source of PCB contamination to the LDW. Comprehensive testing of catch basin solids in 2005 indicated that contaminants, primarily PCBs and metals, were accumulating in the catch basin solids in several areas. At Plant 2, Boeing is conducting data gap investigations for each of the seven CMS study areas to address source control actions that may be needed. EPA accepted work plans and data gap investigation reports for the South Yard Area and 2-60s Area. **Potential Ongoing Sources:** The South Yard, 2-60s, 2-66, and 2-40s CMS study areas contain groundwater and soil contamination. Out of the seven CMS study areas, EPA accepted work plans for the South Yard Area, 2-60s Area, and 2-66 Area; final data gap investigation reports for South Yard and 2-60s Area have been submitted to, but not yet accepted by, EPA. Boeing submitted a draft data gap investigation report to EPA. Boeing submitted the 2-40s Area work plan to EPA, but it is not yet accepted by the EPA. No information regarding CMS study areas 2-10, 2-31, and North Yard were found during a review of files from Ecology. No work plan or data gap investigation report has yet been prepared for these three areas.	Evaluation of the remaining CMS study areas will continue to determine needed source control actions.	EPA and Boeing
	Continue to delineate and evaluate the EMF plume.	EPA and Boeing
	Design and implementation of dredging, capping, and/or backfilling of the Duwamish Sediment Other Area Interim Measure will be completed.	EPA, Ecology, and Boeing
	Contaminated bank fill material will be removed.	EPA and Boeing
	Monthly sampling, including groundwater sampling and vapor sampling of the DDC wells and multiple points along the vapor treatment system, will continue.	EPA and Boeing
	Quarterly shoreline groundwater monitoring will continue.	EPA and Boeing
	The SWPPP will be re-evaluated and necessary changes will be made if process/operational changes are made at Plant 2.	Ecology and Boeing
	The removal of materials containing PCBs, specifically caulk, will be addressed.	EPA and Boeing
	Boeing and Jorgensen Forge will enter into a joint hydrologic investigation to provide additional hydrogeologic data at the boundary of the two facilities.	Boeing and Jorgensen Forge
	Boeing will include the following information to their drainage basin maps: flow direction arrows in drainage basins 34 to 37, locations of buildings and other structures, and if available, areas of known contamination. Locations of the City of Seattle and City of Tukwila discharge connections to Plant 2's stormwater drainage system will also be included.	Boeing

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Potential Sources	Action Items	Parties Involved
Data collected as part of the data gap investigations will be evaluated, interpreted, and applied to future remedy selections. Future reports will also evaluate comparisons to historical areas of COC impacts above screening levels. EPA requested that Boeing start sampling for SVOCs in the shoreline monitoring wells to address this data gap. Another data gap regarding upland facilities is the EMF plume detected in Plant 2. This plume originates along the east side of KCIA and has migrated beneath Plant 2. Additional investigations will be conducted under a CERCLA Order and will address how this plume will be reduced and/or eliminated.	In-line sediment samples in the City of Seattle and City of Tukwila systems will be collected immediately prior to discharge to Plant 2's stormwater drainage system	EPA and Boeing
	It will be determined if the city storm drain outfall discharging to EAA-4 at the South Park Bridge is Outfall J or another outfall.	EPA and City of Seattle
Jorgensen Forge		
Potential Historic Sources: This property was developed as a fabricator of structural steel, tractor, and road equipment. Operations include forging, heat-treating, and cutting prefabricated steel rods to customers' specifications. From 1991 to present, SEACOR and others have conducted investigations, groundwater monitoring, and interim remedial actions for petroleum hydrocarbons (oil and gasoline) in soil and groundwater in Areas 1, 2, 3, and 4, on the Jorgensen Forge property. The four areas were reported to have releases which included cutting oil beneath equipment in the north portion of the forge shop building (Area 1), hydraulic oil from an oil/water separator into soil and groundwater northwest of the aluminum heat treating building (AHT; Area 2), diesel and gasoline in soil and groundwater from former USTs located on the eastern portion of the site (Area 3), and diesel and gasoline in soil and groundwater from former USTs located on the eastern portion of the site (Area 4) (Dames and Moore, 1999). An air sparge/vapor extraction system was installed in Area 3. The analytical results of groundwater samples collected from approximately 1993 to 1997 indicated that the air sparge/vapor extraction system was effective. A No Further Action determination was issued by Ecology for Area 3 in 1999. A	As part of the source control investigation, Jorgensen will conduct soil and groundwater sampling in the southeast portion of the site (historically thought to have been occupied by a wood treating facility) to determine if arsenic contamination is present and if this contamination is leaching into the adjacent sediments.	Ecology and Jorgensen
	Ownership of the 12- and 24-inch diameter stormwater lines located in an easement along the Jorgensen/Boeing property line will be determined. In addition, the exact locations of the connections between these lines and the stormwater systems of Jorgensen, Boeing, City of Tukwila, and KCIA will be determined. A comprehensive figure will be developed to show the locations, connections, and discharges of all these stormwater systems.	Ecology and Jorgensen (in coordination with Boeing, City of Tukwila, and KCIA)
	The quality of discharged water and process through which water is discharged from the onsite scale sumps including the vacuum degasser pit, railroad scale sumps, argon-oxygen-decarbonization, and scale sumps (which periodically discharge through outfalls 001, 002, and 003) will be assessed.	Ecology and Jorgensen
	PCB and metal contamination in sediments of the LDW and Shoreline Bank Area adjacent the facility will continue to be addressed through EPA CERCLA Order No. 10-2003-0001.	EPA and Jorgensen

