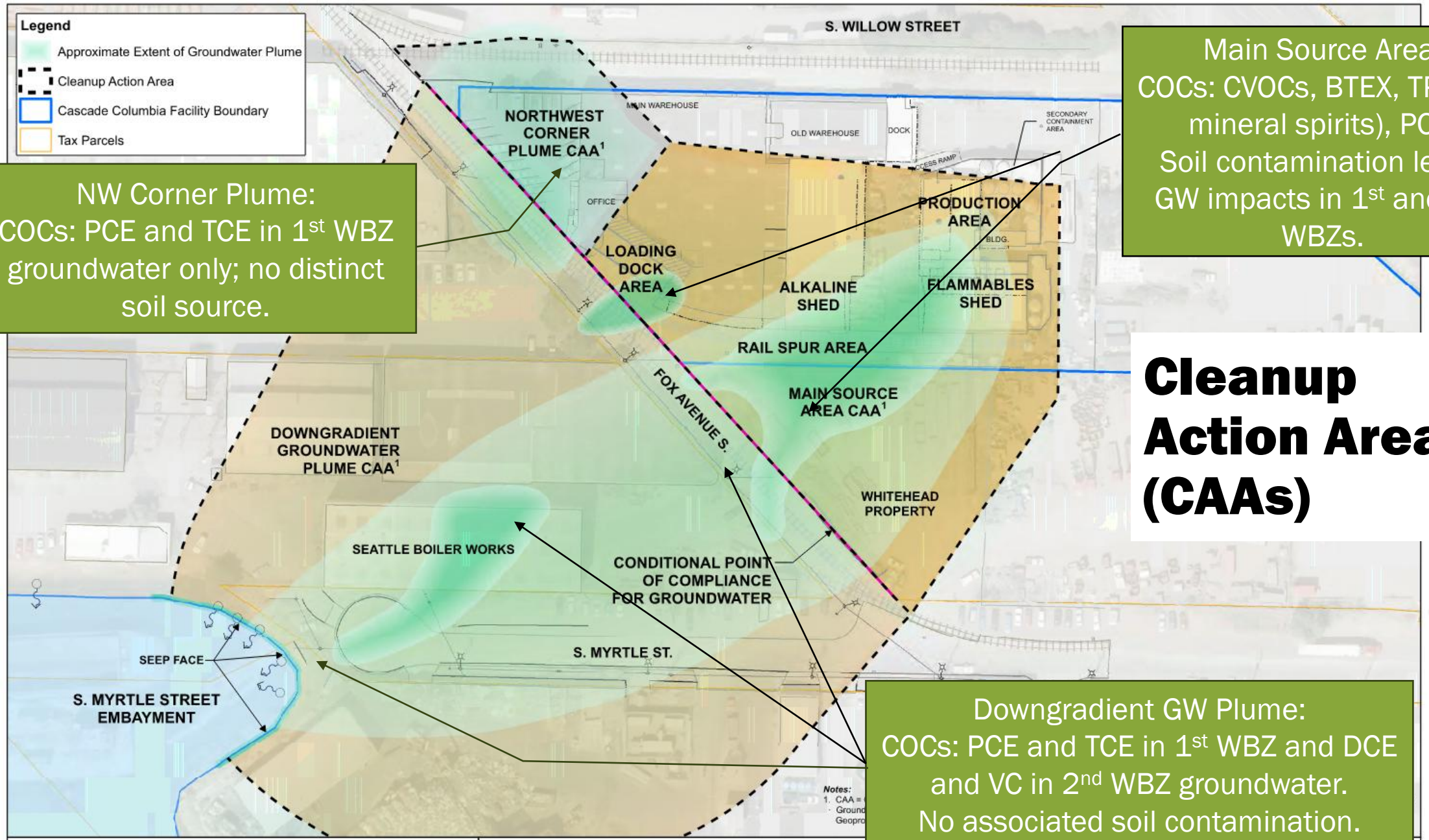
Cleanup Action Areas (CAAs)



NW Corner Plume:
COCs: PCE and TCE in 1st WBZ groundwater only; no distinct soil source.

Main Source Area:
COCs: CVOCs, BTEX, TPH (as mineral spirits), PCP.
Soil contamination led to GW impacts in 1st and 2nd WBZs.

Downgradient GW Plume:
COCs: PCE and TCE in 1st WBZ and DCE and VC in 2nd WBZ groundwater.
No associated soil contamination.

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Cleanup Action Plan
Fox Avenue Site
Seattle, Washington

Figure 2.3
Cleanup Action Areas

Selected Cleanup Action

- August 2009 - Under previous AO for the Site, ERD was implemented as an interim action for groundwater treatment in the Downgradient GW Plume.
- **July 2012 – Ecology issued CAP**
- Selected Active Remedies:
  - Main Source Area CAA - ERH
  - Northwest Corner Plume CAA - SVE
  - Site-Wide - ERD
  - Active remedies will continue until RLs for soil and groundwater are achieved for each technology
- Selected Passive Remedy:
  - Following completion of ERD, MNA will be implemented until the final CULs are achieved

History of CAP Implementation

Dates	Action	Results
Soil – September 2012 to July 2013	SVE System operated in the Northwest Corner Area to remove PCE from vadose zone soil.	• System ran until asymptotic conditions achieved. • Ecology approved shutdown after rebound study. • Removed ~ 111.3 lbs of CVOCs*
Soil and Groundwater – January to May 2013	Thermal treatment via ERH in the Main Source Area and Loading Dock Area.	• Achieved soil RL of mean soil concentrations for PCE+TCE were less than 10 mg/kg. • Destroyed ~11,400 lbs of CVOCs* **~99.6 percent mass removal**
Indoor Air – September 2012 to July 2013	Indoor air sampling at Cascade Columbia and Seattle Boiler Works	Cascade Columbia • Indoor air samples prior to, during, and following active remediation were below Site CULs for indoor air. Seattle Boiler Works • Indoor air samples collected in 2013 and 2023, following implementation of ERD, were below Site CULs for indoor air.

