

Solid Waste Management Units 7/8

Former Tow Way Fuel Farm Optimization Evaluation

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Jacobs

February 19, 2026

Presentation Outline

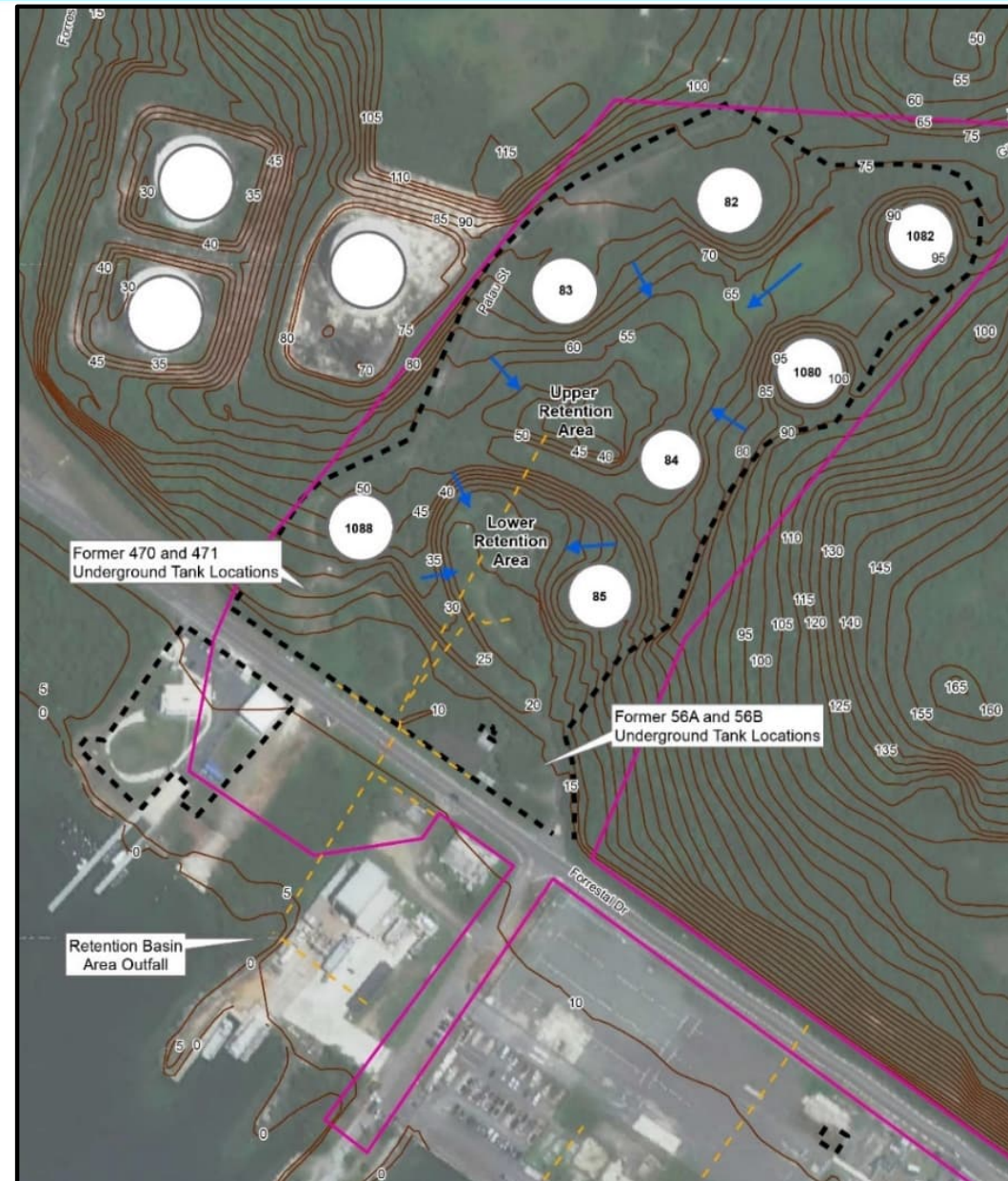


- Site background
- Fuel and dissolved benzene plume historical data
- Optimization evaluation actions
- Conclusions
- Path forward