Potential Sources	Action Items	Parties Involved
groundwater monitoring and sampling program is in place to assess the lateral extent of cutting oil as light nonaqueous-phase liquid (LNAPL) on the eastern portion of the Jorgensen Forge facility (Areas 1, 2, and 4), to monitor the concentrations of TPH (diesel-range, gasoline-range, and oil-range) and BTEX, and to ensure that this contamination is not migrating toward the LDW.	Ecology and Jorgensen will conduct a source control investigation through an Agreed Order (No. DE 4127) to determine if the Jorgensen Forge facility is an ongoing source of contamination to sediments in the LDW.	Ecology and Jorgensen
	A hydrogeologic site model will be developed as part of the source control investigation to characterize the groundwater system on site, including tidal influence.	Jorgensen and Boeing
Potential Ongoing Sources: The Jorgensen Forge facility is currently negotiating an EPACERCLA Order to address contamination in sediments of the LDW and Shoreline Bank Area adjacent to the facility. Jorgensen Forge and Ecology have entered into an Agreed Order (No. DE 4127) to conduct a source control investigation to determine if the Jorgensen Forge facility is an ongoing source of contamination to sediments in the LDW. Fill placed on the site is a potential source of PCBs and metals contamination to the LDW. The distribution of PCB contamination on-site is consistent with the placement of fill from historic hydraulic dredging of the LDW. Metals (arsenic, cadmium, chromium, copper, lead, silver, and zinc) were detected in subsurface fill in concentrations that exceeded screening levels. These metals are likely contained in the fill from hydraulic dredging and/or a result of historic site operations.	All current groundwater monitoring data will be reviewed to ensure that groundwater is not a pathway for migrating contamination to the LDW. A groundwater monitoring and sampling program is in place to assess the lateral extent of cutting oil as LNAPL on the eastern portion of the Jorgensen Forge facility, and to monitor areas where the concentrations of TPH (diesel-range, gasoline-range, and motor-oil range) and BTEX are detected in groundwater above the MTCA Method A cleanup levels.	Ecology and Jorgensen
	Groundwater sampling will be conducted in the center of the site (previously occupied by Isaacson Iron Works) to determine if COCs are present above screening levels.	Ecology and Jorgensen
King County International Airport (KCIA)		
Potential Historic Source: In 2005, sampling of the KCIA stormwater system and joint caulk material was conducted within the portion of KCIA that drains to EAA-4. The sampling results indicated levels of PCBs above Method A cleanup levels in one sample of stormwater sediments collected from a trench location and in one sample of joint caulk material. The sample	The connections between the KCIA stormwater system, the City of Tukwila system, and the 24-inch stormwater pipeline along the Jorgensen/Boeing property line will be determined. A comprehensive CAD file showing the locations, connections, and discharges of all these stormwater systems will be developed.	Ecology and KCIA (in coordination with Jorgensen, Boeing, and City of Tukwila)

