

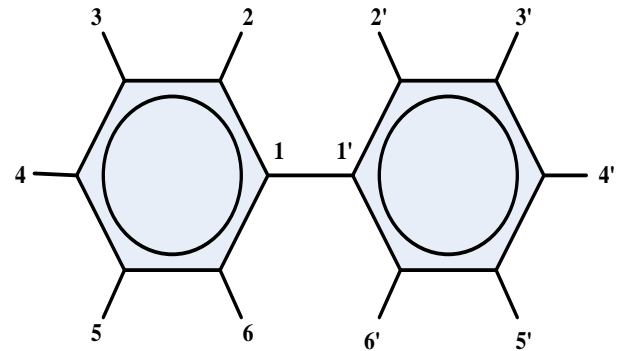
Polychlorinated Biphenyls

Holly Davies, PhD
Toxics Policy Coordinator



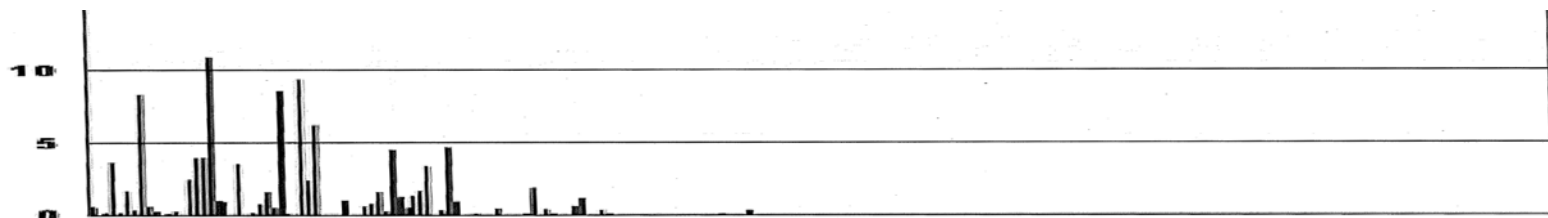
Polychlorinated Biphenyls

- 209 congeners
- Mixtures (Aroclors)
- Properties vary
 - Persistent
 - Bioaccumulative
 - Toxic
 - Hydrophobic
 - Volatization

