Occidental Chemical Inc.

Public Information Meeting
10/28/15

Overview

- Site description and current land Use
- History
  - Processes & by-products
- Remedial Investigation
- Conceptual Site Model
- Schedule and Workplan
- Public Involvement Timeline
- Contact Information

Site Description

- ~23 acres within the property boundary.
- Within 10 – 12 square-mile area Commencement Bay Nearshore/Tideflats Superfund Site.
- Within a segment of the "Mouth of the Hylebos Problem Area."
- Operating site closed.
  - Decommissioned in 2007.
  - Above-ground structures removed except for groundwater treatment plant.

Current Land Use

- Zoned for maritime and heavy industrial use.
- Restrictive covenants limit to industrial land use.
- Use of groundwater for drinking or domestic use is prohibited.
- Buildings on the adjacent Port of Tacoma property are within the groundwater plume.

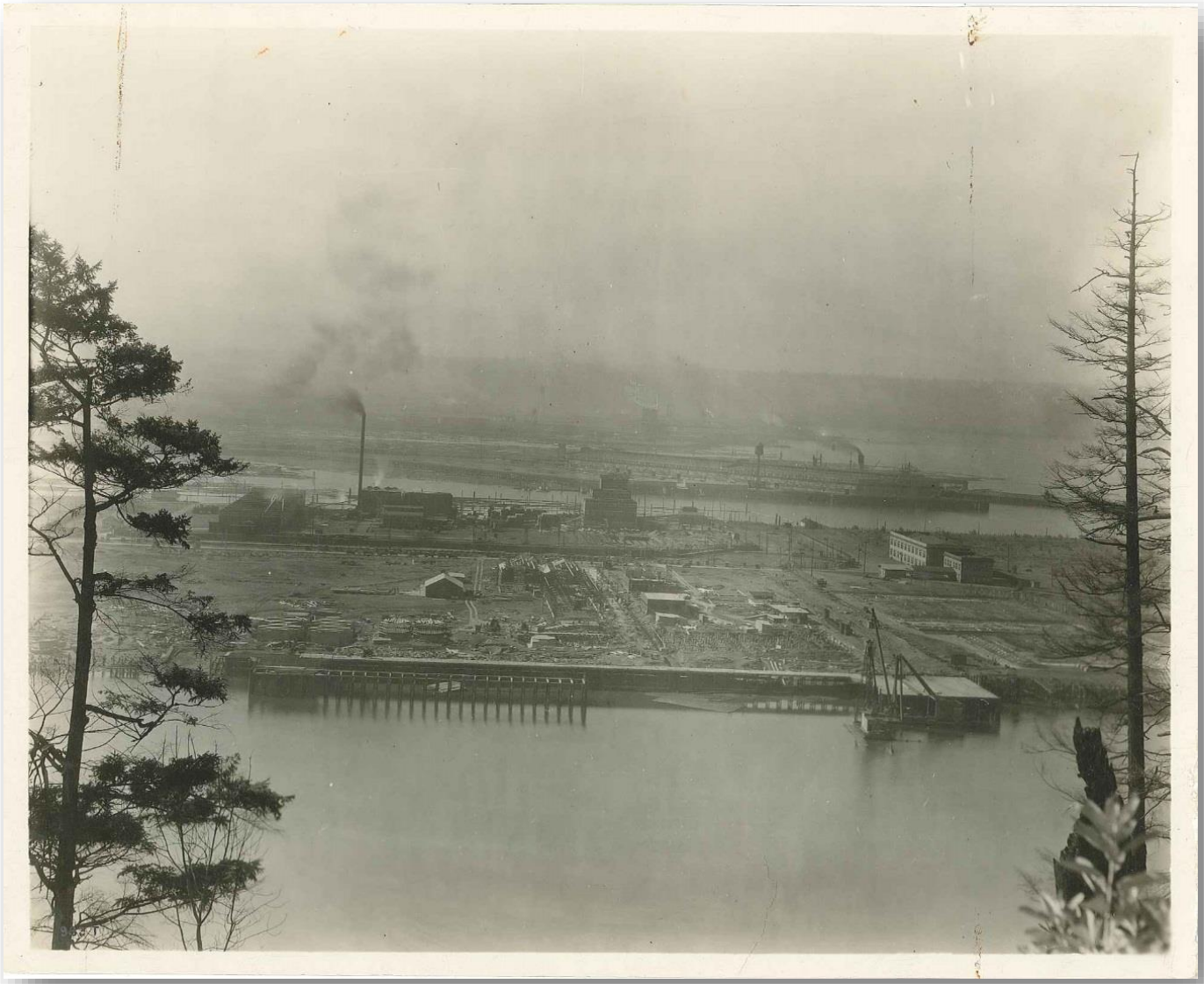
Groundwater Treatment Plant

(Permit renewal out for public comment January 2016)

