Earth Remediation Group

Renewing the Earth one site at a time!

Clean, Sustainable, Renewable, Solutions for the Earth

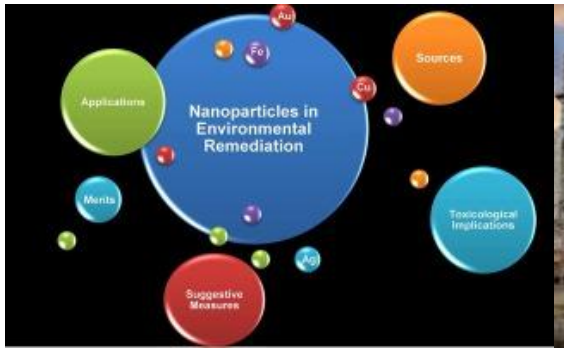
Executive Summary

- ERG has over 45 years of combined experience in Environmental cleanup from its extensive expertise within CRA World, who in their time was a leading Remediation company.
- We are experts in remediation, construction and creative solutions to resolve current contamination issues, we also prevent future problems from occurring and impacting the environment.
- We are teamed with world leading scientist and engineers to ensure every solution is safe to the earth and the people, animals and plants living in and around these sites. We are committed to green solutions and leaving this planet a better place for our children and children's children.

ERG Primary Sectors

ERG covers four primary industrial sectors:

- Environmental Remediation
  - Solving the majority of complex contamination sites
  - Remediation of water and soil
- Wastewater & Large Storm Drains and Ponds
- Coastal, Ocean and Lake Water Contamination
- Agriculture Remediation
  - Elimination of toxic lagoons & soil



ERG SEBS

SEBS (Specific Enzyme Bacterial Solutions) is a unique, proprietary remediation solution designed to feed on targeted proteins within contaminates.

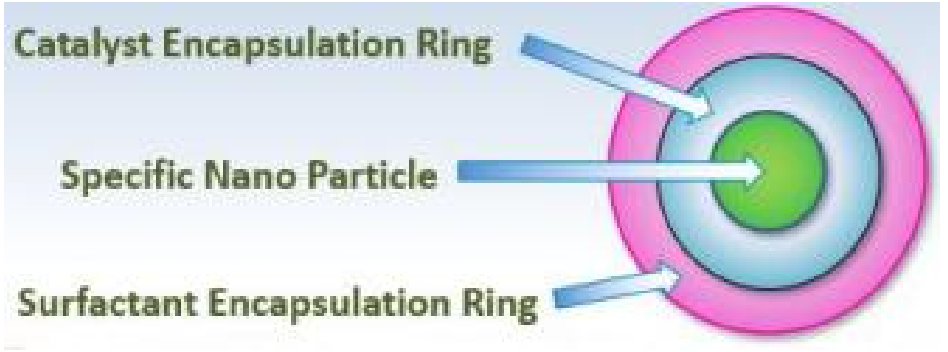
- SEBS eliminates & controls many water problems other competitors solutions cannot. See proven results in Appendix
- SEBS is custom designed to target and eliminate harmful algal blooms
- SEBS can resolve Florida's on-going harmful algal blooms elimination harmful Algae and bacteria.
- SEBS fully remediates and controls blue green algae & red tide

E ScienceDirect.com
Red Tide - an overview | ScienceDirect ...

