

# Application of AgroRemed<sup>®</sup> and SpillRemed (Marine)<sup>®</sup> on Marshlands contaminated with oil

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# Objective



- Present evidence to support our claim that AgroRemed or SpillRemed (Marine) can treat marshlands contaminated with oil in 20 – 45 days without generating any waste for disposal.

# Cleanup of marshlands contaminated with heavy oil using bioremediation



Photograph showing bilge oil after treatment



Photograph showing dispersion of bilge oil after 48 hours of SpillRemed (Marine)  
Sample of Bilge oil. Courtesy MV Zenith of Celebrity Cruises (7/25/99)

- Image on the left shows current conditions in marshlands.
- Image on the right shows a simulated bench scale test on thick bilge oil in 48 hours.
- These results were used to scale up to bilge tanks in ships.
- In our opinion the marshlands contaminated with heavy oil represent conditions similar to an oily bilge tank in a ship.

# Field data on SpillRemed (Marine)



- The previous images were bench scale tests.
- Scaled up tests on bilge tanks were carried out on two ships (reports attached)
  - Use of BilgeRemed aka SpillRemed (Marine) aboard M/V Cape Wrath. [Link](#)
  - Results after use of BilgeRemed aboard M/V Swift Arrow. [Link](#)

# Limiting factors for bioremediation as per the *document*



“Lots of uncertainty as to what factors may be limiting natural degradation rates, and how to effectively overcome them. Oxygen, rather than nutrients, will be the most limiting in marshes; however, there are no proven methods to add oxygen to muddy, water-saturated marsh soils” – Dr. Jacqueline Michel, NOAA/RPI

