

# Bakken Crude Awareness

Greg Powell



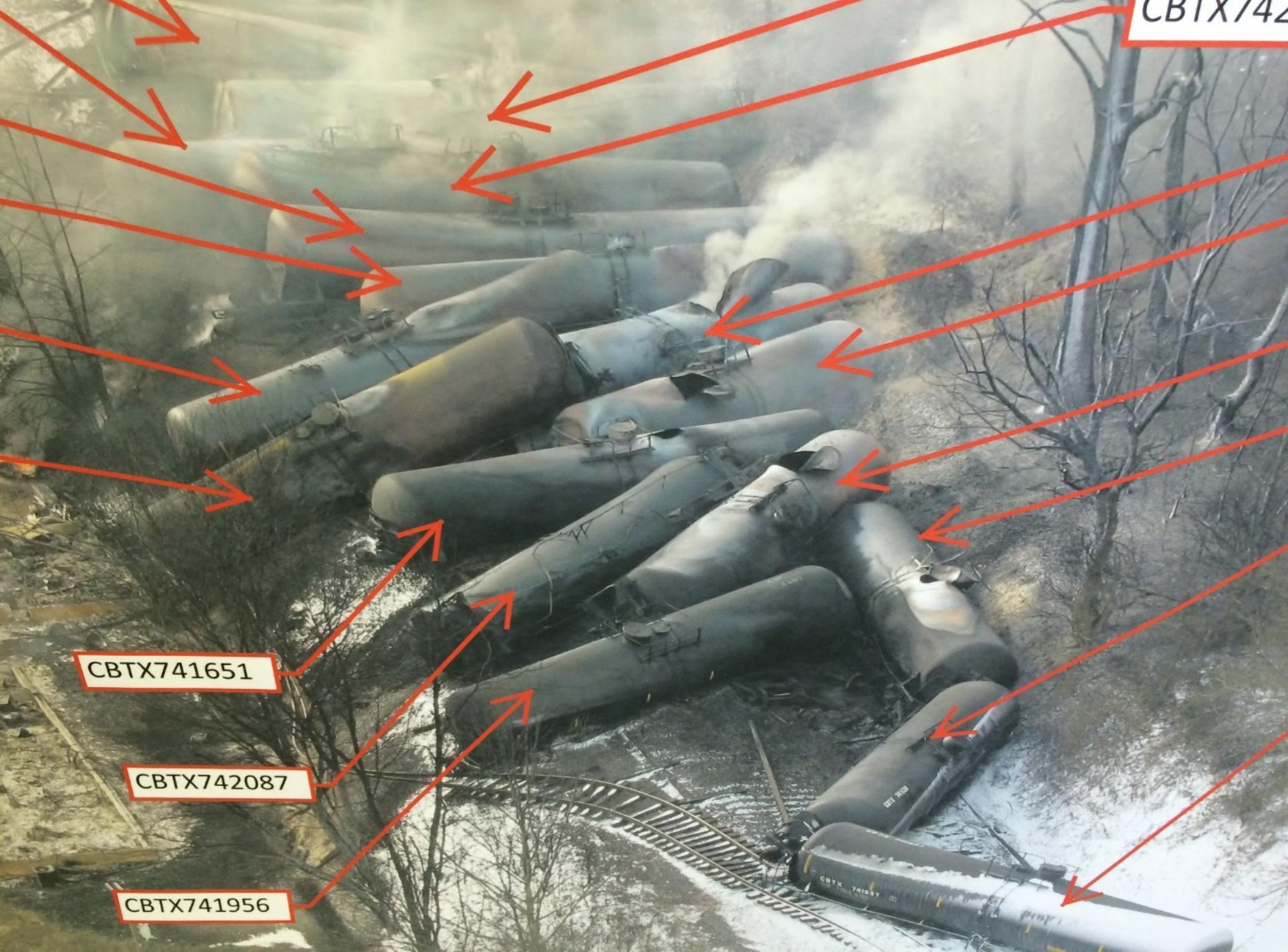
# Unit Train







CBTX742



CBTX741651

CBTX742087

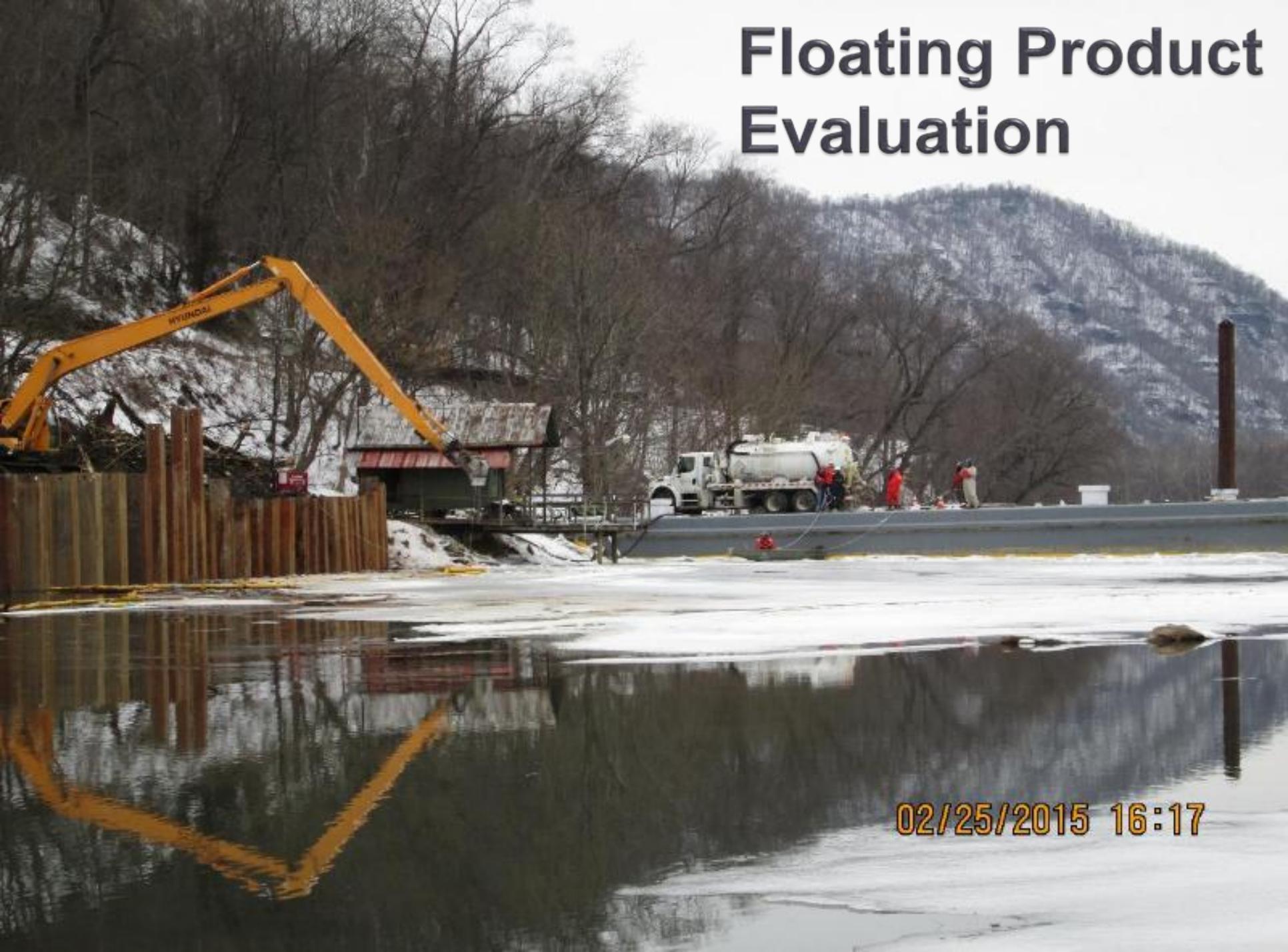
CBTX741956

CBTX 741687

CBTX 742087



# Floating Product Evaluation



02/25/2015 16:17

# Oil in water inside containment boom in Armstrong Creek



# Oil on Ice



# OHMSETT Testing



# Release of Bakken Crude

## } Air Monitoring

- Area Rae's
- Ultra Rae 3000 / Benzene Tubes
- TVA 1000
- Tedlar Bag GCMS Analysis
- Carbon Tubes (Eight Hour Exposure Evaluation)
- TAGA Continuous

