PetroFIX™
Remediation Fluid

Excavation Application Guidance For PetroFix™

PetroFIX™
Remediation Fluid

Table of Contents

Excavation Application Guidance for PetroFix

Questions?
Get in touch with us.

Phone: 949-366-8000
Email: info@petrofix.com

Or visit https://petrofix.com/apply today to learn more.

Introduction

Excavation Application Guidance for PetroFix

PetroFix™ Remediation Fluid (PetroFix) is an environmentally-compatible formulation of micron-scale activated carbon (1-2 microns) that is combined with both slow and quick-release inorganic electron acceptors (Electron Acceptor Blend or EA Blend). PetroFix can be applied to the floor and sidewalls of an excavation through *in situ* soil mixing or direct spraying. PetroFix should generally be applied to the vertical interval of the excavation that is naturally saturated with groundwater or expected to become naturally saturated.

REGENESIS has prepared this guidance document for remediation practitioners who are planning to use PetroFix as an amendment for remedial excavations. Two methods of application are described: Direct and *in situ* soil mixing.

For guidance on application methods that are not described in either document, please contact REGENESIS directly at 949-366-8000 or send an inquiry to info@petrofix.com.

H&S Note: Prior to use all personnel should review the specific SDSs to assure compliance and preparedness for any type of emergency that arises. OSHA (29 CFR 1910.1200)

PetroFix Health & Safety Information

Storage and Handling Guidelines

- Store away from incompatible materials and in original closed container
- Store at temperatures between 40°F and 95°F
- Do not allow material to freeze or store in direct sunlight
- Freezing and hot weather technical memo can be accessed here
- Dispose of waste and residues in accordance with local authority requirements

LEVEL D

Level D Protection is primarily a work uniform and is used for nuisance contamination only. It requires only coveralls and safety shoes/boots. Other PPE is based upon the situation (types of gloves, etc.). It should not be worn on any site where respiratory or skin hazards exist.

Source: https://chemm.nlm.nih.gov/ppe.htm

Note: *This recommendation is only for PetroFix and does not supersede additional precautions due to site conditions and potential exposures.*

Personal Protective Equipment (PPE) Requirements for Safe Installation

PetroFix is considered nonhazardous although it is recommended that personnel working with or in areas where there is a potential for contact with PetroFix should be required at a minimum to be fitted with Level D personal protective equipment. However, this recommendation is only for PetroFix and does not supersede additional precautions due to site conditions and potential exposures.

PPE should be upgraded from modified Level D based on site-specific hazards and requirements.

Typical Requirements

Features, Installation Equipment and Supplies Needed for PetroFix Application

- Secure storage area for PetroFix
- PetroFix SDS
- Appropriate Personal Protective Equipment (PPE)
- Qualified heavy equipment operators if mechanically mixing PetroFix
- Water source for mixing and spraying
- Access to electricity if spray pumps are used
- Mixing tanks – size based on the desired amounts of water to use and site logistics
- Drum mixer for homogenizing PetroFix in its 55-gallon drums (examples given later in this document)
- Hosing between mixing tank/drum and spray pump
- Spray pump if doing a direct spray application

More specifics are provided in the following sections.

Application Process

Pre-Mixing of PetroFix

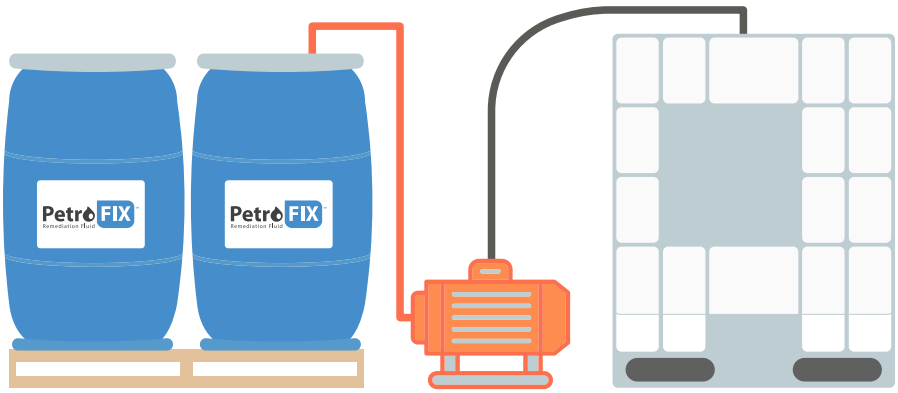
Shipping Information: PetroFix fluid is shipped in 55-gal. polyethylene drums and the EA version is shipped in 20-lb plastic pails.

