

## **Appendix D**

### **Information Regarding Groundwater Issues**

This Appendix D to the consent decree captioned United States of America, et al. v. Occidental Chemical Corporation, et al. (the “Consent Decree”) summarizes information regarding contamination of groundwater beneath the Hylebos Waterway (including but not limited to the “Tribal Land Groundwater Plume,” as defined by the Consent Decree) for which Plaintiffs assert Defendants are responsible. The attached summary of information and related briefing by Occidental Chemical Corporation were presented to the Plaintiffs on July 11, 2006.

# Hylebos Waterway NRD Settlement Groundwater Investigation Summary



*July 11, 2006 Presentation to Trustees*

# Outline

- Overview of NRD settlement proposal
- Regulatory history and proactive responses
- Sediment cleanup actions
- Groundwater treatment/containment actions
- Recent groundwater investigations
- Comparison with NRD injury thresholds
  - Literature-based comparisons
  - Hylebos Waterway biological data
- Implications for NRD settlement
- Data transmittal

# Overview of OxyChem Settlement

- 19-acre Sound Refining restoration project
- \$1.6 million cash to cover past & future costs
- NRD settlement terms:
  - Covenant not to sue based upon current knowledge of conditions (e.g., no additional injury to Hylebos Waterway biota due to OxyChem plume)
  - Reserve groundwater remediation claim on tribal property
  - Reopener triggered if new information indicates additional injury to Hylebos Waterway biota due to OxyChem plume
- Rapid timeline for agreement & restoration

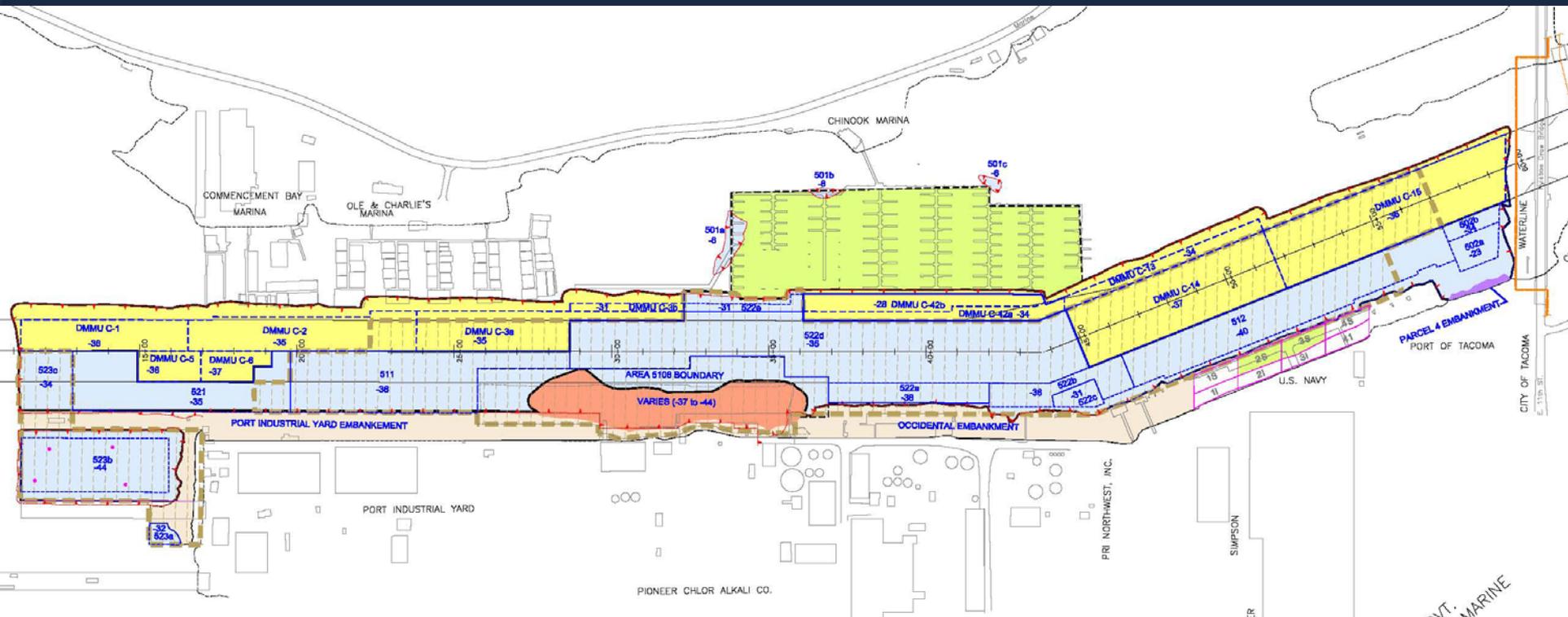
# Regulatory History - Sediments

- 1980s – Sediment and biological studies
- 1989 – Superfund Record of Decision
  - Source Control (Ecology)
  - Sediment Remediation (EPA)
- 1993 - HCC Investigations and Design
  - Integration with NRD (Trustees)

# Hylebos Waterway Sediment Cleanup

- 2002 & 2003 – Area 5106 Dredging
  - Dredging limited by dock stability
  - Post-dredge sediment residuals
  - Future integration with selected remedy
- 2003 & 2004 – Segment 3 to 5 Dredging
  - OxyChem & Port of Tacoma proposal – 1999
  - Expanded dredging (minimal natural recovery)
  - 600,000 cy sediment dredged & disposed
  - Engaged other PRPs through mediation to expedite the remedy

