Underground Injection Control (UIC) Class V
Environmental Remediation Authorization Application Instructions (UICV-P06)

Item A. Site/Facility Location:

1. Physical Address: Enter street address of facility or other description of physical location of facility
2. Latitude/Longitude: Include datum source

Item B. Facility Contact:

1. Owner/Operator; Owner; Operator; Facility Manager; Contractor; KDHE Project Manager; Other

Item C. Applicant Contact:

1. Owner/Operator; Owner; Operator; Facility Manager; Contractor; KDHE Project Manager; Other

Item D. Remedial Type and Oversight Agency:

1. Check the box that corresponds to the remediation type for this project and enter the ID number the regulatory agency assigned to this remediation project.
2. Primary regulatory oversight of subsurface environmental remediation projects is provided by programs and departments other than the UIC program. Enter the oversight department for the remediation project. Provide the name and contact information for the department project manager.

Item E. Remediation Activity Involving Injection Wells: Descriptions of a few of the commonly employed subsurface environmental remediation technologies involving injection wells are given below.

Air Sparging - Air sparging involves the injection of air or oxygen through a contaminated aquifer. Injected air traverses horizontally and vertically in channels through the soil column, creating an underground stripper that removes volatile and semi volatile organic contaminants by volatilization. The injected air helps to flush the contaminants into the unsaturated zone. Soil Vapor Extraction (SVE) usually is implemented in conjunction with air sparging to remove the generated vapor-phase contamination from the vadose zone. Oxygen added to the contaminated groundwater and vadose-zone soils also can enhance biodegradation of contaminants below and above the water table.

In-Situ Bioremediation - Bioremediation uses microorganisms to degrade organic contaminants in soil, sludge, and solids either excavated or in situ. The microorganisms break down contaminants by using them as a food source or co-metabolizing them with a food source. Aerobic processes require an oxygen source, and the end products typically are carbon dioxide and water. Anaerobic processes are conducted in the absence of oxygen, and the end products can include methane, hydrogen gas, sulfide, elemental sulfur, and dinitrogen gas. In situ techniques stimulate and create a favorable environment for microorganisms to grow and use contaminants as a food and energy source. Generally, this means providing some combination of oxygen, nutrients, and moisture, and controlling the temperature and pH. Sometimes, microorganisms that have been adapted for degradation of specific contaminants are applied to enhance the process.

In-Situ Chemical Oxidation - Chemical oxidation typically involves reduction/oxidation (redox) reactions that chemically convert hazardous contaminants to nonhazardous or less toxic compounds that are more stable, less mobile, or inert. Redox reactions involve the transfer of electrons from one compound to another. Specifically, one reactant is oxidized (loses electrons) and one is reduced (gains electrons). The oxidizing agents most commonly used for treatment of hazardous contaminants in soil are ozone, hydrogen peroxide, hypochlorites, chlorine, chlorine dioxide, potassium permanganate, and Fentons reagent (hydrogen peroxide and iron). Cyanide oxidation and dechlorination are examples of chemical treatment.

This method may be applied in situ or ex situ, to soils, sludges, sediments, and other solids, and may also be applied for the in-situ treatment of groundwater.

Item F. Contamination Description and Source: Briefly describe the existing contamination and the source of the contamination.

Item G. Injection Well Operating Status: Indicate the number of wells in each category.

Item H. Injection Well Construction and Subsurface Details: Submit a plan view of the facility property showing the location of the injection well(s). Submit a vertical cross-section showing the details of the injection well(s). Include such details as unique injection well ID number, construction type; if pre-fab construction, indicate type; construction dimensions; depth of well if vertical construction; screened interval if vertical construction; and depth of engineered bottom if horizontal construction.

- **Flush Mount**: If flush-mount completion of the well(s) is needed or desired, then a request for waiver may be required from the KDHE-BOW. If a waiver request is required, it should be submitted in accordance with the KDHE-BOW procedure document WWP-5.
    - **Exception:** if the well(s) is to be located in a roadway, sidewalk, driveway, parking lot, or other heavily trafficked area, such as a road easement, passageway, etc., where there is an increased risk for the well to become an obstruction or to be damaged, a waiver request is not required. Completion must be in accordance with KDHE-BOW's "Flush-Mount Well Construction Detail" (found on the KDHE Water Well program website) and a site map showing the well location(s) and latitude/longitude coordinates must be attached to the water well record (WWC-5 form) submitted for each flush-mount well.

Item I. Plugging and Abandonment Plan: Must include the type of grout, estimated volume of grout, and a description of the grout emplacement procedure. KDHE requires the well(s) to be plugged by a Kansas licensed water well contractor, filled with a KDHE-approved grout from the bottom of the well to three feet below ground level and the top three feet of well casing removed. Also include a diagram depicting how the well(s) will be plugged.

Item J. Lithologic Description: Provide a lithologic description of the injection zone including geologic name(s), depth to top, and depth to bottom.

Item K. Approximate Depth to Groundwater: Information from monitoring wells or exploratory boreholes may be available for the site.

Item L. Injectate Characterization: Include basic chemistry of the remediation process, including products and by-products.

- For air sparge, include air mixture to be injected;
- For remedial compounds, include description of the contents, characteristics, and estimated volume of remedial compound to be injected.

Item M. Injectate Procedure: Detailed description of the injection procedure, including proposed injection pressure. Injection pressure shall be limited to 50 psi surface pressure. If injection pressures exceed 50 psi, a detailed justification for the pressure increase must be provided. The justification must detail all methods for monitoring the injection activities with the proposed injection pressure. Include the frequency of injection. For air sparging wells, provide air injection rate, minimum rate scfm to maximum rate scfm.

Item N. Comments: Include additional contact information and/or any other relevant information not already addressed in the other sections of this form.