Appendix B: Environmental Justice Analysis for the Lower Duwamish Waterway Superfund Cleanup

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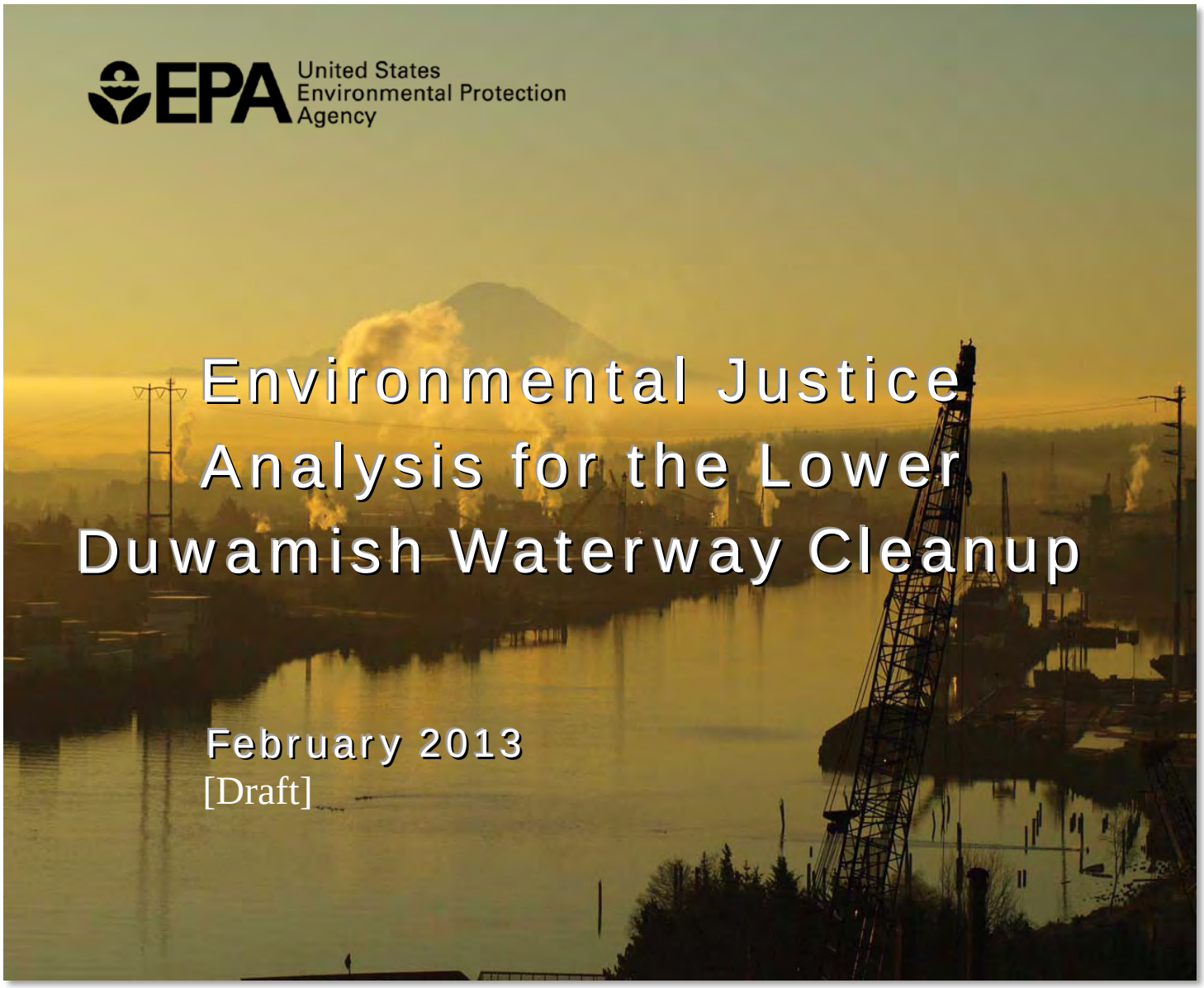

United States Environmental Protection Agency

Environmental Justice Analysis for the Lower Duwamish Waterway Cleanup

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[Draft]

Soil

Contamination of soils from present and past industry is also a concern in South Park and Georgetown. In 2010, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the WA Department of Health reviewed dioxin and PCB contamination data in South Park soils[41], and found that measured concentrations were below levels of concern for non-cancer and cancer health risks for WA DOH's average exposure assumptions.

