

Lessons Learned for Ex Situ PFAS Impacted Soil Treatment Using Thermal Conduction

Emily Dwyer, Ph.D.
Heating



TRS

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Accelerating Value

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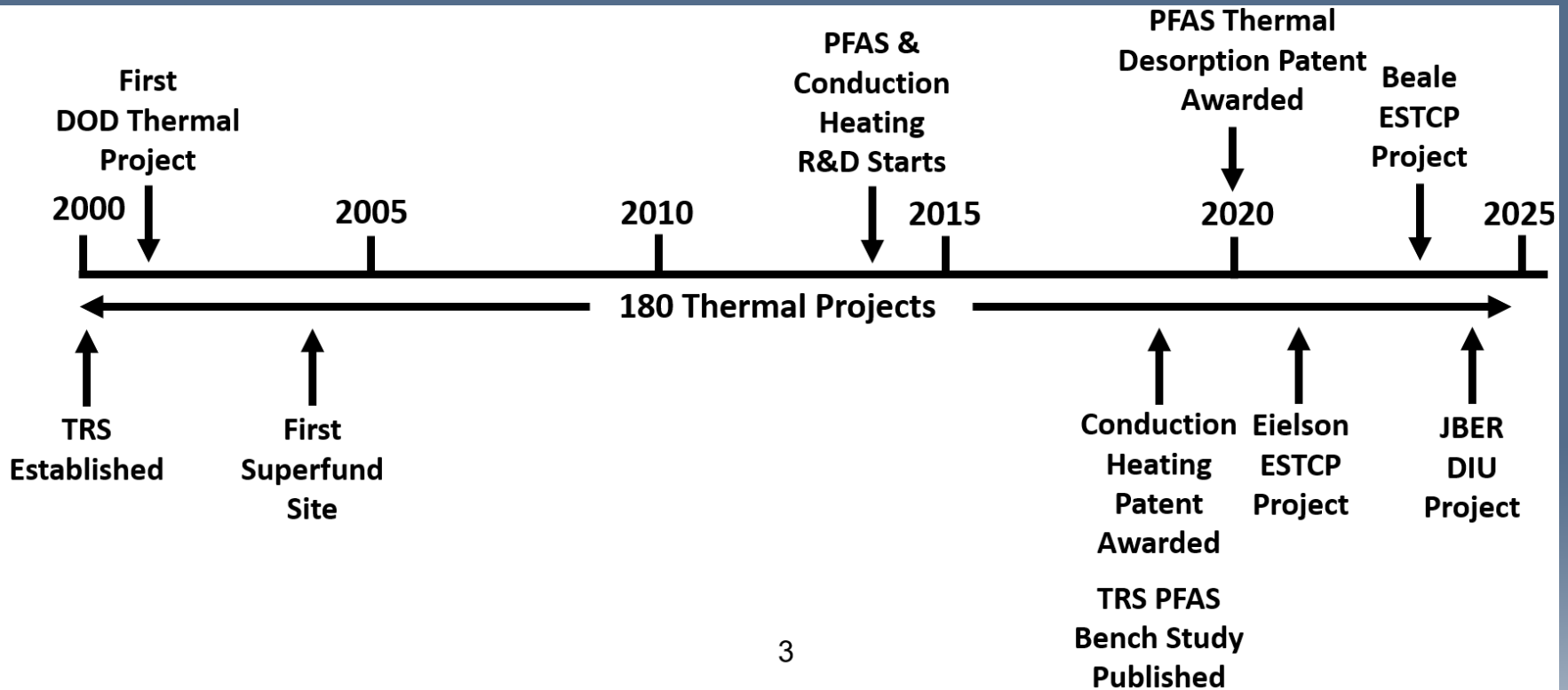
Eielson & Beale Air Force Base - Darren Rector