Photo Credit: Occidental Chemical Corporation

Filling and Construction – 1920

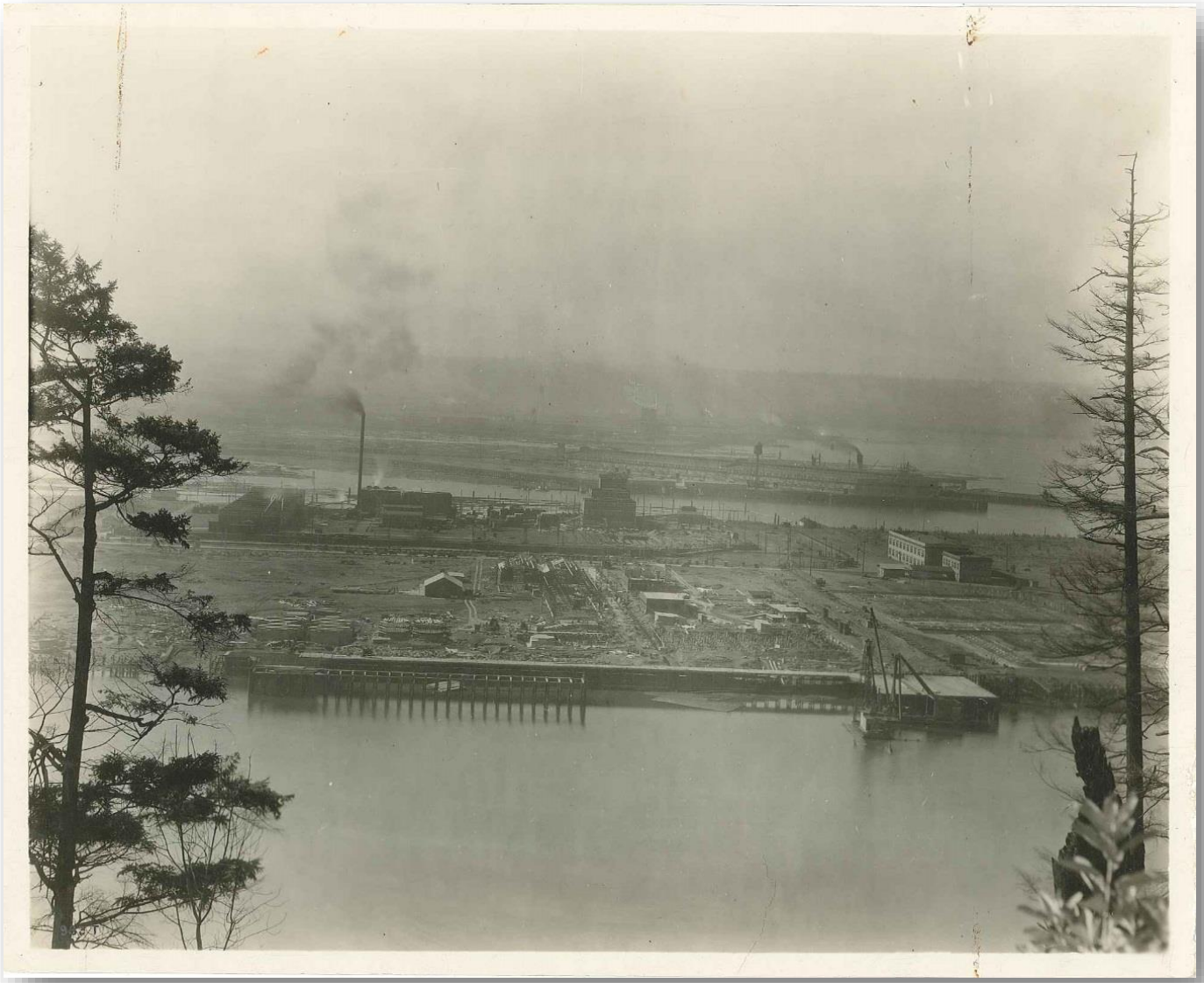
Photo Credit: Puget Sound Regional Archives