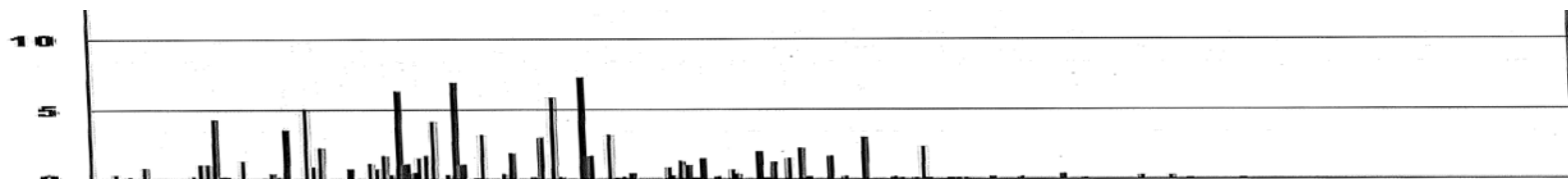


Aroclors

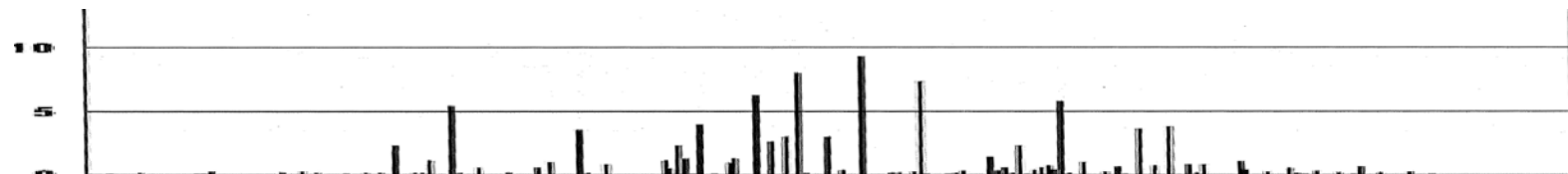
1016



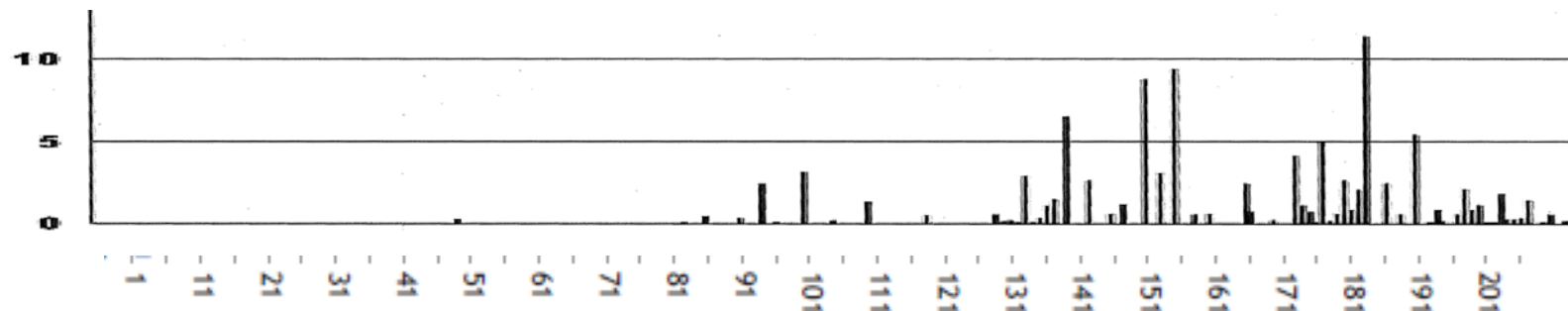
1248



1254



1260

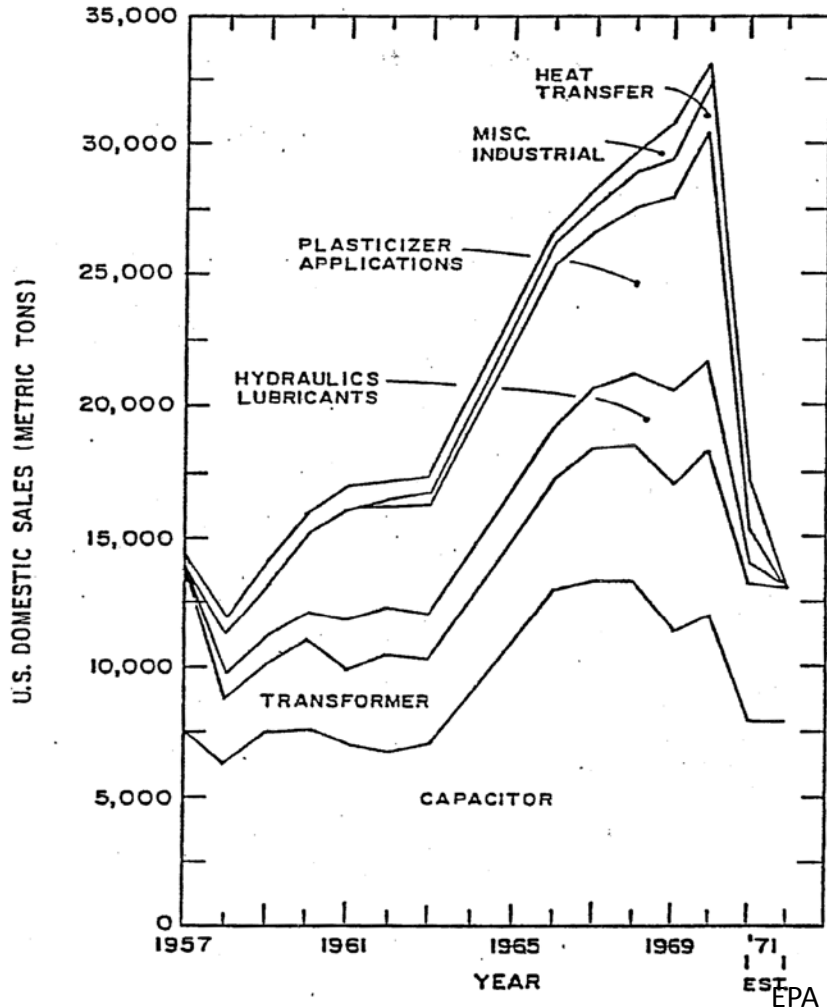


PCB Major Regulations

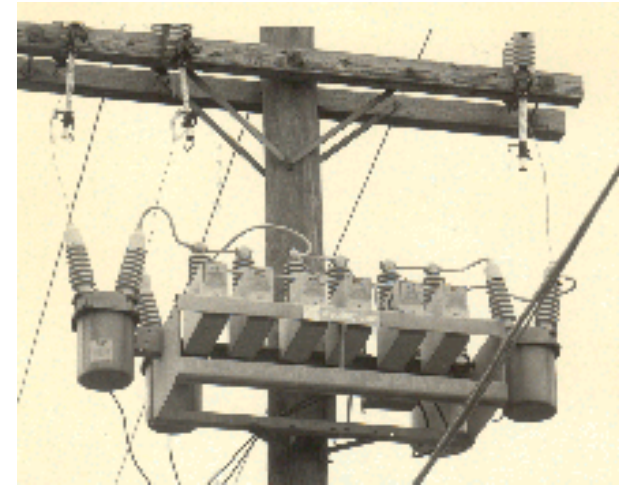
- Federal
 - Toxics Substances Control Act (TSCA)
 - Clean Water Act (CWA)
 - Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
- Washington State
 - Dangerous waste
 - Model Toxics Control Act (MTCRA)