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TRS History



Thermal Remediation Services

FlexHeater[®] Thermal Conduction Heating

OptiFlux[®] Electrical Resistance Heating

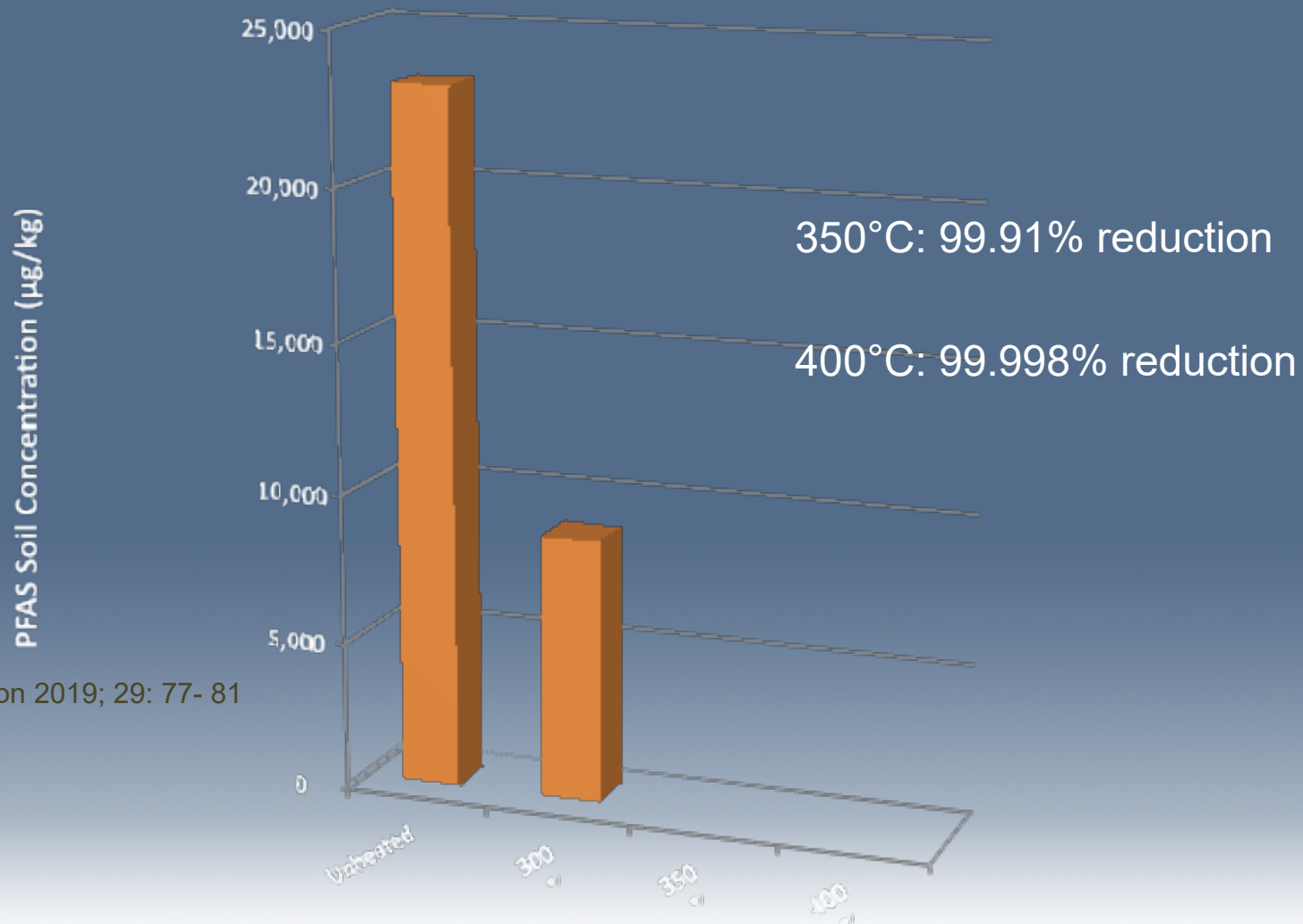
Energetics Chlorinated Petroleum PAHs
Pesticides Solvents Hydrocarbons PCBs
———— PFAS ————

Temperature

HEPA[®] Remediation (subset of ERH)

Steam Enhanced Extraction

PFAS Treatment



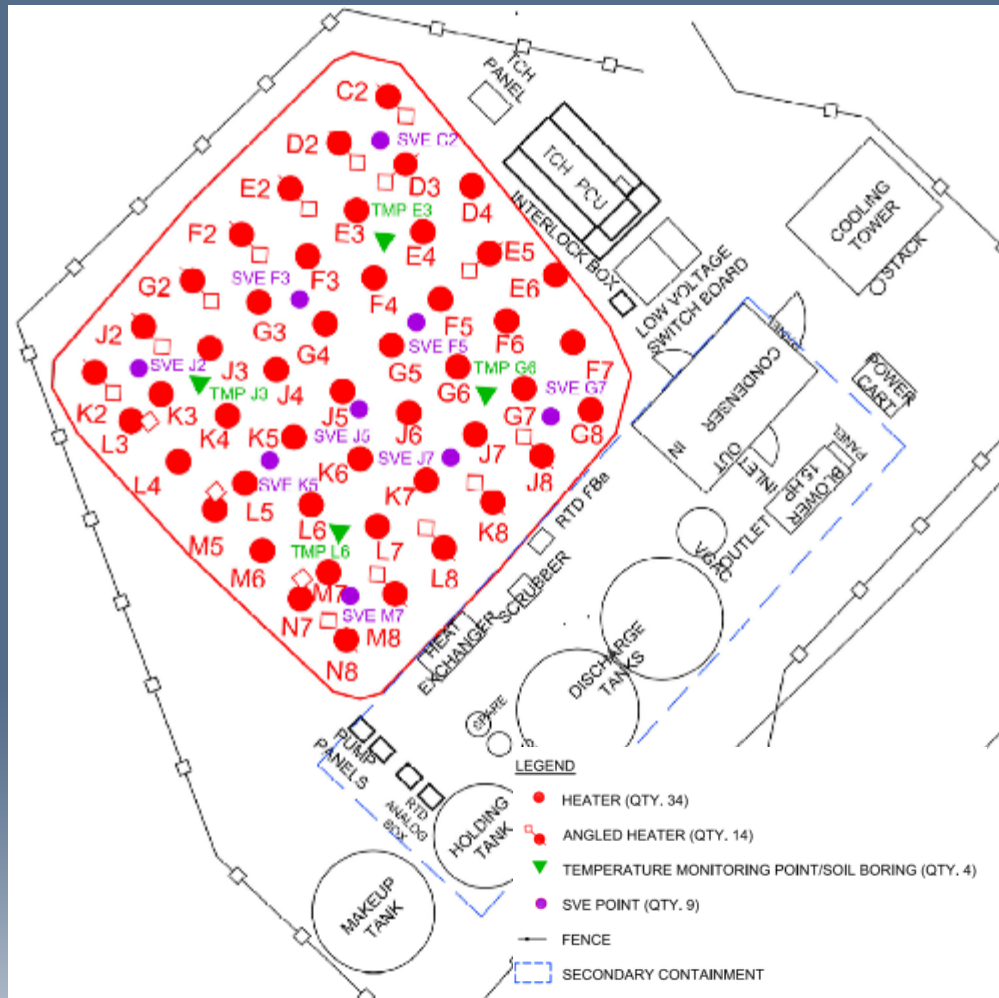
Remediation 2019; 29: 77- 81

ESTCP PFAS Soil Remediation Projects

- Eielson AFB - ER20-5198
 - Ex situ soil pile
 - Pilot study completed
- Beale AFB - ER20-5250
 - In situ vadose zone
 - Pilot study completed



