

Ann Arbor Landfill In-Situ Chemical Oxidation (ISCO) Pilot Test - Summary

We would like to complete two remediation pilot tests in Southeast Area Park along Ellsworth Road. A combined contaminant plume of 1,4-dioxane and vinyl chloride exists in the southwestern corner of the park; resulting from contaminants that previously migrated from the landfill. This contamination is at least 10 feet underground and poses no exposure risk to park users. The soil is not impacted and soil gas samples collected during a different pilot test in 2011/2012 demonstrated no evidence of contamination near the surface. If one or both of the pilot tests are successful, there is an opportunity for ongoing long-term monitoring.

Background

The City of Ann Arbor maintains a closed municipal landfill located on the south side of Ellsworth Road. Groundwater impacts containing vinyl chloride and 1,4-dioxane migrated from the Ann Arbor Landfill to Southeast Area Park during the active life of the landfill. Between 1995 and 1996 the city installed a slurry wall around the landfill to prevent upgradient groundwater from mixing with potential contaminants in the landfill and carrying the concentrations down-gradient. The slurry wall was not extended across 1,500 feet of the northern side of the landfill, instead, extraction wells were installed that continually operate. The extraction wells prevent groundwater in the landfill from migrating offsite. The extraction wells also pull the groundwater and contaminants north of the landfill back to the extraction wells. The water is then discharged to the sanitary system. The vinyl chloride and 1,4-dioxane plumes have maintained relatively similar shapes and have shown decreasing concentrations since 2003 using pump and treat methods. However, vinyl chloride concentrations remain above applicable cleanup criteria and the 1,4-dioxane cleanup criteria is expected to decrease in the near future.

A successful bioremediation pilot test using another treatment technology was completed in 2011/2012 in Southeast Area Park, however it only targeted vinyl chloride. The two pilot tests proposed will target both the vinyl chloride and 1,4-dioxane contaminants.

Bioremediation Technology Chemistry

Both proposed pilot tests require injecting a treatment chemistry into the groundwater near an observation well.

The treatment chemistry for each pilot test is:

1. Catalyzed sodium persulfate – this is a chemical that will quickly breakdown in water and the separate components, primarily sulfate, will continue to react with the contaminants. The catalyst we are proposing is calcium peroxide that will release oxygen, creating an environment for microbial activity to further degrade the contaminants. The sodium persulfate and calcium peroxide are both powders that will be mixed with water to form an 18% solution for injection.
2. Bioavailable media (BAM) – this is a granular biomass product (carbon based) that will be mixed with water to form a 30% solution to inject. The carbon based product provides an affinity for both organic and inorganic compounds to adhere to the carbon. It also has varying pore sizes that allow many different microbes to use the surface area and provide complete degradation of the contaminants.

Proposed Pilot Test Implementation and Schedule

The areas for the proposed pilot tests are illustrated on the attached figure. One of the observation wells was installed in September 2014 and is flush with the ground. The proposed second observation well would also be flush to the ground. Each proposed pilot test will include four to six injection points around the observation well. These will be completed using a smaller Geoprobe drilling rig using direct push technologies to approximately 20 feet. The direct push technology only creates a 2-inch borehole and does not require the use of augers, minimizing time and disruption to the park surface. The treatment chemistries would be mixed in the remediation trailer brought to the site that is complete with water holding tanks, solution tanks and a multi-hosed manifold system. Pressures on the injection will depend on lithology but are expected to not exceed 35 psi. The system trailer only allows up to 100 psi before a safety feature kicks on and turns off the injection pump. Based on our site knowledge of the geology and previous injections in the park of vegetable oil, we know that the aquifer does not typically create backpressure.

Based on our site knowledge and data gathered over decades of site investigation and sampling, we know that the nearby Swift Run Drain is above the contaminated aquifer and not hydraulically connected. During the injections we will have a vacuum truck on site that will be controlling the movement of the treatment chemistries through the aquifer by adding vacuum to the observation well and injection boreholes. The potential to impact the Drain by increasing the pressure in the aquifer is very low. We will be monitoring the Drain during the injection period and will be able to mobilize the vacuum truck in the small chance that a breach occurs. The location of this pilot test is within the capture area of our extraction wells. Therefore, the treatment chemistries are anticipated to migrate south toward the landfill and away from the park.

Schedule

Well Installation and Baseline Sampling

- Install one additional observation well (OW-36-15) in the proposed pilot test area (0.5 day).
- After one week, sample 4 wells (including observation wells) for baseline data (1 day).

Pilot Test Injection Event

- Approximately three weeks after sampling, complete 4-6 injections around each observation well (2 days).

Post Injection Monitoring

- Perform weekly methane monitoring at 4-6 locations for 1 month following the injections.
- Sample 4 wells, 1 month and 4 months following the injection event. This will be completed with other routine monitoring and maintenance activities.

Park Impacts

A drill rig and injection equipment will be located in the park working for 3 days total. The work zone will be cordoned off, to ensure the public is safe during the pilot test from moving equipment and drilling activities. This work zone is identified on the map in yellow. After the injections are complete, all equipment will be removed and the injection boreholes will be filled with bentonite clay. Topsoil will be added to the upper 6 inches and the site restored to previous conditions. The flush mount monitoring and observation wells will remain in place. Ongoing monitoring will be completed to determine the effectiveness of the remediation on these contaminants.