# Rate of degradation of hydrocarbons

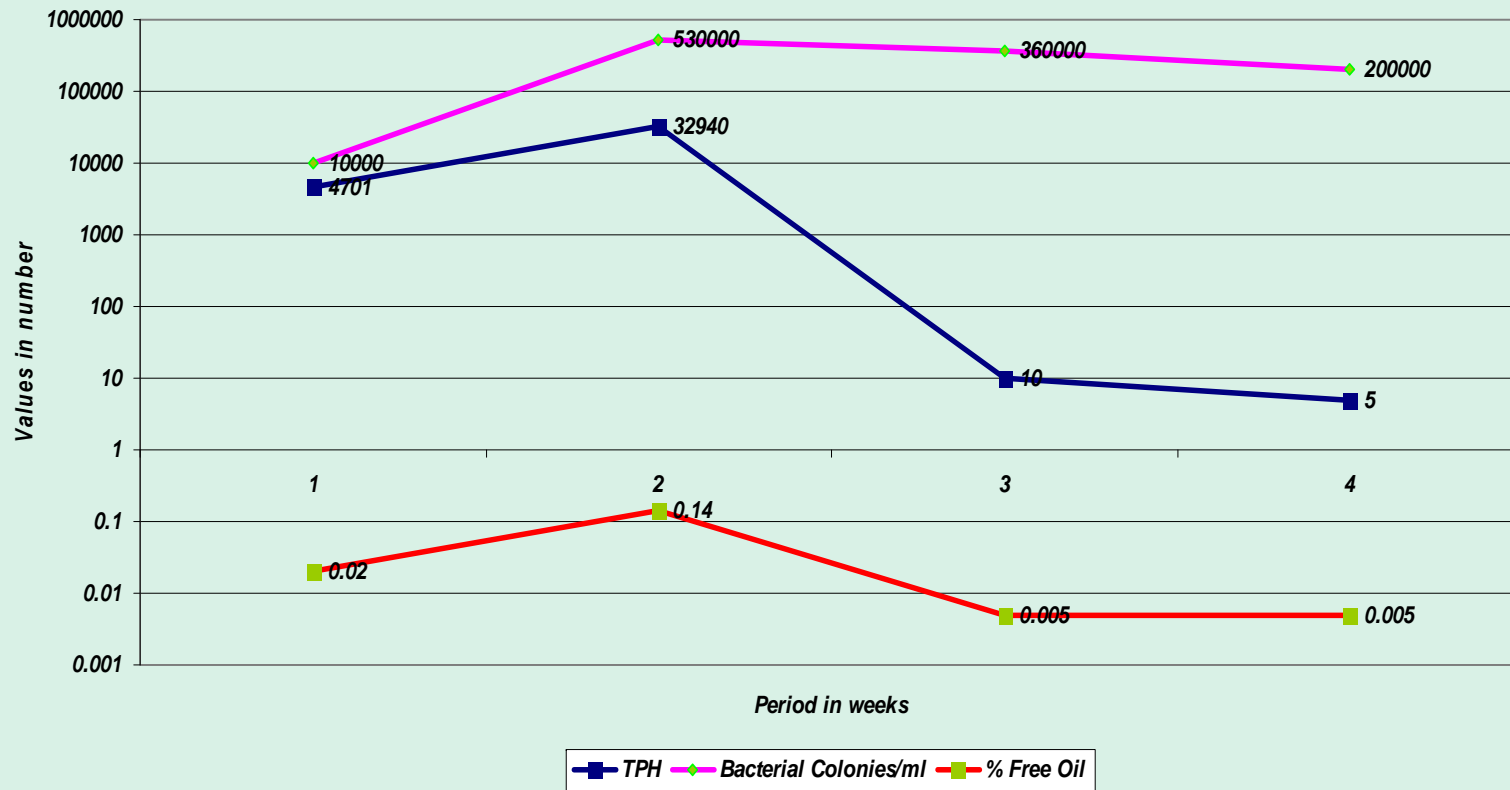


- Degradation Rates accomplished by our products are presented in the subsequent slides
  - SpillRemed (Marine) (for marine environments).
  - AgroRemed (for low salinity environments).
- A few case studies are being presented. More information is available on our website.
- In all the studies reported in this document as well other case studies on site, we did not record oxygen or nutrients as limiting factors for bioremediation.