SEBS Nanotech Micro-Encapsulation

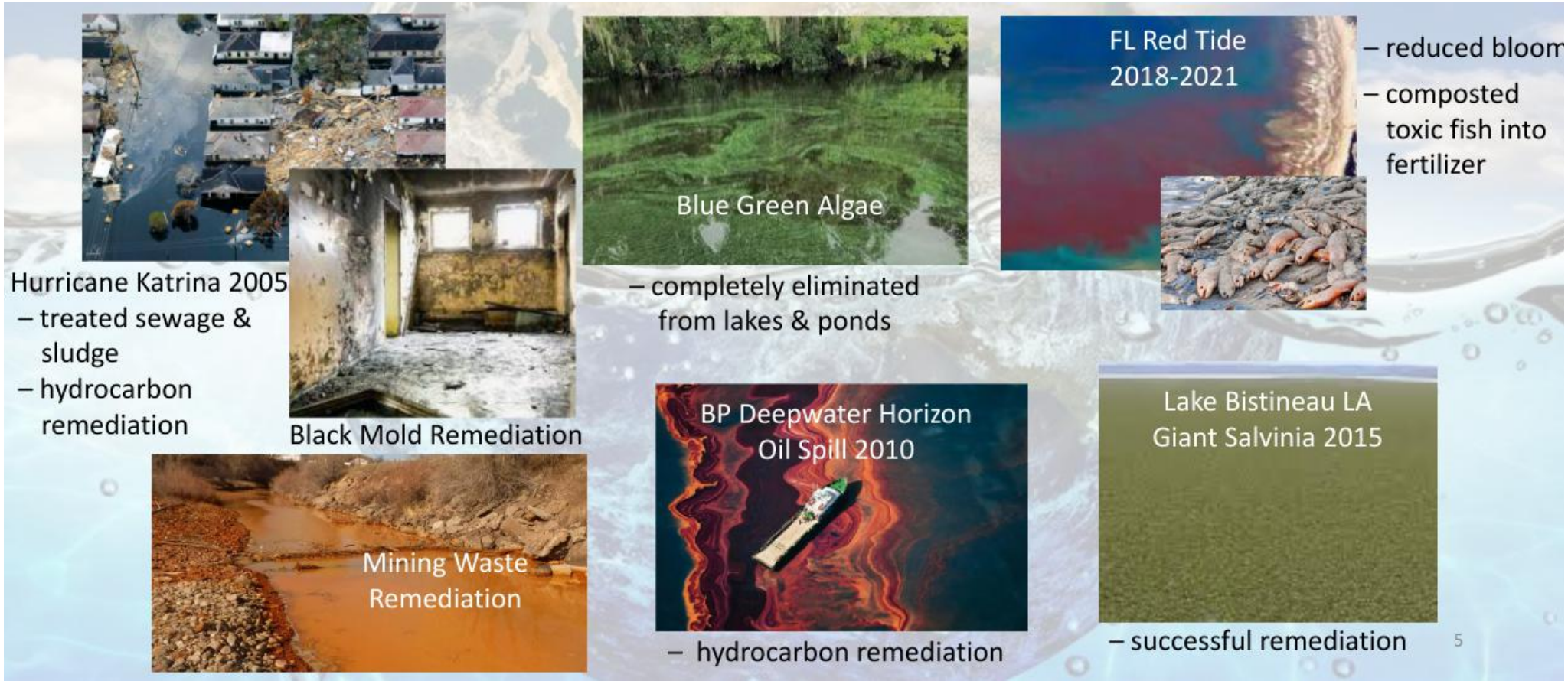
Maximum Effectiveness with proper bacteria + appropriate enzymes = food source (immediate reaction)

- SEBS bacteria strains adhere to food source and continue to “eat” until food source exhausted. Consuming all targeted contaminates.
- Activator nutrients ensure SEBS culture begins multiplication immediately.
- Strain combinations resolve greater range of problems more effectively.
- Lab grown - 1st generation potency
  - 27 bacteria strains compared to 1-3 competitors average.
  - Cultures formulated for a specific targeted use
  - Ability to treat multiple issues at same time via multiple SEBS.
  - Aerobic, anaerobic, & facultative biocultures in micro capsulation for a longer shelf life



ERG / EST SEBS Remediation Site Studies

SEBS has been successfully used throughout the US over the past 20 years and by our team in their efforts in the US cleanup sites.



Using SEBS to target Algae

- **SEBS is custom designed to target and eliminate harmful algae blooms**

Additional Advantages

- 100% live aerobic & anaerobic strains of microorganisms feed on algal dependent food sources
- Eco -Friendly, Non-Toxic, 100% VOC free
- Will not harm humans, animals, fish, plants

SEBS Blue Green Algae & Red Tide (MOTE)

- ERG and its partners have extensive SEBS Blue Green Algae & Red Tide (MOTE) remediation experience resolving multiple types of Aglae.

Kansas: Pre-Condition

26 days post SEBS application

Nova Scotia Pre-Condition

19 days post SEBS appl'n

Missouri Pre-Condition

3 mon post SEBS application

SEBS Other Applications

- Mining wastewater
- Hydrocarbon contamination
- Oil drilling & gas field fracking
- Industrial & municipal waste processing plants

SEBS Remediation Successes

SEBS fully remediates and controls blue green algae & red tide

- Other US / Canada BGA results:
  - Kansas Residential Lagoon (2020: complete elimination 26 days post treatment)
  - Missouri Lake Municipal Wastewater(2018: complete elimination 3 month post treatment)
    - Missouri Lake - Domestic Waste Lagoon (complete elimination 7 days post)
  - St. Antoine, Nova Scotia Dairy Lagoon (complete elimination 19 days post)
- US Red Tide:
  - MOTE Marine Lab SEBS Efficacy Report - Dec 2019
  - Toxic dead fish decomposition to point where can safely be turned into fertilizer
- Other US lake / pond treatments & results
  - Kansas Hog Farm Lagoon - complete elimination of 8" to 12” top crust 30 days post
  - Kansas Poultry Processing Plant Grease Pond (complete elimination of hard edge crust & soft middle crust 8.5 weeks post)

