

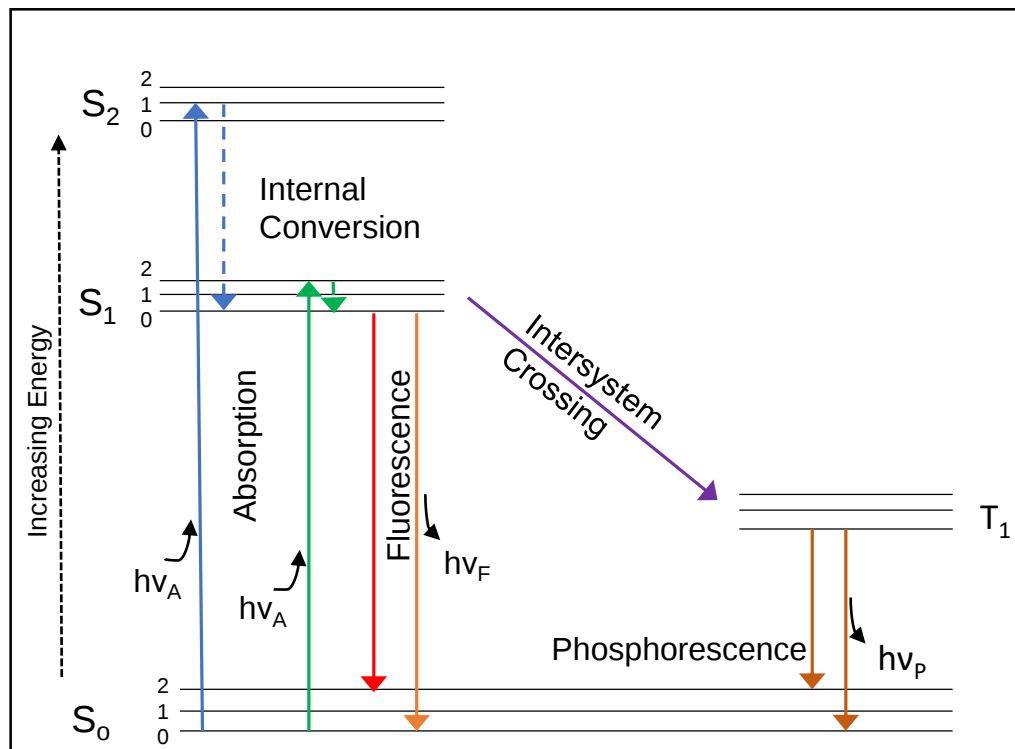


Figure S1: A simplified Jablonski diagram (after Lakowicz 1999). During equilibrium the electrons are in the S_0 ground state. Absorption of light ($h\nu_A$) raises the electrons to the S_1 or S_2 excited state. Internal conversion lowers the electrons to the lowest S_1 sublevel where fluorescence (emission of photon) allows the electron to return to the ground state. In some molecules intersystem crossing occurs to the T_1 level and the slower process of phosphorescence allows the electron to return to the ground state level.

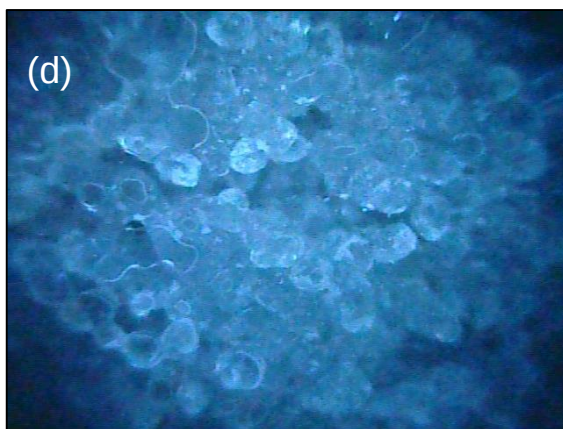
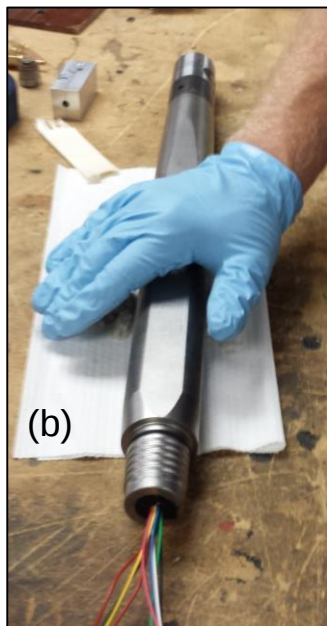
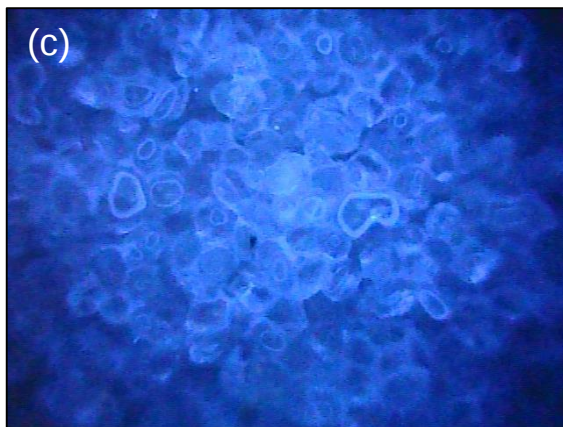