- Other
 - Stockholm Convention



Legacy Uses by Sales (pre-TSCA)



EPA



EPA PCB Inspection Manual



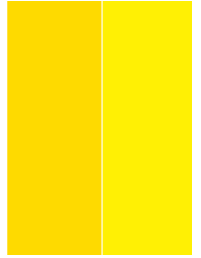
KLIF



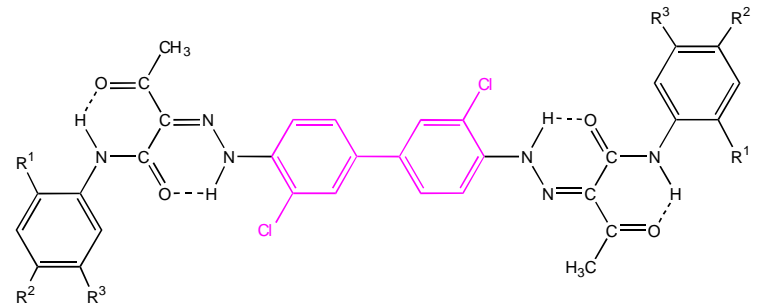
Monsanto Domestic Sales of PCBs in the US by use (EPA 1987)

Current Inadvertent Generation

- Pigments and dyes
 - Yellow (PCB-11 et al.)- diarylide yellow
 - Green- copper phthalocyanine
 - White- titanium dioxide (206, 208, 209)



- Silicone (PCB-68 et al.)



