

# AgroRemed<sup>®</sup>: A Low Carbon Footprint Remediation Solution

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# What is Carbon Footprint?

- ◆ A carbon footprint is a measure of the impact our activities have on the environment, and in particular climate change.
- ◆ It relates to the amount of greenhouse gases (GHG) produced in our day-to-day lives through burning fossil fuels for electricity, heating and transportation etc. and has units of tons (or kg) of carbon dioxide equivalent.
- ◆ It is a measure of our direct emissions of CO<sub>2</sub> from the burning of fossil fuels including domestic energy consumption and transportation (e.g. car, truck and machinery). We have direct control of these.

<http://www.carbonfootprint.com/carbonfootprint.html>



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# US EPA: Green Remediation to Reduce GHG

- ◆ Recognizing the importance of GHG, US EPA has recommended the practice of considering all environmental effects of remedy implementation and incorporating options to maximize the net environmental benefit of cleanup actions.
- ◆ Green remediation strategies for land and ecosystems should capitalize on a “whole-site” approach that accelerates cleanup while returning a site to its natural conditions

[http://www.clu-in.org/greenremediation/subtab\\_b1\\_land.cfm](http://www.clu-in.org/greenremediation/subtab_b1_land.cfm)



# AgroRemed: A “Green” approach to oil remediation

- ◆ Cleanup with AgroRemed<sup>®</sup> helps
  - In reduction of GHG
  - In restoring the soil to its pre-spill levels promoting growth of normal vegetation.
  - Incorporating a “green” remediation strategy as outlined by the USEPA



# Parameters for Cleanup of Soils Using Green Remediation

- ◆ Use low energy approach
  - Use of minimum transportation
  - Minimum excavation (where possible)
  - *In situ* treatment
- ◆ Restoration of soil and vegetation
- ◆ Promote healthy growth of plants by reducing fuel oil toxicity



# AgroRemed<sup>®</sup>: Suitable for Green Remediation

- ◆ AgroRemed<sup>®</sup> effectively reduces Total Petroleum Hydrocarbon (TPH) by 90% in soil in less than three weeks
- ◆ It is sprayed or released in the soil
- ◆ Minimum excavation
- ◆ No transportation
- ◆ Cost effective “Green” solution



# Case Study 1. Cleanup of a Contaminated Site in VA

- ◆ A shipyard in VA was found to be contaminated with mixtures of oils and free product in water
  - Site is located on the river hence excavation of soil was not an option
  - AgroRemed<sup>®</sup> was recommended and one year after treatment with AgroRemed<sup>®</sup> VA DEQ issued NFA
- ◆ A low carbon solution employed out of necessity.



# Application of AgroRemed<sup>®</sup>



Overview of the site



Application of AgroRemed



# Low Carbon Footprint Approach Employed for the Project

- ◆ The site was cleaned *in situ*, thus reducing production of GHG during excavation
- ◆ There was no off site disposal, hence reduced trucking operations and no diesel was consumed: no GHG
- ◆ AgroRemed<sup>®</sup> has been found to be effective in improving the fertility of soil after cleanup
- ◆ Low cost cleanup and no waste for disposal



## Case 2. Cleanup of Contaminated Soil after a Highway Accident

- ◆ 75 gallons of diesel spill on a WV highway
- ◆ The spill was more on the embankment near the guard rail
- ◆ Excavation of soil was not an option because of underlying utility lines
- ◆ WVDEP agreed that in situ treatment with AgroRemed was the only available option
- ◆ The end values showed TPH values below 500 ppm after eight weeks



# Application of AgroRemed



TPH of the soil was 47,000 ppm. Gravel was brought for fresh fill and the soil was treated with AgroRemed. Conditions along the road required multiple application and at the end of 61 days, the TPH of the soil at the 4 monitoring site was less than 500 ppm and in one site it was below detectable limits

# Conclusions

- ◆ The remediation was carried out at the site using AgroRemed
- ◆ There was no excavation and/or transportation of contaminated soil
- ◆ No excessive water or other natural resources used during the cleanup
- ◆ No waste for disposal after cleanup
- ◆ Hence, no carbon footprints were recorded



# Case 3. Cleanup of Soil Contaminated With Transformer Oil in Brazil

- ◆ 18,400 square meters of utility site was found to be heavily contaminated with transformer oil
- ◆ TPH of the soil was found to be more than 700,000 ppm
- ◆ The site being near river Parana, it was declared as Area of Permanent Protection (APP)
- ◆ Excavation of soil was not an option
- ◆ Only bioremediation was considered and AgroRemed was selected as available option
- ◆ Bioremediation was carried out at the site by pumping rain water and treating it with AgroRemed



# Installation of Canals for Rainwater Collection



Canals under construction



After completion of construction

# Results

- ◆ Project was conducted in three phases
- ◆ In the first phase hot spots showing high concentrations was treated
- ◆ After the third phase values of TPH were less than 95% original value
- ◆ In some sites TPH was less than detectable



# Conclusion

- ◆ Project demonstrated “Green Remediation” in action
- ◆ There was no excavation, no diesel used for heavy machinery, no GHG
- ◆ No truck transportation of soil saving of diesel no carbon footprint
- ◆ Use of rain water during remediation
- ◆ Restoration of soil after treatment



# Best Management Practices for Superfund Green Remediation

- ◆ US EPA's guidelines for BMP
  - Green remediation strategies for land and ecosystems capitalize on a “whole-site” approach that accelerates cleanup while returning a site to its natural conditions
  - BMP focuses on opportunities to preserve natural land features, maintain open space, sequester carbon, enhance biodiversity, increase wildlife habitat, and minimize surface and subsurface disturbance.

[http://www.clu-in.org/greenremediation/subtab\\_b1\\_land.cfm](http://www.clu-in.org/greenremediation/subtab_b1_land.cfm)



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# AgroRemed<sup>®</sup> as a Part of BMP Toolkit for Superfund Green Remediation

- ◆ AgroRemed<sup>®</sup> should be considered for cleanup of Brownfield sites contaminated with petroleum hydrocarbons
- ◆ It is available in a Ready To Use liquid form for easy on site application
- ◆ Minimum energy and O & M costs
- ◆ Reduces the contamination at source and reduces ground water pollution
- ◆ No waste for disposal

