

Case Study: Restoration of Abandoned Asphaltic Crude Pits in Ecuador's Amazon Basin

(TPH level reduced from 56,000 to 5,000 ppm in 6 hours.)



Background:

In the Amazon Basin of Ecuador, an abandoned pit filled with a combination of fallen trees, vegetation, debris, rainwater, and a hardened asphaltic crude cap required urgent remediation. The pit also contained 300 cubic meters of sludge, heavily contaminated with degraded asphaltic crude that had taken on the consistency of grease. The goal of the project was to restore the site to background Total Petroleum Hydrocarbon (TPH) levels, ensuring minimal environmental impact and future usability.

Solution:

The remediation process was carried out by a team utilizing ACL, an all-natural, biodegradable solvent, and X4JH2000, a highly effective chemical solution for hydrocarbon remediation. The combined approach involved several key steps, including solvent application, debris removal, and the use of a chemical treatment to reduce TPH levels in the contaminated material.

Process:

1. **Preparation and Initial Application of ACL:** The first step was to spray ACL over the asphaltic crude cap, allowing it to penetrate and liquefy the hardened crude over a 24-hour period. ACL is known for its biodegradability and natural solvents, making it ideal for this delicate environmental restoration. Once the asphaltic crude was liquefied, larger debris, including fallen trees, was removed and cut down to size using chain saws. These materials were then stacked in a lined containment area to prevent further contamination of the surrounding environment.
2. **Crude Removal and Screening:** After the asphaltic crude and debris were removed from the pit, the crude was pumped into a skid tank for screening. This tank was used to separate smaller debris from the crude oil, which was stored for later off-site transportation.
3. **Contaminated Material Preparation:** Following the removal of asphaltic crude and large debris, a track hoe was used to pull the crude-contaminated berm material into the pit. This berm material was mixed thoroughly with the existing sludge and reduced debris, creating a uniform contaminated mixture. This mixture was then prepared for the treatment with X4JH2000.
4. **TPH Analysis and Initial Results:** Before applying X4JH2000, the hydrocarbon-contaminated mixture was grid-sampled, and lab personnel from Escuela Politecnica Nacional in Quito, Ecuador, tested the TPH levels using U.S. EPA Method 418.1. The results showed that the TPH levels were exceptionally high, exceeding 56,000 ppm.
5. **Application of X4JH2000:** X4JH2000, a synergistic blend of synthetic surfactants and nutrients, was then mixed with 10 parts water and applied to the contaminated material. A chemical ratio of 1.83 gallons of X4JH2000 per cubic meter of contaminated material was used. The solution was applied at ambient temperatures (92°F), and the contaminated mixture was thoroughly mixed using a track hoe, forming a slurry. The chemical solution helped break down the hydrocarbons and speed up the remediation process.

6. Progressive TPH Reduction: The TPH levels in the slurry were monitored throughout the mixing process. Samples were taken at various intervals to track the reduction in contamination:
- 30 minutes: 16,940 ppm
 - 1 hour: 15,160 ppm
 - 2 hours: 9,256 ppm
 - 4 hours: 6,210 ppm
 - 6 hours: 2,500 ppm

According to the pit closure criteria, the target TPH level for the site was set to be below 5,000 ppm.

7. Stabilization and Final Analysis: After 6 hours of treatment, clean dirt from a nearby area was used to help stabilize the treated slurry. The pit was left open to dry. Samples of the treated material were collected and sent to the laboratory for further testing. The final TPH analysis, conducted by Escuela Politecnica Nacional, revealed a TPH level of 1,516 ppm—well below the closure criteria of 5,000 ppm.

As a comparison, background TPH levels in an adjacent banana grove were reported to be in excess of 1,000 ppm, indicating that the treated pit had successfully been restored to a level safe for agriculture and natural land use.

Results:

- Reduction in TPH Levels: The application of X4JH2000 led to a dramatic reduction in TPH levels, from over 56,000 ppm to 1,516 ppm, well within the acceptable range for environmental standards.
- Restoration of the Site: The pit was successfully restored, with no visible signs of hydrocarbons remaining. A local Ecuadorian farmer claimed the restored site, and the first crop planted—corn—showed healthy growth, with stalks reaching 12 to 14 inches in height. This provided clear evidence that the site was safe for agricultural use once again.
- Environmental and Cost Benefits: The remediation process was both efficient and environmentally responsible, using biodegradable and non-toxic solutions. The treatment not only met the required TPH reduction but also facilitated the quick recovery of the land for future agricultural use.

Conclusion:

The successful remediation of the abandoned asphaltic crude pits in Ecuador's Amazon Basin demonstrated the efficacy of using X4JH2000 in combination with ACL to treat heavily contaminated sites. The project exceeded expectations, reducing TPH levels by over 97% within a short time frame. The site's successful restoration to background TPH levels not only met environmental requirements but also allowed for the land's return to productive agricultural use. This case highlights the effectiveness of natural, biodegradable solutions in large-scale environmental remediation projects, offering a sustainable and cost-effective alternative to traditional methods.



Corn was planted onsite about 4 weeks after the above treatment.