# Results of bioremediation of oily bilge water on M/v Swift Arrow



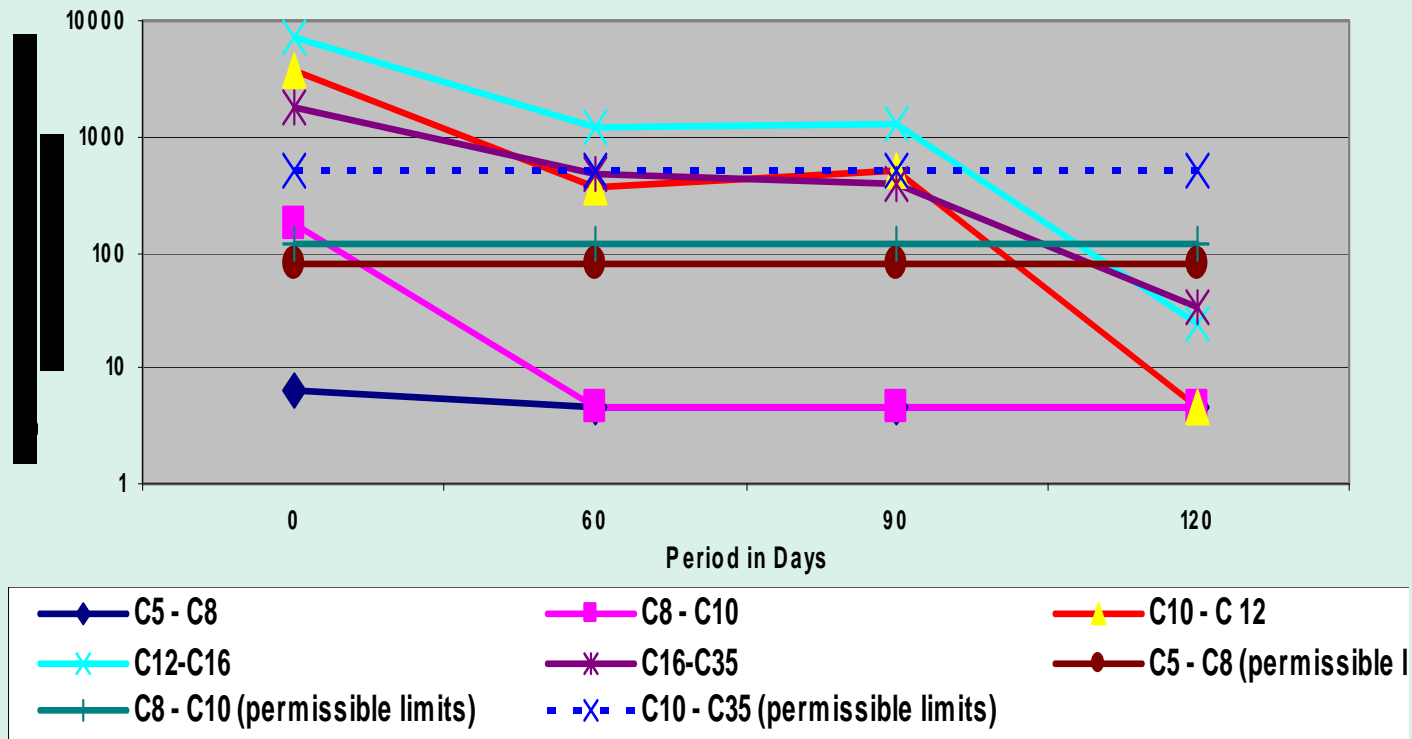
Composite chart showing values of Bacteria, TPH and per cent free oil in ship during sailing with BilgeRemed