Potential Sources	Action Items	Parties Involved
locations in this system discharge to EAA-4 via the 24-inch stormwater line located on an easement through the northern portion of Jorgensen. Due to a lack of information about the locations of stormwater discharges from this portion of the KCIA into the LDW, it is not clear whether or not some stormwater discharges into the EAA-4 area of interest.	The data presented in the excel file entitled *Catch Basin Sediment and Concrete Joint Compound PCB Sampling Results Lot 12 at King County International Airport, Seattle, Washington* (Renaud, 2007) will be reviewed to determine whether or not additional sampling of PCBs in the KCIA stormwater system and joint caulk material is necessary. In-line sediment concentrations maybe required.	Ecology
Potential Ongoing Source: In 2005, KCIA sampled the stormwater system catch basins and pavement joint caulk for potential PCB contamination. The airport has been cleaning out accumulated solids from each stormwater catch basin on the airport semi-annually. Each oil/water separator is cleaned annually, or more frequently, if there are any accumulations noted during weekly inspections. Spills in this portion of the KCIA could enter the storm drain system and be discharged to the LDW. Available information does not indicate whether any of the discharges into the LDW are to the EAA-4 area. However, activities that could potentially cause spills are controlled by the facility Industrial Stormwater General Permit and SWPPP.	Test, and as needed, remove any material (e.g., caulk containing PCBs) in this portion of KCIA that contains elevated levels of PCBs. The current SWPPP will be reviewed and necessary changes will be made to prevent contaminants from entering the KCIA stormwater system.	Ecology and KCIA
East Marginal Way, South		
Potential Historic Sources: East Marginal Way South runs in between the three potential sources of contamination identified for EAA-4. The northern portion is located in the City of Seattle, and the southern portion is located in the City of Tukwila. Drain lines and storm drain locations are shown on an aerial photo, but the lines are not labeled, and discharge points to the LDW are not indicated. As a result previous sampling has not been able to determine if East Marginal Way South is a source of contamination to EAA-4.	Determination of the exact location and connection of the large pipe crossing the northern edge of the Jorgensen site will be assessed. Ownership of this pipe – City of Tukwila or KCIA – will be determined once the location and connection has been investigated.	City of Tukwila, Jorgensen, and KCIA
	The exact connections between the KCIA stormwater system and the City of Tukwila system will be determined.	City of Tukwila and KCIA
Potential Ongoing Sources: As mentioned above, the drain lines and storm drain locations are only identified on an aerial photo; these lines are not labeled, and discharge points to the LDW are not indicated. It is unknown whether groundwater is contributing to the recontamination of the LDW.	Pipe locations and discharge points will be incorporate into a comprehensive CAD file.	City of Seattle, City of Tukwila, and Ecology

Potential Sources	Action Items	Parties Involved
Upland Spills		
The nature of the spill, track origin of the spill, and cleanup activities at Boeing, Jorgensen Forge, and KCIA will determine any post-spill source control needed.		
Atmospheric Deposition		
Potential Historic Sources: King County and SPU have been monitoring atmospheric deposition to assess whether it is a potential source of phthalates, particularly BEHP, in stormwater runoff. Results showed PAH, benzyl butyl phthalate, and bis(2-ethylhexyl)phthalate in the Duwamish Valley at concentrations two to three times higher than outside the valley (i.e., Beacon Hill) during the winter months compared to the spring months. This finding is consistent with historic Puget Sound Clean Air Agency data showing atmospheric particulate concentrations trending higher during fall/winter months than during spring/summer months. No previous atmospheric deposition sampling has been conducted at any of the four sites draining to EAA-4. **Potential Ongoing Sources**: Air pollution can enter the waterway directly or through stormwater, thus becoming a possible source of sediment contamination to EAA-4. Air pollution can be localized, such as paint overspray, sand-blasting, and fugitive dust and particulates from loading/unloading of raw materials such as sand, gravel, and concrete, or it can be widely dispersed from vehicle emissions and industrial smokestacks.	Atmospheric deposition will be investigated to assess whether atmospheric deposition is a potential source of phthalates, particularly bis(2-ethylhexyl) phthalate, in stormwater runoff at EAA-4.	Ecology in coordination with the members of the Source Control Work Group.

Key:
Boeing: The Boeing Company
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
CMS: Corrective Measure Study
COCs: contaminants of concern
DDC: density-driven convection
EAA: Early Action Area
Ecology: Washington Department of Ecology
EMF: electronics manufacturing facility
EPA: U.S. Environmental Protection Agency
KCIA: King County International Airport
LDW: Lower Duwamish Waterway
MTCA: Model Toxics Control Act
PCB: polychlorinated biphenyl
SVOC: semivolatile organic compound
SWPPP: Stormwater Pollution Prevention Plan
TPH: total petroleum hydrocarbons