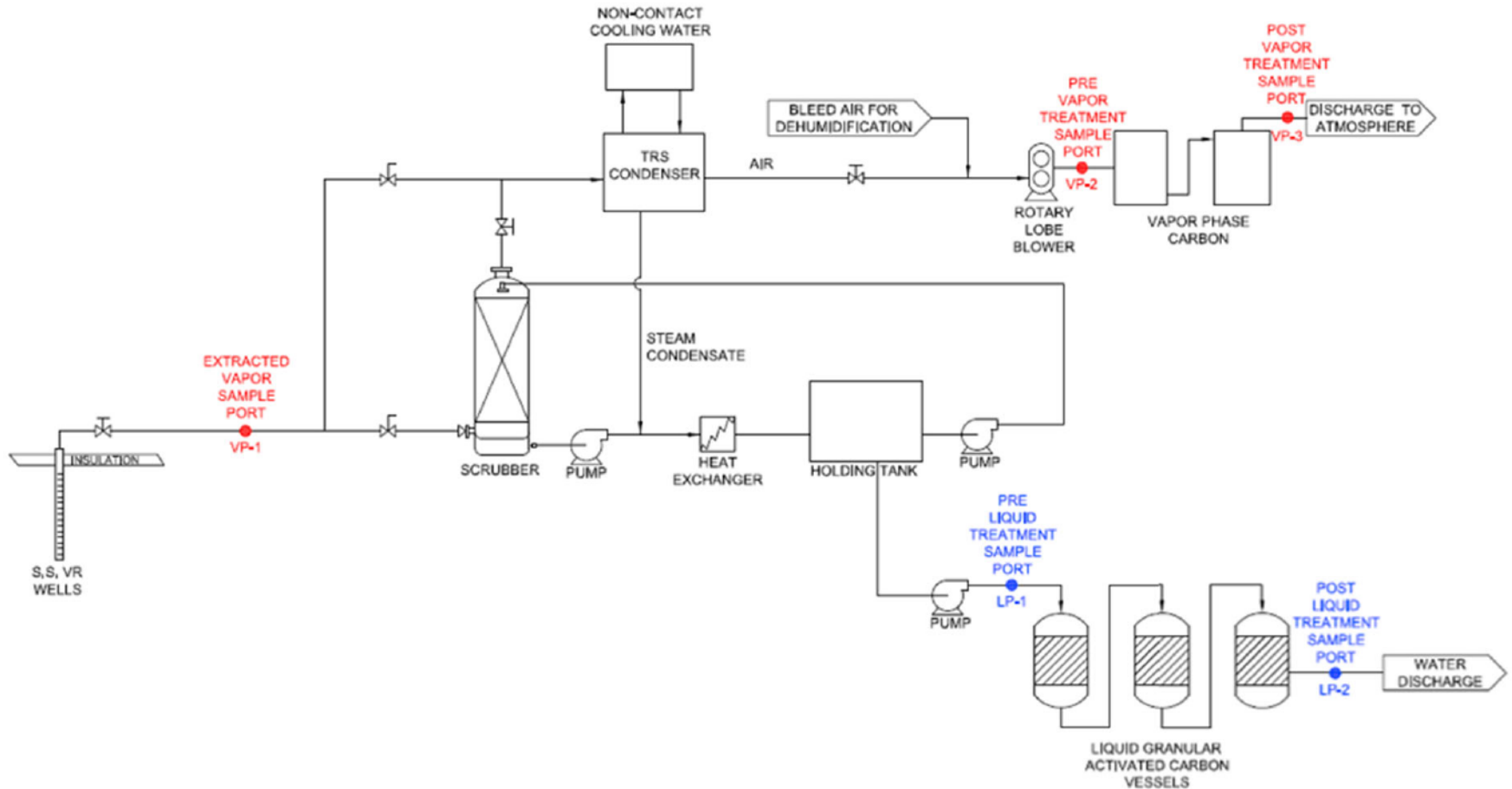
Eielson Stockpile Treatment Design



- 48 heaters
- 9 soil vapor recovery points
- 4 temperature monitoring locations, 20 sensors
- Baseline and post thermal soil samples at temperature sensor locations

