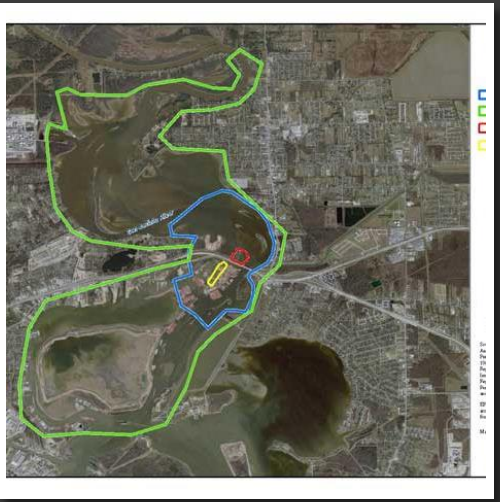

SAN JACINTO RIVER WASTE PITS REMEDIAL OPTIONS ASSESSMENT

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Texas Association of Environmental Professionals

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Report pertains only the north pits

San Jacinto River Waste Pits site, from the RI/FS

BRIEF HISTORY OF THE SJRWP

- Paper mill waste lagoons constructed and filled in 1965-1966
  - Owned by McGinnis Industrial Services (now Waste Management, Inc.)
  - Waste from Champion Paper Mill (Now International Paper)
- Lagoons closed in 1966
- Eventually they subsided and became partially submerged into SJR
- Erosion of the eastern lagoon by river processes

BRIEF HISTORY CONT'D

- 1990—first seafood consumption advisories in the Houston Ship Channel and Galveston Bay for PCBs and dioxins
- 2005—lagoons discovered as source of dioxin to SJR, HSC and GB
- 2009—site placed on the National Priorities List under Superfund
- 2011—Time-critical Removal Action—temporary armored cap installed at the site
- 2011-2013—Draft Remedial Investigation/Feasibility Study, Human Health Risk Assessment and Ecological Risk Assessments were performed

The armored cap at SJRWPs (Texans Together)

BRIEF HISTORY CONT'D

- TAMU Galveston Center for Texas Beaches and Shores—Flood Risk Analysis
- Remedial Options Assessment (this work)
- ACOE Draft Report on Site Stability

- EPA National Remedy Review Board—to meet Dec. 2015 and select a final remedy for the site

PURPOSE OF RESEARCH

- Research EPA's Superfund Site Information Database for similar sites
- Review reports on those sites
  - RI/FS, Remedial design documents, Five-year progress reports
- Determine what remedies were selected at those sites
- Determine what criteria were used to select the remedy at each site

WHAT IS A "SIMILAR" SITE?

- Four criteria used to select sites from the database
- 1. Contaminants of Concern (COCs) include dioxins and furans
- 2. Site is geographically located in tidally-influenced river which connects to a major estuary
- 3. Contaminated media include "sediments"—meaning that contamination extends to the floor of the adjacent river or water body.
- 4. A seafood consumption advisory exists based on risks associated the COCs at the site.

ONLY SEVEN SITES MET THESE CRITERIA

- Calcasieu Estuary Area of Concern (Coastal LA)
  - Bayou Verdine and Bayou D'Inde
  - Closest analog to the SJRWPs site
- Atlantic Wood Industries, Portsmouth VA, near Norfolk
- McCormack and Baxter Creosote, Portland, OR
- Pacific Sound Resources, Seattle, WA
- Welsh Creek area of the Domtar Site, Plymouth, NC
- Wyckoff Co./Eagle Harbor, Bainbridge Is, WA (fully marine)

SIGNIFICANT DIFFERENCES FROM SJRWPS

- SJRWP is the only site where an actual dioxin disposal lagoon is now submerged in a river
- Only Bayou Verdine and Bayou D'Inde actually had materials disposed into them directly—all others received accidental discharges
- Only Bayou Verdine and Bayou D'Inde have residential neighbors
- All other sites have many other COCs
- All other sites are larger, and have contaminated soils, groundwater, and sediments