# Hylebos Waterway Mouth Cleanup



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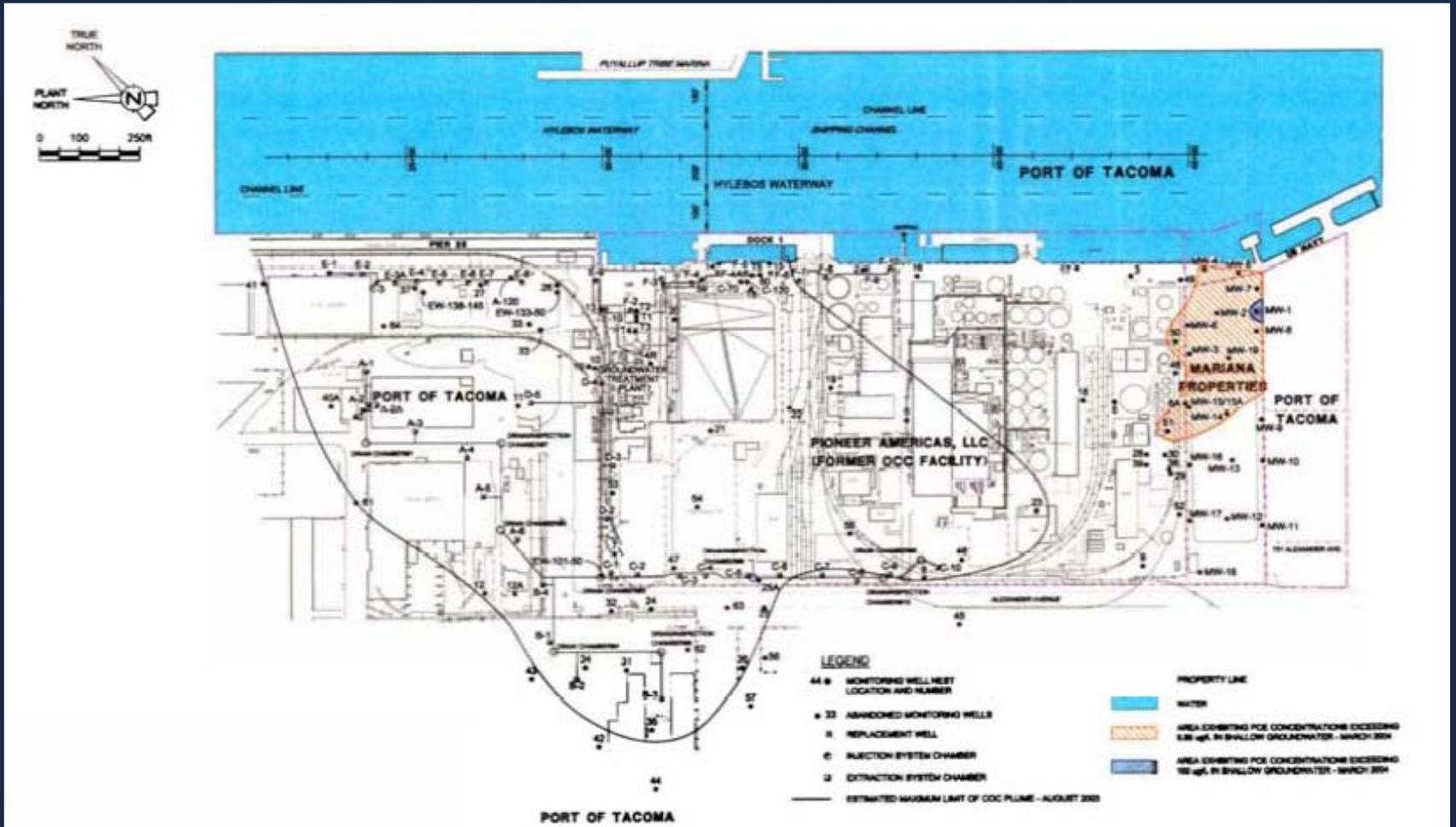
# Hylebos Sediment Cleanup

- Hylebos Waterway sediment cleanup successfully completed in 2004
- Pending issues
  - Integration of NRD restoration
  - Embankment capping (Pier 25)
  - Integration of embankment cleanup with groundwater cleanup remedy
  - Ongoing groundwater investigation & design