# Bakken Crude Specifics

- } Flash Point = 95 degrees plus
- } LEL = 0.8%
- } UEL = 8.0%
- } API Gravity = 45
- } Specific Gravity = 0.82
- } Benzene Concentration = 1700 – 1900 ppm

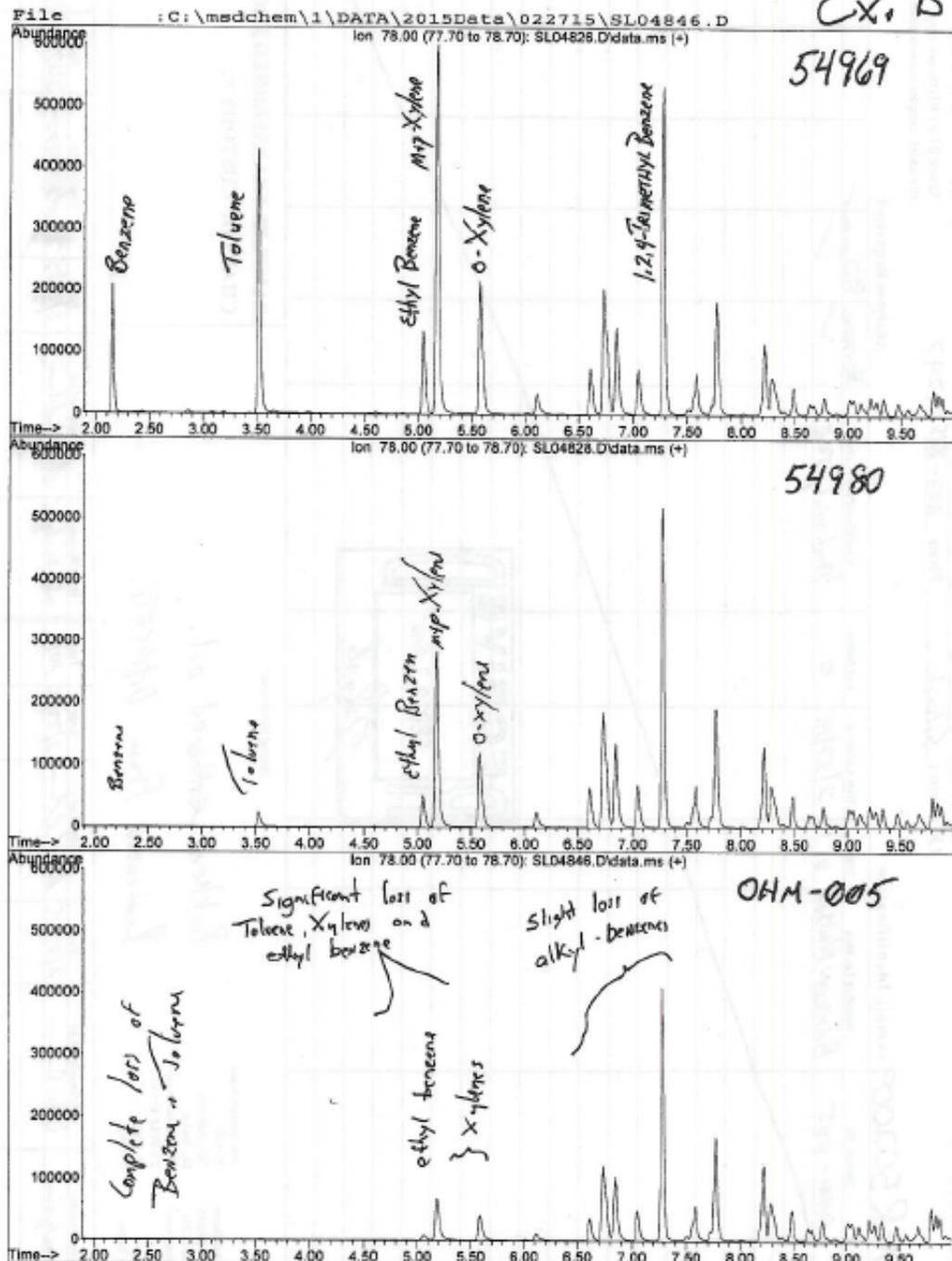
# Volatile Compound Reduction With Weathering