Location Map of the Calcasieu Estuary

ACTIONS TAKEN AT BAYOU VERDINE

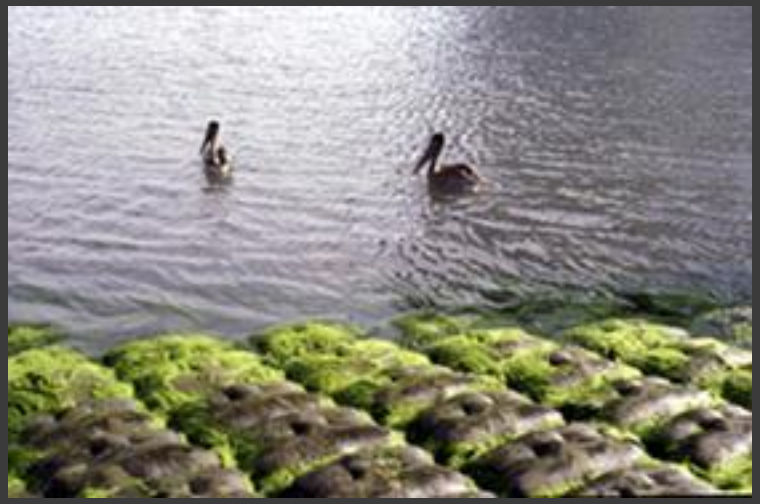
- Time-critical Removal Action—removal of contaminated sediments and capping of underlying clays
- Presence of free EDC, a highly toxic DNAPL
- Non-time critical Removal Action—excavation and removal of 13,300 cubic yards of contaminated sediment from the Bayou itself

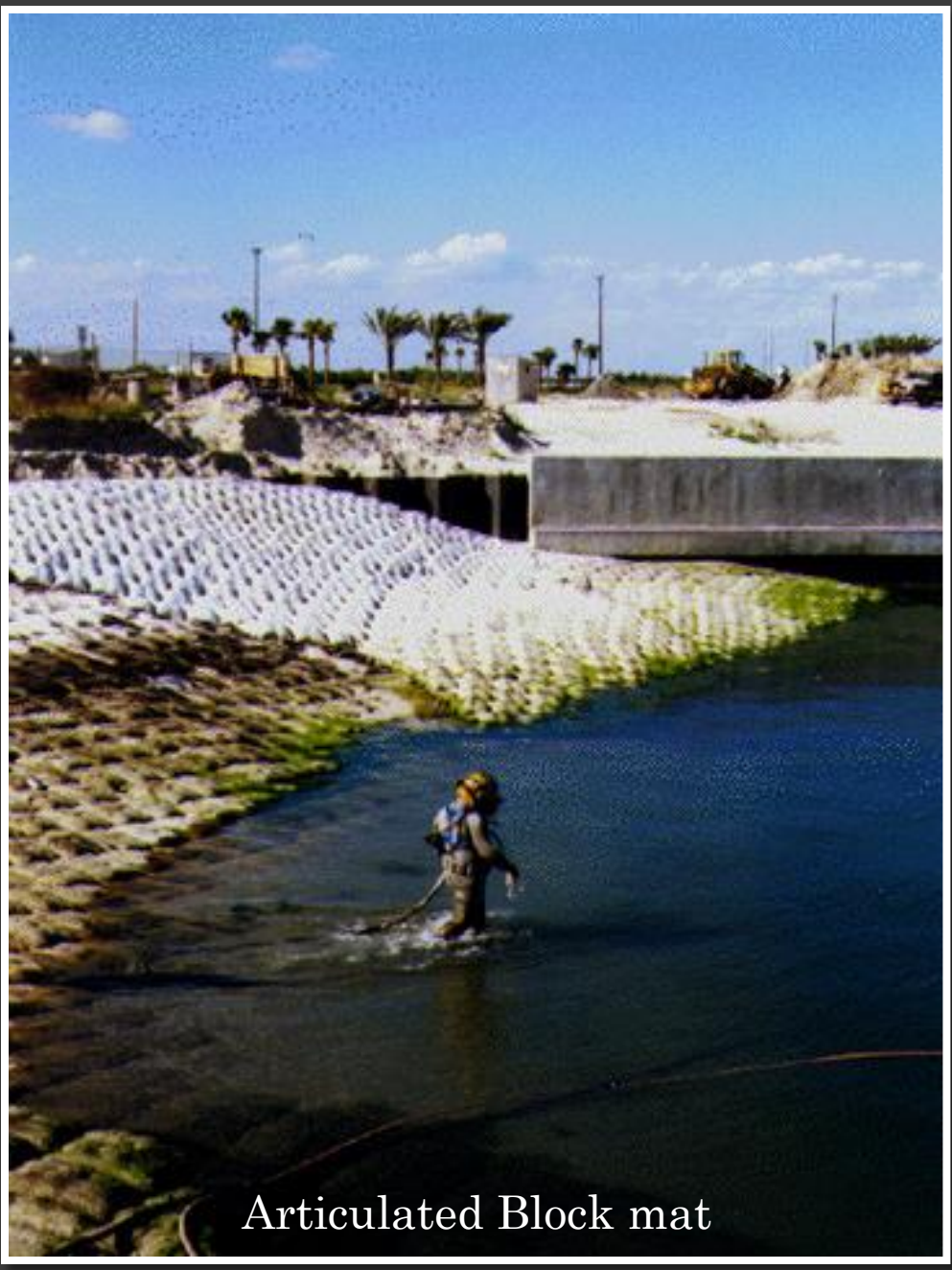
- COCs: PAHs, EDC, and hexavalent chromium

