

## ***GUIDELINES TO CONTRACTORS FOR SUBMITTING A PETROFIX™ DIRECT PUSH APPLICATION BID***

REGENESIS recognizes that your injection firm likely has deep experience with the geology of where the project is located and has experience with various injection tooling and methodologies. A successful PetroFix injection approach may differ from what you have performed for other injection projects and the goal of this document is to highlight key practices and equipment that are recommended by REGENESIS.

The goal of a PetroFix™ injection is to “*flood*” the product into the conductive zones of the contaminated aquifer under relatively low pressure. In comparison, certain direct push tooling promotes high pressure “*fracturing*” of PetroFix into the formation which can result in random and incomplete product distribution. The equipment and methodologies outlined below are based on REGENESIS’ experience at hundreds of PetroFix applications and emphasize product “*flooding*” and product distribution testing. We recognize that our guidelines will add some cost to your injection bid and that you should confirm with your client that they desire you to follow these guidelines. An introduction to key application concepts can be viewed here on YouTube:

### [PetroFix™ Pre-Application Presentation Video](#)

#### **EQUIPMENT AND METHODS REQUIRED FOR A PETROFIX INJECTION:**

- **Multi-port injection tooling:** Provide long, multi-port injection tooling that allows for semi-discrete injections of high volumes of PetroFix at relatively low injection pressures (< 100 psi). Examples of multi-port injection tooling can be found [here](#).
  - Multi-port injection tool lengths that are 2 or 3 feet in length are optimal. Unless the geology requires it, avoid tool lengths that are 1 foot or 5 feet in length. Select a tool length that allows for an easy pull count (if injecting over a 10-foot interval, a 2-foot tool would allow for five 2-foot lifts per point).
- **Flow meters and pressure gauges:** Provide a meter and gauge for all simultaneous injection points.
- **Soil sampling tooling:** Provide soil sampling tooling to collect soil cores for PetroFix distribution testing.
  - Add ½ to a full day to your injection bid to allow for Day 1 PetroFix distribution testing. This early distribution testing will involve collecting one or more pre-injection soil core samples across the vertical injection interval and one or more post-injection soil cores after 2 to 4 PetroFix injection points are completed. Next, visibly look for PetroFix in the post-injection soil cores. In our experience, collecting a couple of cores only adds a few hours to the project timeline. More detailed information can be found in the "Verifying PetroFix Distribution In The Field" section of the "[Direct Push Application Guidance Document](#)".
- **Plan B injection plan:** Be prepared to adjust the PetroFix injection design and/or injection tooling. Further discussion is provided in the “PetroFix Pre-Application Presentation” linked above and examples include:
  - Adjust the PetroFix dilution or injection point spacing if PetroFix is not visibly distributing based on the design provided and the injection tooling you are using. A dilution adjustment might require increasing total dilution water by 15% to 20% or decreasing spacing by ½ to 1 foot. Not all sites will require an adjustment, but you should be prepared to do so from a time and cost perspective.
  - Provide alternate injection tooling as backup options. Most alternative injection tooling (e.g. single-row Geoprobe® pressure activated injection probes, expendable points, etc.) will require pulls of 12 inches or shorter within the injection interval to achieve full vertical distribution.
- **Monitoring well flush:** Your client may request that you flush monitoring wells located within the injection area directly after injecting PetroFix. See links below for more information.

#### **KEY DOCUMENTS TO REVIEW PRIOR TO SUBMITTING A BID:**

- [PetroFix Direct Push Application Instructions](#)
- [On-Site Product Storage Requirements During Freezing or Hot Weather](#) (do not allow PetroFix to freeze)
- [Well Flushing Technical Bulletin](#) and [Well Flushing Calculator](#)
- Safety Data Sheets – [PetroFix](#) and [Electron Acceptor Blend](#)