Site Background



- Constructed in 1957
- Nine bombproof and two additional underground storage tanks (USTs)
- Used to store marine diesel fuel, jet fuel (JP-5), Bunker C fuel oil, and leaded and high-octane aviation gasoline
- Two, 10,000-gallon bombproof USTs and associated soil, and the two additional USTs were removed in 1996
- Fueling operations ceased in 2004



Site Background (continued)

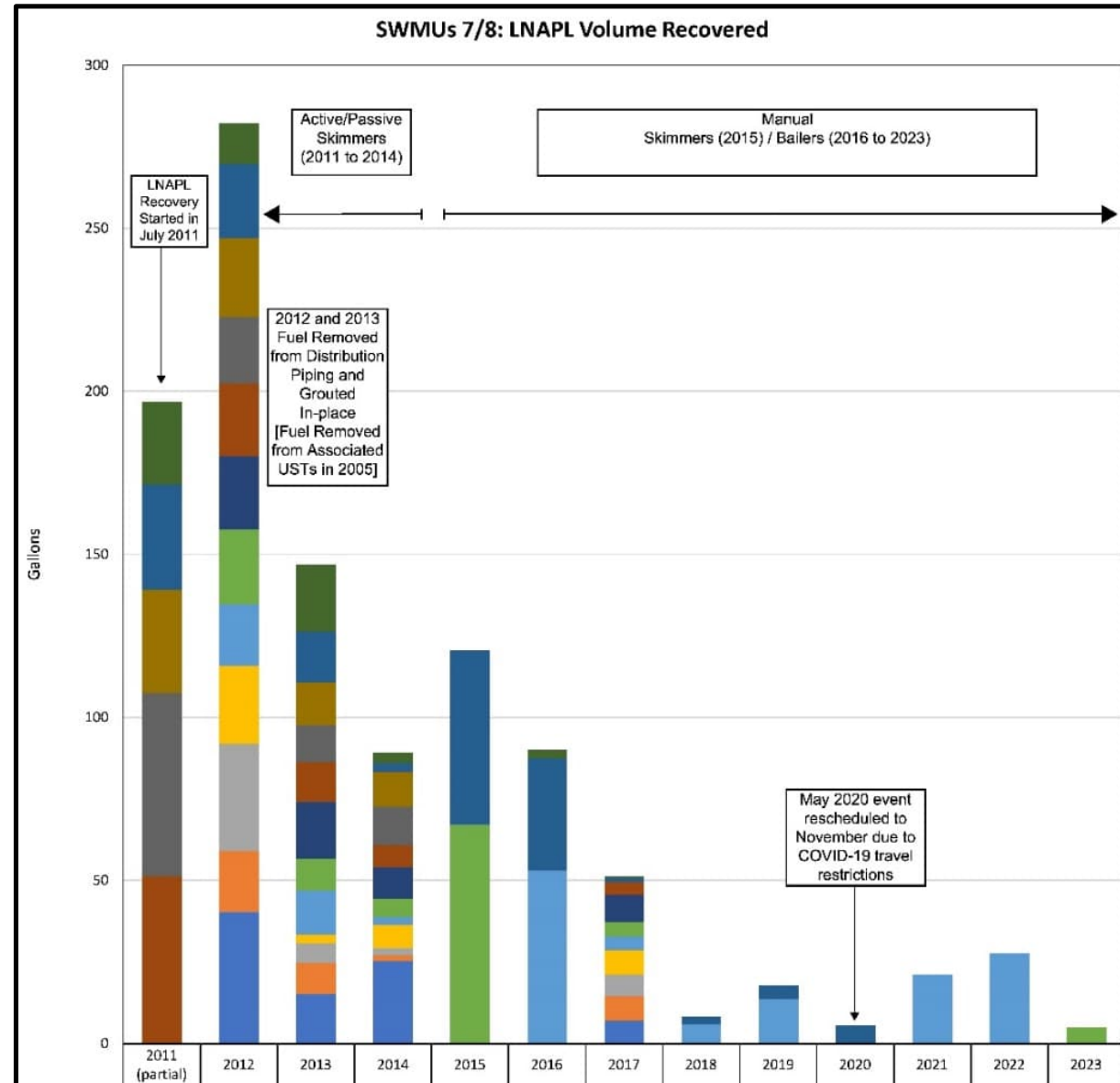


- Remaining USTs were drained and cleaned, and the conveyance piping was purged and grouted in place in 2012 and 2013