Occidental Site on Hylebos Waterway

1928

Photo Credit: Glenn Springs Holdings Archives



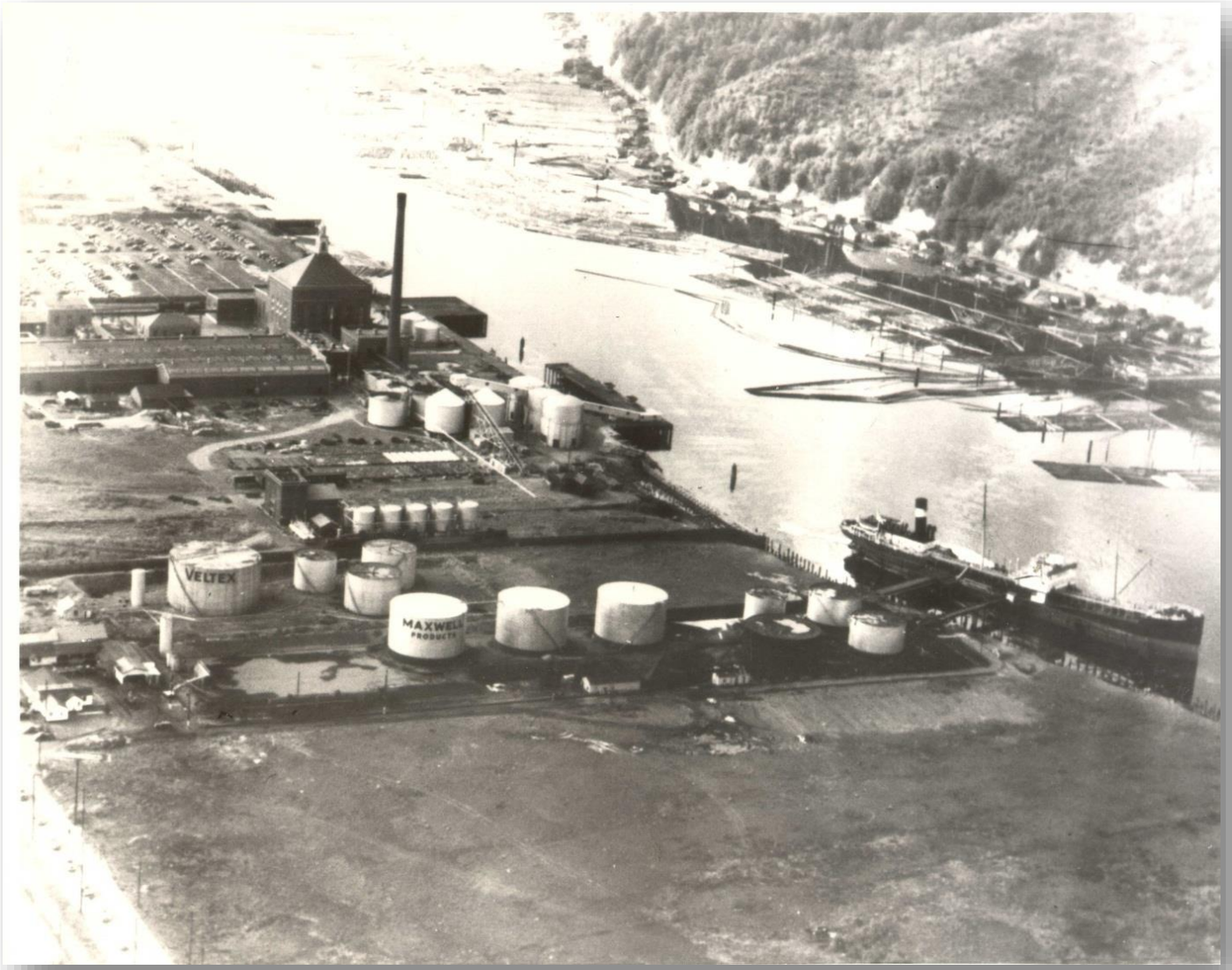
Occidental Site on Hylebos Waterway

1928

Caustic House Newly Constructed

1929

Photo Credit: Glenn Springs Holdings Archives



Occidental Site In Operation

1935 – 1946 period

Fueling site in the foreground

Photo Credit: Glenn Springs Holdings Archives

Naval Shipyard from Occidental site

1945

Photo Credit: Glenn Springs Holdings Archives

Demolition of salt conveyer

2006