ACTIONS TAKEN AT BAYOU D'INDE

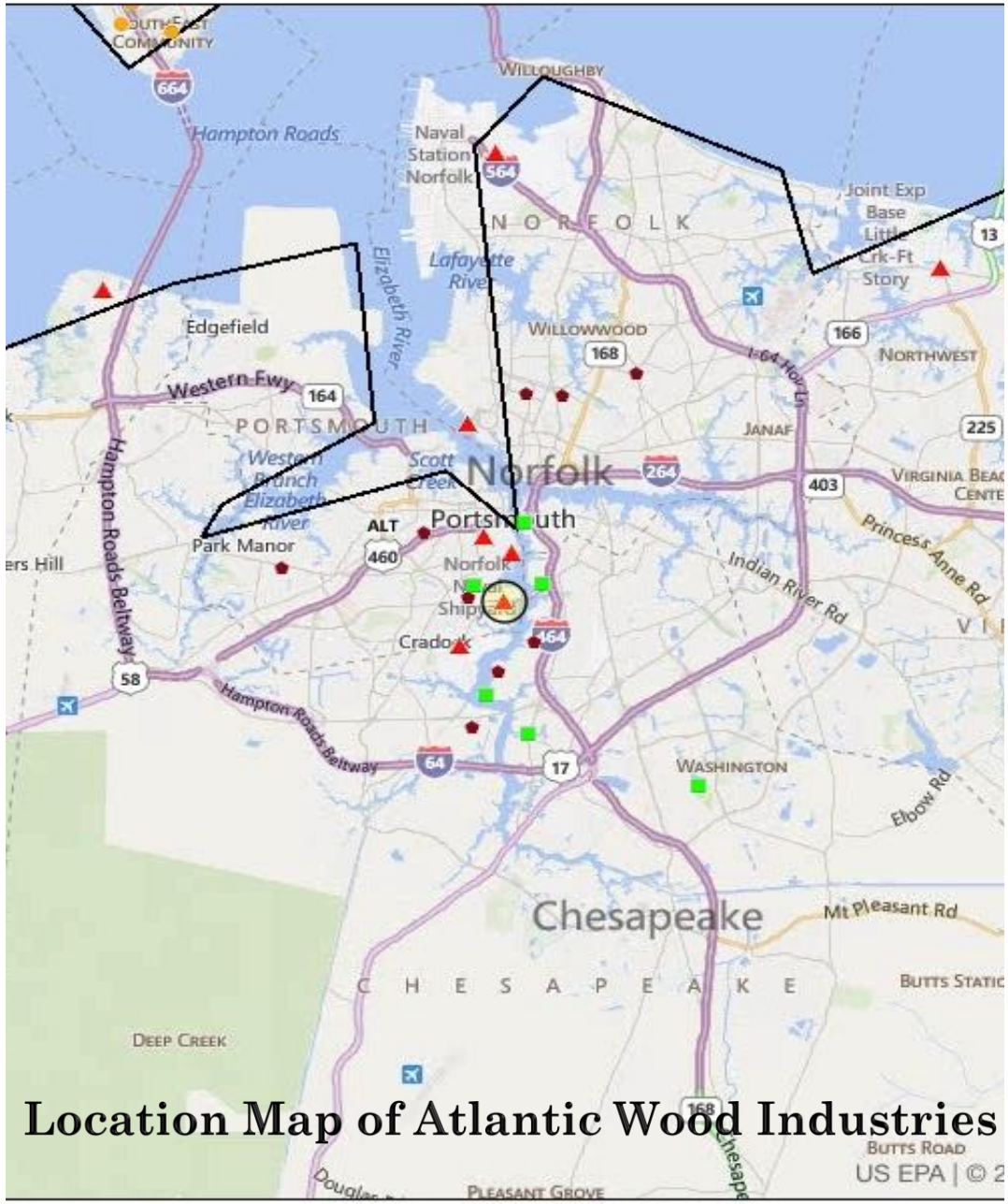
- Dredging of 100,000 cubic yards of contaminated sediments from channel
- COCs are dioxins and furans in this area