- Achieved Corrective Action Objectives (CAOs):
 - Ethylbenzene: 493 µg/L
 - 1,2,4-Trimethylbenzene: 5,251 µg/L
 - Trichloroethene: 193 µg/L
- Active CAOs:
 - Fuel thickness: 0.01 foot
 - Benzene: 160 µg/L
- Land Use Controls (LUCs):
 - Designated industrial land use
 - LUCs to prevent unintended receptor exposure to groundwater and prevent unrestricted use of the property and groundwater

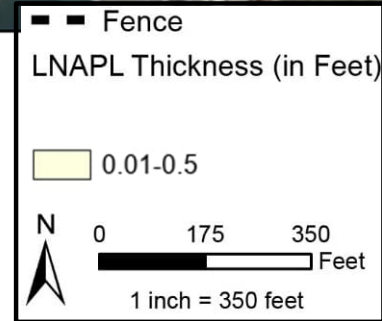
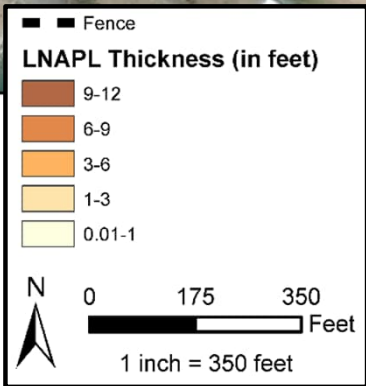
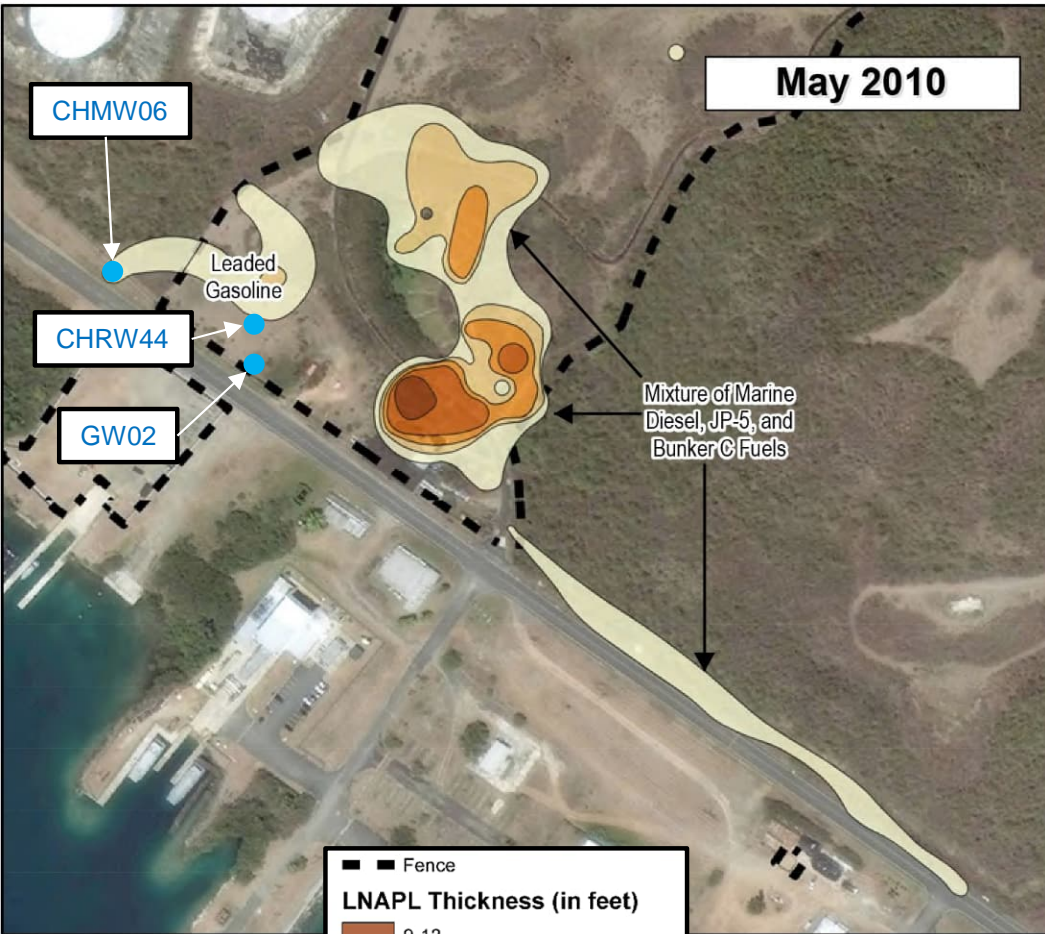
How has the fuel been removed?



