PETROFIX AND ORC ADVANCED EXCAVATION

CASE STUDY:
Innovative Combined Solution to Speed BTEX and TPH-G Remediation at Former Gas Station Site

REGENESIS®

Overview

PetroFix Provides a Cost-Effective Approach to Treat BTEX and TPH-G at Former Gas Station

First excavation using PetroFix and ORC Advanced Pellets

Success at this site can shape and improve the treatment of other similar sites.

anteagroup

Antea Group and REGENESIS collaborated to create a unique design using both ORC Advanced and PetroFix to treat petroleum hydrocarbon contaminants.

PetroFix technology allowed Antea Group to design a remediation strategy that was fast, affordable, and highly effective.

Fort Dodge, Iowa is located on the Des Moines River and traces its beginnings back to 1850 when soldiers from the United States Army erected a fort at the junction of the Des Moines River and Lizard Creek. The town, founded in 1869 is home to the first gypsum mill west of the Mississippi River, at the head of what is now known as Gypsum Creek.

Working with a large regional convenience store chain, Antea Group, a leading global environmental firm, was tasked to develop a cost-effective solution to address BTEX and TPH-G levels at a former gas station site. Antea Group decided to contact REGENESIS, a long-time partner and a leader in bioremediation products, to develop a remediation plan for this site.

Antea Group developed an excavation plan involving PetroFix™ and ORC Advanced® pellets to address contaminant levels following the excavation and removal of contaminated soil on the site.

This marks the first site where the remediation plan employs applying a mixture of both PetroFix and ORC Advanced pellets at the base of the excavation along with spray-applying PetroFix to the sides of an excavation pit.

Background

Uniquely Challenging Site Conditions

The site posed multiple challenges as a former gas station where multiple leaking underground storage tanks had been removed. Previous consultants who had been contracted to work on the site could only produce mixed results due to challenges the site presented.

Difficult geology as a result of tight soils and clay made it difficult to inject remedial agents. In addition, the property owner historically limited on-site crews and was not amenable to remediation efforts. This changed when the sale of the property hinged on addressing BTEX and TPH-G levels to meet regulatory guidelines and move forward with the sale.

Antea Group was tasked with the remediation of the site. Working with the REGENESIS team, Antea Group specified the application of PetroFix in conjunction with the excavation due to the product's ability to sorb and biodegrade petroleum hydrocarbons. The remediation design called for mixing PetroFix and ORC Advanced pellets into the base of the excavation site and applying PetroFix to the sides of the excavation pit.

PetroFix was spray-applied to the walls of the excavation pit to aid in reducing BTEX and TPH-G levels

Timeline

PetroFix Provides a Cost-Effective Approach to Treat BTEX and TPH-G at Former Gas Station

- **August 2001**
  BTEX/TPH-G contaminant level determined to exceed regulatory standards
- **2001**
  Original remedial efforts by first consultant (removal of UST's)
- **July 2007**
  Phase I performed
- **March 2019**
  Property Owner provided access to remediate
- **July 2019**
  Remedial plan created using PetroFix
- **August 2019**
  Excavation and application of amendments

Treatment

A Combined Remedy Approach Leads to Rapid and Promising Results

Following excavation and removal of the contaminated soil along with the removal of the large footings present as part of the gas station canopy, PetroFix and ORC Advanced pellets were manually mixed into the base of the excavation pit, and then PetroFix was spray-applied to the walls of the pit to address BTEX and TPH-G levels. PetroFix was developed to rapidly sorb and biodegrade petroleum contaminants, making it ideally-suited to address the contaminant levels present.

Challenges arose on-site due to clay and tight soil geology. In addition, the crew on site were faced with the removal of the canopy bases which measured over 5 feet high and 6 feet wide and required a crane to remove and haul away in a tight footprint adjacent to a busy street, and property ownership issues arose which led to poor ownership cooperation.

Aerial view of the excavation pit and large footings removed to make way for the application of PetroFix and ORC Advanced

Large 5X6 ft. footings were removed using a crane to hoist the extremely heavy blocks into trucks to be hauled away.

