

District Department of the Environment (DDOE)
IN-SITU CHEMICAL OXIDATION (ISCO) INJECTION GUIDANCE FORM

(Please fill out as thoroughly as possible. Attach boring logs, site plan, injection map, any additional comments as necessary)



Site Information:

Address _____

City, State, Zip _____

WARD _____ LOT _____ SQUARE _____

Site Owner:

Name(s) _____

Mailing Address _____ City, State, Zip _____

Phone (_____) _____ E-mail _____

Consultant:

Name(s) _____

Mailing Address _____ City, State, Zip _____

Phone (_____) _____ E-mail _____

Agent for Permit:

Name(s) _____

Mailing Address _____ City, State, Zip _____

Phone (_____) _____ E-mail _____

Driller / Company Responsible for Injection:

DCRA Business License No. _____

Name(s) _____ License State & No. _____

Mailing Address _____ City, State, Zip _____

Phone (_____) _____ E-mail _____

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Site Description:

Site Status:

- Operating as a gasoline station, Not operating, with tanks in place, Temporarily out of service from... to..., Permanently out of service. Tanks permanently closed in..., Tank/Release product..., Past uses..., Current uses...

Ground Surface Conditions:

- Unpaved, Paved, % area paved, Materials, Any visible cracks in the pavement? YES, NO

Site Stratigraphy: (Please attach all available boring logs for the Site)

Table with 3 columns: Depth (feet), Unified Soil Classification, Type of Soil and Description

Bedrock encountered? YES, NO, If yes, Depth, Bedrock description

Site Hydrogeology:

Type of aquifer? Confined, Unconfined, Perched, Underlying predominant aquifer name:, Range of groundwater level fluctuations [feet below grade (fbg)], Average depth to water table/static water level (Attach groundwater elevation table) (fbg):, Flow direction (Attach groundwater contour map):, Are there additional water bearing units in the planned ISCO area: YES, NO

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Please describe: _____

Hydraulic gradient (feet/foot): _____

Hydraulic conductivity (cm/year): _____

Hydraulic conductivity test method: Grain size/Sieve analysis Slug test

Pump test Duration (hours): Other (specify and *attach literature*)

Annual precipitation (average for last 30 years) [inches/year]:

Saturated Zone Characteristics:

Characteristics	Values/Range	Estimated/Measured	If Measured, Method
Wet bulk density [g/cm ³]			
Estimated porosity (cm ³ /cm ³)			
Water content (cm ³ /cm ³)			
Fractional organic carbon content (g-C/g-soil)			

Receptors Information:

Receptors	Distance from Injection Area (feet)	Direction from Injection Area	Upgradient/Downgradient/ Cross-Gradient
Nearest residential site:			
Nearest commercial site:			
Nearest surface water body:			
Nearest wetland area:			
Nearest potable well:			
Nearest school/daycare:			
If site vacant, nearest inhabited building:			
Nearest basement:			
Nearest below grade parking:			
Other:			

Are there any sensitive receptors in the vicinity of the ISCO zone? Yes No

Are there vapor intrusion pathway(s) within the ISCO zone? Yes No

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Does the presence of sensitive receptors preclude ISCO? Yes No

Will vapor intrusion pathway(s) preclude ISCO: Yes No

Underground Utility Information:

Are there any subsurface structures that could be affected? Yes No

Utility	Distance from Injection Area (feet)	Depth below Grade (feet)	Direction from Injection Area
Water line:			
Sanitary sewer:			
Storm sewer:			
Gas line:			
Telephone line:			
Electric line:			
Cable line:			
Metro tunnel:			
Other:			

* Please attach a utility map with the form.