- Installation of articulated block mat in upper reaches of the Bayou
- COCs are PCB hotspots in this area





Articulated Block mat

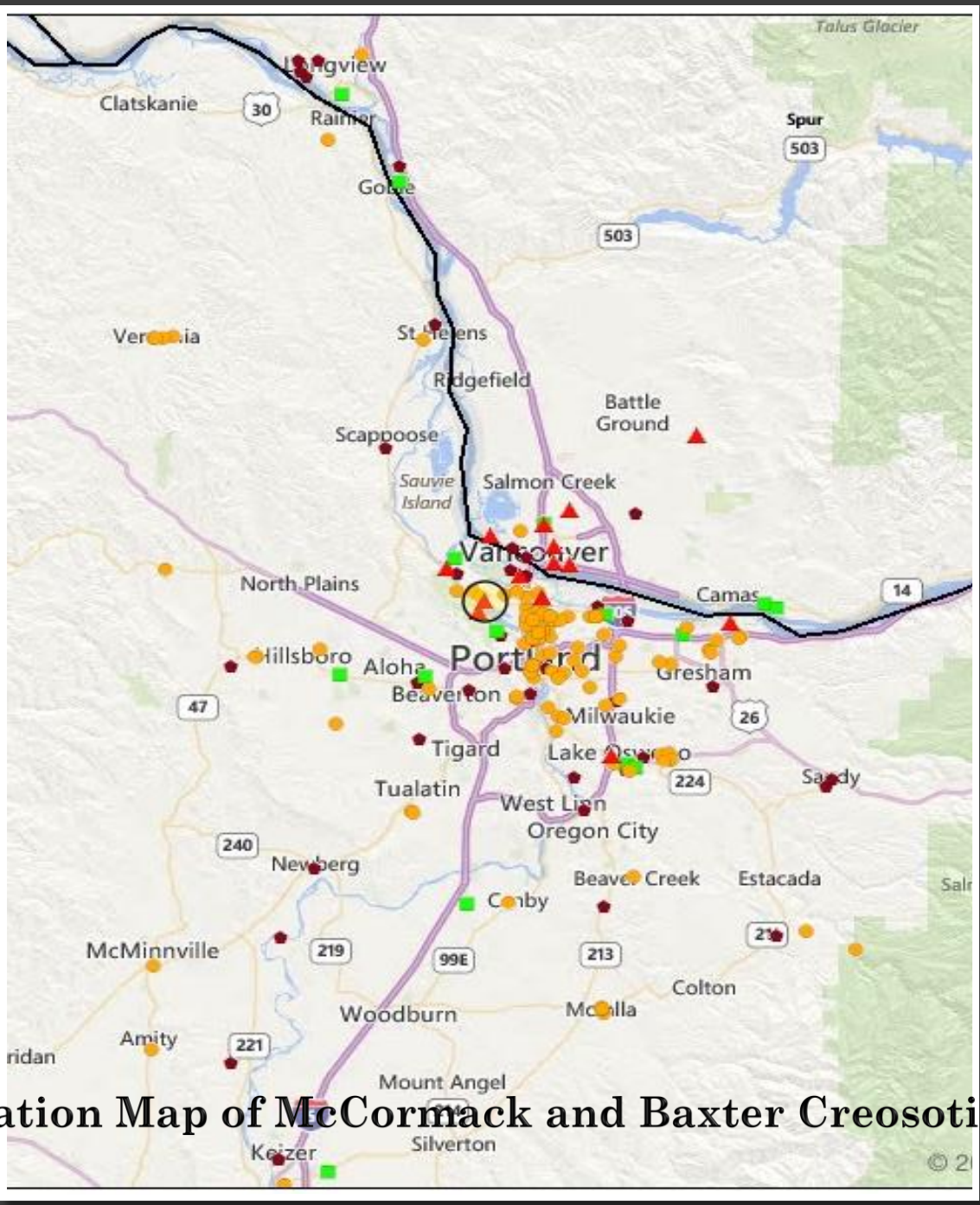


Location Map of Atlantic Wood Industries

ACTIONS AT AWI SITE (1995-2007)

