

PORT ANGELES HARBOR CURRENT STATUS AND FUTURE OUTLOOK



Photo: Washington Ecology website

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Richmond, VA
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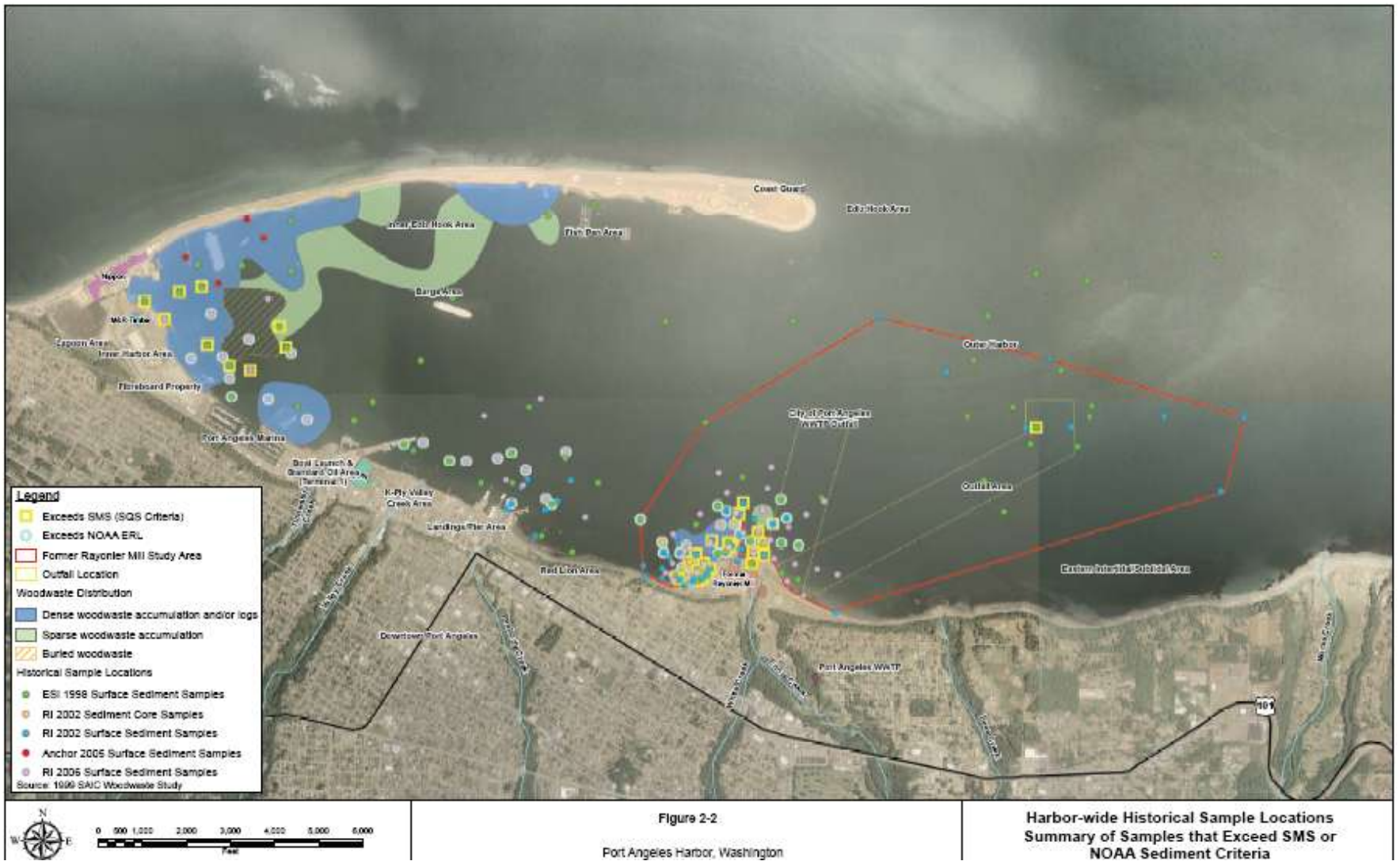
10 Years Later

- Update on activities in Port Angeles
 - ▣ Some preview of cleanup options
- Washington State activities
 - ▣ In Duwamish River cleanup
- Federal effort on specific contaminants and cleanup issues
 - ▣ Dioxins/furans
 - ▣ Issues