- Unknown
 - List of processes “likely” to produce PCBs (1984 rulemaking)
 - Many chlorinated compounds

Reports to EPA

CI Pigment Yellow 12
CI Pigment Yellow 13
CI Pigment Yellow 14
CI Pigment Yellow 17
CI Pigment Yellow 83
CI Acid Yellow 49
CI Pigment Red 2
CI Pigment Yellow 3
CI Pigment Red 112
CI Pigment Red 48:3
CI Vat Brown 1
CI Vat Black 27

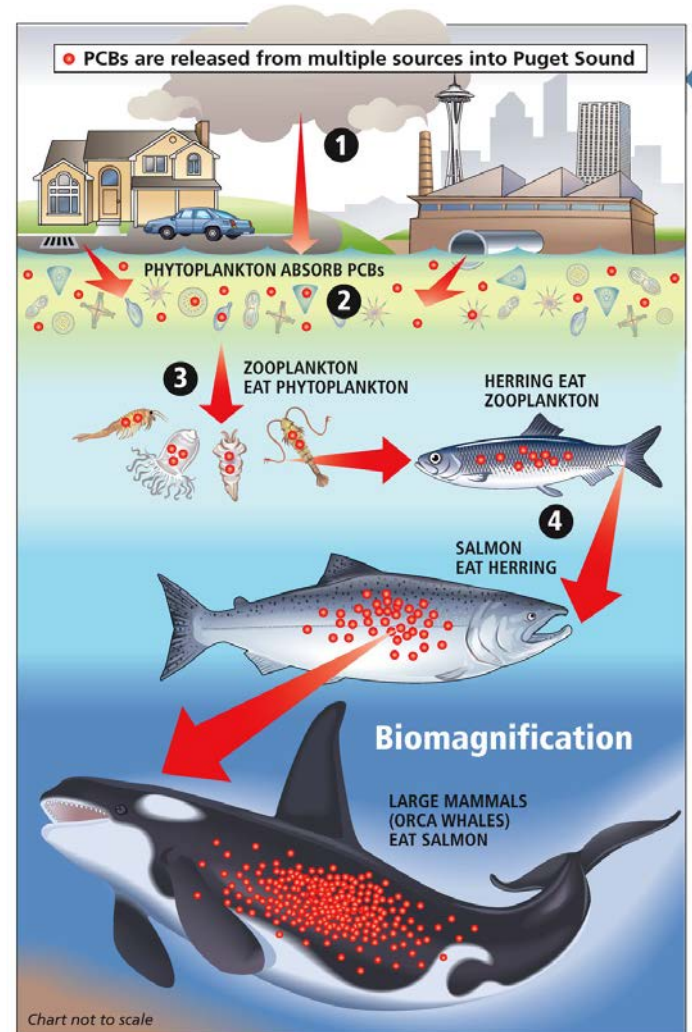
The following Research Samples were imported from abroad:

COMPANY SANITIZED

Sun Chemical Corporation is in the business of marketing _____, as well as intermediates used in the manufacture of _____ products. This certification represents two products. The first product is an _____ Chemical Abstracts Service Number ("CAS") _____, empirical formula _____ used to manufacture _____. The second is _____, CAS Number _____.

PCB Chemical Action Plan

- PBTs- worst of the worst
- Looks at all sources, from permitted pipes to products
- Chemistry, health effects, regulations
- Provides recommendations on how to reduce or eliminate the most important sources
- Builds on collaborative stakeholder input



Seattle Post-Intelligencer "The Zone"



Preventing exposures to toxics is the smartest, cheapest and healthiest way to protect people and the environment

Photo:
DRCC/TAG



- Across programs
- Integrate prevention, management, clean up
- Identify opportunities
- Effectively reduce impacts



Coming Attractions



- Product testing
- PFAS CAP
- Update the 2006 CAP Rule
- Children's Safe Products Act Rulemaking
- Copper Boat Paint Alternatives Assessment