Photo Credit: Occidental Chemical Corporation

Demolition of Caustic House

2006

Photo Credit: Occidental Chemical Corporation

Caustic House removed

2007

Photo Credit: Occidental Chemical Corporation

Occidental Site Post Demolition from Treatment Plant

2008

Photo Credit: Occidental Chemical Corporation

Historical Operations as sources of contamination (1920-1970)

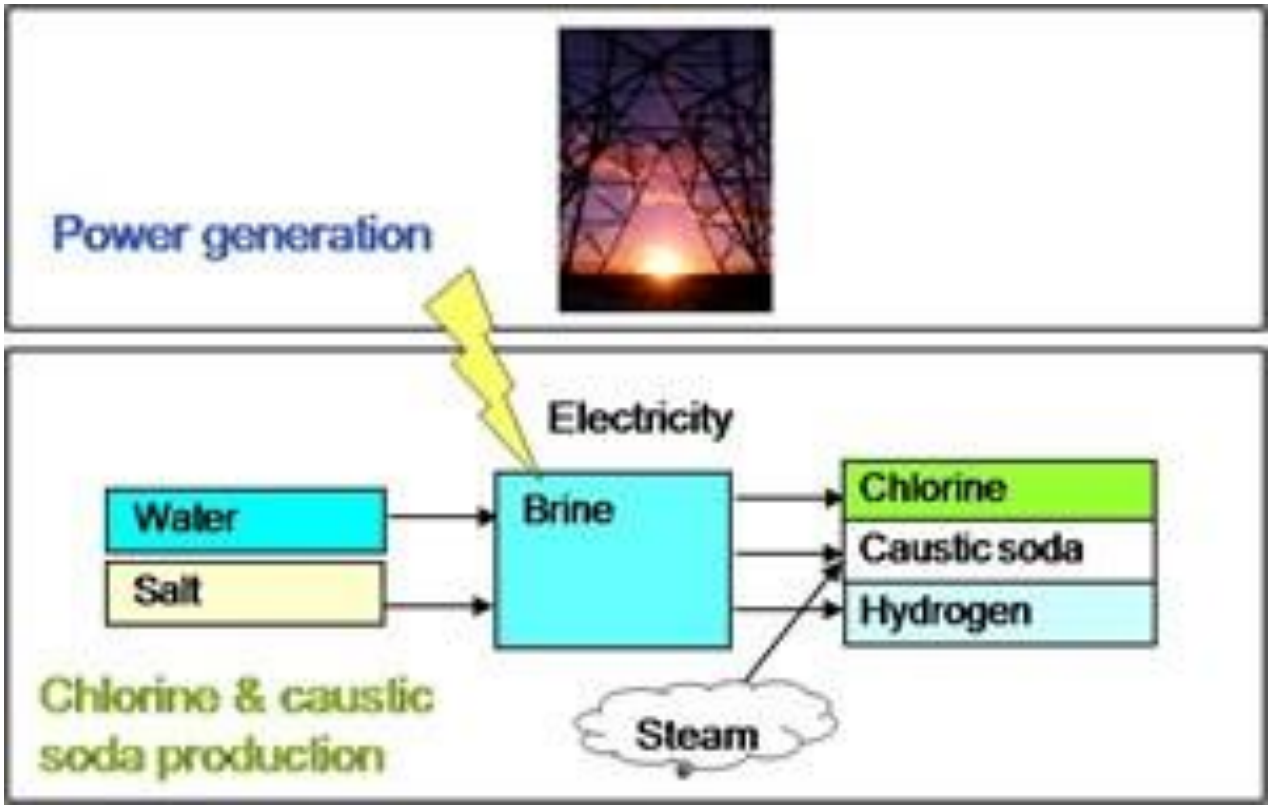
- Wastes from chlorine production were discharged directly to the Hylebos Waterway through the plant outfall or settling barges.