Fig. S2: Bench test set up and images for unleaded gasoline and on-road diesel tests. Silica sand samples were prepared with 10% moisture content and then spiked with selected mass of product to achieve given concentrations for testing. Prepared samples (a) were placed in a VOA vial cap and placed to cover the OIP sapphire window, as shown here. Gloved hand was pressed over the test specimen (b) to exclude ambient light as the string potentiometer was manually actuated for ~600mm (2ft) to acquire multiple images of fluorescence and log of the % Area of Fluorescence (%AF) as obtained for typical logging procedure. Bench test image of diesel fluorescence (c), concentration of 10,338mg/kg, giving 94.7% area of fluorescence for this specific image. Bench test image of unleaded gasoline fluorescence (d), concentration of 10,571mg/kg, giving 79.9% area of fluorescence for this specific image. Note different color hue of images.

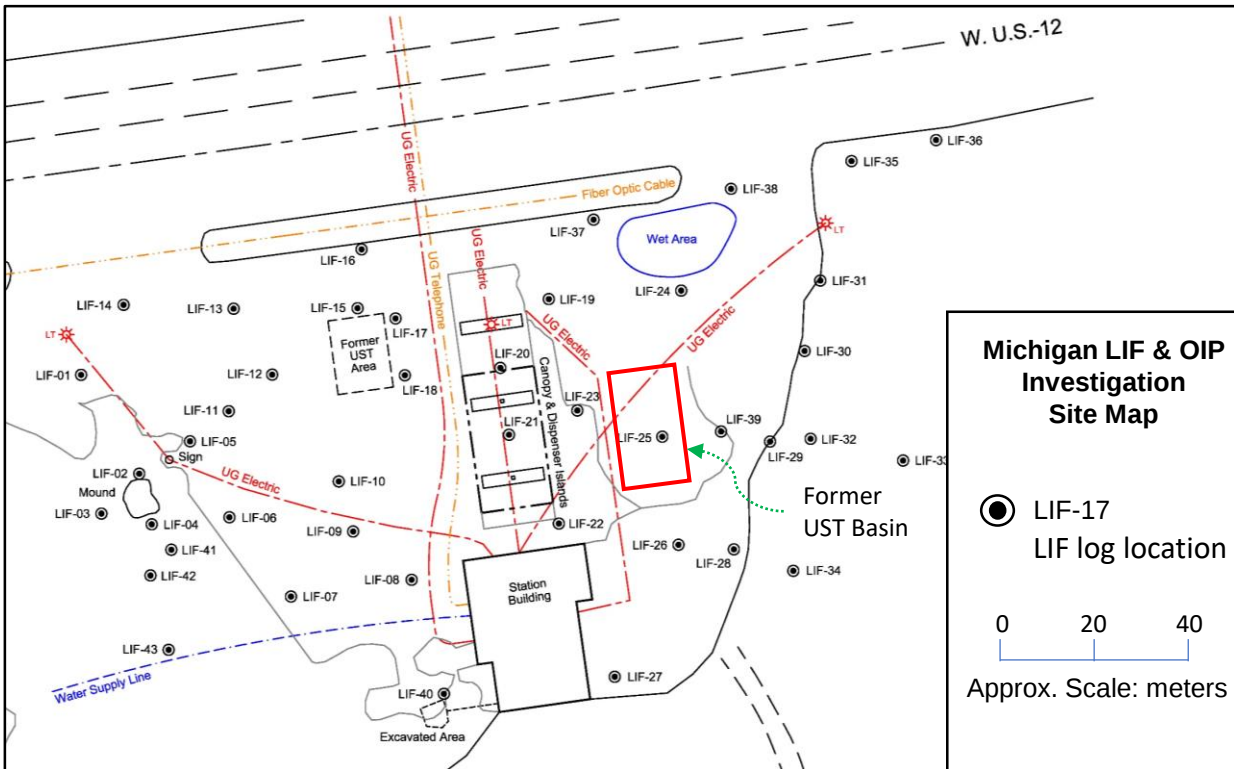


Figure S3: Site map showing locations of the LIF logs at the Michigan UST site. OIP logs were obtained offset about 0.5m to 1.5m from each LIF log. (After Compliance, Inc. Brighton, MI., USA)

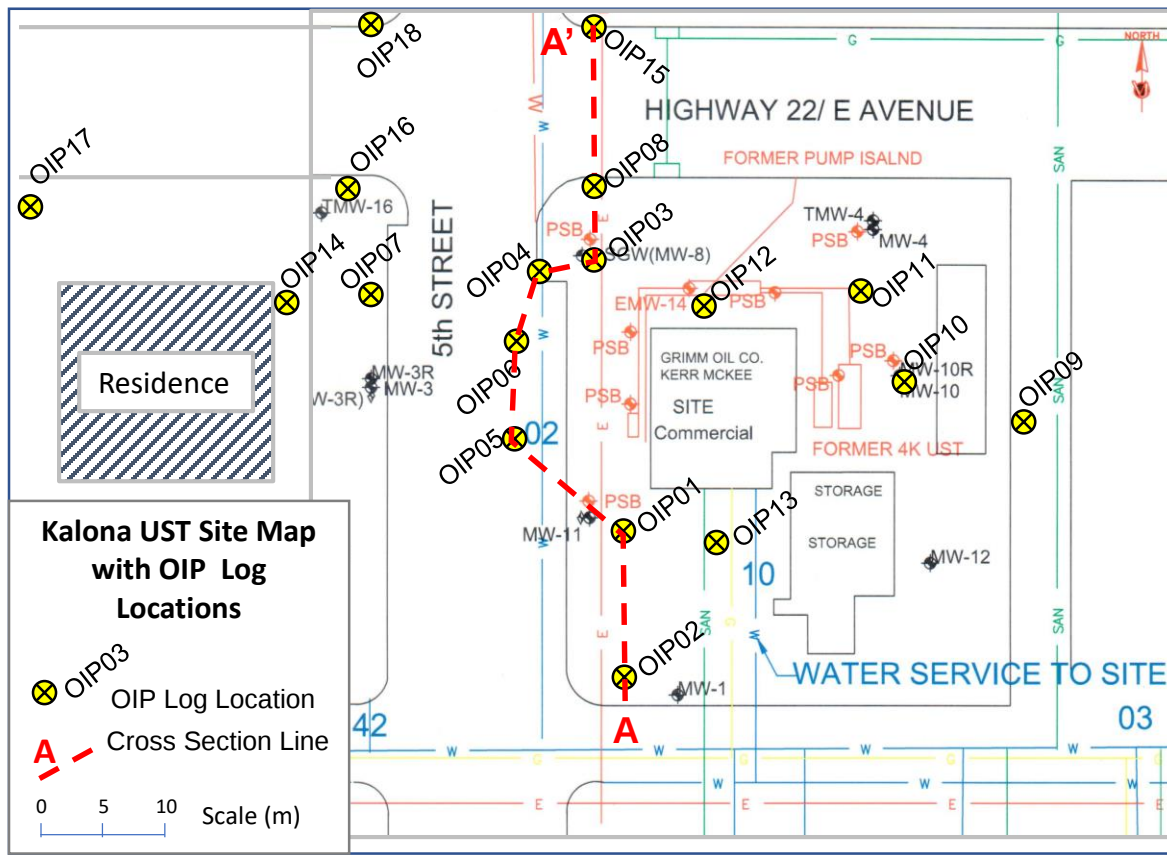


Figure S4: Iowa UST site map showing locations of the OIP logs and cross section line. Note the location of MW08 near OIP logs 3 and 4 and adjacent to the city water line (light blue line with “W”). (Modified from VJ Engineering 2016, Coralville, Iowa, USA).