- } Significant Levels of Light Hydrocarbons in Unweathered sample
- } After 24 Hours a Significant Loss of Light Hydrocarbons Up to Nonane and BTEX Compounds
- } After Seven Days a Complete Loss of Benzene and Toluene. Significant loss of Xylenes

# Initial Concentration

# 1 Day Weathering

# 7 Day Weathering

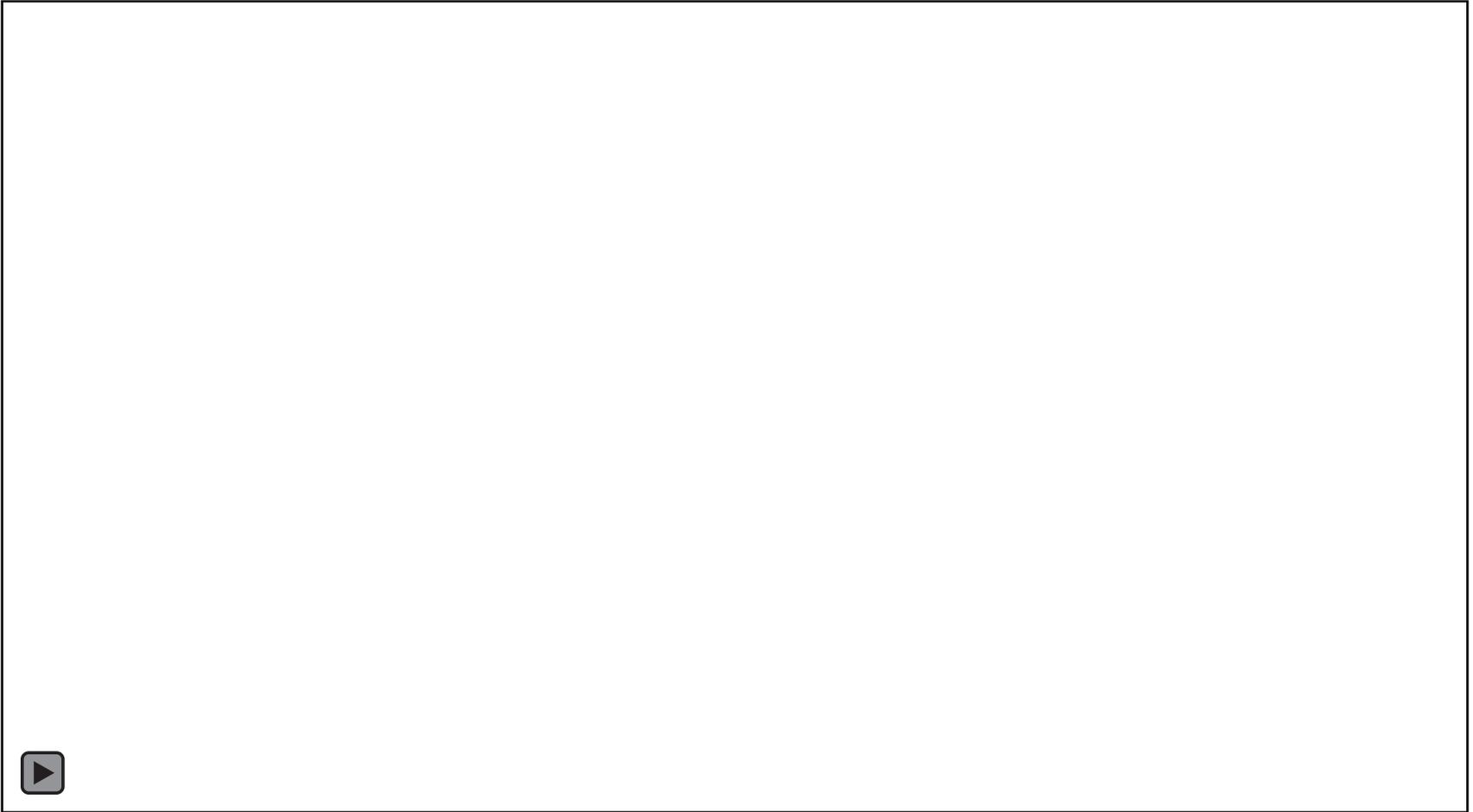


# Benzene Air Issues

- } OSHA action level = 0.5 ppm
- } TWA (8 hrs.) = 1 ppm
- } STEL = 15 ppm 15 minutes



# Release and TAGA Monitoring



# ASTM Skimmer Testing



# Additional Skimmer Testing



- } Weathered Oil Recovery Rate
  - 20 gpm
  
- } Fresh Oil Recovery Rate
  - 5 gpm

Grooved Drum Skimmer

# Air Monitoring



# OPEN CUP FLASH POINT

- } Fresh Oil-Too volatile and was lost prior to determination
- } Oil Weathered One Day-132.0 Degrees Fahrenheit
- } Oil Weathered Seven Days-165 Degrees Fahrenheit