- Wastes from other production processes were:
  - Temporarily held in on-site settling ponds.
  - Disposed to:
    - The Hylebos Waterway.
    - A deep-water disposal site.
    - Off-Site.

Solvent Loss Estimates

- It is estimated that 457 million pounds of solvent were produced at the site.
- The amount of solvent currently in the subsurface is estimated to be approximately 1 million pounds.
- The uncertainty associated with this estimate is large. The actual amount could be half as much or twice as much.

Chlorine Production



Chlorine and Bleach Production

Chlorine and Bleach Production Process → By products:
Calcium carbonate (lime)
Magnesium hydroxide (milk of magnesia)
Sodium chloride (salt)

TCE and PCE Production

TCE and PCE Production Process → By products:
Calcium hydroxide (slaked lime)
Calcium chloride
Chlorinated organic residues

Photo Credit: Glenn Springs Holdings Archives

Photo Credit: Glenn Springs Holdings Archives

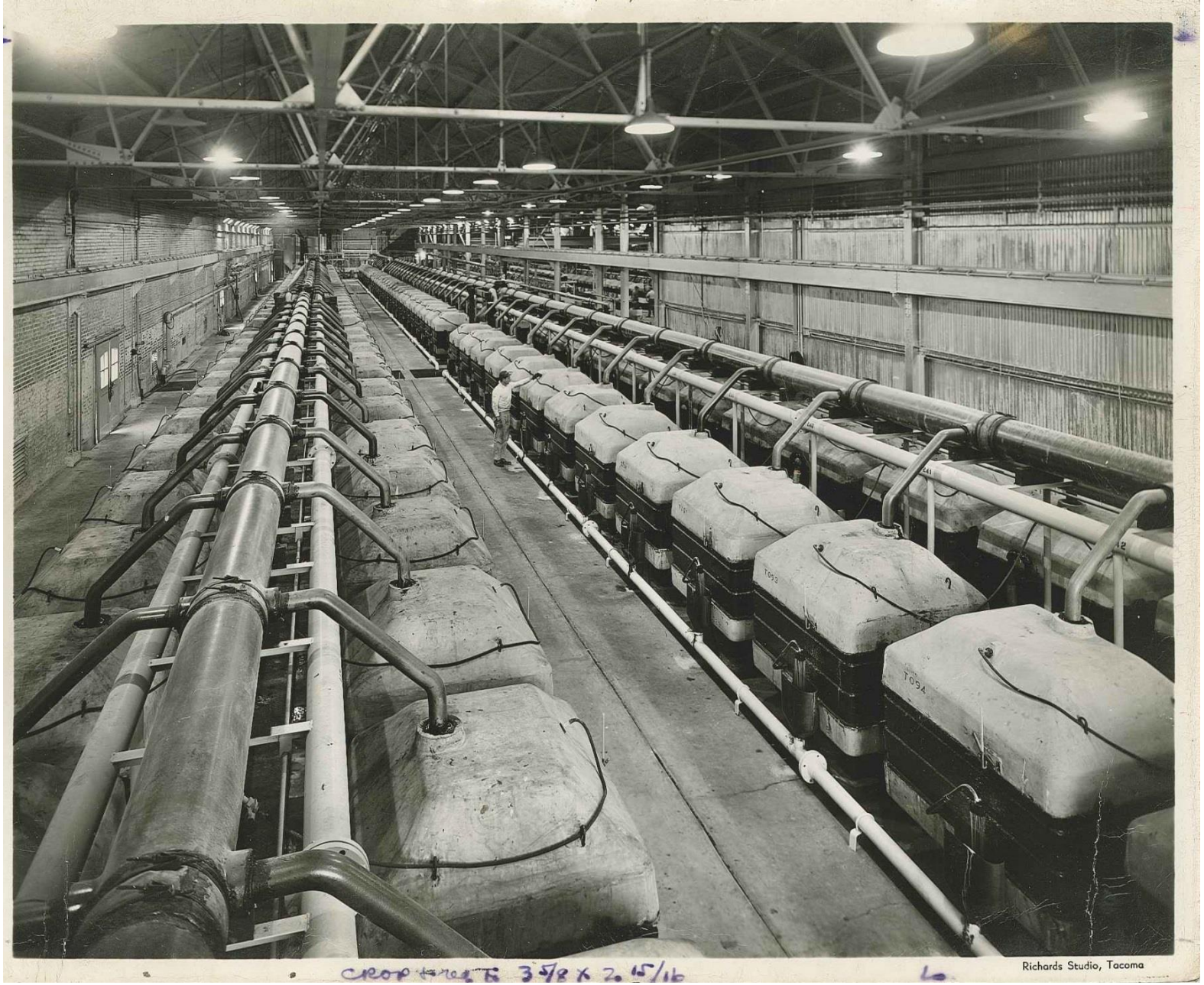


Photo Credit: Glenn Springs Holdings Archives

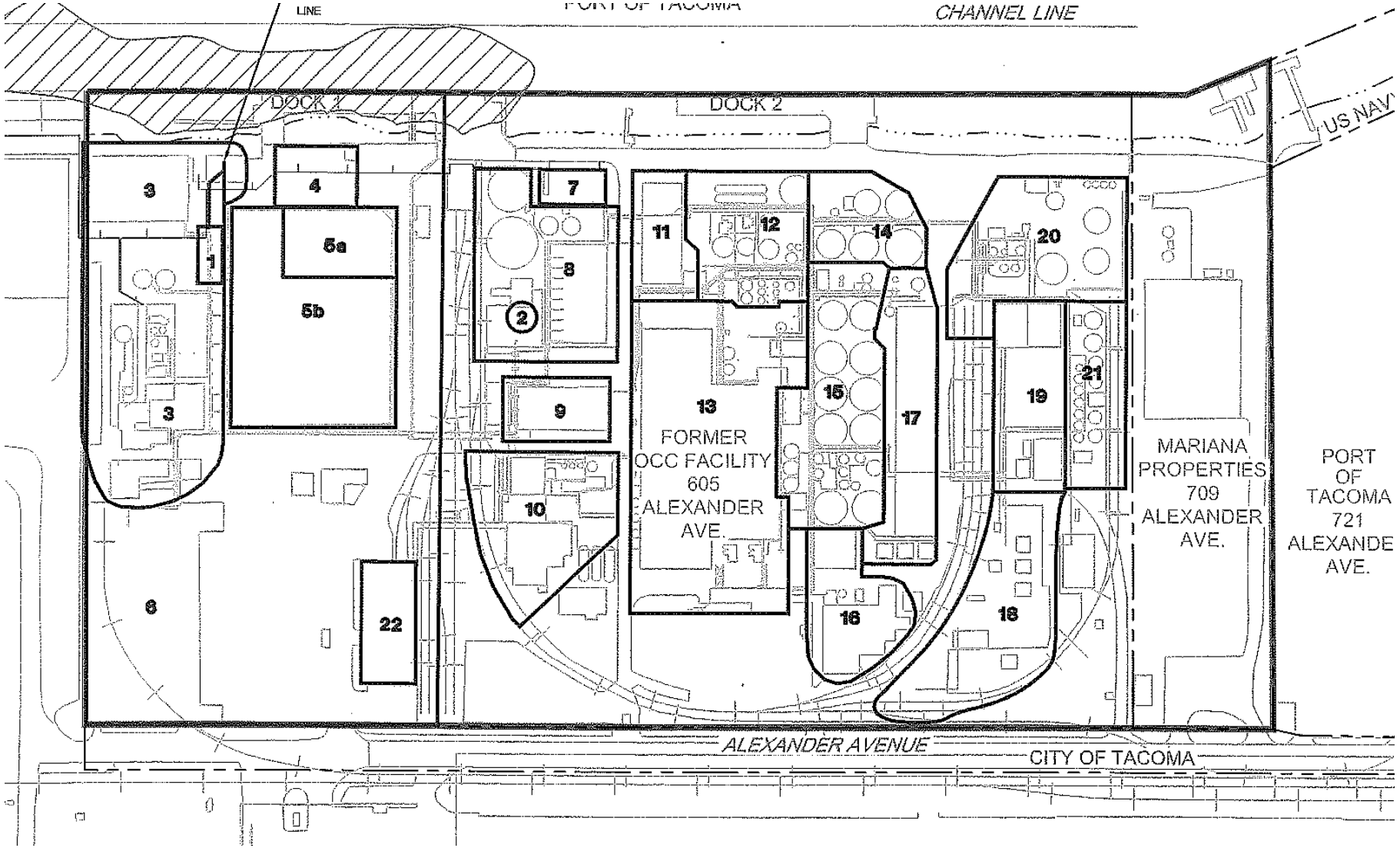


Figure 1.3 from the Draft Remedial Investigation Report

Two Primary Sources of Problems in Groundwater

TCE and PCE production

Groundwater PCE & TCE produces Vinyl Chloride (VC)

