DOCTED CDOUD



Natural Source Zone Depletion Rate Comparison over a 40-foot Thick Smear Zone

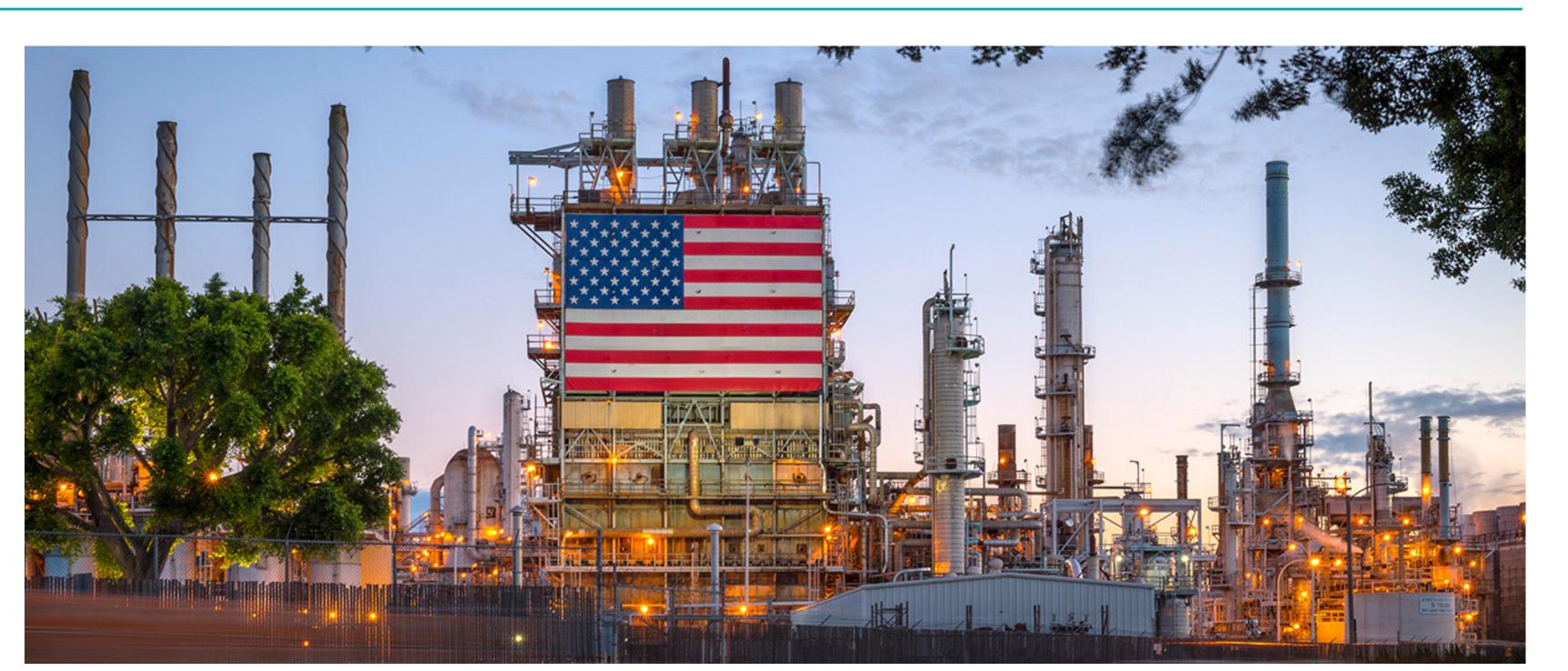
POSTER GROUP 1