PetroFix fluid is shipped in 55-gallon polyethylene drums and the EA Blend is shipped in 20-lb plastic pails. There are 41 gallons of fluid in each drum. PetroFix fills to roughly 12 to 14 inches below the top of the drum. PetroFix fluid can be transferred from its drum into a mix tank using either a diaphragm pump, trash pump, or a drum pump.

Note: *Always add water to mixing tank prior to adding PetroFix Remediation Fluid*

In most instances PetroFix will need to be diluted in a larger mixing tank and then pumped from that mixing tank to spray or pour into the excavation. Both PetroFix and the supplied electron acceptor should be diluted in the mixing tank and not in the drum the material was shipped in. **Mix tank volumes of 200 to 500 gallons should be enough for most sites and one should expect repeated re-fills of the tank until PetroFix is distributed.** Always add water to mixing tank prior to adding PetroFix Remediation Fluid.

- Assemble product transfer system to move the PetroFix from the drums to the mix tank. A diaphragm pump such as a Yamada diaphragm pump can be used to pump PetroFix form a drum to a mix tank.



The image shows an example PetroFix transfer and mixing setup where a tote was chosen as the mix tank

The image shows the homogenization of PetroFix using a high torque/high rpm mixer with appropriate mixing paddle.

- Always pre-mix PetroFix in its container prior to pumping material out of the container

- PetroFix is easy to mix with a proper power drill/mixer and a mixing blade combination. In cold weather or prolonged storage times PetroFix may settle a few inches at the bottom of the 55-gallon poly drum. Any such settling can be resuspended in the field with little time and the right equipment. A recommended mixing combination for all circumstances would be a high torque, double handle mixer such as a QEP or Rigid thinset grout and mortar power mixer with QEP 30" pro spiral mixing paddle, or equivalent (available at Home Depot). Other high torque mixers and paddle combinations can be used if they can create a vortex in the drum.

- If the PetroFix is difficult to pump after mixing with our recommended mixer you may need to thin the material. We recommend you add 3 to 5 gallons of water to the drum and blend that into the material. This will reduce the viscosity to allow for proper homogenization and transfer to dilution tanks.

- Transfer appropriate volume of PetroFix remediation fluid to the water in the mix tank.

- Thoroughly mix PetroFix solution in the mixing tank using an impeller type drum mixer or by recirculating the product inside the tank.

- Add recommended ratio of PetroFix Electron Acceptor Blend to the mixed solution in the tank. One tip is to use a scale to measure mass of electron acceptor blend needed for partial mix batches. Standard dosing is one bucket of electron acceptor blend per one drum of PetroFix.

  CAUTION: DO NOT mix PetroFix Electron Acceptor (EA) blend from the 20 lb buckets into undiluted PetroFix Remediation Fluid in the drums or totes. Only add the PetroFix EA blend into the diluted PetroFix solution in the mix tank. Adding the EA blend directly into the PetroFix Remediation Fluid will prevent the EA blend from properly dissolving in the mix water.

- As the drum is emptied into the mixing tank, flush out the drum with water to fully use all material. Flush water can be used as mix water.

Excavation Applications

The following text provides general guidance for how to apply PetroFix by direct application through spraying or in-excavation soil mixing. This document should not be considered an exhaustive review of all potential PetroFix application techniques and only provides a brief discussion on procedures recommended by REGENESIS.

PetroFix should never be applied by personnel within the excavation, unless proper shoring or sidewall cutback is in place.

Aerial view of PetroFix application an excavation site via direct-spraying

Direct Application

PetroFix can be sprayed onto the floor and sidewalls of an excavation by mixing PetroFix with water in above-ground mixing tanks and spraying using a high-volume water pump to fully cover the treatment area. PetroFix application should be focused in areas where complete excavation was not possible or where there is a concern for potential contaminant rebound. To facilitate focused application for sidewalls or areas of concern, application of the PetroFix solution can be sequenced to coincide with the incremental lifts during the soil backfilling.