Chlorine and Bleach Production
PCE and TCE Production

High pH in groundwater 10.5 – 14

PCE & TCE in the Environment

TCE and PCE production

Groundwater PCE & TCE produces Vinyl Chloride (VC)

- Solvent heavier than water ("Dense Non-Aqueous Phase Liquid" or "DNAPL").
- Not readily dissolved in water.
- Amount that does dissolve can exceed safe levels.
- Molecules cling to soil particles or "pool."
- Persistent – breaks down slowly.
- Produces vinyl chloride.

Vinyl chloride in the environment

- Slightly soluble in water.
- Amount that does dissolve can exceed safe levels.
- Lower capacity to absorb to particulate matter and sediment.
- Rapidly volatilizes in surface water .
- Carcinogen and toxic to the liver (hepatotoxin).
- Under certain conditions in groundwater, vinyl chloride can continue to degrade to harmless products over time.

Two Primary Sources of Problems in Groundwater

TCE and PCE production

Groundwater PCE & TCE produces Vinyl Chloride (VC)

Chlorine and Bleach Production
PCE and TCE Production

High pH in groundwater 10.5 – 14

Sodium Chloride & Sodium Hydroxide in the Environment

- Basic – pH over 7
- Corrosive
- Dissolved the aquifer material, primarily silica.
- Created dense material that moves and displaces groundwater.

Chlorine and Bleach Production
PCE and TCE Production

High pH in groundwater
10.5 – 14

Early Source Control Measures

- "Closure" of waste management units
  - Surface impoundments emptied and excavated.
  - Area 5106 (discharge/barge area along shore) dredged.

- 1996 EPA and Occidental both concluded the groundwater plume needed to be contained.
  - A shallow pumping/injection groundwater well system installed to attempt containment.
  - The system has removed approximately 150,000 pounds of solvent.
  - The system is limited by locations of wells and achievable pumping rates.

Continued Investigations

- From 1988 to today 25 physical chemical, and hydrogeologic investigations.
- 12,000 data points from investigations from primarily borings and groundwater wells
- On-going investigation of vapor intrusion at the north end of the site and on Port of Tacoma-owned properties.
- Planned sediment/porewater sampling to update 2005 data and answer questions about groundwater impacts.

Challenges for the Investigation

- Complexity in groundwater system – flows from east and south into Commencement bay.
- Behavior of the density plume, called the "ADP," has reversed groundwater flows in the past.
- Seawater and tidal influences.