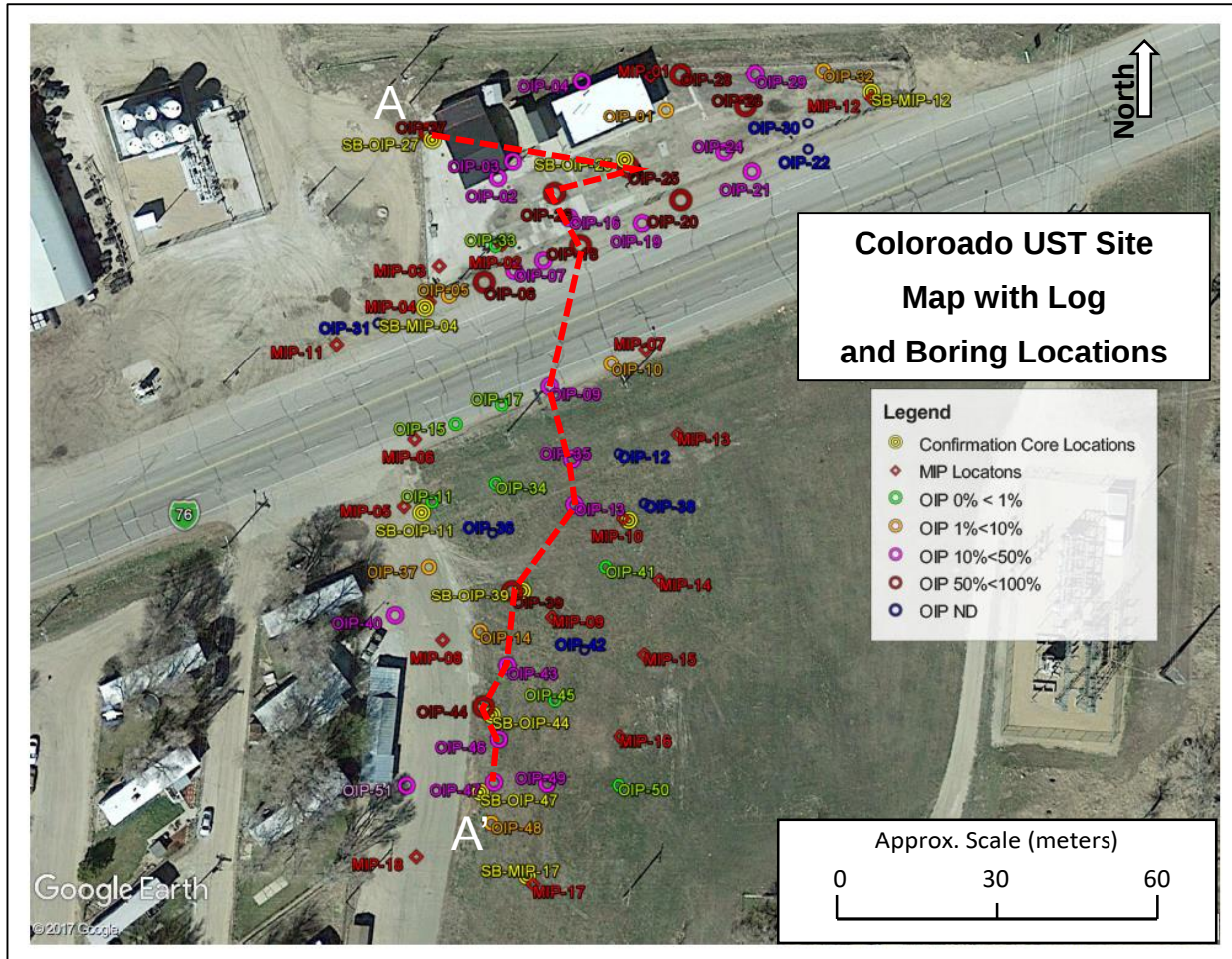


Fig. S5: Colorado UST site map with OIP and MIP log locations and soil boring locations. The A-A' cross section down the LNAPL plume is noted by a bold red dashed line.
(Modified from Vista GeoScience 2017, Golden, CO, USA).