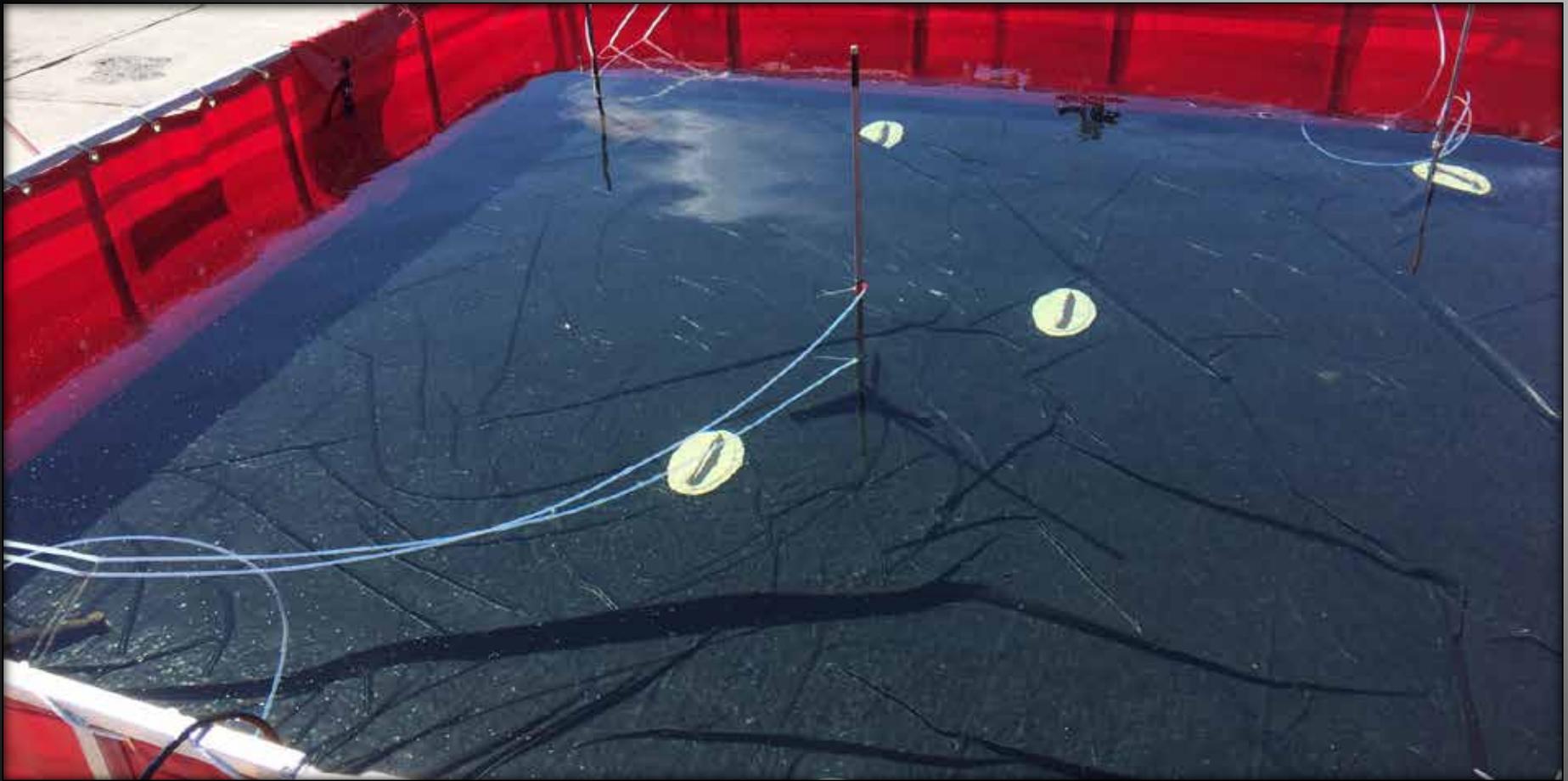
# PHASE II Warm Weather Testing

Somerset, New Jersey



# Testing Area Layout



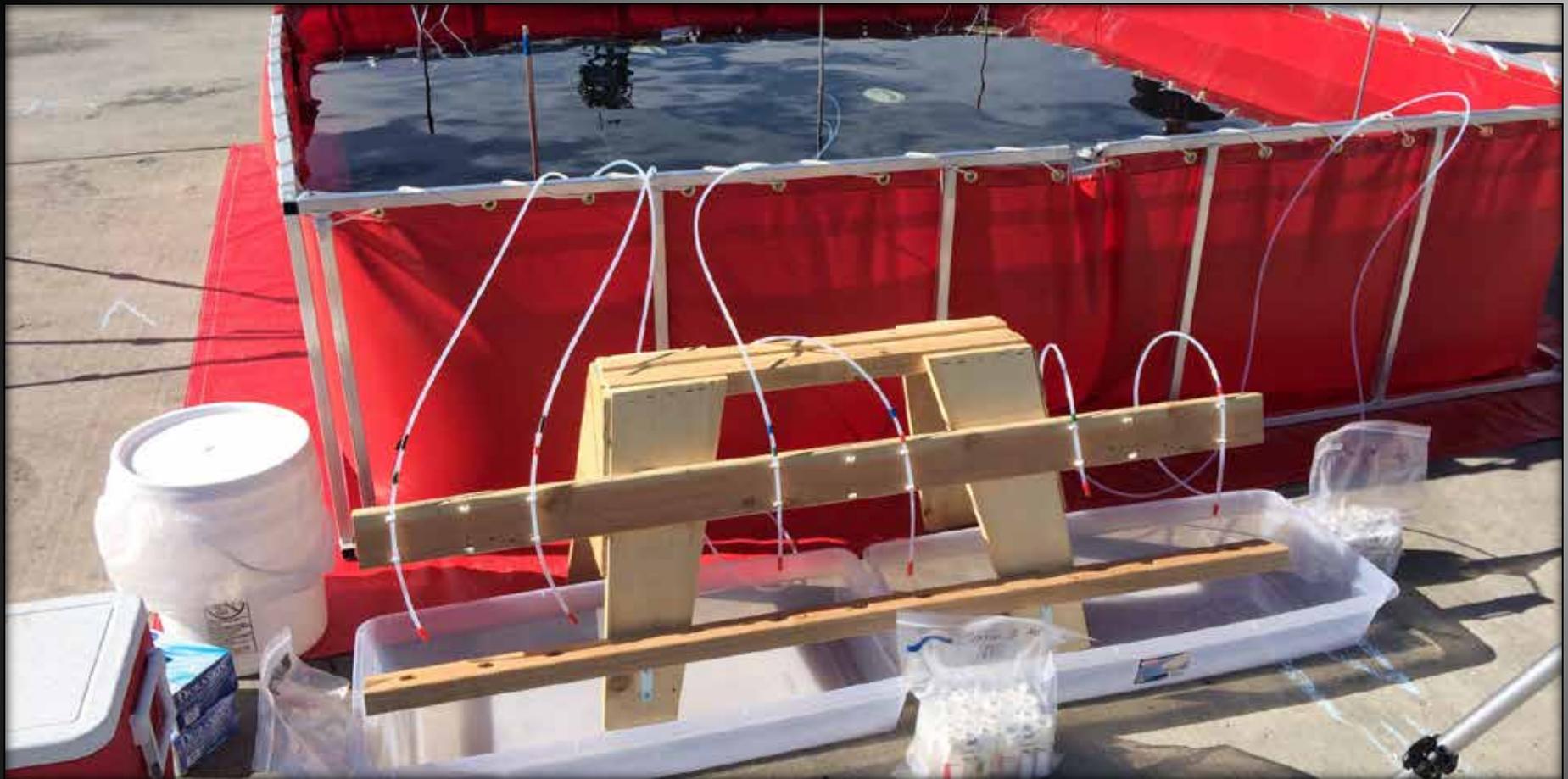


## Quiescent Pool Prior To Release >>

Location of Water Sampling Ports

# AreaRae Setup





# Water Sampling Collection Configuration >>

Siphon Flow

# Bakken Oil Release



# Flash Point Data

- } Time Zero  $\leq 23^{\circ}\text{F}$
- } Time 25:30 Still Pool  $168^{\circ}\text{F}$
- } Time 21:28 Agitated Pool  $161^{\circ}\text{F}$
- } After 24 hours most of the C4 thru C10 hydrocarbons had volatilized.



## Initial Release Air Monitoring >>

AreaRaes, PID/FID, UltraRae 3000, Tedlar bags for GC/MS Analysis, and Continuous TAGA Monitoring