Treatment Process

Although PetroFix was designed as an injectable carbon product for direct push or well injections, the treatment at this site proves that it can also be used for soil excavations.

3,600 Pounds of PetroFix

1,102 Pounds of ORC Advanced

4 Large 5x6ft. Footings Removed by Crane to a nearby landfill

Antea Group performed design verification testing through multiple soil borings to delineate the excavation. After the excavation, PetroFix was applied on excavation floors, side wall, and was mechanically mixed into the base. Although PetroFix was designed as an injectable carbon product for direct push or well injections, the treatment at this site proves that it can also be used for soil excavations. Petrofix rapidly sorbs and biodegrades hydrocarbons, diesel, BTEX, MTBE, and TPHG at sites where Petroleum Hydrocarbon (PHC) levels are above regulatory standards for complete remediation at the lowest total cost to closure.

The design for the Fort Dodge site consists of 3,600 lbs of PetroFix delivered in drums and 1,102 lbs of ORC-Advanced pellets applied to the soil using excavation. The addition of ORC and PetroFix in the base of the excavation and along the side walls will enhance the biodegradation and will fix the contaminants at the edge of the excavation.

REGENESIS®

Technology Used

PetroFix and ORC Advanced

PetroFix™ Remediation Fluid

PetroFix Remediation Fluid is a concentrated, water-based, activated carbon suspension specifically designed to treat PHC plumes stemming from bulk storage, gas station and UST spills. Safe, fast, effective and easy-to-apply, PetroFix is designed to specifically sorb and biodegrade petroleum hydrocarbons (PHC), diesel, BTEX, MTBE, and TPH-G. Composed of a mix of micron-scale activated carbon and electron acceptors to promote biodegradation, PetroFix offers an in-situ approach designed specifically for sites where PHC levels are above regulatory standards for complete remediation, at the lowest total cost-to-closure. PetroFix can also be applied to excavation sites.

ORC® Advanced OXYGEN RELEASE COMPOUND

ORC Advanced Pellets are engineered, oxygen release compound pellets designed specifically for enhanced, aerobic bioremediation of petroleum hydrocarbons in groundwater and saturated soils. Upon contact with groundwater, this calcium oxyhydroxide-based material becomes hydrated producing a controlled release of molecular oxygen (17% by weight) for periods of up to 12 months on a single application. ORC Advanced decreases time to site closure and accelerates degradation rates up to 100 times faster than natural degradation rates and there is no operation or maintenance required.