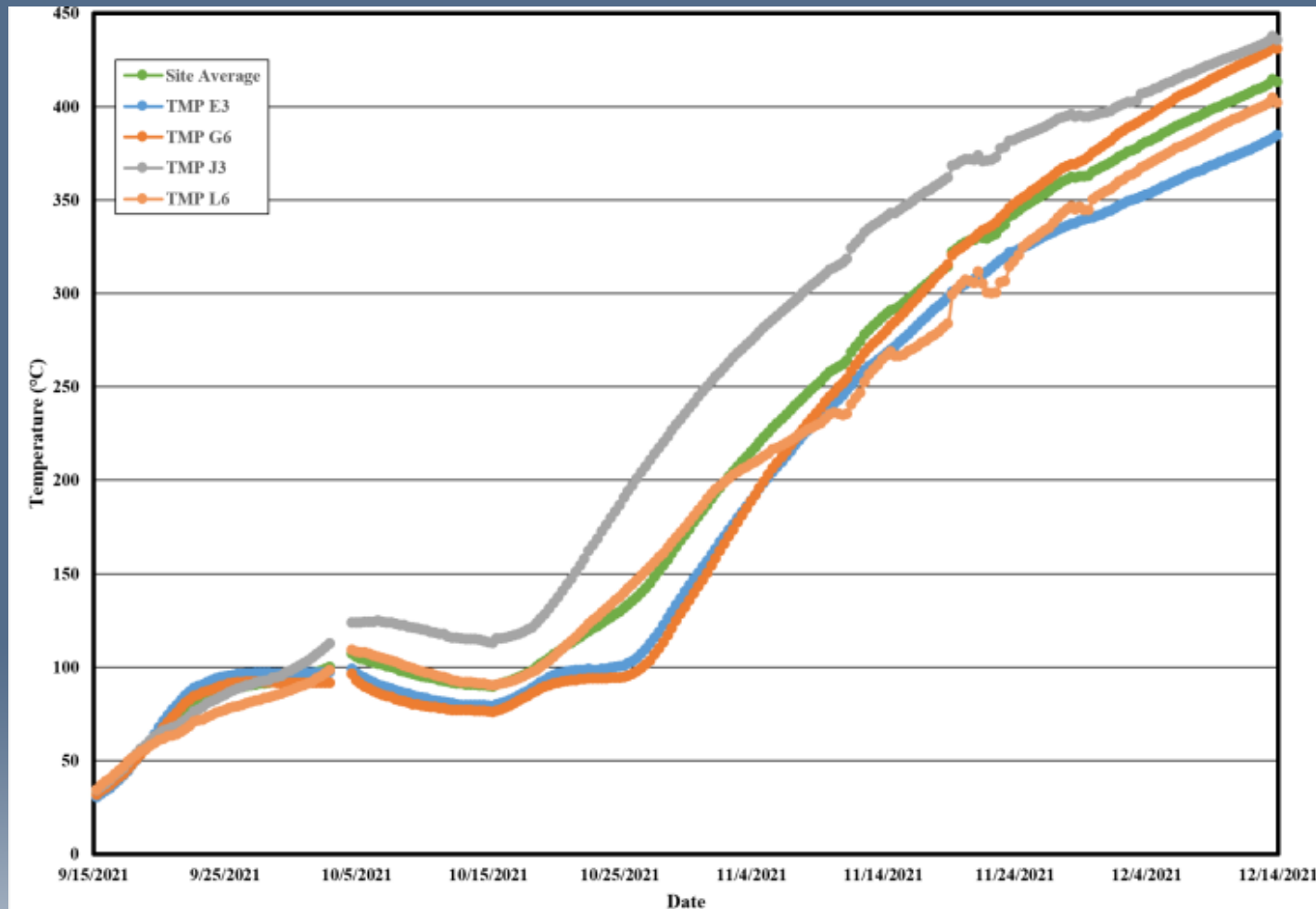
ER20-5198

Process Treatment



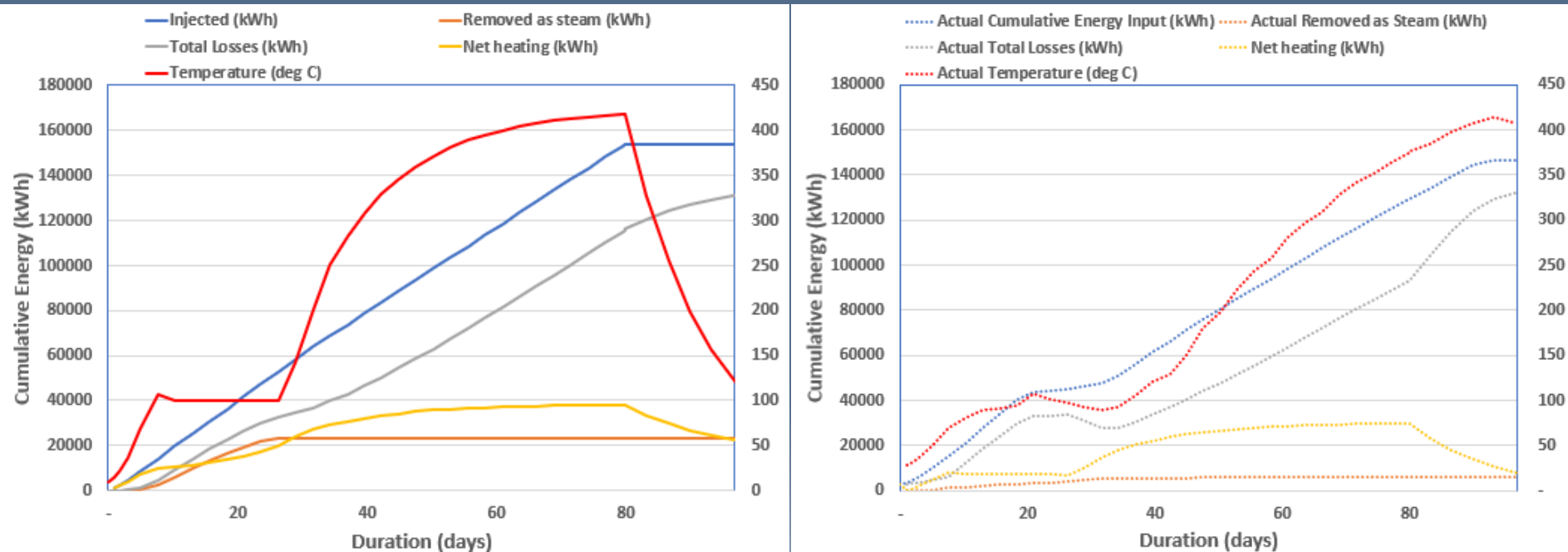
PFAS impacted vapors extracted from soil stockpile
Vapor and condensate treated with GAC