Current Hot Sites

Piney Point is a ecological disaster with no acceptable remediation solution

- Contaminated water at former Piney Point phosphate plant puts Tampa Bay on brink of disaster - **blue green algae and arsenic**
- Contaminated water nearing site's capacity, endangering Tampa Bay
- Stakeholders have struggled for decades with how to handle the dangerous waters.
- Removal of water is costly and time intensive, Commissioners most persistent solution being construction of a deep-water well onsite.
    - **This solution puts future generations at isk and in unacceptable.**

SEBS can resolve Piney Point Hot Site

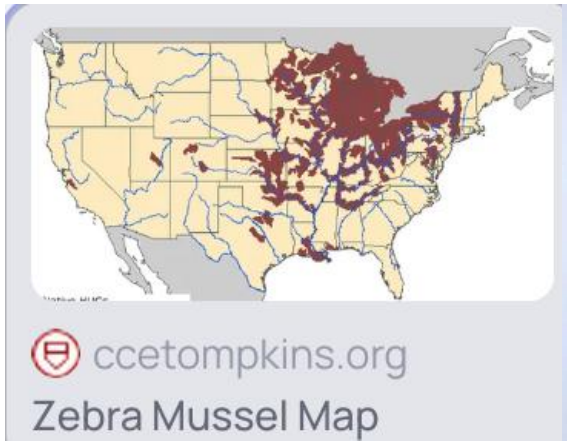
SEBS can successfully remediate Piney Point for reuse of the land

- SEBS has eliminated similar Blue Green Algae and Phosphate contamination challenges around the country.
- Simply determine exact SEBS formulation for Piney Point.
  - 1 gallon sample of Piney Point lake water / algae to eliminate.
  - EST chief scientist will identify, analyze and select the exact microbes and bacteria strains for a customized SEBS solution required to treat the entire Piney Point problem
- Conduct benchmark testing to demonstrate SEBS efficacy (48-72 hours)
- Conduct 7 day on-site Field Test
  - SEBS treat large containers of Piney Point contaminated water (10 gal– 100 gal). Completely eliminate within 3-7 days.
  - Measure reduction hourly
- Begin treating Piney Point within 2 weeks after signed contract o Upon successful field test, GNP can start producing specific SEBS with first ship of 2-3 tankers (32-48k gallons total). Apply 2nd application of 2 tanker loads 2 weeks after first application

SEBS vs ZEBRA MUSSELS

SEBS can successfully remediate and consume zebra mussels

- One of the fastest spreading and damaging ecological disasters is the Zebra Mussel invasion. https://www.nps.gov/articles/zebra-mussels.htm
- Zebra mussels are impacting the Great Lakes and Finger Lakes. ERG can remediate these precious natural resources we have for far too long taken for granted and done nothing to protect them. (See MAP below)
- SEBS is a cost effective and safe solution to the Zebra Mussel problem.



Next Steps

Contact ERG to schedule a meeting to discuss the options in resolving your crisis and getting your sites fully remediated and green again. In addition to site remediation we have soil treatment solutions to return the soil to near virgin status, live soil, healthy soil.

ERG comprises of Agricultural, Heavy Construction, Landfill Elimination & Remediation, Road and Bridge Construction divisions.

Appendix

Clean, Sustainable, Renewable, Solutions for the Earth

Pre / Post Treatment Results

- FL Blue Green Algae o Lake Okeechobee
  - Any other FL BGA treatment / results
- Other US / Canada BGA treatment / results
  - Kansas Residential Lagoon (2020: 26 days post treatment) o Missouri Lake – Lagoon (2018: 3 month post treatment)
  - Miller, Missouri Lake - Domestic Waste Lagoon (7 days post treatment)
  - St. Antoine, Nova Scotia Dairy Lagoon Bio-Augmentation (8, 19 days post)
- US Red Tide o MOTE Marine Lab SEBS Efficacy Report - Dec 2019
  - Toxic dead fish decomposition
- Other US lake / pond treatments & results
  - Kansas Hog Farm Lagoon & Sludge
  - Kansas Poultry Processing Plant Grease Pond