PCB Priorities

Source	Legacy reservoir of PCBs	Annual releases of PCBs (kg/yr)	Potential exposure pathways and concerns	Is the release controlled?	Priorities
Historic uses					
transformers	100-200 kg	< 2	Accidental spills, which are identified and cleaned up.	Yes	
large capacitors	20 metric tons	10 to 80	Accidental spills, which are identified and cleaned up.	Yes	
lamp ballasts	100-350 metric tons	400 to 1,500	Continual release of lower concentrations, with high concentrations released when the ballast fails.	Yes	In school buildings as part of energy efficiency improvements.
small capacitors	1-35 metric tons	3 to 150	Disposal in landfills from a variety of old appliances.	Yes	
caulk	87 metric tons	160	Continual release of lower concentrations into the air, with high concentrations released when materials are disturbed.	No	Remodeling and demolition, especially in schools.
Current generation					
pigments and dyes	N/A	0.02 to 31 ^a	Continual release of lower concentrations, with higher concentrations released during recycling.	No	Identify and promote safer alternatives.
other inadvertent generation	N/A	900	Concerns about both continual releases and potential large releases.	No	Identify processes and products first and then identify and promote safer alternatives.

Human Health

- Effects
 - Cancer
 - Immune toxicity
 - Neurological problems
 - Reproductive effects
- Exposure
 - 100% of people are exposed
 - Declining levels since late 1970s
 - Diet
 - Fish advisories
 - Air, water, soil, house dust, etc.
- Acute and chronic
- Aryl hydrocarbon (Ah) receptor mediated
- Endocrine disruption



Wildlife toxic effects

- Mortality
 - Reproduction
 - Development
 - Cancer
 - Immunological
 - Neurological/behavioral
 - Hepatic effects
-
- Acute and chronic
 - Aryl hydrocarbon (Ah) receptor mediated
 - TEFs for dioxin-like PCBs
 - Endocrine disruption



Environmental Concentrations

- Ubiquitous in environment
- Mixture of congeners
- Sediment and biota
 - Water 10-100 pg/L
 - Sediment 1-100 ug/kg
 - Fish 1-1,000 ug/kg
- Mostly declining