Eielson Heating Performance Assessment



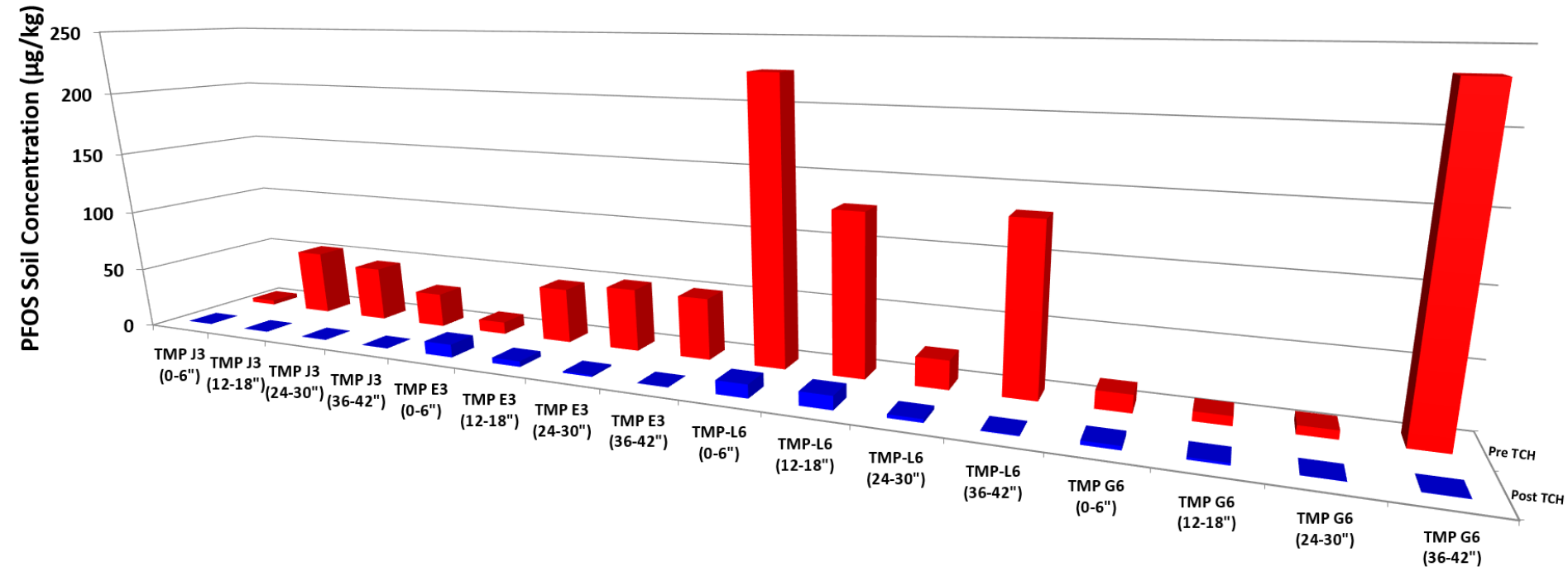
ER20-5198

Eielson Energy Efficiency Performance Assessment