In discrete samples in South Park in 2008 as part of the Superfund investigation at Terminal 117 (T117), dioxin concentrations of 90 parts per trillion TEQ (toxicity equivalent, a measure of how toxic a contaminant is by relating the various dioxin types to the toxicity of the most toxic form) were found in roadway soils, and other soil samples tested positive for dioxin in the vicinity of the roadway[42] (City of Seattle 2008). These results exceeded the state standard for unrestricted land use, which is 11 parts per trillion TEQ for dioxin under the WA Model Toxics Control Act (MTCA) program. In 2011 Ecology measured soil dioxin and cPAH concentrations in neighborhoods around Seattle[43]. In five of six of those Seattle neighborhoods sampled, which included South Park and Georgetown, the average dioxin concentration in soils was higher than the state MTCA standard but less than the EPA draft cleanup level (72 pptr TEQ). The highest measured dioxin sample concentration, 114.7 pptr TEQ, was found in Georgetown, which also had the highest average concentration, 36 pptr TEQ. The formerly industrialized neighborhood of Ballard had the next highest average concentration, (26 pptr TEQ) while South Park's average level (12 pptr TEQ) fell at the lower end of the range of the six sites sampled. Soil dioxin remediation is part of the activities slated for the Terminal 117 Early Action Area cleanup under the Superfund Program.

Another set of contaminants, PAHs, were measured at the same time during Ecology's 2011 study. The average concentrations in soil samples from four neighborhoods, including Georgetown, were above the MTCA screening level (137 ppb TEQ). In addition, soils from all six neighborhoods exceeded the EPA screening levels of 15 ppb TEQ for cPAHs.

Risks and Disproportionate Adverse Impacts from Consumption of Resident Seafood Caught in the LDW

PCBs, arsenic, cPAHs and dioxins/furans were identified as human health COCs based on an excess lifetime cancer risk greater than 1 in 1,000,000 for carcinogenic chemicals, or a hazard quotient (HQ) greater than 1 for non carcinogens. For any given contaminant, the HQ is the ratio of the exposure concentration or dose to the lowest observed adverse effect level; the hazard index (HI) is the same but for multiple contaminants. Although BEHP, pentachlorophenol, vanadium, tributyltin, and several pesticides were found in the waterway at concentrations that exceeded risk thresholds they were not selected as COCs due to low detection frequency, low contribution to overall risk, or quality assurance concerns with analytical data.

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[41] Evaluation of Contaminants in Adjacent Streets and Residential Soils in the South Park Site, South Seattle, King County, Washington. 2010. Health Consultation. WA Dept. of Health. July 28, 2010.

[42] Fact Sheet released by Chuck Clarke, Director of Seattle Public Utilities. "South Park Streets Fact Sheet" May 2008. Accessed at Yosemite.epa.gov/r10/CLENAUP.NSF/LDW/Fact_Sheets/$FILE/South-Park-Street-FS.pdf

[43] Department of Ecology, State of Washington. Urban Seattle Area Soil Dioxin and PAH Concentrations Initial Summary Report. September 2011. Publication no. 11-09—40. Study accessed at: fortress.wa.gov/ecy/publications/1109049.pdf

The human health risk assessment (HHRA; Windward 2010) conducted for the LDW is described in Section 4.1 of the Proposed Plan, and used a range of seafood consumption rates that correspond to a variety of consumption practices by Duwamish community members and local fishers and were selected by EPA and Ecology as the basis for risk estimates in the RI/FS. The information used in the HHRA was derived from EPA's 2007 Tribal Fish and Shellfish Consumption Framework for Puget Sound[44], and the aforementioned Asian Pacific Islander Fish Consumption Study (Sechena et al. 1999). The Tulalip tribal and API data were used as the reasonable maximum exposure (RME) rates in the HHRA[45]. The adult tribal RME seafood consumption rate from Puget Sound, excluding anadromous fish, totaled 97.5 g/day, and comprised pelagic and benthic fish at 15.6 g/day and shellfish at 81.9 g/day. Tribal children RME consumption rates were 39 g/day from all seafood sources, with 6.2 g/day for pelagic and benthic fish, and 32.8 g/day for shellfish).

The Asian and Pacific Islanders' (API) consumption rates were taken from the Sechena et al. collaborative study as reinterpreted for the risk assessment by Kissinger (2005). The overall API RME was 51.5 g/day, with 7.3 g/day for resident species of benthic and pelagic fish and 44.2 g/day of shellfish, respectively. For comparison, the HHRA also considered adult fish consumption at one meal per month (7.5 g/day), and rates for Suquamish adult tribal members[46] based on a Suquamish tribal survey, totaling 584.2 g/day, and comprised of 499.0 g/day for shellfish, 29.2 g/day for benthic fish, and 56.0 g/day for pelagic fish.

Although Suquamish tribal members have fishing rights in the Duwamish River, their total fish consumption rate is dominated by shellfish consumption. However, the LDW does not currently support widespread high quality intertidal shellfisheries (Windward 2010).