PetroFix should be applied on a mass basis per treatment area using the design recommendations provided by REGENESIS. The minimum recommended mixing ratio for PetroFix for spraying is 1:1 by volume with water (i.e. 41 gallons of PetroFix fluid + 20 lb of supplied EA Blend to 41

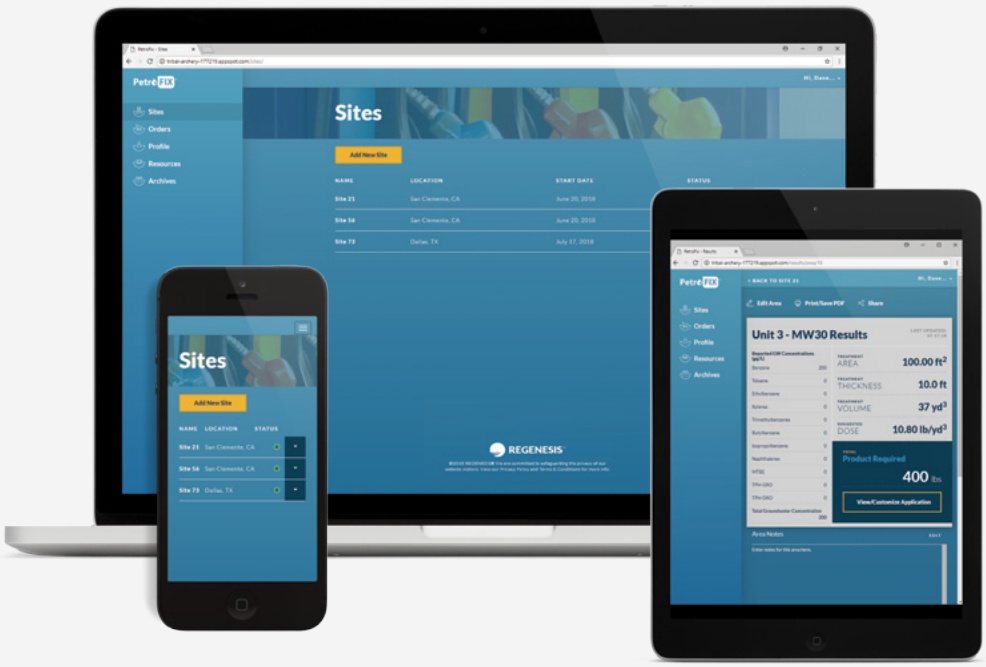
H&S Note: All excavations should be assessed by an "excavation competent person" as defined in OSHA (29 CFR 1926.50) to assure that personnel and equipment applying the product are a safe distance away from sheer walls to prevent engulfment and injury.

gallons of mix water) and this is usually used for relatively small excavations where a large area of distribution is not needed. Higher dilution volumes would be recommended where PetroFix is sprayed into the middle of a large excavation that is harder to reach. The volume of mix water can be increased or decreased as needed to fully cover the treatment area and is usually determined in field. As a rule-of-thumb, plan on using at least 5x as much volume of mix water as PetroFix remedial fluid used and vary as needed so that you feel you have enough water to achieve the coverage that you need. Enough water should be used to spread PetroFix through the entire excavation treatment area. If the excavation is not saturated, enough water should be used to attain coverage and saturate the first few inches of the excavation and cause some downward percolation.

PetroFix can be applied directly to the soil using a towable water trailer (such as Wastecorp 500 to 1,600 gallon water trailers) equipped with an onboard centrifugal water pump and sprayed using a 1.5" lay flat hose fitted with a 1.5" fire nozzle. This equipment can be rented at most construction rental supply stores. PetroFix and the associated Electron Acceptor Blend can be mixed by recirculating the solution within the water tank using either the onboard water pump or an external pump. PetroFix and the EA Blend should be mixed with water for approximately five minutes before it is ready to be sprayed into the excavation. It is recommended to flush the pump, hose, and nozzle with clean water after spraying each PetroFix drum and at the end of the day to prevent potential clogging. Follow OSHA-required health and safety practices while spraying and follow regulations on appropriate distances to stand away from the edges of the excavation. Use caution when spraying PetroFix upwind and it is advised to wear a face shield to prevent liquid splashing on the face.

In Situ Soil Mixing

In situ soil mixing can be performed to improve PetroFix distribution within the soil targeted for remediation. PetroFix can be added undiluted into the excavated area and mixed *in situ* with standing groundwater. If the excavated area is dry, it is recommended to add water to the floor of the excavation to aid in soil mixing and saturate at a minimum the first few inches of soil. Add water as needed to aid in mixing and plan for enough water based on the volume of excavation to be treated. Another option is that PetroFix can be diluted (per instructions in the prior section) with higher volumes of water and then sprayed into the excavation at the mixing head. Mechanical mixing can be performed using a variety of excavator attachments, including bucket, auger, or rotary tool.



Simple
Easy to Use

Flexible
Designs Tailored to Your Site

Fast
No Waiting for a Design

Phone: (949) 366-8000

www.PetroFix.com

www.REGENESIS.com

REGENESIS®