

PFAS Degrading Bacteria & BAM

Dane County Regional Airport – Madison, WI

Pilot Treatment – DPT Injection

Project Summary: ORIN successfully conducted a pilot test to treat groundwater contaminated with PFAS using by injecting a combination of BAM, calcium peroxide, PFAS Degrading Bacteria, and electrooxidation. 200 gallons of 20% BAM Ultra mixed with water, 0.5% calcium peroxide, and PFAS degrading bacteria and injected through 153 DPT points. A total of 26,250 gallons of the treatment solution was injected through the 153 points. Treatment extended from 12 feet below ground surface (ft bgs) to approximately 22 ft bgs. Approximately 137 electrodes were installed to 20 ft bgs. The electrooxidation system generates oxygen through low voltage currents conducted through the screw pilings to support the aerobic PFAS Degrading Bacteria.

Site Conditions:

Groundwater Contaminants –

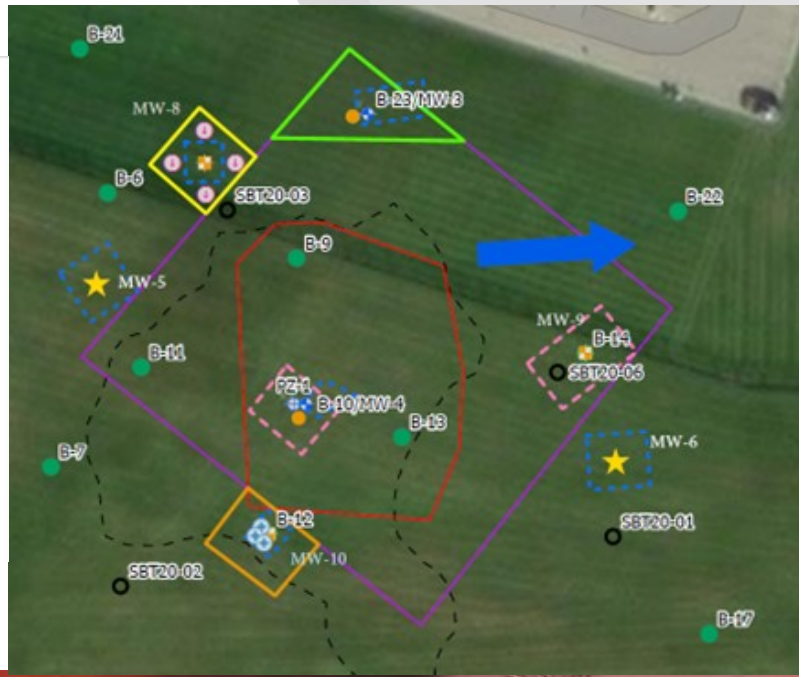
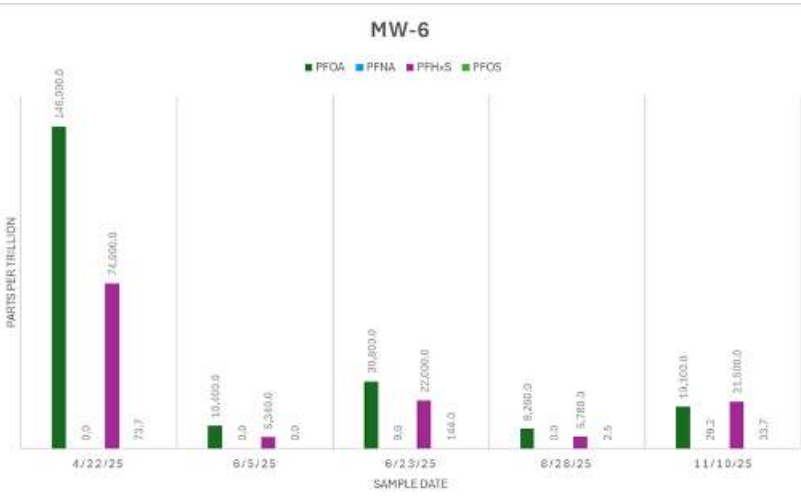
Per- and polyfluoroalkyl substances (PFAS)

Impacted Matrix –

Silty Sand
12 to 22 ft-bgs

Treatment Chemistry/Approach –

BAM Ultra, PFAS degrading bacteria, Calcium Peroxide, and Electrooxidation



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MW-5: Upgradient and outside of treatment area. Data shows little to no effect contaminant concentrations as untreated groundwater migrates across site.

MW-4: Located where fire fighting training took place. Influenced by treatment chemistry during injection. Large decrease in contaminants in 3-month sampling event and sustained at 6-month event.

MW-6: Downgradient and outside of treatment area. Changes in PFAS compounds are consistent with past studies showing bacteria breaking longer chain PFAS.

MW-4

| Analyte (ng/L) | Preventative Action Limit (ng/L) | Enforcement Standard (ng/L) | 4/22/25 | 5/29/25 | Percent Change | 6/5/25 | Percent Change | 6/23/25 | Percent Change | 8/28/25 | Percent Change | 11/10/25 | Percent Change |
|----------------|----------------------------------|-----------------------------|----------|----------|----------------|----------|----------------|----------|----------------|---------|----------------|----------|----------------|
| PFOA | 2 | 20 | 17,000.0 | 17,400.0 | -2.35% | 19,600.0 | -15.29% | 20,100.0 | -18.24% | 3.8 | 99.98% | 2.7 | 99.98% |
| PFNA | 3 | 30 | 428.0 | 373.0 | 12.85% | 458.0 | -7.01% | 509.0 | -18.93% | 0.0 | 100.00% | 0.0 | 100.00% |
| PFHxS | 4 | 40 | 63,900.0 | 71,600.0 | -12.05% | 66,100.0 | -3.44% | 91,500.0 | -43.19% | 7.4 | 99.99% | 5.0 | 99.99% |
| PFOS | 2 | 20 | 3,740.0 | 1,860.0 | 50.27% | 2,570.0 | 31.28% | 2,870.0 | 23.26% | 3.6 | 99.90% | 3.1 | 99.92% |

Note: Zero value indicates analyte below laboratory detection limit

| |
|------------------------------------|
| Indicates exceedance of ES and PAL |
| Indicates meeting ES and PAL |
| Indicates meeting ES but not PAL |

Project Results: Baseline samples were taken prior to treatment to characterize the contaminant level and compare treatment reductions. The results yield a near 100% reduction for contaminant levels at MW-4 which was the center of the treatment area. MW-6 that was downgradient of the treatment area, had a large percent change as well. While MW-5 is upgradient and outside the treatment area, no effect on contaminant concentration as the untreated groundwater migrates across the site.