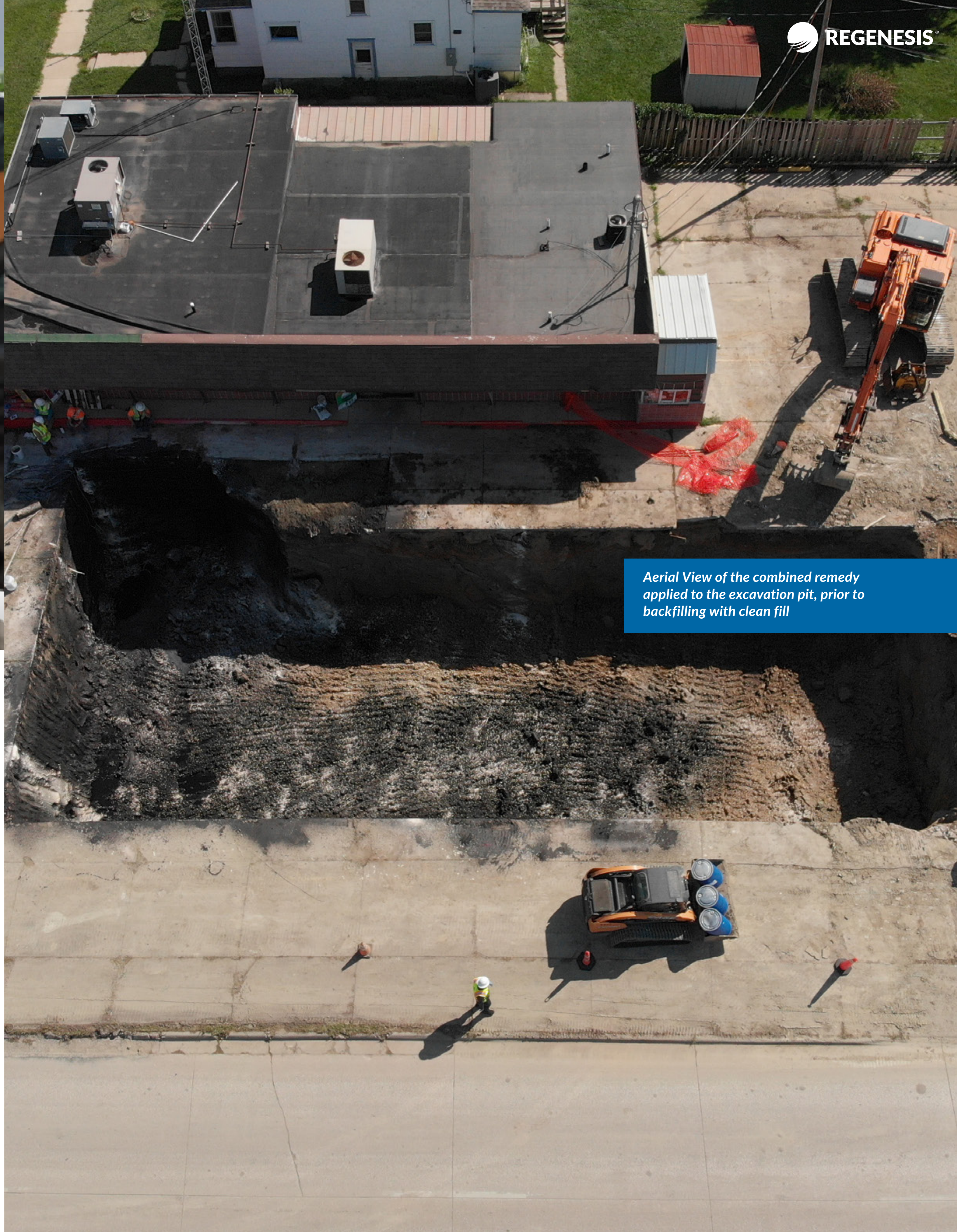
Antea Group, working with REGENESIS successfully applied the remedial amendments

Results

Combined Remedy Allows the Property Owner to Move Closer to Sale of the Site

Antea Group and REGENESIS plan on closely monitoring the site and incorporating the same approach at similar sites where excavation is being considered to quickly reduce levels and accelerate site closure.

Both Antea Group and REGENESIS anticipate the results for this new combined remedy will be effective in treating BTEX and TPH-G levels to meet site goals and allow the property owner to move forward with the sale.