The HHRA used the Tulalip rates rather than Suquamish rates to determine the consumption of seafood, as they are more analogous to the resources found in the LDW. The Suquamish Tribe has raised issue with the use of the Tulalip Tribes' rates for the RME scenarios. In addition, the Muckleshoot and Suquamish Tribes have raised the issue that their current consumption rates as recorded in the 2007 framework and in other seafood consumption studies (i.e., Suquamish 2000) are suppressed, reflecting the degraded conditions for fishing, and that with a cleaner river in the future to support safer and robust fisheries, rates would actually be much higher.

Washington State ARARs for human health risks relating to seafood consumption are exceeded for tribal adults and Asian American Pacific Islanders. The standards comprise 1 excess cancer per 100,000 persons for multiple chemical contributions, an individual chemical risk of 1 excess cancer in 1,000,000, or no greater than a noncancer Hazard Index of 1).

Consistent with EPA and Washington risk assessment guidance, the exposure term for calculating human health risks for fish consumption were based on the 95% upper confidence limit on the mean (UCL95) of the concentrations of COC.

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[44] Framework for Selecting and Using Tribal Fish and Shellfish Consumption Rates for Risk-Based Decision Making at CERCLA and RCRA Cleanup Sites in Puget Sound and the Strait of Georgia. EPA, August 2007.

[45] The Tulalip Tribe does not have usual and accustomed fishing rights in the Duwamish; since Muckleshoot Tribal consumption rates were not available, Tulalip Tribal rates were used as a proxy.

[46] The Suquamish seafood consumption rate used in the LDW HHRA (Windward 2010) was 583.5 g/day while the value cited in the LDW RI (Windward 2010) was 584.2 g/day. This difference was due to considerations of rounding and significant figures associated with assigning overall seafood consumption to specific seafood categories (e.g. benthic, pelagic, or shellfish). Given the overall uncertainties in the HHRA, the slight differences in consumption rate have an insignificant impact in assessment of overall risks.

Results of the assessment indicate that individuals who use the LDW as a fisheries resource would suffer more health risks than individuals with access to less contaminated resources.

Particularly for the tribal and subsistence fishers and others who consume seafood at a higher rate than the general population, risks from eating contaminated seafood would be even higher, representing a significant environmental justice concern: an existing pre-cleanup adverse disproportionate impact for these groups of individuals.

Hazards from consuming fish from the LDW were also evaluated by DOH coordinating with ATSDR in 2003 and 2005 (WADOH 2005[47]). Based on the findings of the evaluation, the Washington State Department of Health (WA DOH) advisory advocates that fishers "Do Not Eat" the following resident fish and shellfish: perch, flounder, English sole, crabs, and other shellfish. The study found that those who consume large amounts of resident fish (which does not include anadromous fish like salmon) caught in the LDW were at risk for adverse health effects, and that consumption of resident fish represented a public health hazard. Salmon, which spend a limited amount of time in the LDW and are minimally impacted by COCs from it, are not included in the "Do Not Eat" fish advisory. The evaluation found that the effects of mercury and PCBs were of greatest concern, due to the potential for impacts on the development of children after fetal exposure.

The evaluation found that bottom fish like flounder and English sole were of most concern of the fish stocks. There was measurable, although slight, concern raised over the consumption of fish like striped perch. Consumption of red rock and Dungeness crab were also of concern due to high concentrations of PCBs, mercury, and arsenic. Further data compiled during the RI/FS process have been used to calculate relative cancer and noncancer risks from consuming different seafoods in the LDW (Proposed Plan 2013, Figure 7). Because the concentration of contaminants varies within an organism, the WA DOH evaluation identified which portions of target species posed the greatest health concern. For example, fish livers and the crab hepatopancreas (crab butter) concentrate toxins, and should be avoided.

During the study, community members raised concerns over the safety of consuming salmon, the safety of consuming fish at markets, and the lack of adequate warning about consuming seafood from the Duwamish, which are important points to consider in the development of education tools during the Superfund cleanup in the LDW.

Additional seafood risk comparative data are available from the FS 2012. Here, baseline seafood consumption risks are compared to two other measures: a) Preliminary Remediation Goals (PRGs), which are based either on non-urban background or risk-based thresholds, and b) the model-predicted long-term river steady state. PRGs are preliminary cleanup levels used to meet the Remedial Action Objectives in an EPA Proposed Plan. They are finalized to cleanup levels in the Record of Decision after considering public comment. (The Proposed Plan describes the process of selecting PRGs in Section 7.)

Figure 7 of the Proposed Plan shows baseline risks as well as hazard quotients for PCBs (which were the major contributor to non-cancer effects). The combined excess cancer risks for the tribal adult RME scenario based on a diet of perch, flounder, crab or a "market basket" combination of fish are higher than the CERCLA and MTCA thresholds.

[47] 2005. Lower Duwamish Waterway Site: Updated Fish Consumption Advisory and Evaluation of Marine Tissue Collected from the Lower Duwamish Waterway in August and September 7, 2005. Seattle, Washington. Health Consultation. WA Dept. of Health.