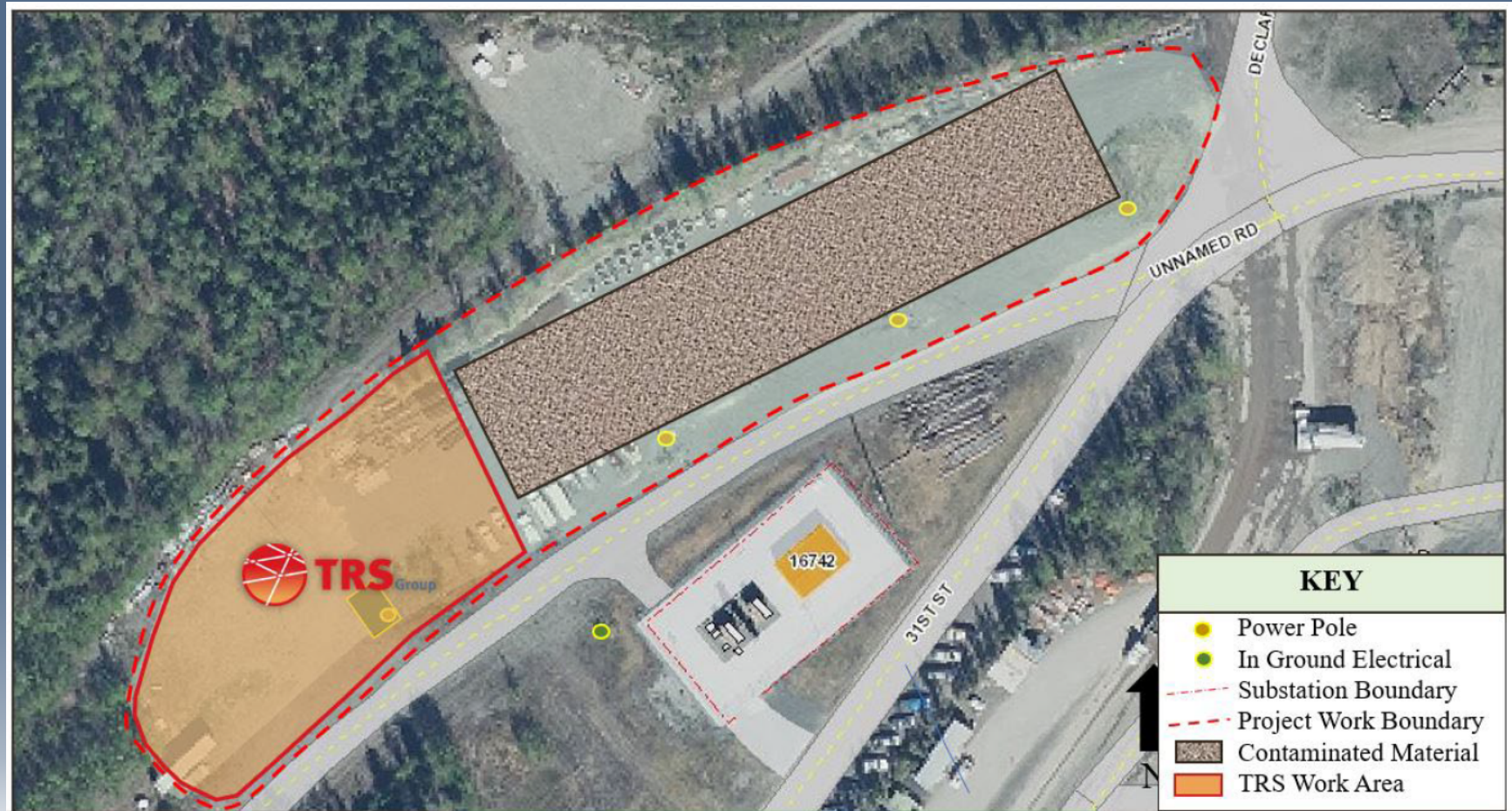
ER20-5198

Eielson Performance Assessment

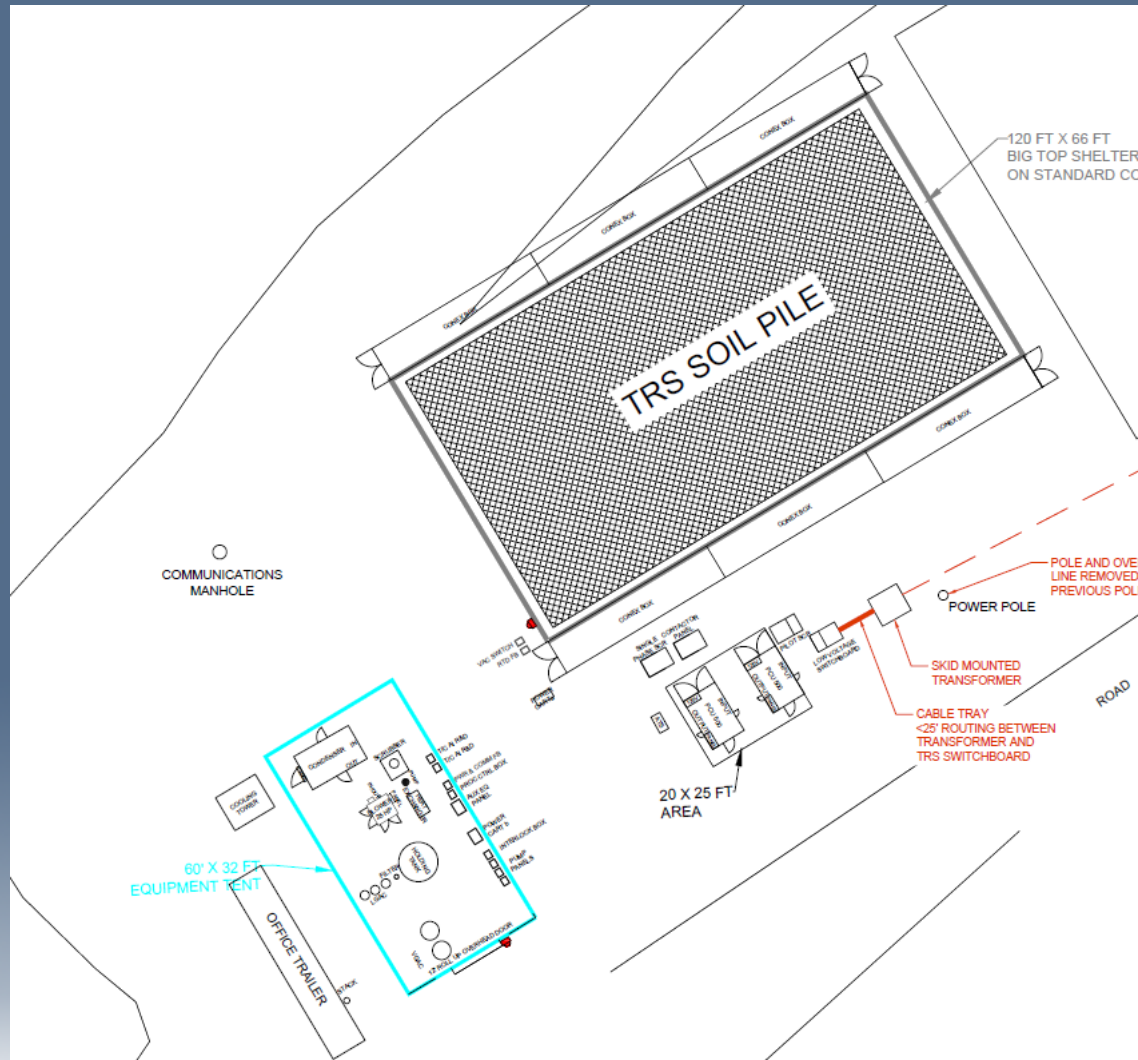