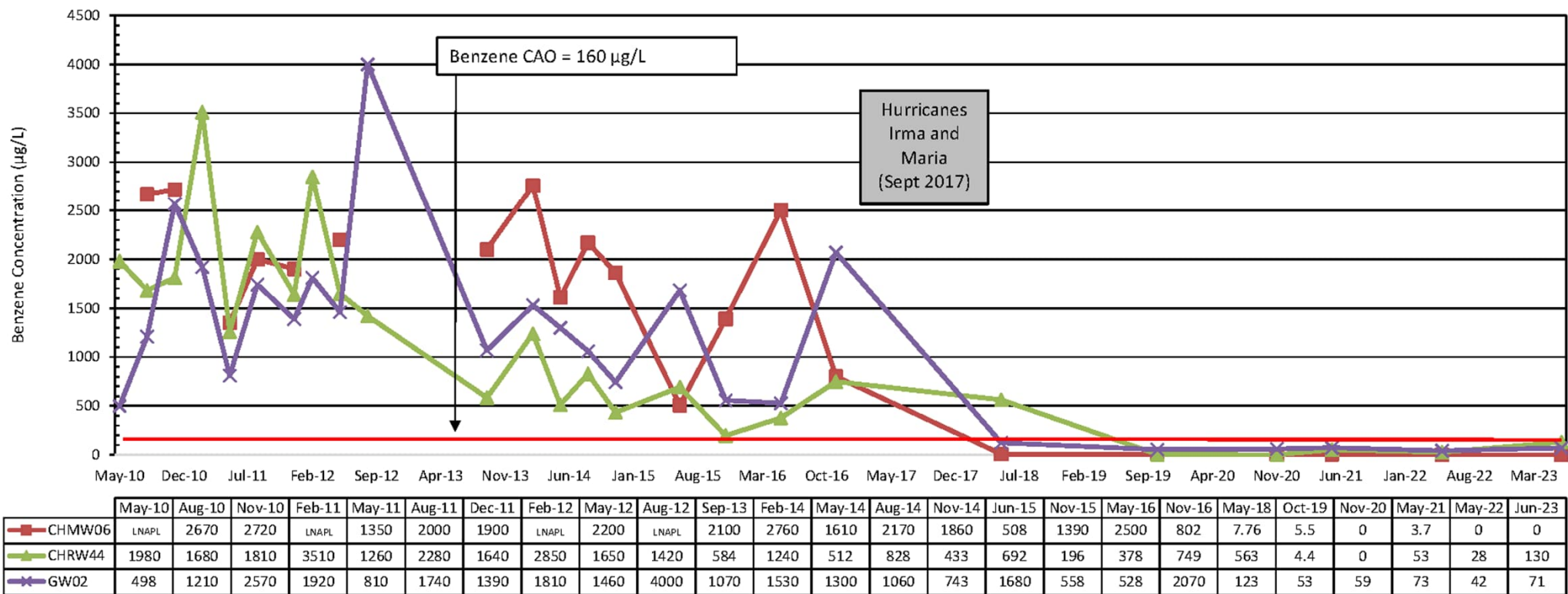
- **1994 to 2010:** Multiple fuel recovery technologies used to remove about 18,000 gallons of fuel
- **2011 to 2014:** Full-time passive/active skimmer system
 - 715 gallons recovered
 - Continued decreasing each year
- **2015 to 2023:** Manual product recovery
 - 347 gallons recovered
 - Last 6 years averaged 14.2 gallons per year



