



→ **Kristina Hill, PG**
Geologist | NA West Environ –
Contaminated Site Assess &
Remediation

Sustainability in remediation:

→ When have we gone too far?

Welcome

Overview

- Past perspectives
- Current experiences
- Future considerations

Past perspectives

Regulatory / stakeholder remediation objectives
California, USA

1969

Porter-Cologne Water
Quality Control Act

“All Contamination”

1989

Leaking Underground Fuel
Tank (LUFT) Field Manual

“This goal is unattainable
at many sites.”

2012

Low Threat Closure Policy
(LTCP)

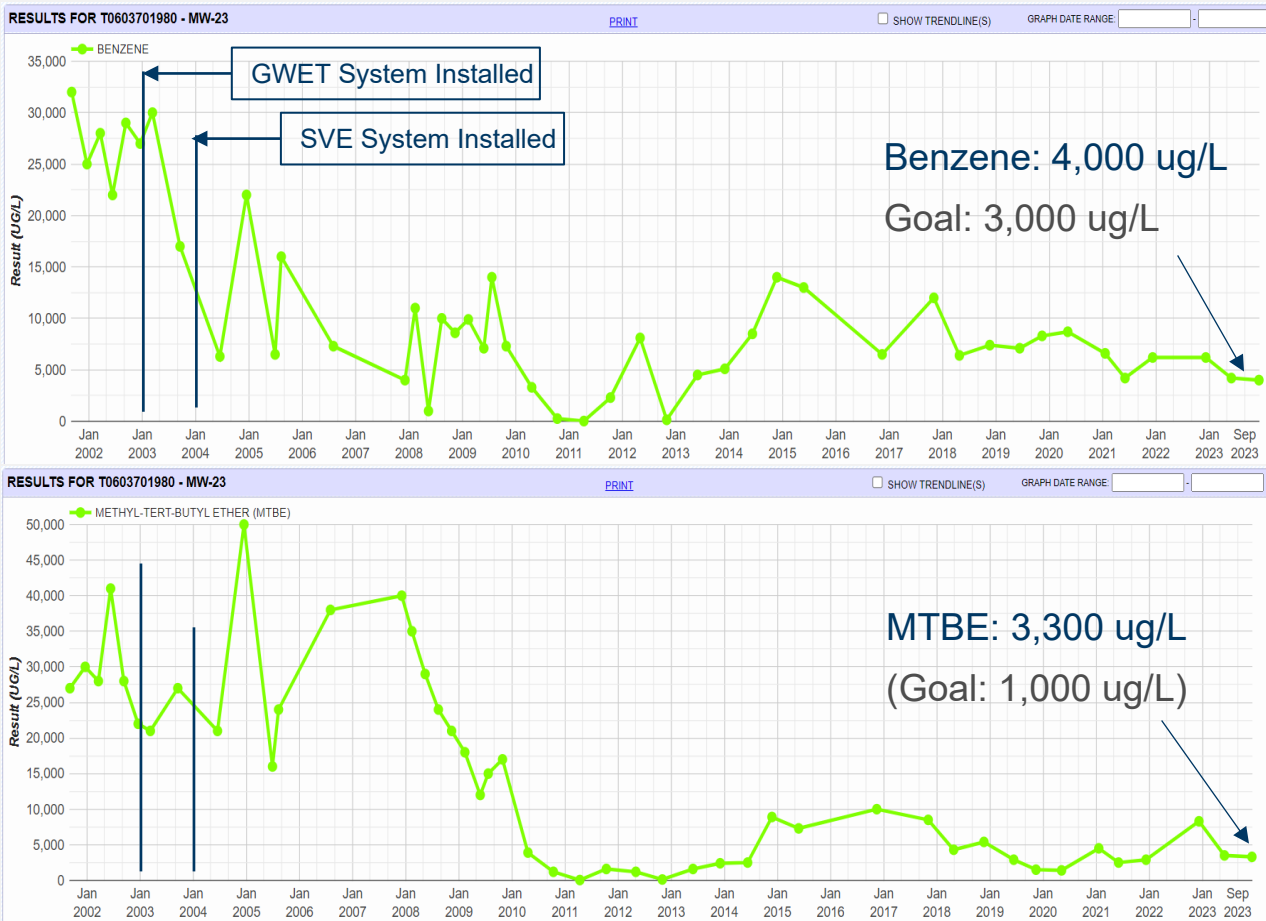
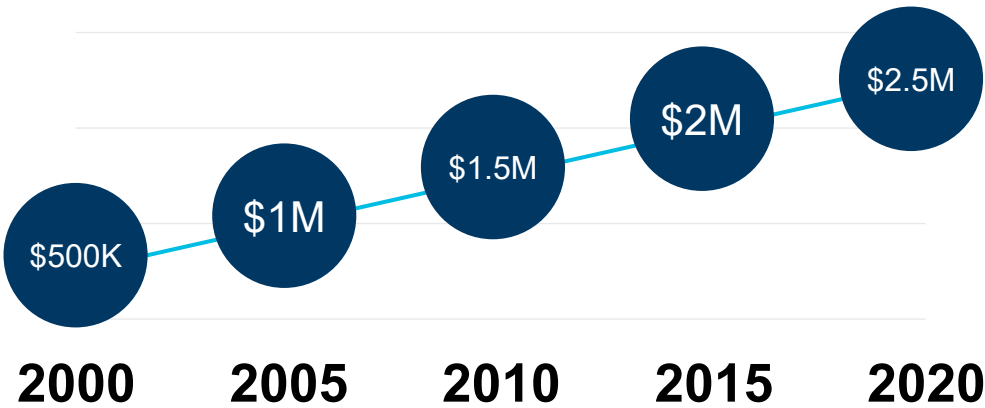
Risk-based approach to
closure

