

# ENVIRONMENTAL REMEDIATION CONSULTANTS, INC.

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Environmental Remediation Consultants, Inc. (ERC), a Florida corporation since 1994, was established to demonstrate the effectiveness/reliability of using bacterial cultures in soil/groundwater remediations. Utilizing its trademarked Bio-Integration® technology, ERC is successful in removing, in-situ, petroleum hydrocarbons, PCBs, crude oils, chlorinated solvents, etc., in both dissolved and free phase impactions. Bio-Integration® combines pure strain bacteria (biotic) with inorganic co-treatments (abiotic) to support a treatment regimen that is site specific, with the blending controlled by soil conditions and contaminant profiles. All ingredients are proprietary, non toxic, biodegradable, and have been disclosed to the FDEP under a signed confidentially agreement; a copy of FDEP's acceptance letter has been provided.

The biotic amendment consists of single genus, multiple species, heterotrophic, non-fastidious, naturally occurring, aerobic, facultative, non-pathogenic, non-opportunistic, non-fermentative, ATCC Class 1 cultures that have not undergone intergeneric mutation and meet all TOSCA regulations. They are accepted for use by FL, AL, IN, NC, OH (TX does not review bacterial inoculants for soil application) and are listed on the EPA's NCP Schedule. Bio-Integration® uses a standard, viable concentration of  $1 \times 10^6$ /cc of soil and/or groundwater.

The abiotic amendments are simply inorganic adjuncts that are added, as required, to support growth. They include electron acceptors, bioavailability enhancers that desorb/detoxify and reduce the hydrophobicity of the organic contaminants, and enzyme production/bio-surfactant stimulants. Again, all biotic and abiotic amendments specific to this technology are proprietary. For additional information, please visit ERC at [www.remediatenow.com](http://www.remediatenow.com).

In March, 2012, ERC was sent a sample of sludge from Tank #202 at the former Marion Oil Refinery site in Mobile, Alabama. This tank contained approximately three (3) feet of 30+ year old, non-pumpable crude oil sludge (180,000 gallons) that had to be removed prior to demolition. ERC's task was to increase the fluidity of this material and, if possible, facilitate the removal/sale of said product. Based on the data derived from the bench testing of this sample, these chronologically ordered events occurred:

5/7/12 ERC met Big Dawg Services, Inc. (BDS) on site.

5/8/12 As instructed, BDS and Marion personnel pumped wet and dry abiotic amendments into tank; mixture was non uniform with heavy, balled sludge in center.

5/9/12 BDS pumped remaining abiotic amendments into tank; volume approximately 235,000 gallons. 2000 GPM centrifugal pump started circulating; contents immediately pumpable. Run time for 1 pump was 29 hours.

5/10/12 Two, on site, ERC reactors were inoculated with the biotic amendment. Second 2000 GPM pump on site; run time for 2 pumps was 21 hours. Total pumping time was 50 hours.

5/11/12 Sludge more uniform and starting to circulate; no balling. ERC inoculated second set of reactors.

5/12-5/16/12 Continued circulation; contents noticeably more fluid with good swirling action; second biotic amendment added.

5/17/12 Contents asphalt grade.

5/18/12 ERC demob

5/19-5/27/12 Contents #6 oil; starting to produce diesel. BDS will contract to sell material.

In this application, ERC's Bio-Integration® technology was found to not only change the physical properties of a waste product, but the chemical composition as well. Prior to this project, ERC's protocols were utilized in Alabama at the LL&E refinery (now Shell Oil), in their treatment facility and to mitigate a 1995 crude oil spill in Gulf wetland areas, as documented by Brad Gane, then Chief of Coastal Programs for ADEM and Ronald Debenedetto, then Environmental Specialist with LL&E at a 1996 Chicago symposium.