*Mass removal of CVOCs as reported in Floyd|Snider. 2013. *Construction Completion Report, Fox Avenue Site Seattle, Washington.* Prepared for Fox Avenue Building, LLC. September.

History of CAP Implementation

Dates	Action	Results

Groundwater – September 2013 – ongoing	ERD bio-polishing and GW Monitoring
	• 56 injection wells installed/used.
	• 14 ERD injection events
	• Injection events ranged from 11 to 33 wells
		• Main Source Area CAA
		  • Less than RL in all wells
		  • Less than CULs in ~50% of wells
		• Northwest Corner Plume CAA
		  • Less than RL in ~50% of wells
		  • Less than RL at COPC
		  • Less than CULs in ~50% of wells
		• Downgradient Groundwater Plume CAA
		  • Less than RL in all wells
		  • Less than CULs in ~50% of wells
		• Wells include monitoring wells and select injection wells routinely sampled (3 or more events)
		• 64 of 70 wells/depth intervals sampled 3 or more times had achieved the groundwater RL for Total CVOCs through 2025 sampling.

*Mass removal of CVOCs as reported in Floyd|Snider. 2013. *Construction Completion Report, Fox Avenue Site Seattle, Washington.* Prepared for Fox Avenue Building, LLC. September.

Summary of Groundwater Conditions

- Groundwater samples have been collected from approximately 65 monitoring wells and 55 injection wells (120 total)
- Remediation Levels (Total CVOCs)
  - Achieved RL in all required monitoring wells (64 total)
- Statistical Evaluation (Total CVOCs)
  - Decreasing trend for 42 wells/depths
  - No significant trend (stable) was reported for 28 wells/depths
  - **No** increasing trend for any well/depth
- Seep
  - Decreasing or stable concentration trends for Total CVOCs and individual CVOCs in seep locations.
  - VOCs, including CVOCs less than CULs in 3 of 4 seep locations (SP-2, SP-3, SP-3B)
  - Consistent attainment of CULs for individual CVOCs is still in progress for Seep S-4 location.

Summary of Selected Remedy Elements

Cleanup Action Area	Treatment Technology	Implemented until Compliance with RL or CUL Achieved	Restoration Timeframe	Status	Expected to Achieve By
Main Source Area	ERH (Primary)	Soil RL: 10 mg/kg total PCE + TCE	1 year of active heating	Achieved in 2013	**Complete**
	ERD (Polish)	Groundwater RL: 250 µg/L total CVOCs (measured at CPOC)	5 years (post-thermal)	Achieved RLs at CPOC between 2016-2018	**Complete**
Downgradient Groundwater Plume	ERD	RL (Wells): 250 µg/L total CVOCs (as measured in the designated monitoring well network)	10–15 years (post-thermal)	Achieved RLs in Downgradient plume wells between 2016-2018	**Complete**
	MNA	CUL: measured in all downgradient wells	50 years (post-ERD)	~30 wells Achieved CULs in GW ERD still in progress	**May 2068**
	ERD	CUL (Seeps): achieve cleanup levels as defined in CAP	10-15 years (post-thermal)	Achieved CULs in 3 of 4 seeps	**May 2028**
Northwest Corner Plume	SVE	SVE system will run until asymptotic	1 year of operation	Achieved in 2013	**Complete**
	ERD	RL: 250 µg/L total CVOCs in groundwater (measured at CPOC)	5 years (post-SVE)	Achieved RLs at CPOC between 2016-2018	**Complete**
	MNA	CUL: Individual COCs (measured at CPOC)	50 years (post-ERD)	ERD still in progress	**May 2068**

CAP Contingency Measures

Contingency Measures by Media and CAA

CLEANUP GOALS ARE BEING ACHIEVED - NO CONTINGENCY MEASURES ARE CURRENTLY REQUIRED

- **Soil** – RLs achieved. No contingency measures required.
- **Indoor Air** –CULs achieved in Cascade Columbia and Seattle Boiler Works. No contingency measures required.
- **Groundwater** –
  - Northwest Corner Plume – RLs achieved at the CPOC. No contingency measures required.
  - Main Source Area – RLs achieved at the CPOC. No contingency measures required.
  - Downgradient Groundwater Plume – RLs achieved in all wells. Attainment of CULs in progress via additional ERD and in the future via long-term MNA.

CAP Contingency Measures

- Main Source Area
  - RL exceeds at the COPC
    - ERD for 2 Years
    - Evaluation of additional contingency actions (excavation, PRB, ERD, etc.)
- Northwest Corner Plume
  - RL exceeds at the COPC
    - Evaluation of additional contingency actions (ERD, PRB, SVE, etc.)
- Downgradient Groundwater Plume
  - RL exceeds in well network and ERD not working
    - Evaluation of revamped ERD approach
- Seeps
  - Dependent on magnitude and nature of exceedance
    - Continued ERD
    - Assessment of the actual (not predicted) concentrations of COCs in shellfish near the seeps

2026 Anticipated Schedule

- Groundwater and Seep Monitoring
  - VOCs including select CVOCs and BTEX
  - TOC to evaluate ERD
  - TPH and PCP
- ERD Injections

Future Activities

- Long-Term Monitoring Plan
  - LTM will commence following termination of ERD injections
  - Expected to consist of 8 to 10 wells located along and downgradient of Fox Avenue and 2 to 3 seeps
  - Initial sampling frequency expected to be semi-annual and then transitioning to annual until CULs are achieved
  - When CULs achieved, quarterly monitoring required to cease all sampling