Current experience

3 cases of Dual Phase Extraction remediation of mature hydrocarbon plumes sites



Age	27–40-year-old releases, 12-20 years of active remediation
LTCP	Qualify for closure under one or more criteria
Stability	Stable boundaries, Asymptotic concentration decline reached
Cost	\$2.5-\$3M spent per site, + \$100K annually



* Concentrations from center of Plume

Obstacles to closure:

- Tert Butyl Alcohol (TBA) goal concentrations
- Remediation of impacted vapor and groundwater not exhausted
- Difference of interpretation of criteria 5

Future Considerations

Environmental impact

SEFA Calculations

Does the benefit of remediation still exceed its carbon footprint?

HHRAs

Incorporated at Milestone X

Regular/Standard Inclusion in evaluations

Financial Cost

Dollar Per Pound Hydrocarbon Removed

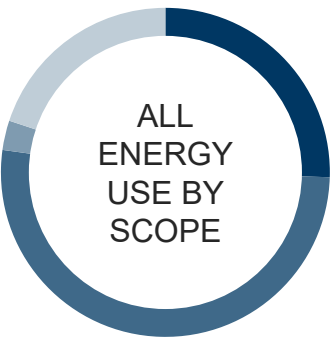
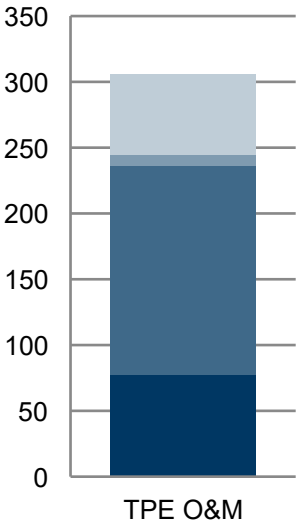
If asymptotic, has “maximum extent practical” been reached?

Community impact

(Opportunity Cost)

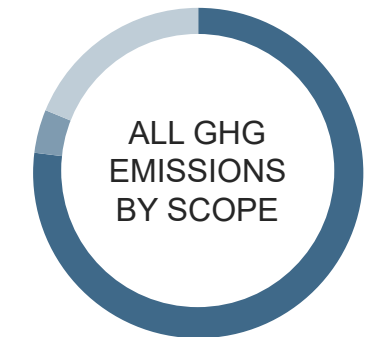
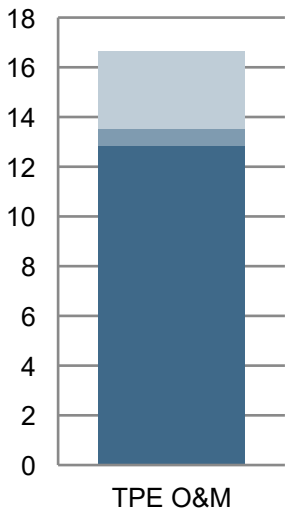
Is further remediation the best option for the community?

All Energy Use by
Remedy Component
and Scope
(in MMbtu)



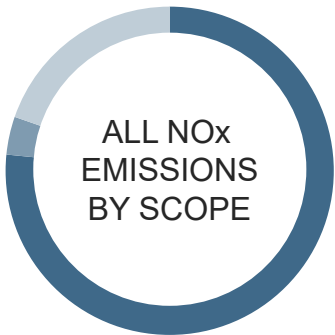
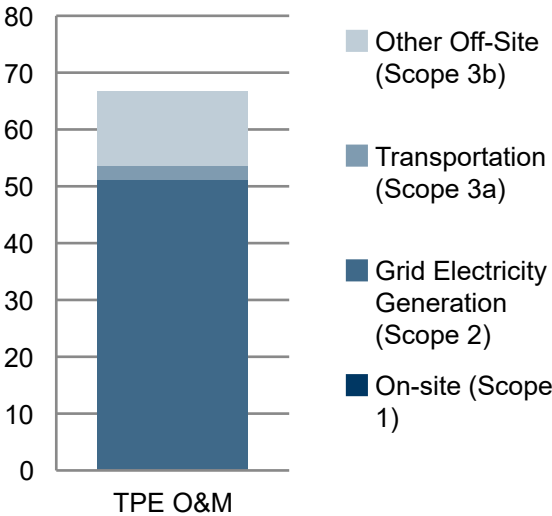
Total Energy All Scopes =
305.7 MMbtus