Fuel Thickness Reductions



Dissolved Benzene Reductions



- In addition to the fuel reductions, benzene concentrations downgradient of fuel decreased by over 96 percent from 2010 to 2025.
- 2025 analytical data indicate benzene concentrations were not detected above the laboratory detection limit of 1 µg/L in downgradient sentry well samples. So, what's next?

Optimization Evaluation: Fuel Natural Attenuation Analyses



- 1. Is remaining fuel at risk of migrating?*
- 2. How much remaining fuel is recoverable?*
- 3. Will naturally occurring processes serve to attenuate remaining fuel and dissolved contaminants in a reasonable timeframe?*

- Fuel Mobility – Soil core sampling, fuel saturation, and gravity drain / water drive tests
- Fuel Recoverability – Fuel baildown tests
- Fuel Natural Attenuation – Natural Source Zone Depletion (NSZD) tests
- Benzene Natural Attenuation – Enhanced Benzene Attenuation Pilot Study

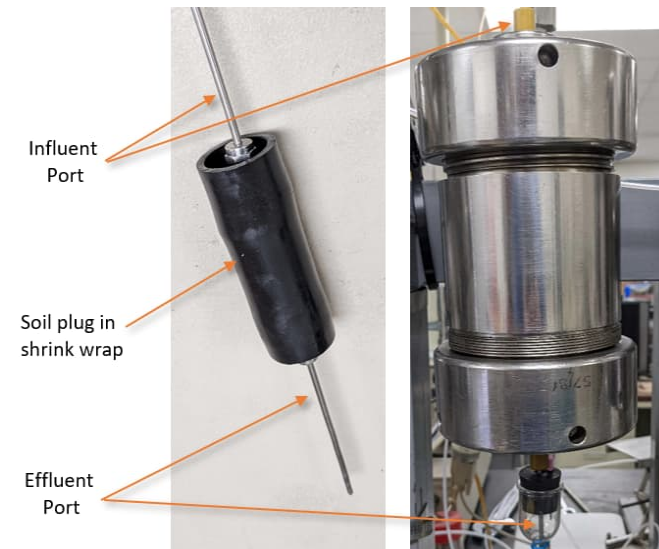
Optimization Evaluation: Fuel Mobility



- Advanced soil borings near the leading edge of fuel plume
- Collected soil core samples at the seasonal water table or smear zone
- Measured fuel saturation every 6 inches along each soil core sample
- Conducted gravity drain and water drive tests on sections with the peak observed fuel saturations
- **Findings:**
 - Fuel saturations were less than 5% of total pore volume in soil, indicative of residual levels
 - Fuel was not mobilized during gravity and water drive test



Soil plug (left) and apparatus for gravity drain and water drive testing (right)