# Regulatory History - Groundwater

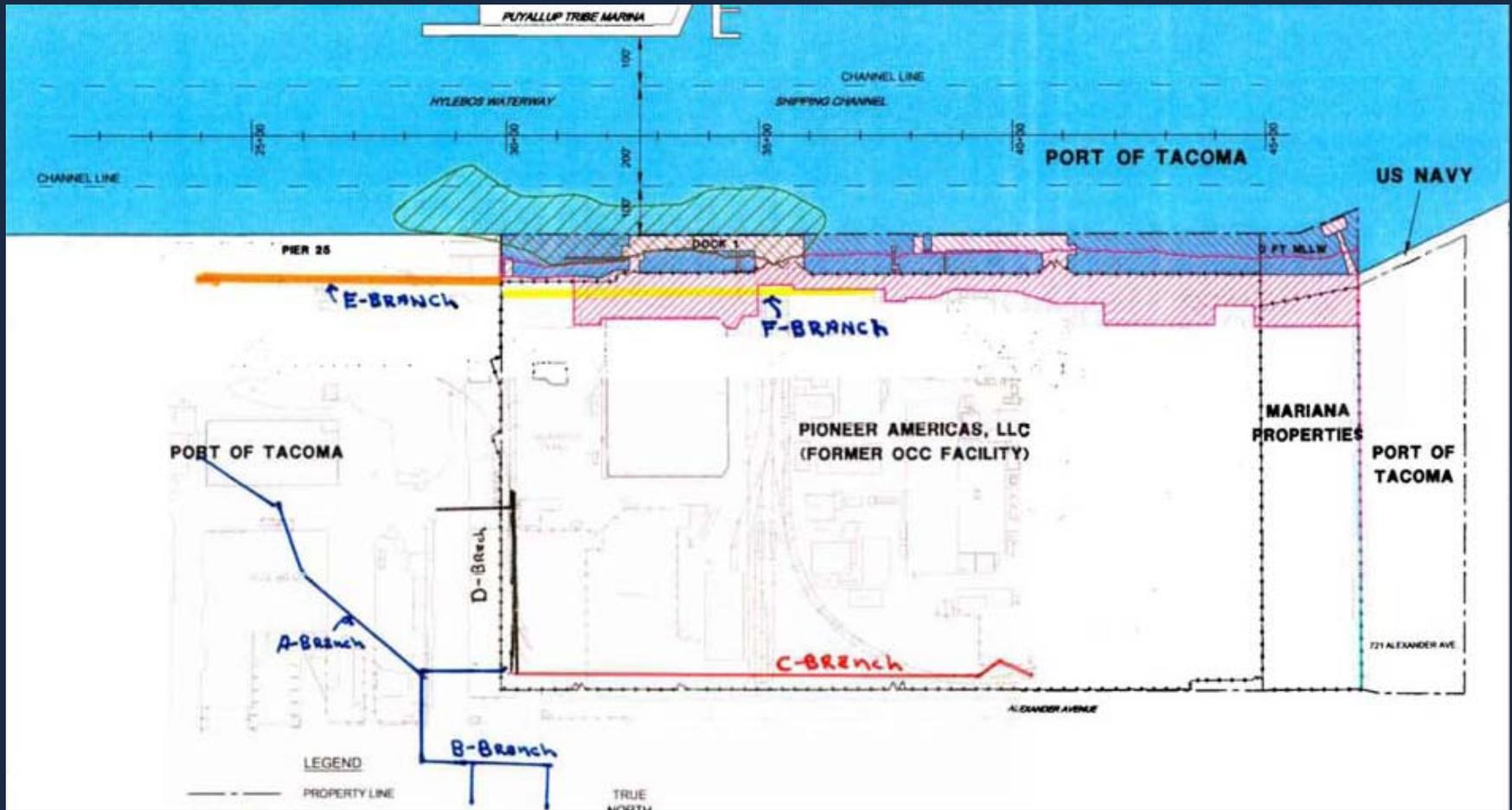
- 1973 – PCE Manufacturing ceased
- 1979 – PCE Tank Storage ceased
- 1980 – Lime pond soil removal (source control)
- 1980s – Groundwater studies
- 1988 – RCRA groundwater actions
  - RCRA Part B Permit – 1988
  - Groundwater Corrective Action Plan – 1989
  - Clean closure and upland soil removal
  - Extraction & injection wells on-line – 1994
  - Monitoring & adaptive management – ongoing

# RCRA Groundwater Corrective Action



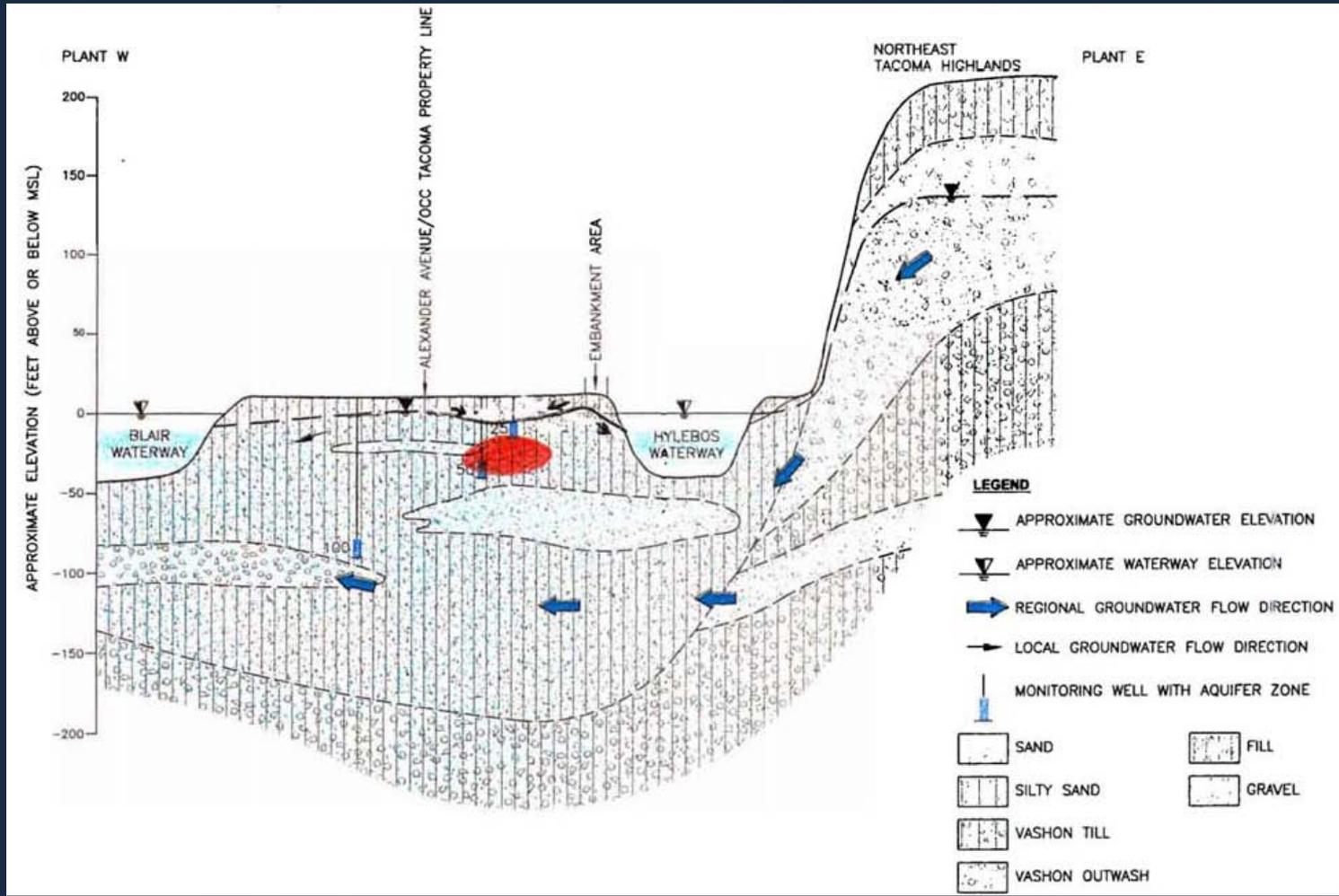
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# Groundwater Extraction and Injection (Containment) Wells