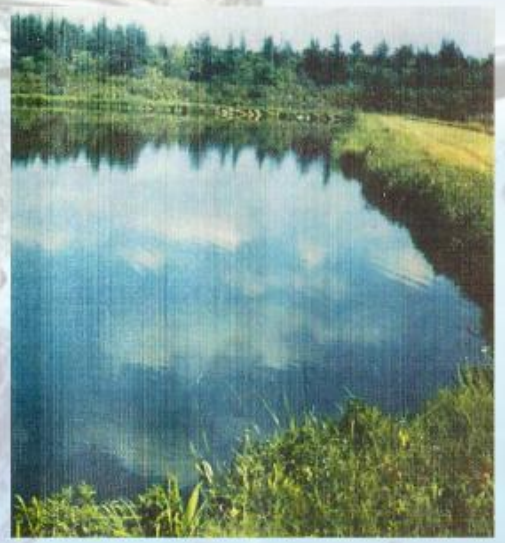
Kansas Lagoon – SEBS Treatment

Missouri Lake – Municipal Wastewater & Lagoon

Missouri Lake Domestic Waste Lagoon – SEBS Treatment

Nova Scotia – Dairy Lagoon Bio-Augmentation

Pre-Condition	8 days post SEBS application	19 days post SEBS application
• Basin contained 5 million gallons of contaminated water	• Eliminated 90% of odor • Eliminated 50%-60% of surface solids	• Eliminated 100% of odor • Eliminated 95% of surface solids



Red Tide EST SEBS Environmental Remediation

- FL MOTE SEBS Efficacy Report - Dec 2019
- Tested efficacy of SEBS Complex to both destroy Karenia brevis cells and eliminate toxins
- Control, low (4 µL) & high dose (12 µl) tested in duplicate with cultures of the Manasota Karenia brevis clone.
- Cellular concentrations determined by microscopy at 0, 2, 24, and 48 hours

Table 3: Percent Reduction in K. brevis cell concentration

Time	4 µL/L	12 µL/L
2	30.23256	-10.0221
24	16.83434	43.3937
48	13.8191	-45.0586

*MOTE Report included in attachments

Figure 1: Cell Concentrations vs. Time

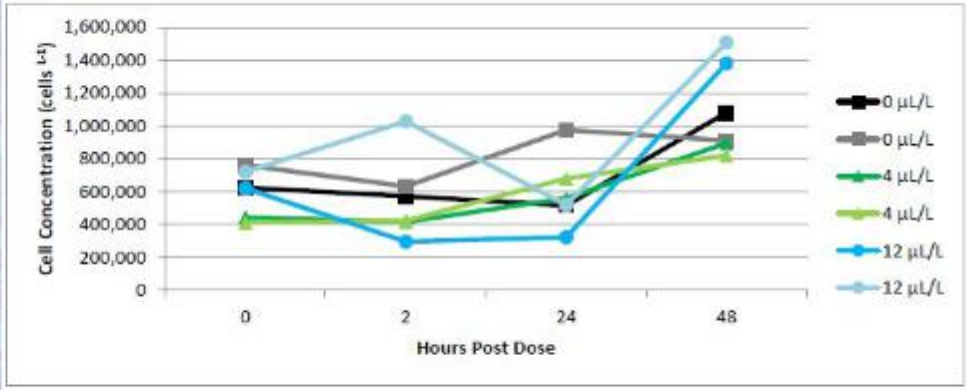


Fig.1: *K. brevis* cell concentrations were obtained and enumerated at T=0, T=2, T=24, and T=48 hours post dose. Doses include high (12 uL/L), low (4 uL/L), and control (0 uL/L).

SEBS Red Tide Fish Decomposition

Kansas Hog Farm Lagoon & Sludge

Lagoon Pre-Condition

- 15 years old
- Top crust – 8" to 12”
- Dry crust – 4" to 8”

15 days post SEBS application

- Areas of liquid present in cracks that were completely dry previously
- Crust varied from 1" to 6” dependent on SEBS application

30 days post initial SEBS application; 2nd treatment

- Post 20 min. agitation
- Crust in agitator 1" and 3“, was very loose & agitated quickly

Kansas Poultry Processing Plant Grease Pond

Grease Pond Pre-Condition	Setup to introduce SEBS	After introducing SEBS	After 8.5 weeks
• Poultry fats • Hard crust on edges, soft crust in middle • Malodor	• Pipe installed • SEBS pumped into pond with aeration • Lagoon filled with water	• Bottom solids and crust begin breaking apart • SEBS started digesting bottom & suspended solids	•Eliminated floating grease •Eliminated 80% of solids •SEBS application of 5 gal/wk for continued maintenance