Does the presence of underground utilities preclude ISCO? Yes No

Chemicals of concern (COCs) and Oxidant(s) information:

List site specific target COCs: _____

List Other COCs Detected at Site: _____

Name and Chemical formula of the Oxidant(s): _____

Oxidant(s) form: Liquid Solid Gas

Is the oxidant a patent oxidant? Yes No

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If yes, list the major chemical(s) with their respective percentage used in the oxidant: _____

Name of the patent/oxidant manufacture: _____

Material safety data sheet (MSDS) for the oxidant is attached? Yes No

(Please note that DDOE requires the MSDS for the selected oxidant)

Please list potential oxidant impurities provided by manufacture:

Chemical Reactions:

Type of reaction: Exothermic Endothermic

Any other chemicals such as acid (H₂SO₄), base (NaOH), chelating agents (EDTA) are used to activate

the oxidant? Yes No Name of the activator: _____

Describe the activation process: _____

General chemical reactions among activator(s) [where applicable], COCs and oxidant(s): _____

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What are the by-products of the above mentioned chemical reactions? _____

Is there any impact of the by-products on the environment? Yes No

If yes, describe briefly: _____

Half-life of the oxidant(s) or by-products: _____

MSDS for any other chemical used in ISCO is attached? Yes No

(Please note that DDOE requires the MSDS not only for the selected oxidant(s) but also for any other chemical used during activation or other processes)

Note: Potable water is required for chemical mixing, cleaning of injection tools and other equipment.

Site Background Concentrations:

[Please include data from the source, up-gradient, down-gradient, and cross-gradient monitoring wells (MWs) from the Site]

MWs	pH	Temp. (°C)	ORP (mV)	Cond. (mS/cm)	DO (mg/L)	Oxygen (%)	LEL (%)	VOC (ppm)	H ₂ S (ppm)	CO (ppm)

(Temp. – Temperature; °C – Degree celsius; ORP – Oxidation reduction Potential; mV – Millivolt; Cond. – Conductivity; mS/cm – milliSiemens per centimeter; DO – Dissolved oxygen; mg/L – Milligrams per liter; % - Percentage; LEL – Lower explosive limit; VOC – Volatile organic compounds; ppm – Parts per million; H₂S – Hydrogen sulfide; and CO – Carbon monoxide)

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MWs	Sulfate (mg/L)	Nitrate (mg/L)	Dissolved Iron (mg/L)	Total Iron (mg/L)	Carbonate (mg/L)	Arsenic (mg/L)	Chromium (mg/L)	Lead (mg/L)
DC Standards								
EPA Standards								

(Note: If DC Standards are not available, please include EPA Standards)

Groundwater Analytical Data for COCs *(Please attach at least the last two years groundwater analytical data from the Site monitoring wells network with this form):*

Soil Analytical Data for COCs *(Please attach the soil analytical data from the various subsurface investigations conducted at the Site with this form):*

Injection Information:

(DDOE understands that ISCO injection is a dynamic process and need to be adjusted based on the field observations. However, please fill out the following information using best engineering judgments)

Method of injection: Geo-probe Injection Wells Existing Monitoring Wells

Total amount of oxidants (pounds): _____

Estimated treatment area length (ft): _____ Estimated treatment area width (ft): _____ Total

Estimated area (ft²): _____

For Geo-probe Injection:

Estimated treatment depth interval (ft): _____

Estimated radius of influence (ft): _____

(Note: Where feasible an injection pilot test is required to determine a more accurate radius of influence; if pilot test findings indicate a significant difference from the estimated radius of influence, the number of injection points and locations will require re-evaluation.)

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No. of injection points: _____

(Note: Injection points cannot be added outside of the original DCRA permit conditions. If a potential exists for additional injection points, please include these points as part of the original DCRA permit, or submit permit modifications for approval prior to installation.)