- Excavation of 157,000 cubic yards of contaminated sediment
- Placement behind a constructed sheet piling wall
- Solidification of top and edges of fill
- Surface to be paved and maintained above water

- COCs at site: dioxins

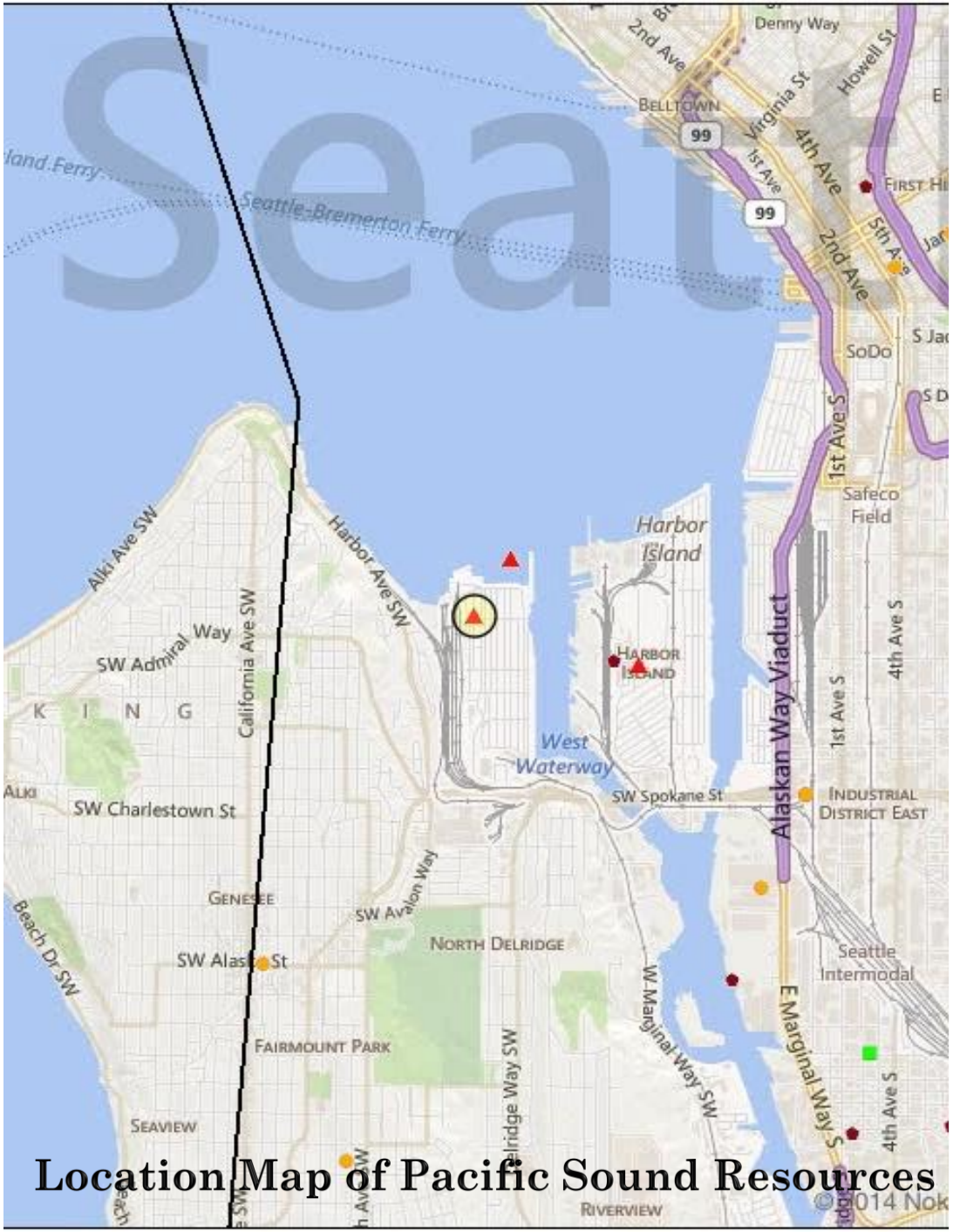


Location Map of McCormack and Baxter Creosoting

ACTIONS AT MCCORMACK AND BAXTER (2000-2011)