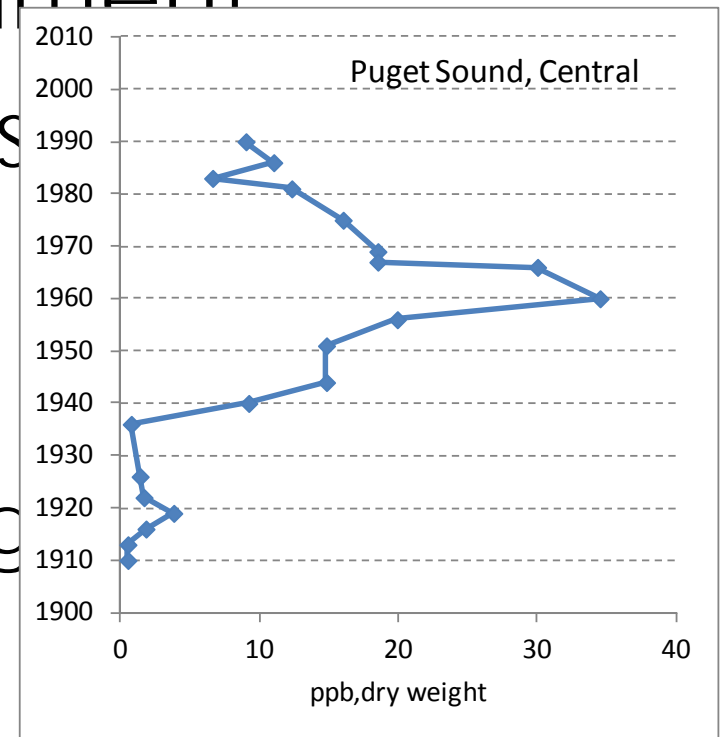


Figure 13: Total PCBs in Age-Dated Sediment Cores from Puget Sound



Puget Sound fish

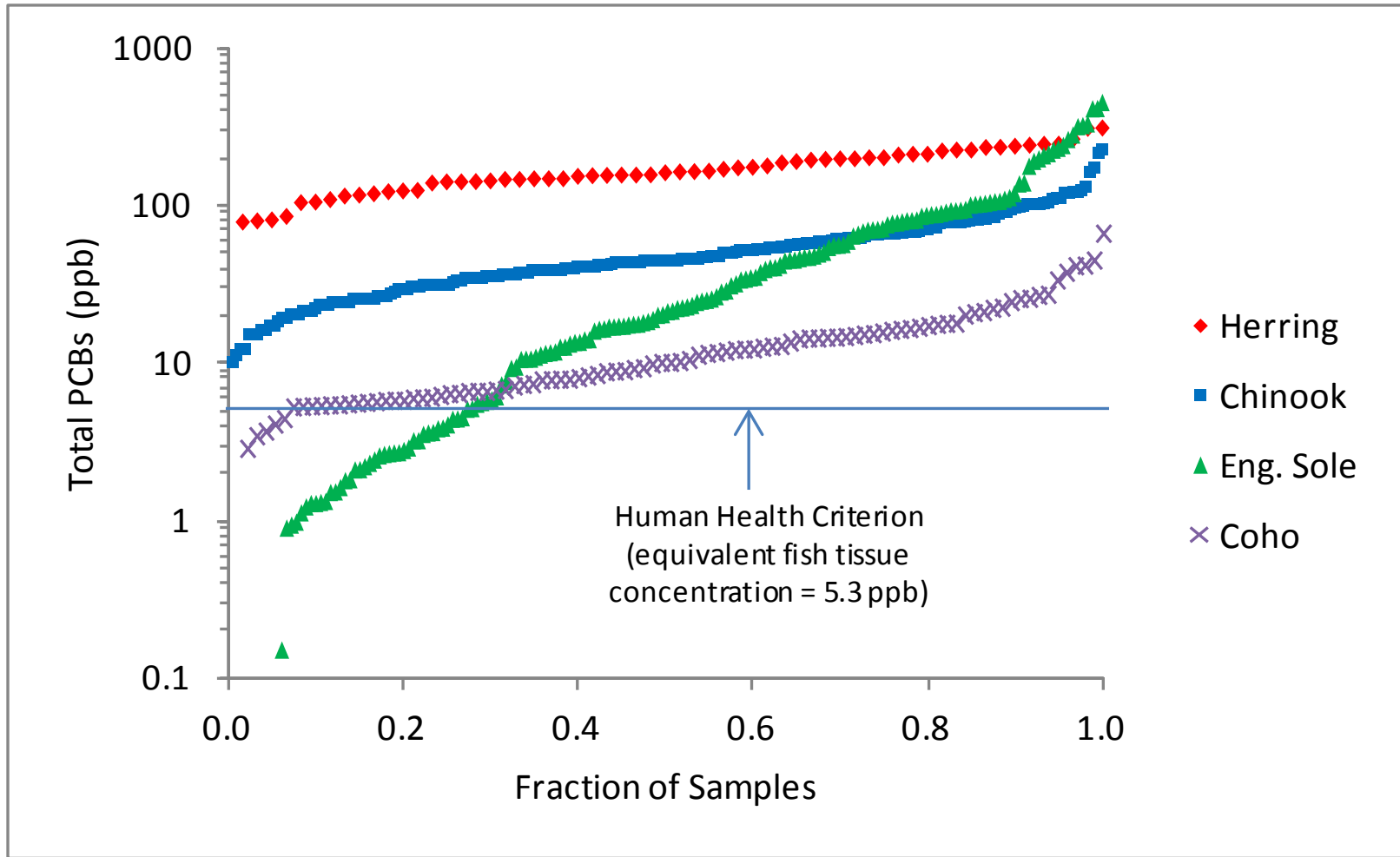


Figure 19: PCBs in Edible Tissues of Four Species of Puget Sound Fish (1992-2010 data provided by James West, WDFW; N =60 – 210)



How much PCBs are...

- In the environment?
- Being released from legacy products?
- Being inadvertently generated?

Determine best actions to protect human health and the environment



Legacy Sources/Uses (pre-1979 TSCA)



EPA PCB Inspection Manual



EPA PCB Inspection Manual



EPA



EPA



KLIF





Transition slide title

Subhead or speaker

IMPACTFUL STATEMENT/TITLE