figure 1
SITE LAYOUT
Occidental Chemical Corporation, Tacoma, Washington

Conceptual Site Model – Groundwater Flow and the Plumes

- 4 Dimensional demonstration

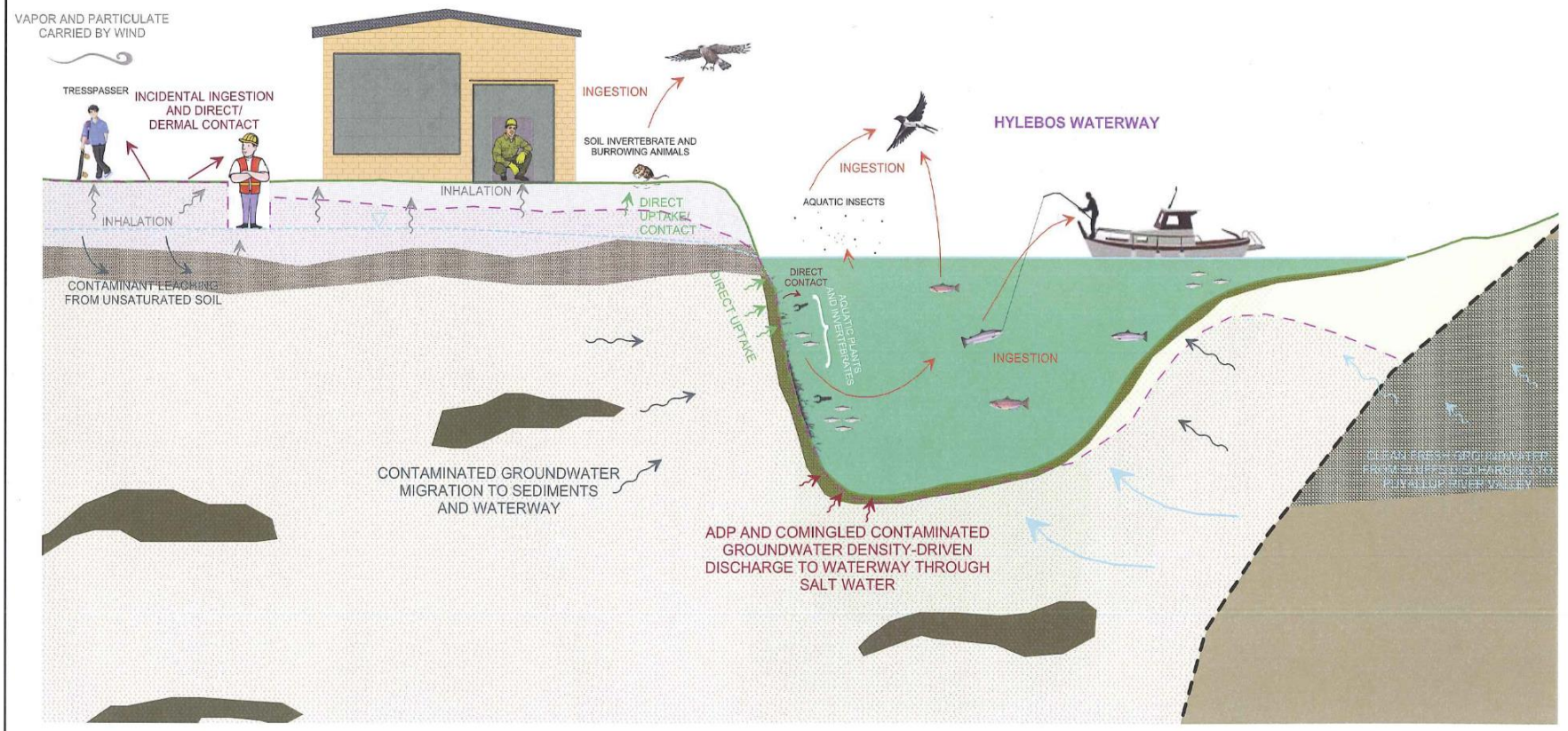


figure 6.1

SCHEMATIC OF EXPOSURE PATHWAYS AND RECEPTORS

Occidental Chemical Corporation, Tacoma, Washington

Next Steps

- Targeting mid-2016 for a public review draft Feasibility Study.
- EPA, Occidental, and Ecology developed a screened list of technologies as the foundation of the Feasibility Study.
- On-going UW Study of gelation, pH, in groundwater and soils.
- Framework focuses as a priority on containment.

Groundwater Remedial Action Objectives

1. Prevent discharge of contaminated groundwater to surface water.

2. Prevent discharge of contaminated groundwater to sediments.

3. Prevent use of aquifer groundwater for drinking water, irrigation, or industrial purposes.

4. Prevent further migration of the contaminant plume and high pH plume to the Hylebos waterway, Commencement Bay, and non-impacted portions of the aquifer.

Sediment Remedial Action Objectives

1. Reduce risks of exposure to contaminated sediments and debris to protective levels for benthic invertebrates and other biota.

2. Reduce risks from direct contact (skin contact and incidental ingestion) to contaminated sediments and debris to protect human health.

Remedial Investigation

- Public review draft Remedial Investigation (RI) report out for a 60 day public comment period.
- October 23, 2015 – December 19, 2015.

MTCA Process Timeline

Contact Information

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Planned Regulatory Framework Changes 2015/16