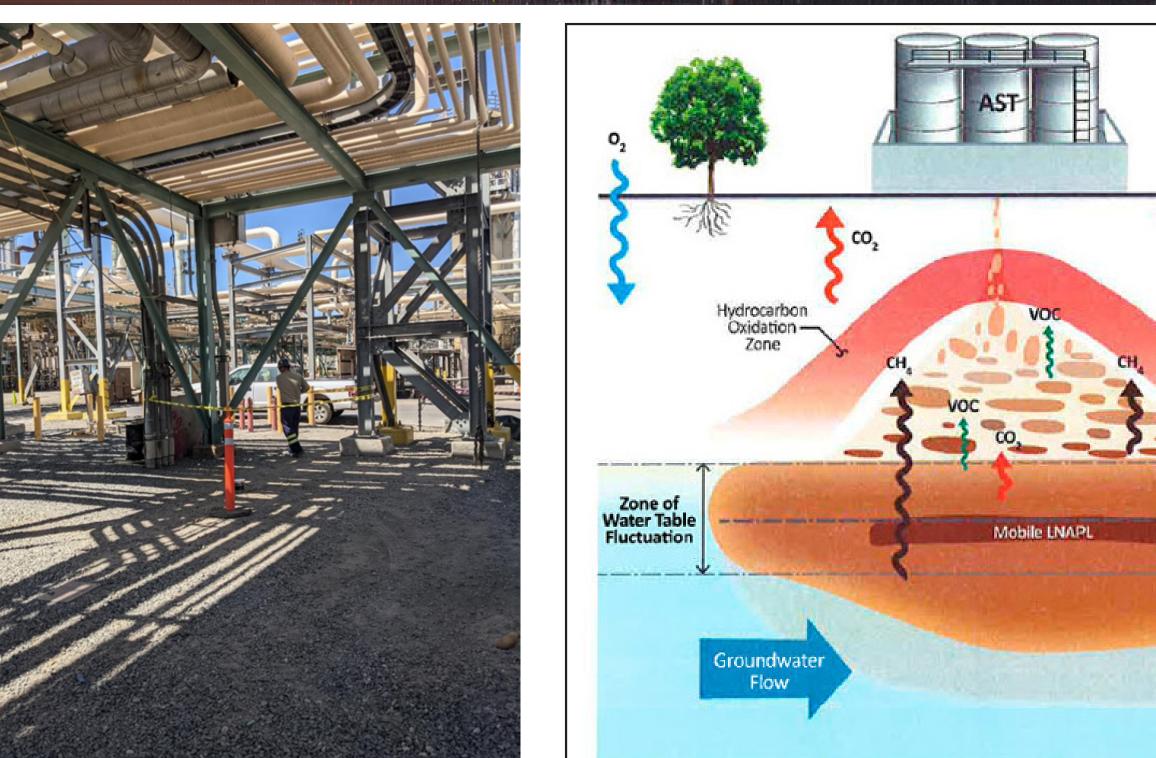
AECOM

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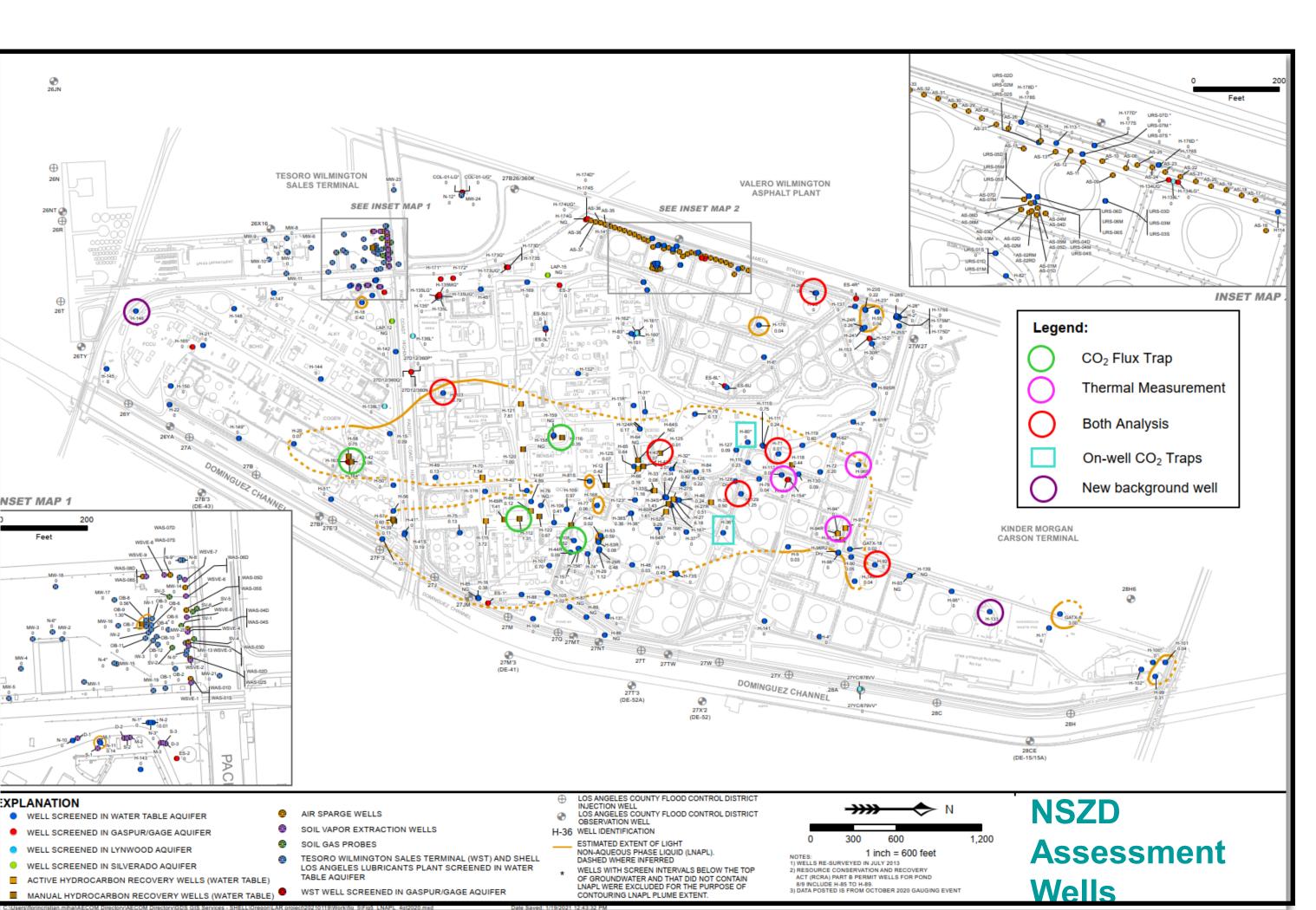
INTRODUCTION