ER20-5198

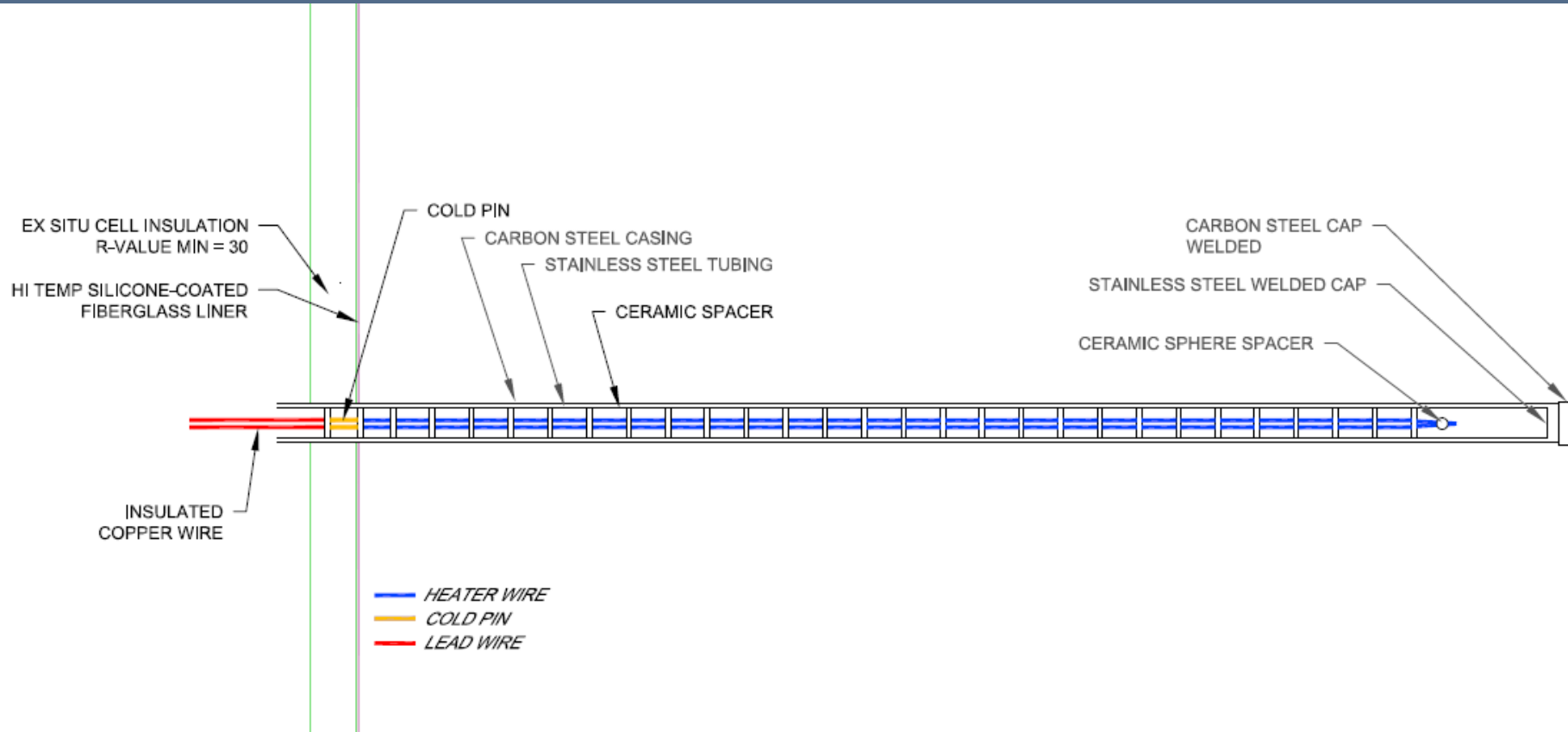
Joint Base Elmendorf-Richardson (JBER) TRS TCH Layout