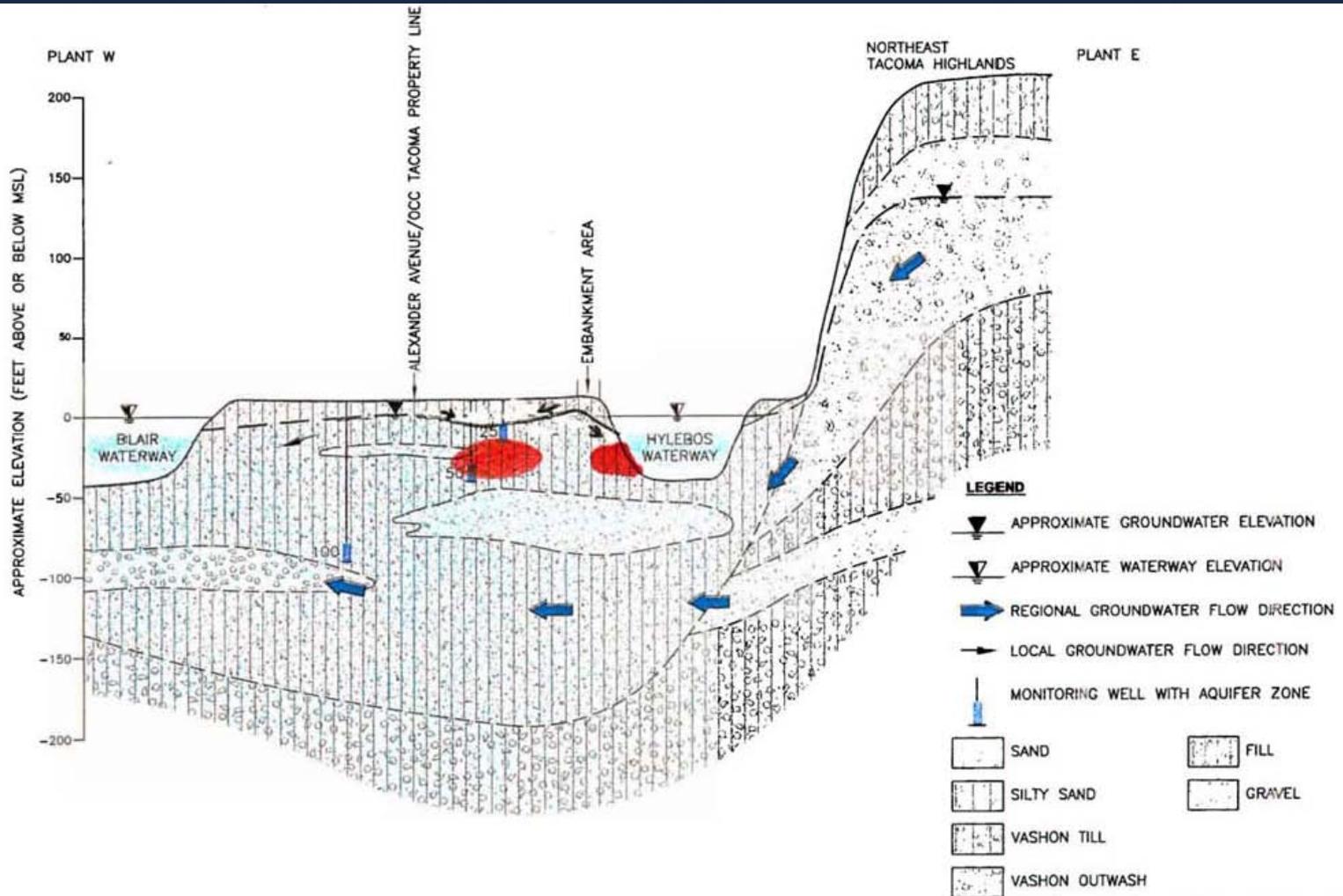
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# Groundwater Schematic – Pre 5106



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# Groundwater Schematic – Post 5106