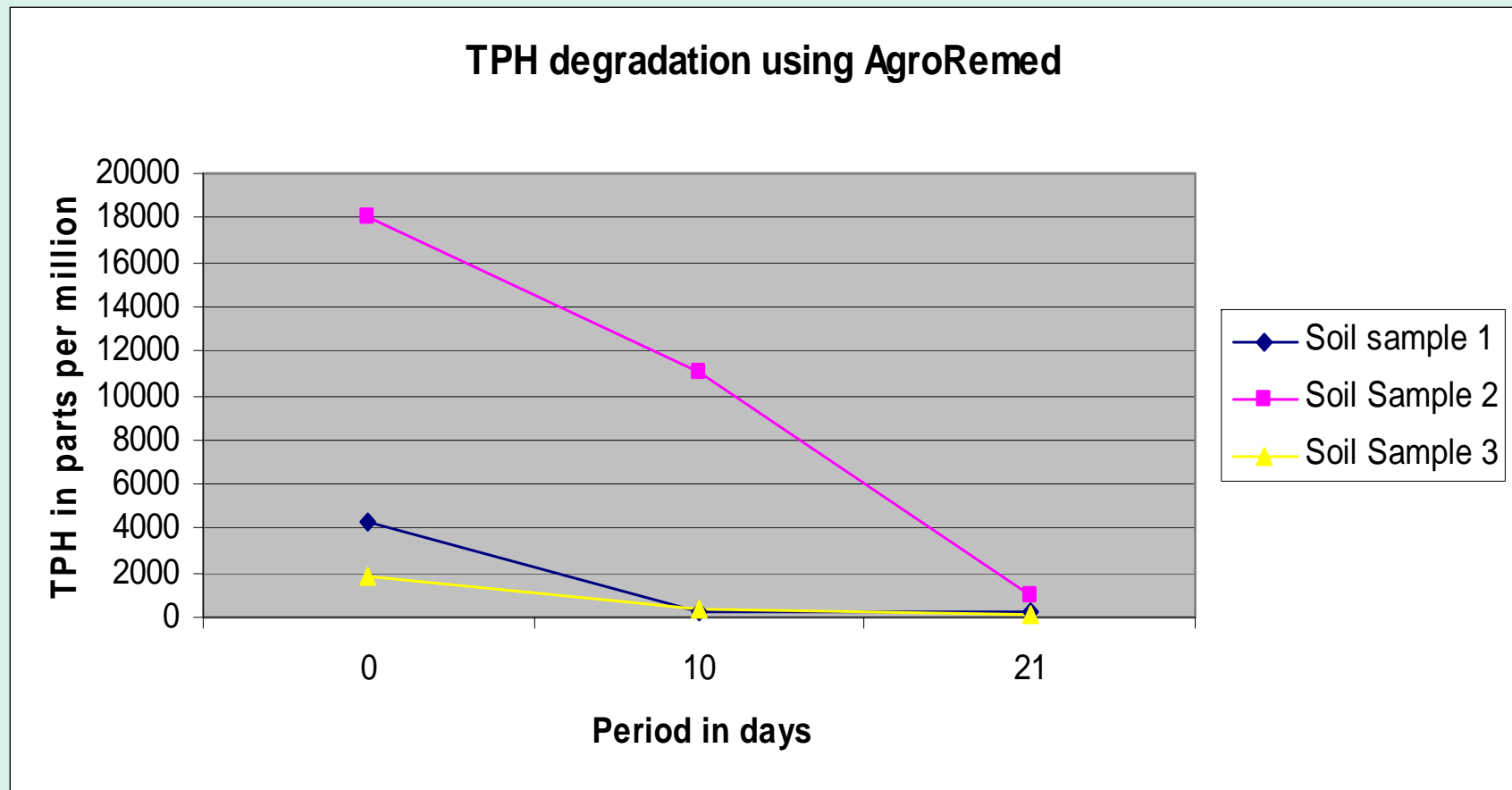
# Bioremediation of contaminated soil using AgroRemed at a gas station between Dec 2009 – May 2010



Representative degradation of hydrocarbon fractions



# TPH degradation at a site in Virginia



Details of this project can be viewed by following the [link](#).

# Limiting factors for our products



- For these type of areas, based on field data collected on our products, we can conclude that both oxygen and nutrients are not limiting factors.

# Note about nutrients in our products



- The nitrogen and phosphorus in our product is as follows ([link](#))
  - Nitrogen: 210 ppm
  - Phosphorus : 15.5 ppm
- Our product gets added in 1 gallons to 10 gallons of oil, implying that the nutrients in the environment our product introduces
  - Nitrogen – 21 ppm
  - Phosphorus – 1.5 ppm
- In conventional bioremediation where the nutrients are added externally as fertilizers excessive nitrogen promotes algal bloom resulting **eutrophication**. In our field tests we have not seen any evidence of eutrophication and we believe that this is due to the low amount of nitrogen that our products contain.

# Conclusions



- Cleanup of marshlands heavily contaminated with oil present a significant challenge to cleanup.
- We present evidence to support our claim that cleanup can be effected in 20 - 45 days.
- Oxygen and nutrients are not limiting factors for our products.
- Finally, as is already documented elsewhere on our site, there is no waste for disposal after remediation.

# Presentation conventions



- This document is prepared on the basis of the documents presented by Dr. Jacqueline Michel, NOAA/RPI at NIC Barrier Island Berm Meeting, June 02, 2010. [Link](#)
  - The word document in the meeting is referred to as the *document*. [Link](#)
  - The presentation document in the meeting is referred to as the *presentation*. [Link](#)
    - **Heavy marsh oiling** refers to a type of contamination documented in the *presentation*.
- SpillRemed (Marine) is also marketed as BilgeRemed.
- AgroRemed is marketed as SpillRemed (Industrial) and HydroRemed.

# Contact



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