Linking Contamination to Source



Figure 5-26. Heptachlor Epoxide Concentrations (ppb) in Offsite Soil Samples



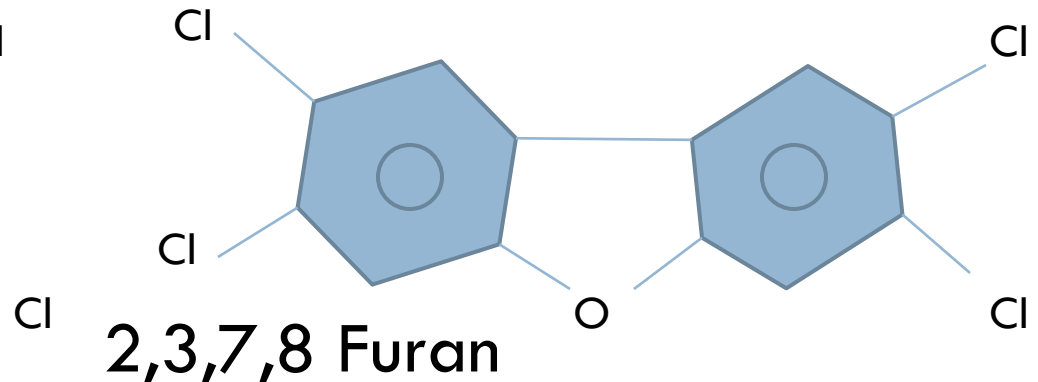
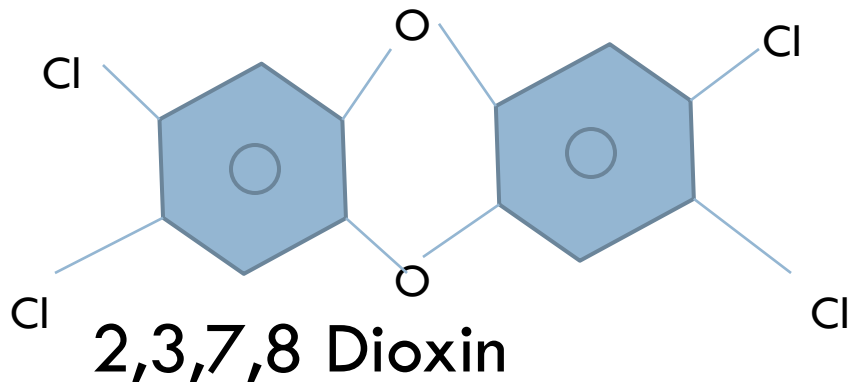
Harbor area and nearby terrestrial areas

The map shows historical sediment sampling locations.

Dioxin in residential lawns



- Recent results from testing in Port Angeles
- 85 properties surrounding Rayonier mill site
- Sampling in 2008
- Range of emissions from the mill



Dioxins and Furans (17 toxic ones)

Dioxins

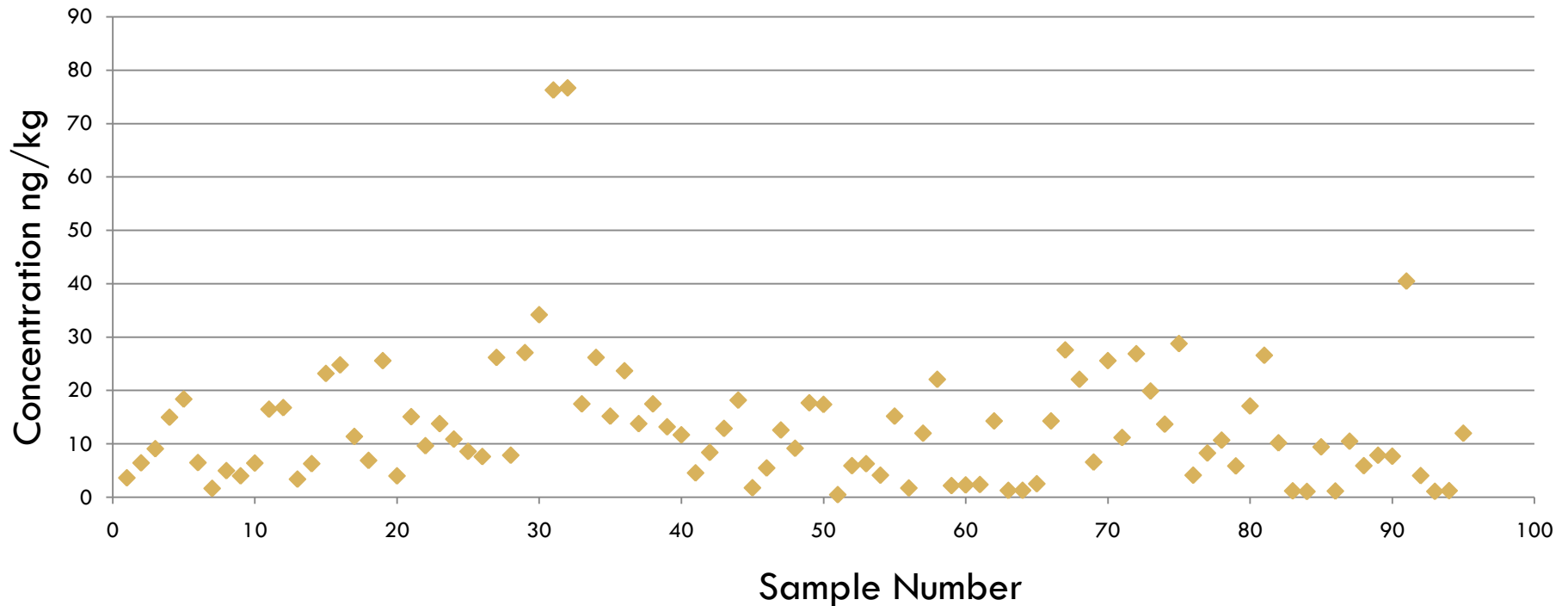
2,3,7,8-TCDD
1,2,3,7,8-PECDD
1,2,3,4,7,8-HXCDD
1,2,3,6,7,8-HXCDD
1,2,3,7,8,9-HXCDD
1,2,3,4,6,7,8-HPCDD
OCDD