- Active southern California refinery since 1923
- Since 1985, hydraulic recovery removed ~ 38 million gallons of LNAPL
- Historical groundwater fluctuations of 40 feet created a large vertical smear zone with an estimated over 30 million gallons of submerged LNAPL remaining
- A natural source zone depletion (NSZD) study was conducted in 2021 to evaluate the rate of natural depletion of the LNAPL across the full footprint and compare it to current diminishing hydraulic recovery rates
- Thermal profiling and carbon dioxide (CO2) flux measurements were used to quantify NS7D
- A wide variation in NSZD rates was observed for both methods





OBJECTIVES & METHODOLOGIES





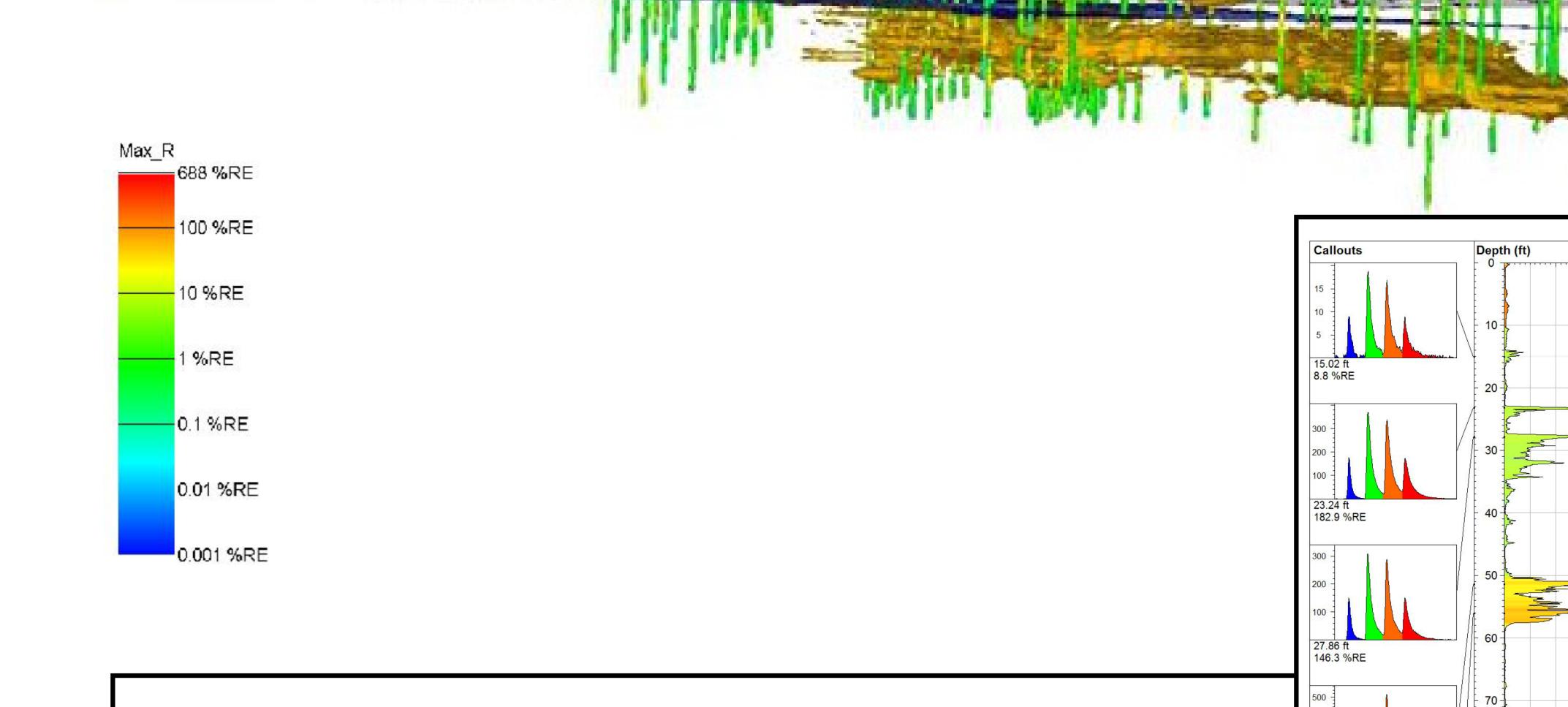


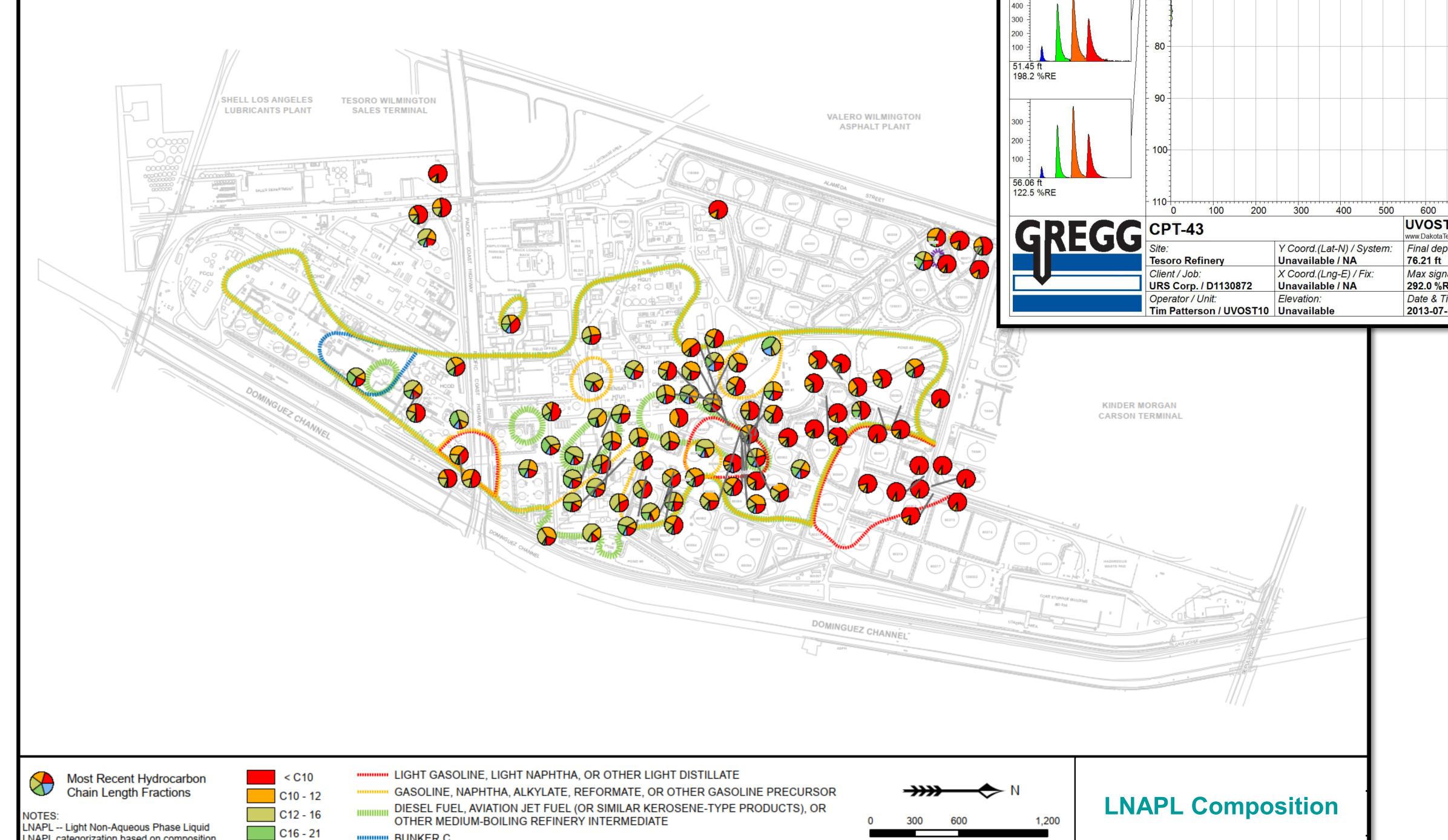
- To examine the variation in NSZD rates as a function of the smear zone thickness in the formation
- The closest CPT/ROST/ LIF locations or boring logs were used to identify the thickness of the smear zone at each location and plotted against estimated NSZD rate to identify any correlation