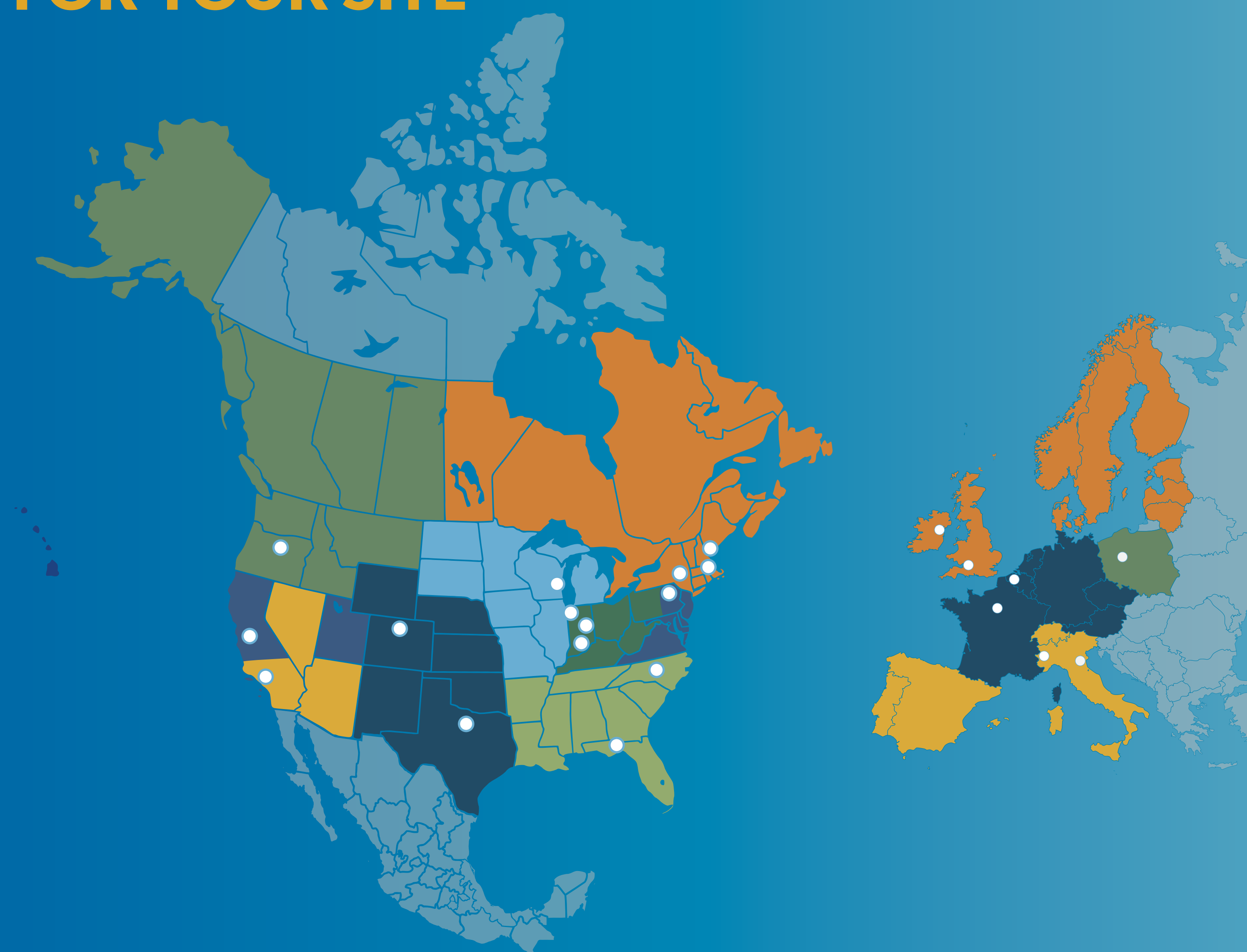
Aerial View of the combined remedy applied to the excavation pit, prior to backfilling with clean fill

The Consultant
About Antea Group

Antea Group is an international engineering and environmental consulting firm. With access to more than 3,300 employees on 6 continents, they serve clients ranging from global energy companies and manufacturers to national governments and local municipalities. Antea Group includes the Belgian, Dutch, French and United States engineering and consultancy operations of Oranjewoud N.V.

5910 Rice Creek Parkway
St. Paul, MN 55126 USA
Tel: +1 651 639 9449

WE'RE READY TO HELP YOU
FIND THE RIGHT SOLUTION FOR YOUR SITE



Global Headquarters

1011 Calle Sombra
San Clemente, CA 92673 USA
Ph: (949) 366-8000
Fax: (949) 366-8090

Europe

Bath, United Kingdom
Ph: +44 (0) 1225 731 447

Dublin, Ireland
Ph: +353 (0) 1 9059 663

Torino, Italia
Ph: +39 (0) 11 19781549

Ieper, België
Ph: +32 (0) 57 35 97 28

www.REGENESIS.com

REGENESIS®