# Significant Effervescence



# Total Coverage of Off Gas Foaming



# COMPARISON DATA

Table 2  
 Comparison of Benzene Air Monitoring and Air Sampling Results from 14 June 2016  
 Bakken Crude Oil: Worker Health and Safety Pilot Scale Study  
 Somerset Fire Training Academy, Hillsborough, NJ  
 September 2016

Sample ID	Location	Description	Start Time	Tedlar Bag GC/MS Benzene Concentration (ppmv)	UltraRAE 3000 Benzene Concentration (ppmv)
--	Southside of Pool	Background	9:41	--	0
55612	Southside of Pool	T+1	11:55	5.9 J	3.75
55613	Southside of Pool	T+5	11:59	4.8 J	--
55614	Southside of Pool	T+10	12:04	3.3 J	1.45
55615	Southside of Pool	T+15	12:08	3.1 J	2.75
55616	Southside of Pool	T+30	12:24	5.7 J	69.35
55617	Southside of Pool	T+45	12:39	6.2 J	23.45
55618	Southside of Pool	T+60	12:54	2.2 J	11.6
55619	Southside of Pool	T+75	13:09	4.0 J	28.45
55620	Southside of Pool	T+90	13:24	1.6 J	1.85
55621	Southside of Pool	T+120	13:54	0.8 J	55
55622	Southside of Pool	T+150	14:24	0.58 J	2.95
55623	Southside of Pool	T+180	14:54	0.19 J	0.25
55624	Southside of Pool	T+240	15:54	0.072 J	4.05
55625	Southside of Pool	T+300	16:54	0.042 J	16.25
55626	Southside of Pool	T+1257*	8:51	0.00061	0.15

GC/MS = gas chromatography/mass spectrometry



# TAGA Monitoring



# Water Sample Collection



# Oil Characteristics



Initial Release



After Off Gasing

# Rudimentary Oil Thickness Gauging