All GHG Emissions by
Remedy Component
and Scope
(in Tons)



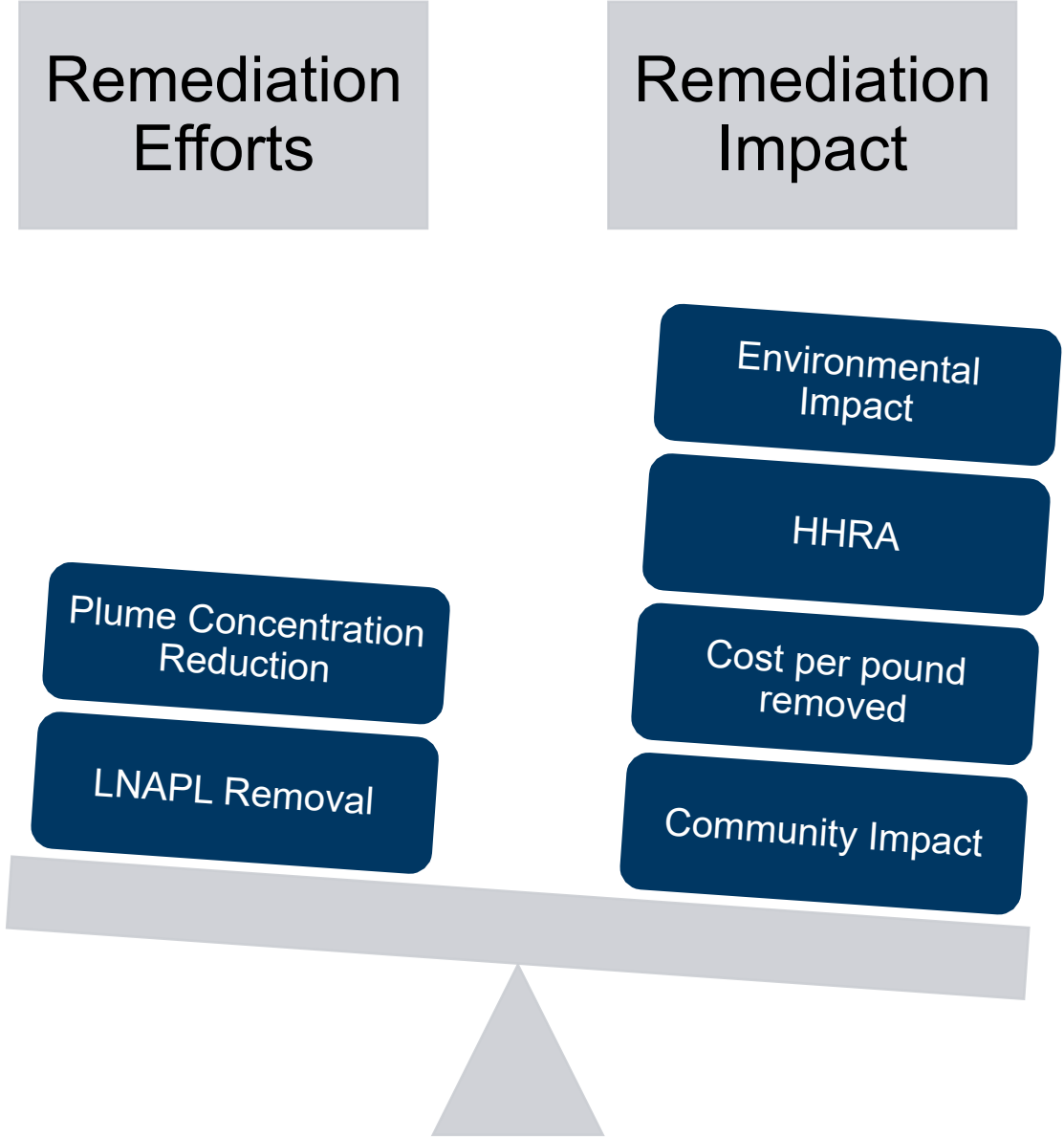
GHG All Scopes =
16.7 Tons CO2e

All NOx Emissions by Remedy
Component by Scope
(in Lbs)



NOx All Scopes =  SOx, PM, HAP
66.8 lbs

An Evolving Balance



1969

Porter-Cologne Water Quality Control Act

1989

Leaking Underground Fuel Tank (LUFT) Field Manual

2012

Low Threat Closure Policy (LTCP)

2024+

Inclusion of Environmental & Community Impact



Thank You

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