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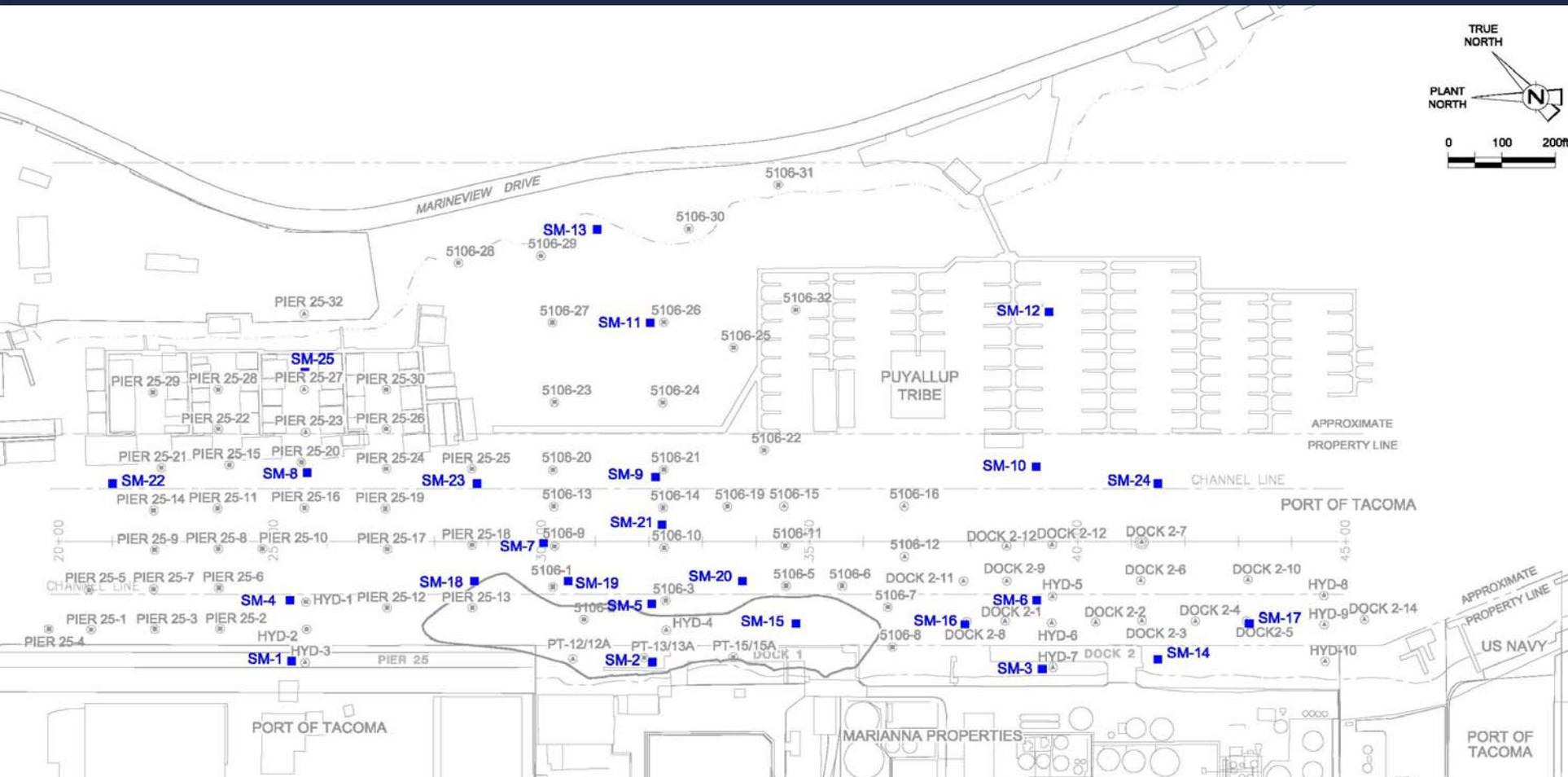
# Groundwater System Performance

- More than \$45 million expended to date
- More than 10 years of successful operations
- Annually removes 3 to 4 tons of chemicals
- Effective containment of plume
- Long-term operations anticipated
- Adaptive management (ongoing)
  - Address localized areas of high pH
  - Integration with future remedy

# Recent Subtidal Groundwater Investigations

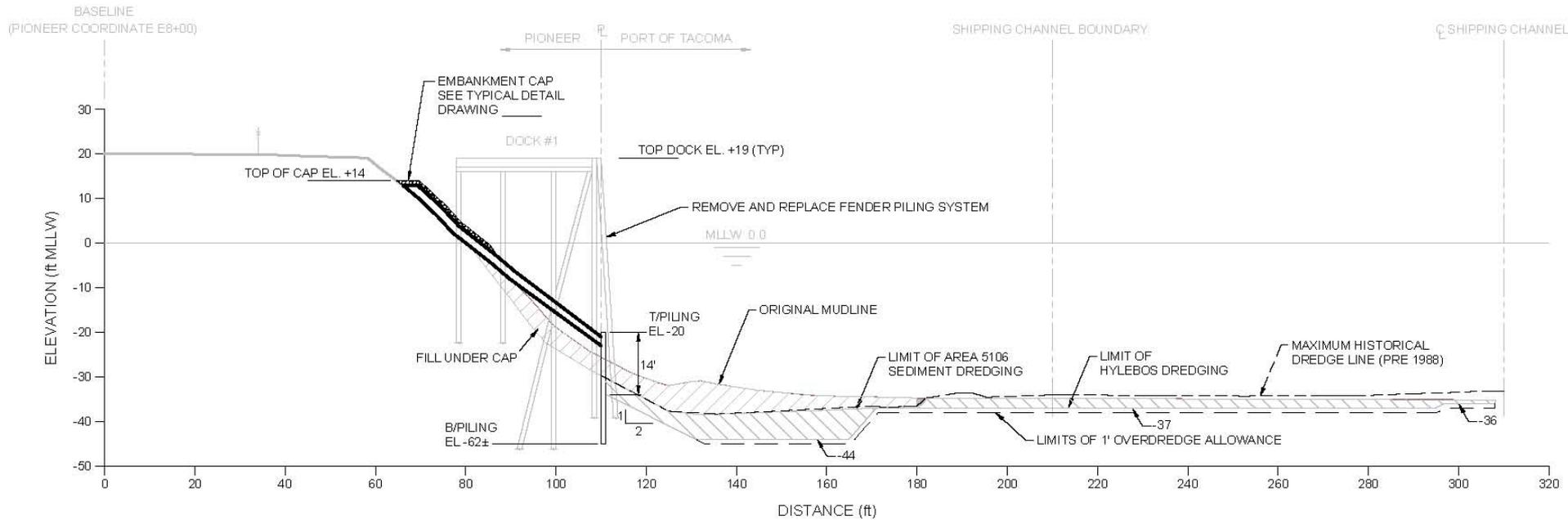
- Detailed studies in the 1980s under EPA direction led to existing groundwater treatment system
- Supplemental site characterization activities for remedy design in Area 5106 and waterway
  - Detailed investigations
    - Upland soils, sediment and groundwater sampling
    - Geophysical, seepage meter and hydraulic investigations
    - All data collection utilized state-of-the-art methods
  - 3-D modeling and alternatives analysis
  - Remedy selection and design of selected remedy
- No sediment injury due to groundwater plume
  - Concentrations within near-surface biologically active zone generally below injury thresholds

