**TABLE 3.3-1**
**NATURAL ATTENUATION ANALYTICAL AND FIELD SCREENING PARAMETERS**

| Parameter | Method/Reference | Rationale | Sample Volume, Container, and Preservation | Field or Fixed-Base Laboatory |
|---|---|---|---|---|
| **Organics** | | | | |
| Volatile Organic Compounds | SW-846 8260B | CVOCs are primary target analytes for monitoring natural attenuation. | 40 mL, glass, HCl, cool, 4°C | Fixed-base |
| **Bacterial** | | | | |
| Dehalococcoides (qDCH) | Census DNA®/Microbial Insights | Bacterial group capable of reductive dechlorination of PCE and TCE to ethene. | Bio-Flo filter/Falcon Tube, cool, 4°C | Fixed-base |
| Vinyl Chloride Reductase (bvcA) | Census DNA®/Microbial Insights | Detects a strain (BAV1) of Dehalococcoides responsible for reductive dechlorination of Vinyl Chloride to ethene. | Bio-Flo filter/Falcon Tube, cool, 4°C | Fixed-base |
| TCE Reductase (tceA) | Census DNA®/Microbial Insights | Indicates some strains of Dehalococcoides responsible for reductive dechlorination of TCE to cis-1,2 DCE. | Bio-Flo filter/Falcon Tube, cool, 4°C | Fixed-base |
| Vinyl Chloride Reductase (vcrA) | Census DNA®/Microbial Insights | Detects a strain (VS 5) of Dehalococcoides responsible for reductive dechlorination of cis-1,2DCE and Vinyl Chloride to ethene. | Bio-Flo filter/Falcon Tube, cool, 4°C | Fixed-base |
| Dehalobacter spp. | Census DNA®/Microbial Insights | Bacterial group capable of reductive dechlorination of PCE and TCE to cis-1,2 DCE and TCA to chloroethane. | Bio-Flo filter/Falcon Tube, cool, 4°C | Fixed-base |
| **Inorganics** | | | | |
| Alkalinity, Total | SM20 2320B | General water quality parameter, assess buffering capacity of groundwater. | 200 mL plastic or glass, cool, 4°C | Fixed-base |
| Chloride | EPA 300.0 | General water quality parameter to assist in assessing potential contributions from road deicing salts. Final product of chlorinated solvent reduction. | 50 mL plastic or glass, cool, 4°C | Fixed-base |
| Iron, Ferric | SW-846 6010B mod. (calculated) | Assess potential for vinyl chloride oxidation under ferric iron reducing conditions. | 500 mL - 1 L plastic or glass, cool, 4°C, $HNO_3$ to pH<2, field filter | Fixed-base |
| Iron, Ferrous | SM20 3500 Fe B mod. | May serve as an indicator of anaerobic degradation of vinyl chloride and fuel compounds. | 250 mL amber glass, cool, 4°C, HCl to pH<2, analyze immediately | Fixed-base |
| Iron, Dissolved | SW-846 6010B | Assess if anaerobic biological activity is solubilizing iron from aquifer soils. | 500 mL - 1 L plastic or glass, cool, 4°C, $HNO_3$ to pH<2, field filter | Fixed-base |
| Manganese, Dissolved | SW-846 6010B | Assess if anaerobic biological activity is solubilizing manganese for aquifer soils. | 500 mL - 1 L plastic or glass, cool, 4°C, $HNO_3$ to pH<2, field filter | Fixed-base |
| Nitrate | EPA 300.0 | Substrate for microbial respiration if oxygen is depleted. Potential marker for contributions from sewers. | 50 mL plastic or glass, cool, 4°C (48 hour max hold) | Fixed-base |
| Dissolved Organic Carbon | EPA 415.1 mod. | Assess availability of carbon to drive reductive dechlorination. | 125 mL glass, cool, 4°C | Fixed-base |
| Sodium, Dissolved | SW-846 6010B | General water quality parameter to assist in assessing potential contributions from road deicing salts. | 500 mL - 1 L plastic or glass, cool, 4°C, $HNO_3$ to pH<2 | Fixed-base |
| Sulfate | EPA 300.0 | Substrate for anaerobic microbial respiration. | 50 mL plastic or glass, cool, 4°C | Fixed-base |
| Sulfide | SM20 4500 $S_2$ F/D or EPA 376.1/376.2 | Assess anaerobic conditions supporting reductive dechlorination. | 500 mL, glass, cool, 4°C, NaOH, ZnAc (no headspace) | Fixed-base |
| **Dissolved Gases** | | | | |
| Ethene and Ethane | AM20GAX | Monitor daughter products of reductive dechlorination. | 2 x 40 mL, glass, $Na_3PO_4$, cool, 4°C | Fixed-base |
| Methane and Carbon Dioxide | AM20GAX | Monitor respiration products associated with biodegradation. | 2 x 40 mL, glass, $Na_3PO_4$, cool, 4°C | Fixed-base |
| **Field Screening Parameters** | | | | |
| pH | QED MP-20 Multimeter and flow cell, or equivalent | Stabilization parameter for low-flow sampling, aerobic and anaerobic biological processes are pH sensitive. | Not applicable | Field |
| Temperature | | Stabilization parameter for low-flow sampling, assist in monitoring influence of thermal treatment. | Not applicable | Field |
| Specific Conductance | | Stabilization parameter for low-flow sampling, general water quality parameter. | Not applicable | Field |
| Oxidation-Reduction Potential | | Stabilization parameter for low-flow sampling, assess aerobic and anaerobic nature of biodegradation of CVOCs. | Not applicable | Field |
| Dissolved Oxygen | | Stabilization parameter for low-flow sampling, assess aerobic and anaerobic nature of biodegradation of CVOCs. | Not applicable | Field |
| Turbidity | | Stabilization parameter for low-flow sampling. | Not applicable | Field |