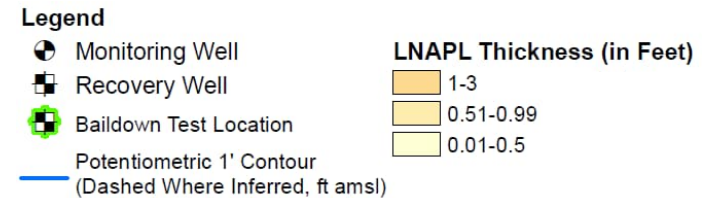
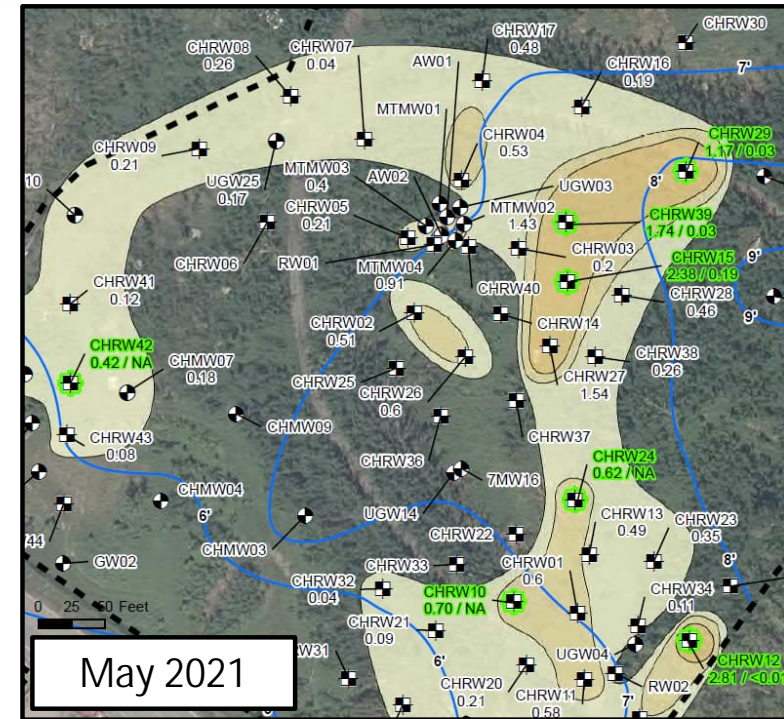
Conclusion: No lateral fuel migration is occurring

Optimization Evaluation: Fuel Recoverability

- Used a pump or bailer to remove fuel
- Measured the recovery rate
- Calculated transmissivity using the recovery rate data
- **Findings:**
 - Calculated transmissivities were less than 0.1 square foot per day
 - Meets industry benchmark for assessing lateral fuel mobility



CHRW12 ← Location ID
2.81 / <0.01 ← Average transmissivity (ft²/day)
 ← Pre-baildown NAPL thickness (ft)



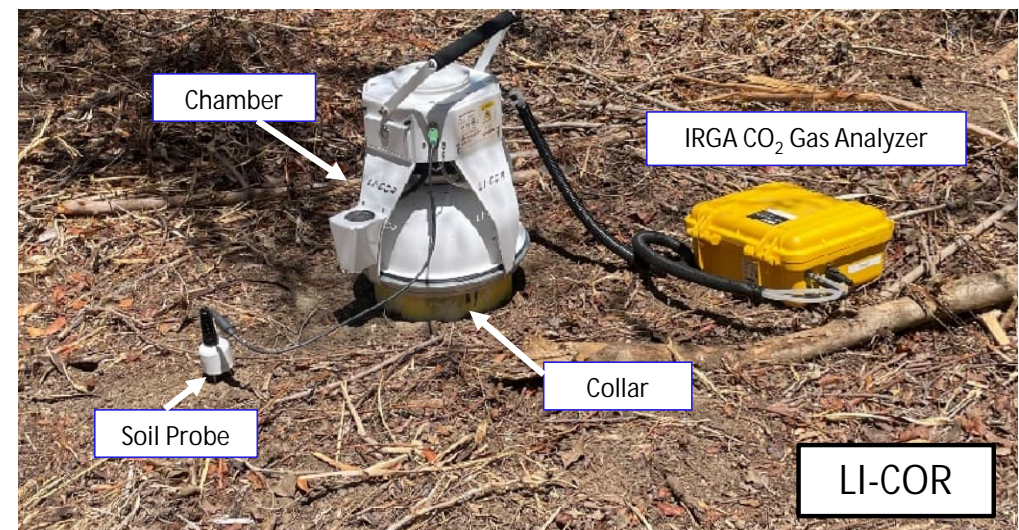
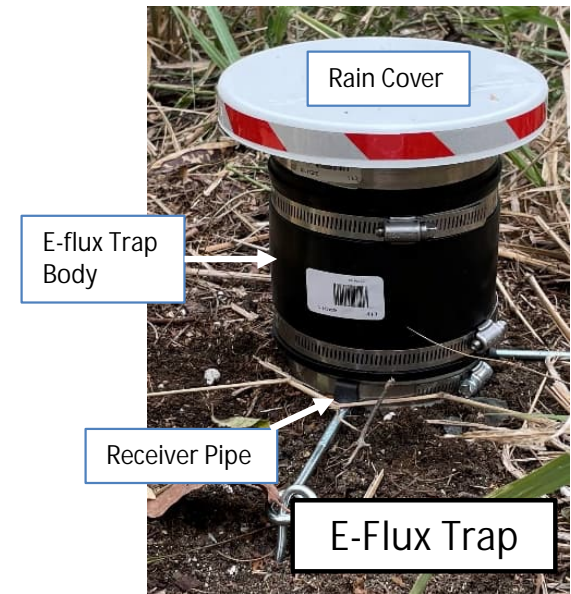
- Notes:**
1. Wells with one value listed depict NAPL thickness at that well
 2. Wells without values listed were not measured for NAPL thickness or did not contain NAPL.
 3. LNAPL measurements are from May 2021.
 4. NA - Not Applicable
 5. < - less than
 6. Imagery: FEMA: October 24, 2017