# Recent Groundwater Investigations



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# Typical Area 5106 Dredge Section (and potential future remedy)



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# Recent Groundwater Investigations: Tetrachloroethene (PCE)

PCE Limit = 8.85 ppb

100,000 ppb

10,000 ppb

1,000 ppb

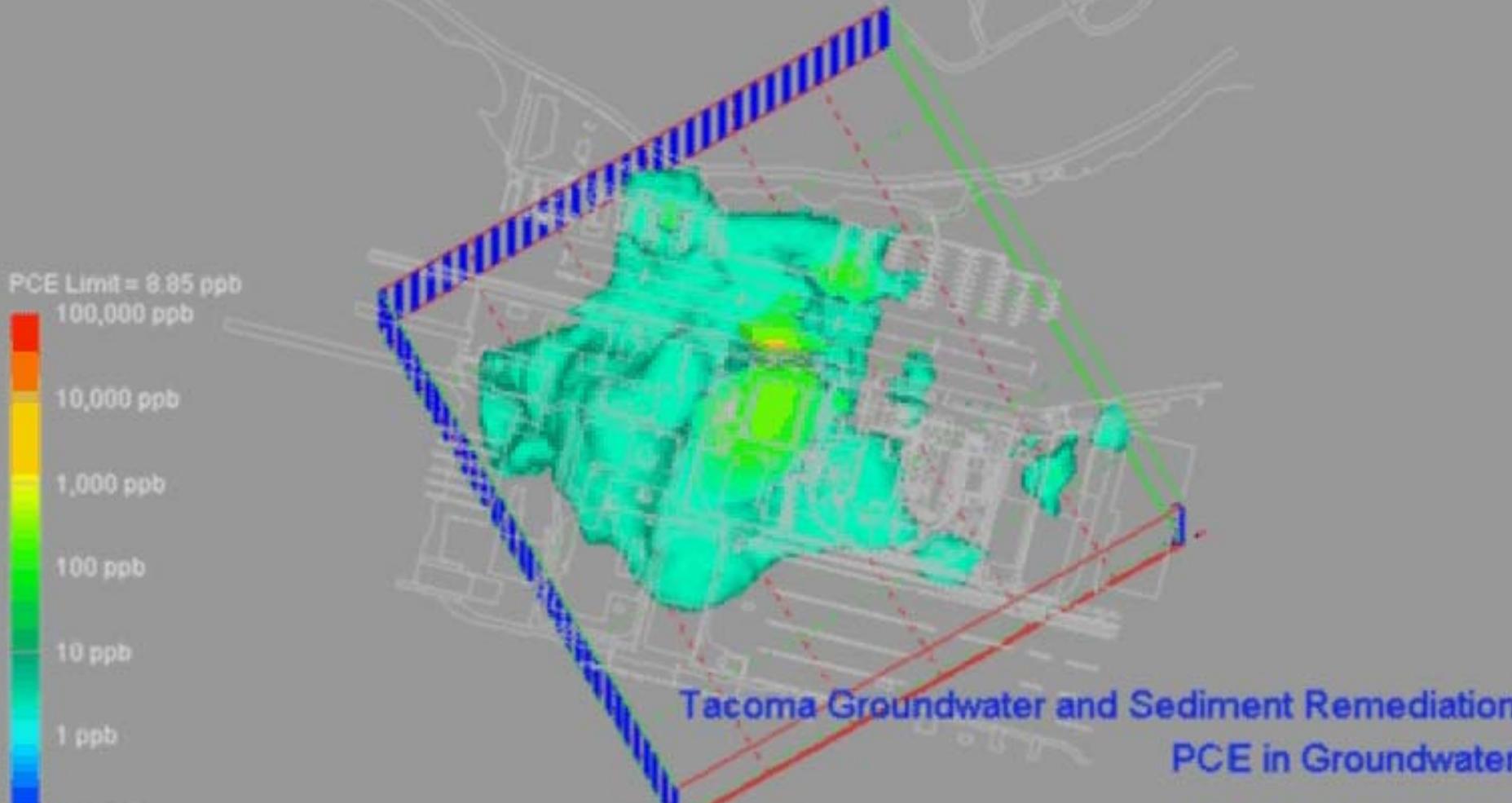
100 ppb

10 ppb

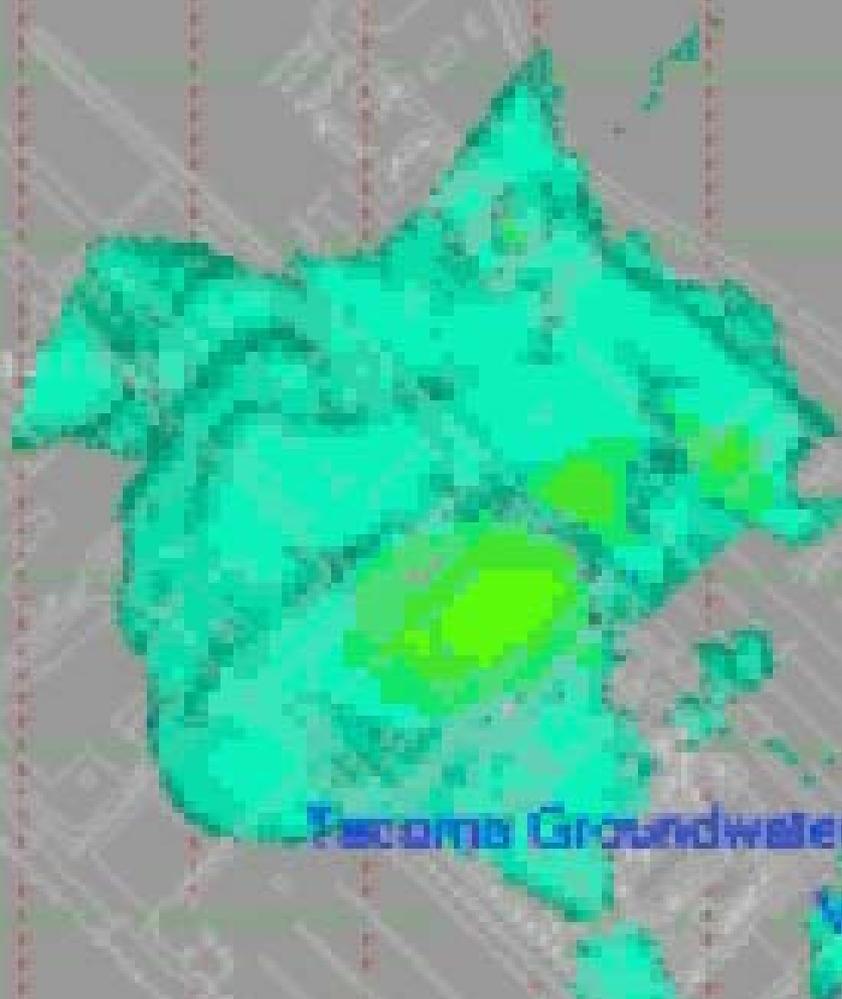
1 ppb

0.1 ppb

Tacoma Groundwater and Sediment Remediation  
PCE in Groundwater



# Recent Groundwater Investigations: Vinyl Chloride (VC)



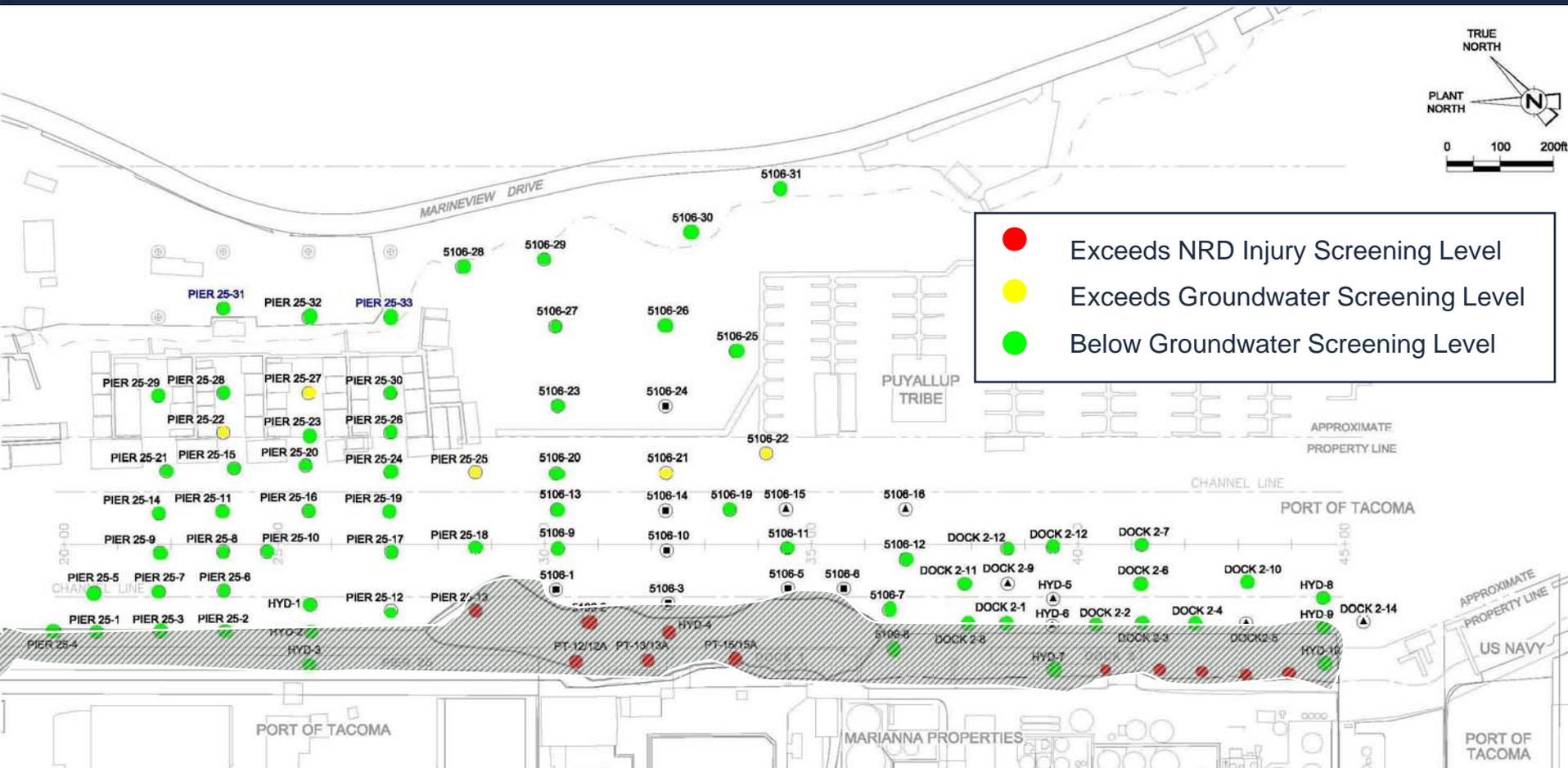
Facoms Groundwater and Sediment Remediation:  
Vinyl Chloride in Groundwater