- River bottom contaminated to 80 feet of depth
- Excavation of top 4 feet of subaerial contaminated soils
- 22-acre sand, rock and organoclay sediment cap installed over the river bottom with articulated block mats on the river side slopes
- Organoclay cap performance tested 2005-2011 for effective treatment of PAHs

- COCs are: PAHs, NAPL, and dioxins and furans



Location Map of Pacific Sound Resources

ACTIONS AT PSR (2005-2009)

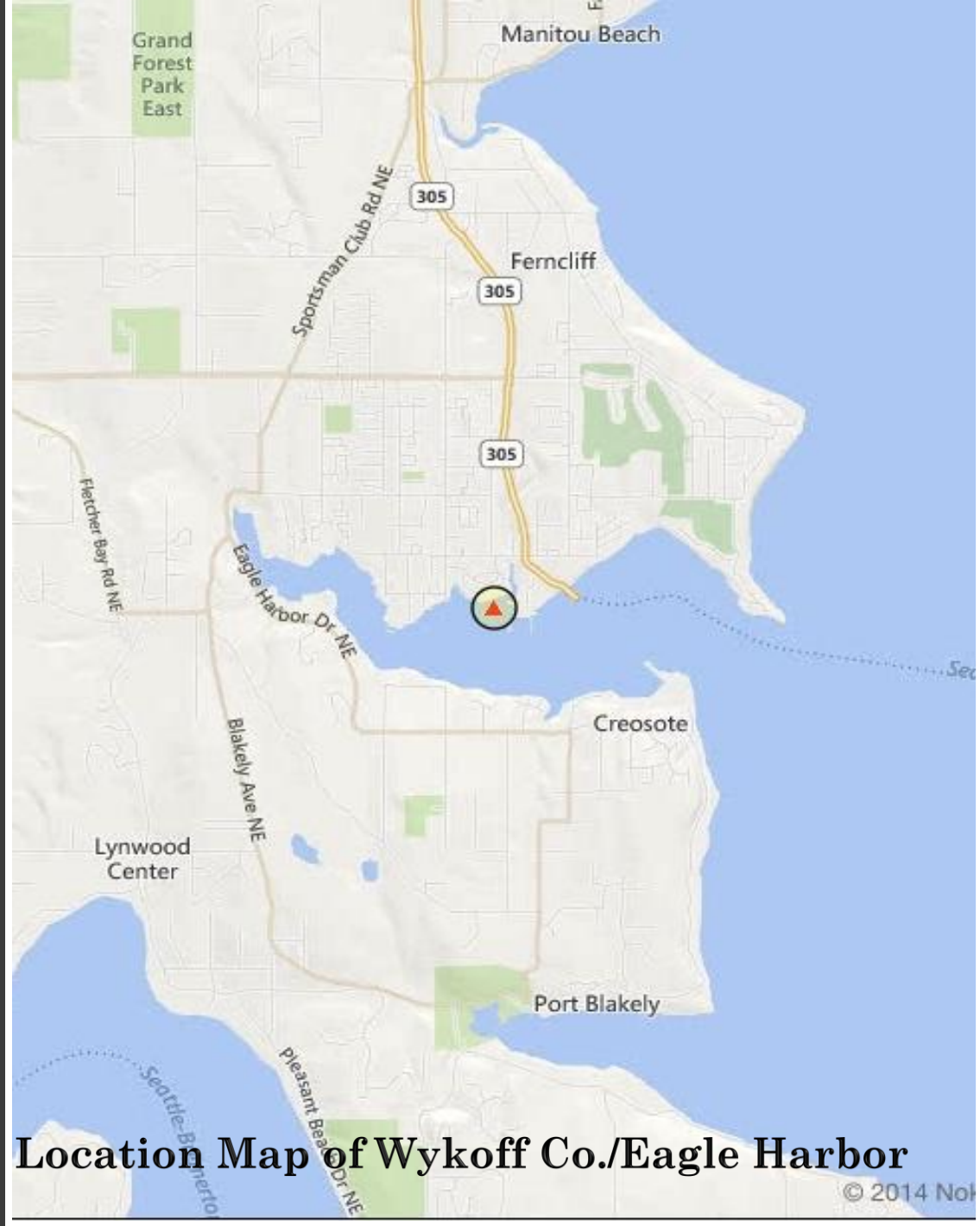
- 58-acre engineered subaqueous cap in waters ranging from 0-300’ in depth
- Excavation of 10,000 cubic yards of highly contaminated sediment in navigational areas