Conclusion: Negligible fuel can be recovered

Optimization Evaluation: Fuel Natural Attenuation



- NSZD describes the collective, naturally occurring processes in the subsurface that degrade and convert fuel into aqueous and gaseous byproducts
- Carbon dioxide (CO₂) from NSZD processes can be measured at ground surface and converted to fuel degradation/loss rates
- Used two methods for measuring CO₂ emitted from ground
- **Findings:**
 - LI-COR results were used because its survey network had a more complete coverage than E-Flux traps
 - Sitewide NSZD rates ranged from 300 to 800 gallons of fuel removed per acre per year, consistent with literature values



Conclusion: Fuel removal rates by NSZD far surpass removals using mechanical and manual removal methods used over the past 15 years

Optimization Evaluation: Enhanced Benzene Attenuation Pilot Study



- Groundwater data indicates naturally occurring sulfate enhances anaerobic benzene biodegradation
- Approximately 81,000 gallons of sulfate solution were injected into three wells in August 2023 to support ongoing natural processes
- Six groundwater performance monitoring sampling events were conducted over one year to assess the influence of the sulfate solution

Fuel Plume

- Spatial extent and thickness has decreased since 2010 as result of active recovery and NSZD
- Per the mobility and recoverability test results, and consistent with field observations over the past 15 years of low fuel transmissivity and recoverability, the fuel is immobile

Dissolved Benzene Plume

- Fuel depletion has contributed to dissolved benzene plume attenuation
- Dissolved benzene concentrations in monitoring wells immediately downgradient of the source area have steadily decreased since May 2010
- The sulfate injection was effective at reducing dissolved benzene concentrations
 - Benzene concentrations at the three injection wells decreased by more than 73 percent one-year post-injection
 - Benzene concentrations also decreased at three of five monitoring wells one-year post-injection

Path Forward



- Continue Long Term Monitoring (LTM) to evaluate ongoing benzene degradation in the source area groundwater and fuel plume attenuation

KEY POINT

Thirty-one years of investigation, recovery, and monitoring at up to 60 monitoring wells has achieved CAOs for ethylbenzene, 1,2,4-trimethylbenzene, and trichloroethene and demonstrated the remaining fuel and dissolved benzene are not moving downgradient and are being attenuated by natural processes



Questions/Comments from the Public

Thanks for your participation!

Next RAB meeting date is August 2026



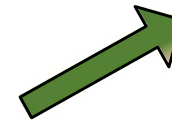
CONTACT US

If you are interested in:

- Becoming a Restoration Advisory Board member, or
- Receiving more information about the cleanup, join our mailing list



Talk with a Navy representatives at tonight's meeting or contact them by email.



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