Furans

2,3,7,8-TCDF
1,2,3,7,8-PECDF
2,3,4,7,8-PECDF
1,2,3,4,7,8-HXCDF
1,2,3,6,7,8-HXCDF
1,2,3,7,8,9-HXCDF
2,3,4,6,7,8-HXCDF
1,2,3,4,6,7,8-HPCDF
1,2,3,4,7,8,9-HPCDF
OCDF

Study Results

Results from Ecology & Environment Soil Dioxin Study

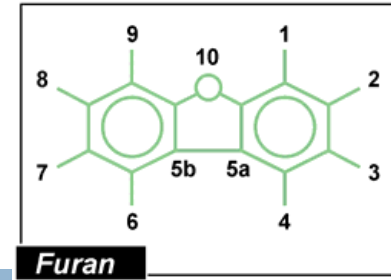


- Mean 13.2
- Median 10.5
- Mode 25.6

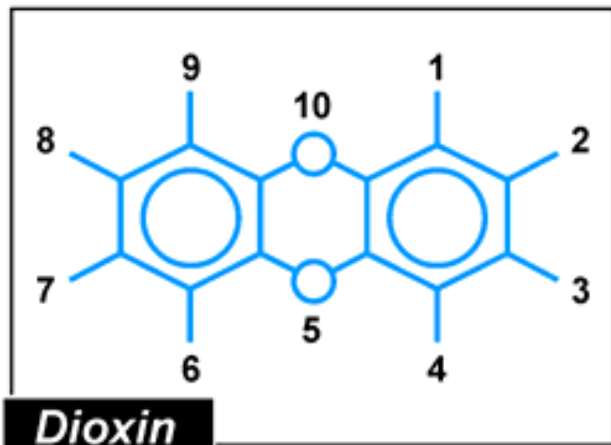
Example of dioxin analysis

Dioxin or Furan	Concentration ppt	Potency	TEQ concentration ppt
2,3,7,8-TCDD		6.06	1 6.06
1,2,3,7,8-PECDD		4.8	1 4.8
1,2,3,4,7,8-HXCDD		5.67	0.1 0.567
1,2,3,6,7,8-HXCDD		10.1	0.1 1.01
1,2,3,7,8,9-HXCDD		10.3	0.1 1.03
1,2,3,4,6,7,8-HPCDD		93.5	0.01 0.935
OCDD		344	0.0003 0.1032
2,3,7,8-TCDF		11.6	0.1 1.16
1,2,3,7,8-PECDF		2.9	0.03 0.087
2,3,4,7,8-PECDF		3.34	0.3 1.002
1,2,3,4,7,8-HXCDF		2.65	0.1 0.265
1,2,3,6,7,8-HXCDF		1.78	0.1 0.178
1,2,3,7,8,9-HXCDF		0.237	0.1 0.0237
2,3,4,6,7,8-HXCDF		1.66	0.1 0.166
1,2,3,4,6,7,8-HPCDF		7.93	0.01 0.0793
1,2,3,4,7,8,9-HPCDF		0.716	0.01 0.00716
OCDF		14.7	0.0003 0.00441
			17.47777

Dioxin on national stage



- US EPA is supposedly reconvening the panel to assess dioxin and complete the reassessment
- 18 years of debate!
- Could lower current benchmarks to be more protective of human health
- What does this mean for cleanups locally?