# Comparison of Groundwater (and sediment) Screening Levels in ppb

Chemical	Groundwater Screening Level	NRD Injury Screening Level
Tetrachloroethene	9	98 (sed = 57)
Trichloroethene	81	47 (-)
Vinyl chloride	2.4	210 * (-)
Hexachlorobenzene	50	- (sed = 22)
Hexachlorobutadiene	0.01	- (sed = 11)

\* 1,000 times below lowest aquatic life LC<sub>50</sub> (consistent with limited toxicity data)

# Limited Exceedance of NRD & Other Screening Levels in 0 to 2-ft Sediments

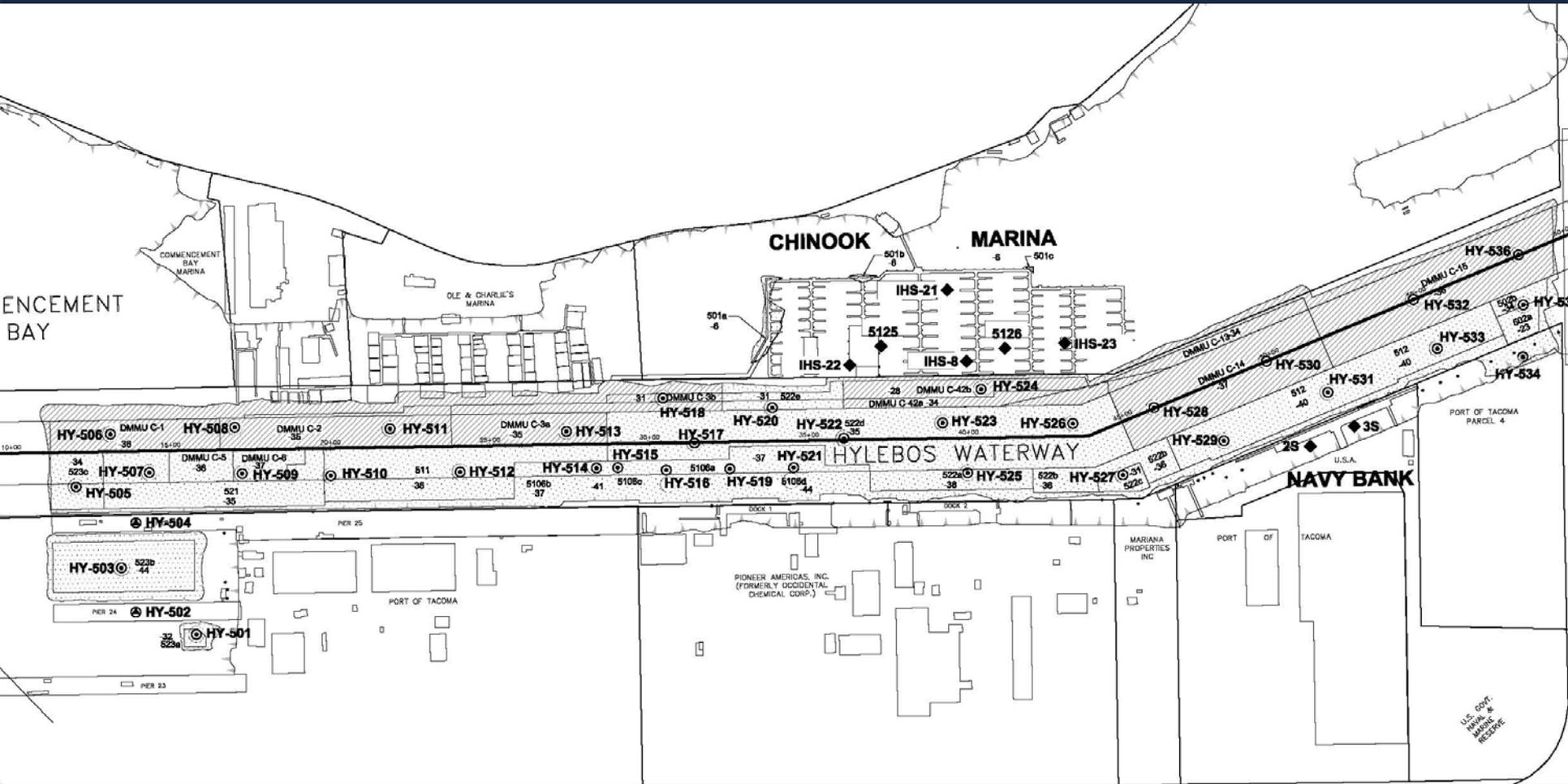


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# Subtidal Groundwater Investigation

- Extensive data collection/site characterization
  - All data collected using state-of-the-art methods
- No sediment injury associated with delineated groundwater plume
  - Peak levels ~20 to 50 feet below mudline
  - Concentrations within near-surface biologically active zone generally below injury thresholds
- “Surfacing” plume restricted to Area 5106 dredge prism and adjacent embankment
  - Upcoming remedial actions will reduce exposure below NRD injury thresholds
- Data do not change basis for NRD settlement

# No Sediment Injury Indicated by Surface Sediment Bioassay Data



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# Biological Data Corroborate No Post-Dredge Sediment Injury

- Post-dredge bioassays all passed (2004)
- Earlier pre-dredge biological data also suggested minimal injury
- No tissue accumulation in fish/shellfish tissue
  - English, Sand, and Rock sole
  - Starry flounder
  - White spotted greenling
  - Red rock and Dungeness crab
- No fish advisories related to groundwater constituents

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# Data Used to Define Current Knowledge

- Hylebos Pre-Remedial Design Evaluation (PRDE; reported by HCC)
- Trustee Assessment data
- Area 5106 and Embankment investigations
- Hylebos Remedial Design (Port & OxyChem)
- Area 5106 post-dredge confirmation data
- Hylebos post-dredge confirmation data
- Recent subtidal groundwater and sediment investigations (preliminary data; on CD)