- COCs are PAHs, PCBs, and dioxins

ACTIONS AT THE WELCH CREEK AREA OF THE DOMTAR SITE (2005)

- 18-acre, thin sand cap over upper reaches of creek, not subject to erosive forces

- COCs are PAHs and dioxins. Dioxins here not considered a principal threat waste



Location Map of Wykoff Co./Eagle Harbor

ACTIONS AT WYCKOFF CO./EAGLE HARBOR (1992-2012)

- TCRA 1992-1994 to remove physical facilities and debris, sludges and oils, and asbestos
- Sheet-pile wall constructed to contain contaminated groundwater
- 54-acre sediment hot spot dredged and capped
- 30,000 cubic yards of contaminated soils removed

- COCs: PAHs, mercury and other heavy metals, pentachlorophenol (PCP), dioxins

All previous maps from EPA documents for the referenced sites

RESEARCH ON THESE SITES

- Was a Time-critical removal action performed? If so, what was it?
- What remedy or group of remedies was selected for the dioxin-contaminated areas of the site?
- How were sediments addressed in the remedy?
- Is there a consistent method of addressing dioxin contamination at these similar sites?
- What conclusions can we draw from this information for the SJRWPs site?

HOW DID EPA ADDRESS DIOXINS AT THE STUDIED SITES?

- Sediments with dioxin concentrations above 1 ppb were removed unless removal would destabilize the channel.

- Areas with lower, but still significant concentrations of COCs, were capped using a variety of methods. Capping methods reflected the energy of the aquatic environment where the cap was placed.

HOW DID EPA DECIDE WHICH SEDIMENTS TO REMOVE OR CAP?

- Dioxin concentrations above 1 ppb.
- Human cancer risk associated with consuming contaminated seafood met or exceeded the 1 in 100,000 cancer risk level
- Sediments were toxic to benthic (bottom-dwelling) organisms

EPA POLICY AND GUIDANCE ON DIOXIN-CONTAMINATED SITES

- National Contingency Plan (Superfund and Oil Pollution Act) says:
- "***Expectations.*** *EPA generally shall consider the following expectations in developing appropriate remedial alternatives:*
- ***(A)*** *EPA expects to use treatment to address the principal threats posed by a site, wherever practicable. Principal threats for which treatment is most likely to be appropriate include liquids, areas contaminated with high concentrations of toxic and highly mobile materials.*

EPA POLICY AND GUIDANCE ON DIOXIN-CONTAMINATED SITES

- ***(B)*** *EPA expects to use engineering controls, such as containment, for waste that poses a relatively low long-term threat or where treatment is impracticable.*

EPA POLICY AND GUIDANCE ON DIOXIN-CONTAMINATED SITES

- ***(C)*** *EPA expects to use a combination of methods, as appropriate, to achieve protection of human health and the environment. In appropriate site situations, treatment of the principal threats posed by a site, with priority placed on treating waste that is liquid, highly toxic or highly mobile, will be combined with engineering controls (such as containment) and institutional controls, as appropriate, for treatment of residuals and untreated waste."* (40 CFR 300.430(a)(1)(ii)

NEW DIOXIN CLEANUP GOALS

- February 2012: EPA Released a new dioxin reference dose and recommended cleanup levels to guide EPA in setting site-specific cleanup goals for CERCLA and RCRA sites

- Residential standard: 50 parts per trillion (.05 ppb)

- Industrial standard: 664 parts per trillion (.66 ppb)

APPLICATION TO THE SJRWP SITE

- EPA would use a combined approach in the affected area
- Areas of Principal Threat Wastes (the pits and surrounding highly-contaminated river bottom) would be addressed using treatment, which = removal for dioxins
- Areas of lower-level threat wastes (surrounding river sediments) would be capped with appropriate methods for a river with active shipping traffic, tidal influence, and high risk of both riverine flooding and coastal storms.

CONCLUSIONS

- A combination of removing highly-contaminated materials and capping materials with lower concentrations of contamination would be
  - Consistent with actions at similar sites AND
  - Compliant with stated EPA Guidance and Policy