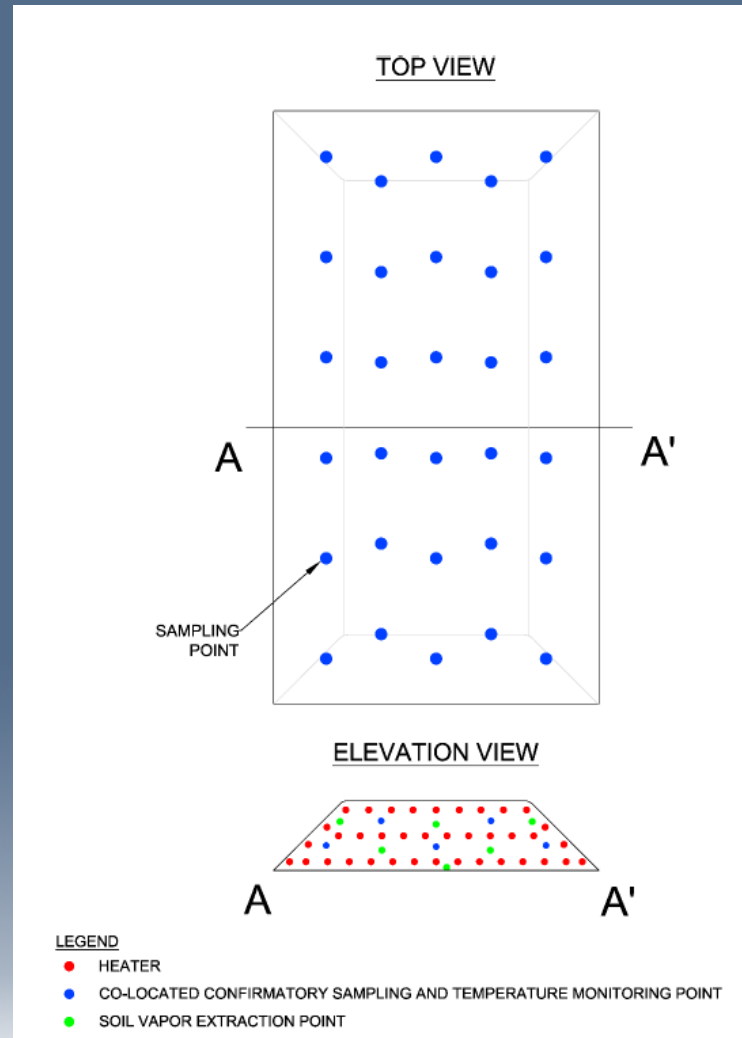
JBER TRS TCH Layout



Heater Cross Section



JBER Conceptual Design



Concentration Performance Assessment

— Baseline & confirmatory soil sampling

- PFAS – EPA Method 1633
- SVOC & VOC – EPA Methods 8270 & 8260
- DRO – AK 102
- Total Oxidizable Precursor Assay
- Extractable Total Organic Fluorine
- Method 1313

— Process water

- EPA Method 1633
- EPA Method 8270 & 8260
- DRO – AK 102

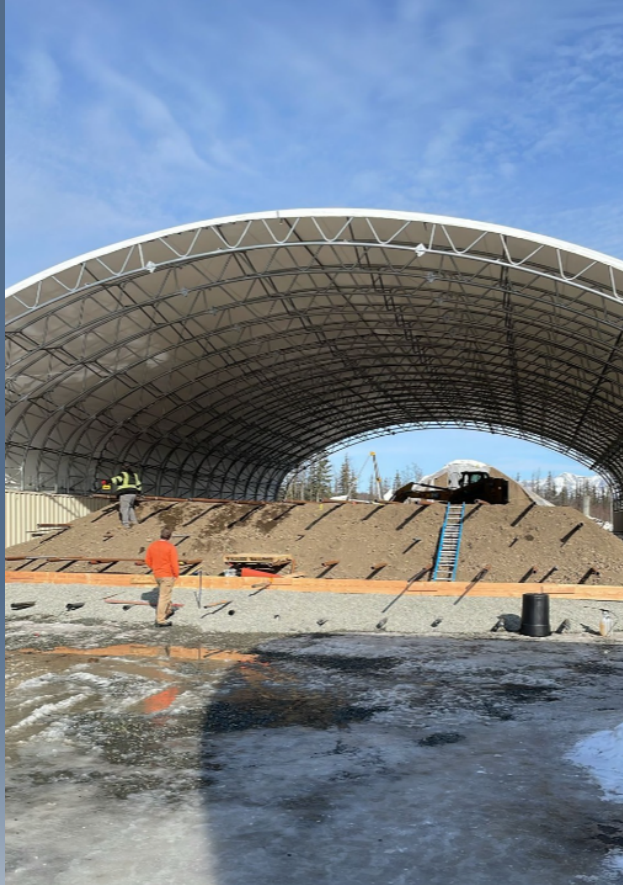
— Vapor

- OTM-45 with sequential extraction
- OTM-50
- Method 26 - HF

JBER Construction



JBER Construction

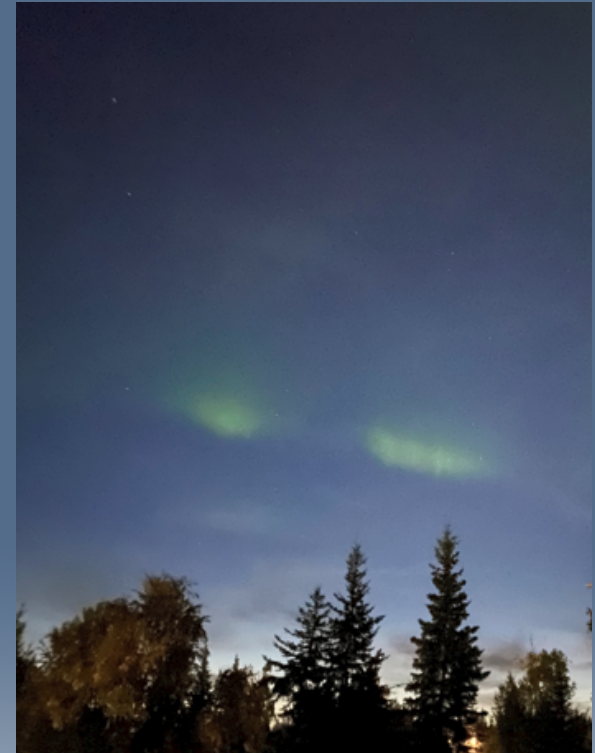


JBER Thermal Treatment System



Lessons Learned

- OTM-45 w/sequential extraction for OTM-55 analysis
- More frequent vapor sampling at water boiling point
- Interim soil sampling capabilities important
- Customizable weather cover protection
- Winter installation strategies developed
- Horizontal heaters more efficient



Contact Information

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