SUBMERGED LNAPL

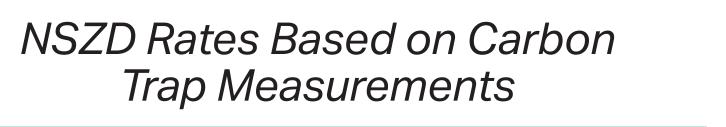


UVOST Max Reflectance @50% Re





ESTIMATED NSZD RESULTS



Location

H-125

H-129¹

H-92

H-108

H-116¹

H-42

H-103

NSZD Rate

2,200

29,000

1,260



 e
 H-71
 H-92
 H-96R
 H-103
 H-117
 H-125
 H-125

 21
 740
 1,800
 3,000
 1,700
 420
 1,400
 85

1,700 gallons/acre/year

 1
 Jul-21
 740
 1,800
 3,000
 1,700
 420
 1,400
 850

 2
 Aug-21
 240
 2,700
 3,600
 2,000
 -180
 1,700
 1,700

 3
 Sep-21
 320
 2,400
 3,000
 2,200
 -700
 1,200
 1,200

 4
 Oct-21
 520
 1,700
 1,800
 2,500
 330
 2,400
 2,100

 5
 Nov-21
 2,600
 1,600
 1,700
 1,600
 450
 2,000
 3,100

 6
 Dec-21
 2,200
 1,600
 1,800
 1,600
 1,200
 2,500
 2,700

 Average
 1,100
 2,000
 2,500
 1,900
 250
 1,900
 1,900

Site-wide Average 1,300

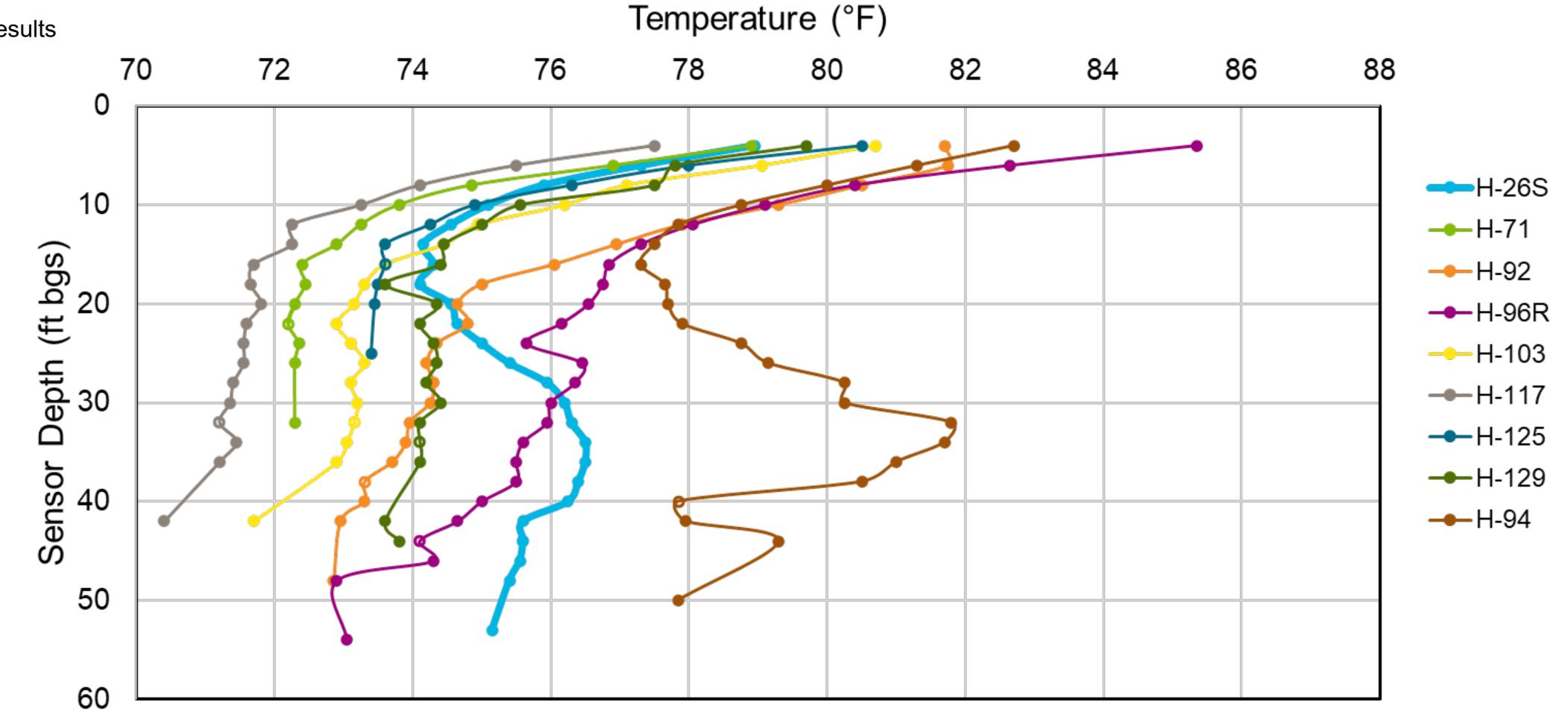
Notes:

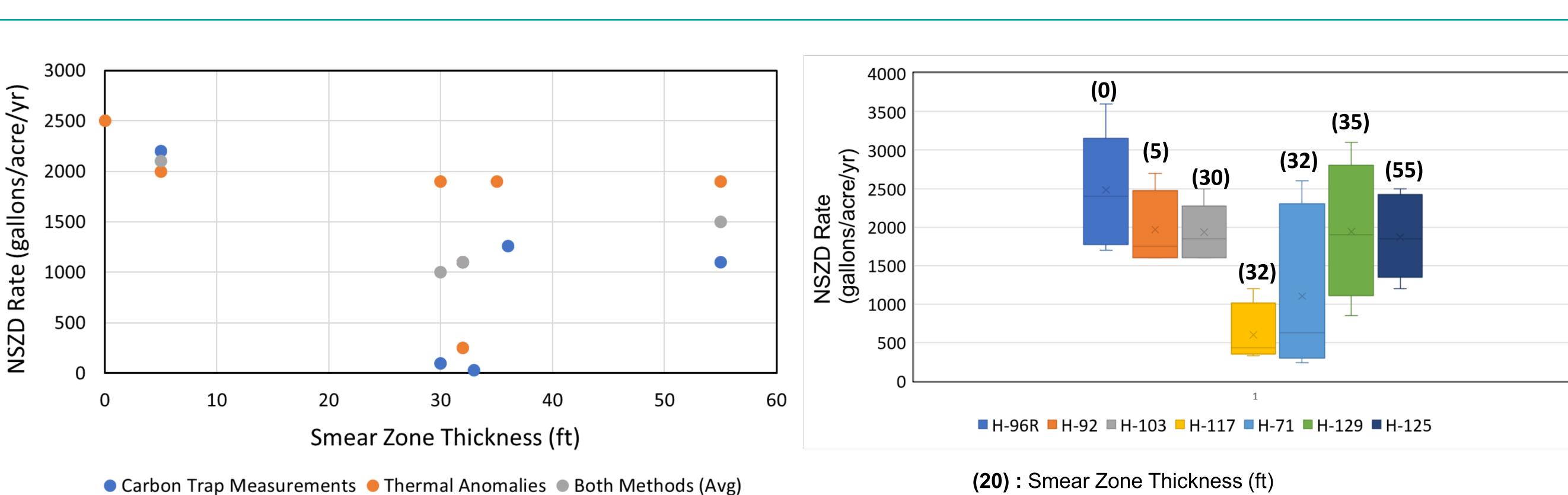
1 Data excluded as anomalously high results

July 2021

Temperature (**

Site-Wide Average





No clear correlation observed between NSZD Rates and Thickness of the Smear Zone