Injection Approach:

- Bottom-up Top-down
 Single point Multiple-points Both
 Grid pattern Circular pattern Random Other:

Oxidant Injection Intervals (feet): < 1 1 - 2 2 - 3 3 - 4 4 - 5 > 5

Injection Pressure (pound/inch²): _____

For Injection Wells (IWs) and Existing Monitoring Wells (MWs):

(Note: Existing MWs shall not be utilized as IWs without the prior approval of modifications to the original MW permit's intended use)

Monitoring /injection well depth (ft): _____ Screen intervals (ft): _____

Estimated radius of influence (ft): _____ No. of injection/monitoring wells: _____

Injection Approach:

- Gravity-feed Mechanical-feed
 Single well Multiple-wells Both

Approximate Injection Pressure (pound/inch²): _____

Please describe surfacing management process:

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Injection Monitoring:

(Note: Monitoring activities shall be conducted before injection for background information, during injection, and after injection. Post injection frequency and monitoring period must be based on oxidant selection)

In addition to COCs, following parameters are required to monitor prior and after the injection at the source, up-gradient, down-gradient, and cross-gradient monitoring wells:

▪ Volatile organic compounds	▪ Dissolved oxygen	▪ Carbon monoxide
▪ Lower explosive limits	▪ Temperature	▪ Oxygen (O ₂)
▪ oxidation-reduction potential	▪ pH	▪ Conductivity
▪ Hydrogen sulfide	▪ Sulfate	▪ Nitrate
▪ Dissolved iron	▪ Total iron	▪ Carbonate
▪ Arsenic	▪ Chromium	▪ Lead

*Note: Analysis for potential oxidant impurities shall be included as part of all injection monitoring activities.

On-site and surrounding utility manholes must be monitored prior to, during and after the injection for VOCs, H₂S, CO, LEL, Temperature, and O₂ with an interval of (hour):

0.5 1 1.5 2 3 4 5

Describe post injection monitoring frequency and period:

[Note: Post injection monitoring frequency is required to be completed from hourly to weekly in the beginning followed by weekly to monthly depending on selected oxidant(s)]

Additional Notes:

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Case Study:

Has this type of ISCO injection been completed in DC prior to this proposed event? Yes No

If not, please provide approvals for the proposed ISCO event from regulatory agencies other than DDOE. If approvals from outside regulatory agencies are not available, please provide actual case studies completed in the past. List the information and any attachments here:

If yes, list the DC sites where it was applied: _____

List of Attachments:

(Attach all associated documents and list them here)

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I declare that the information provided is accurate, true and complete to the best of my knowledge and belief. I agree to comply with all applicable laws and regulations of the District of Columbia.

Owner:

Name (Print): _____ Signature: _____ Date: _____

Owner Authorized Consultant:

Name (Print): _____ Signature: _____ Date: _____

Agent for Permit:

Name (Print): _____ Signature: _____ Date: _____

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DDOE APPROVAL:

Underground Storage Tank Branch:

Name (Print): _____ Signature: _____ Date: _____

Air Quality Division:

Name (Print): _____ Signature: _____ Date: _____

Water Quality Division:

Name (Print): _____ Signature: _____ Date: _____

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Terms and Conditions:

1. Completion of this Injection Guidance Form will serve as Pre-approval of the ISCO CAP or Work Plan proposed for any specific site located in Washington, DC. However, all associated documents (i.e. CAP, Work Plan, etc.) as well as this pre-approved Injection guidance form need to be submitted for the Final Approval.
2. Additional information may be required for the approval of the injection points. In addition, for any modification/deviation (i.e. changes in number of injection points, location of injection points, etc.) from the approved CAP and/or Work Plan, DDOE must be notified.
3. A decision will be notified within 30 calendar days of submission of this form.
4. By applying for the permit to perform in-situ injections the permittee agrees to comply with all District permit requirements, directives and regulations.
5. Responsible parties are liable for all operations and maintenance costs associated with the injection.
6. Responsible parties are liable for any exacerbation, or disruption of existing contamination caused by the injection process.
7. Responsible parties are liable for the chemicals injected and their bi-products that may cause negative impacts on environment.

For Additional Information or Clarifications please contact:

District of Columbia Department of the Environment
Toxic Substances Division
Underground Storage Tank Branch
Attention: Branch Chief
1200 First Street, NE, 5th Floor, Washington, DC 20002.
Tel: (202) 535-2600 Fax: (202) 535-1383
Website: www.green.dc.gov, **Email:** ust.doe@dc.gov