Wood waste Harbor-wide cleanup

- Wood waste
- Related to Rayonier cleanup?
- Other pulp/paper mills



**PCBs,
Dioxin,
Metals**

**Port
Angeles
and
Duwamish
River**

**Ideal cleanup
is removal of
contamination**

**Cleanup by
EPA,
Ecology,
and PRPs**

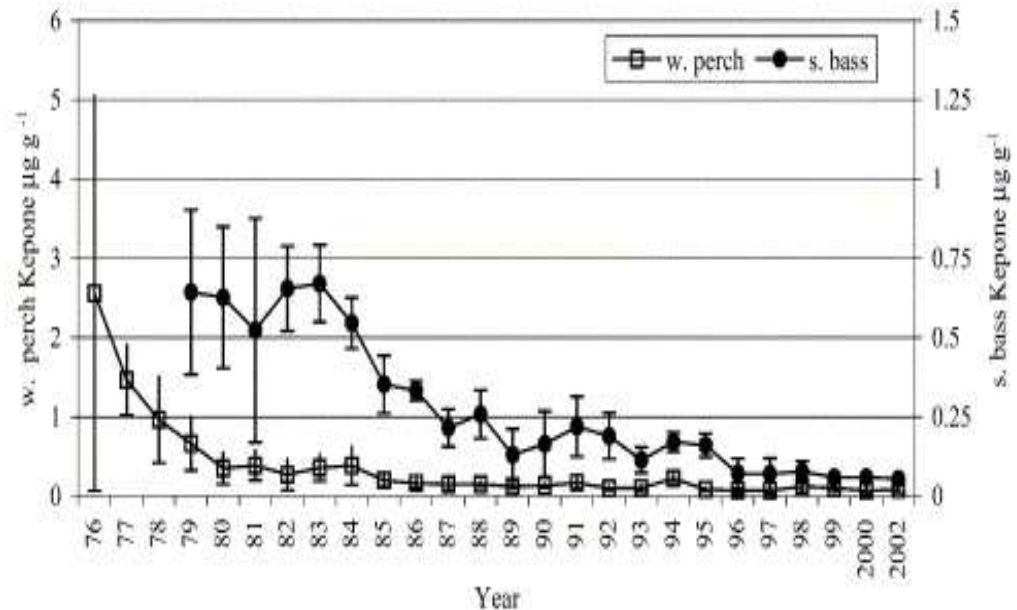
**Both in
Washington
State**

At the Duwamish...

- Public comment on first draft of Feasibility Study early July
- Dredging, capping and let it alone are the options
- Narrow scope of alternatives
- Limited area of cleanup
- PRPs are ready to prescribe “natural recovery” and call the remediation complete

Natural recovery

- The technique of doing nothing
- Hudson River, NY
- James River, VA



Kepone in fish from the James R, VA 1976- 2002

Kepone in fin-fish has declined, but 30 years after the cleanup began, fish still can have as much as three times the amount accepted by the VA Dept. of Health

Future at Rayonier... Report status

- Report on Rayonier Mill off-property soil dioxin study
 - ▣ Preliminary results released February 2009
 - ▣ Agency Draft Review in July
 - ➡ Public comment period in August
- Port Angeles Harbor sediment investigation report
 - ▣ Agency Draft Review in July



Photo: Washington Ecology website

Basic cleanup options of contaminated sediments

- No action - must be included by law
- Remove sediments
- In place approach



Hydraulic dredge removes sediments, which are deposited in an on-shore lagoon for treatment.



Cleanup options at Rayonier

Increasingly aggressive

Burial - Monitored natural recovery

- ▣ Leave in place - limited options for marine sediment
- ▣ Thin layer to augment physical processes

Sediment capping

- ▣ Use of granular activated carbon to isolate COCs
- ▣ 3 feet of sand

Remove the sediments

- ▣ Dredge – hydraulic and clamshell
- ▣ Post-removal action – sediment washing, landfill, or thermal desorption

New technologies

Environmental Clamshell

- Reduces the impact of environmental dredging
 - Venting system decreases water displacement and minimizes resuspension of contaminated sediments
 - Excess water drainage reduces dewatering costs by allowing excess water to drain at the surface
 - Design ensures complete sediment removal with level cutting and safe containment of sediments until unloading
 - The clamshells are GPS-guided and have a lower overall weight because they do not need counterweights.



Technologies continued...

Silt curtains

- ▣ Used in conjunction with dredging to prevent transport of resuspended contaminated particles

Note the isolation of resuspended sediment to the area being dredged. The yellow line is the silt curtain.



Summary

- Awaiting document release and public comment period
- Dioxin off-property soil sampling report
- Lessons from the Duwamish
- Cleanup technologies





Ten Years Later

Questions ?

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