

OPTIMIZING OIL SPILL CLEAN UP Summary of Research Project Objectives and Description:

Despite best efforts to prevent them, oil spills will continue to happen but we believe there is no need for them to be as environmentally devastating as is too often the case.

There are major gaps in assessment and decision-making systems and tools for spill response professionals when it comes to bioremediation clean up systems.

More specifically, planners and responders are missing science-based information for the selection of response tools in the enzyme category (containing no microbes) of bioremediation. Although the NCP has the *RRT IV Bioremediation Response Plan* which has been adopted by other regions also, there has not been a complete pre-examination of present available bioremediation technology against that assessment and feasibility examination plan. Without that information, Federal On-Scene Coordinators and RRTs are missing information for making the best science based decisions. To this end, LAEO is conducting a series of advanced field trials and research to answer data gaps on all phases of the mechanism of action of this response system/type of bioremediation technology on an NCP listed agent #B53. This research has the objective to optimize and integrate legacy response tools and technology improvements for ocean and fresh water (open water environments) and shoreline, inlet and estuary oil spill response systems including greater capacity for Arctic regions.

We will achieve this by conducting a series of examination, tests and treatments on spills of opportunity inside and outside of the US utilizing EPA and NOAA prescribed protocols for producing

scientifically valid observations. [note U.S. spills of opportunity have been difficult to access as yet which is hindering scientific advancement in the field.] The results of our usage monitoring and examinations of the prospective agent's mechanism of action on surface water, in the water column and on shorelines and other scientific information gathered will be turned over to/shared with NRT officials and in particular the Science and Technology Committee task force that is updating the NRT Bioremediation Fact Sheet—Steve Lehmann with NOAA is heading up that project.

Identification of better oil spill technologies has been an ongoing process, especially since the 2010 Deepwater Horizon disaster, but how to assess and optimize what tool is most appropriate for a given situation and consolidate and codify scientific and real spill experiential information into a usable reference guide remains a challenge.

This information will in turn ultimately contribute to the development of an algorithm for on-scene coordinators and spill response professionals to aide in the decision-making process involving the vast number of variables, types of oil and spills in a variety of environments one has to take into account in any given spill situation.

Such an assessment system would need to be based on the premise that the foremost-reason one cleans up an oil/chemical spill is to REMOVE the pollutants/toxicity from the environment as rapidly as possible so that living organisms can survive, minimize harm and remove all pollutants so that the ecosystem can sustain itself.

Research Plan Outline

An LAEO Consortium of oil spill response experts, qualified

marine scientists and specialized collaborative entities in the United States, Canada and EU will be carrying out field demonstrations and testing on a new model and design of oil spill cleanup systems which employs advanced mechanical recovery and skimming technology combined with the use of an agent containing non-toxic bio surfactants, multiple enzymes and nutrients that detoxify and nullify the harmful effects of a spill—an integrated system requiring no additional equipment, operators or secondary clean up measures. While conventional systems would still have applicability, the LAEO Consortium has developed a sequential method for using legacy oil spill response tools with added mechanical advancements and protocols reducing clean up costs with increased efficacy and no environmental trade offs or human health risks for responders or the public. [white papers and complete documentation is available but is not being included here.]

The scope of this work will entail a final phase of trials and demonstrations, documentation of results, compilation of response plans and training materials for implementation with an end point of greatly increased response capacity on numerous types of oil spills, in open water and oil that reaches shorelines, under varied conditions, ecosystems and climate scenarios.

[Refugio Spill presents an opportunity for doing some of this research]

In particular: [separate and detailed experimental design is drafted and can be finalized once we get more information from on site inspection]

1. In open water ocean and moving onto shoreline environments:
 - a. Open water field demonstrations and testing will be conducted on spills of opportunity made available by respective authorities. Oil treated moving onto shorelines.

- b. Shoreline, Sandy and Rocky beach field demonstrations and testing will likewise be conducted to address a spill that reaches shorelines.
- c. Above a & b to be done in triplicate with controls and in simulated open water mesocosm/wave tank and other per detailed designs by Dr. Norman Duke.

These demonstrations and tests will be done and carefully documented to close the gap in knowledge and document the scientific observations of alternative spill response methods resulting in significantly improving the efficiency and effectiveness of spilled-oil clean up capacity throughout temperate and cold regions.

2. In shallow water, bays, harbors, ports and along shorelines where recovery of oil is not practical.

- a. Ports/Harbors
- b. Open water mesocosm/wave tank scenarios.

Again, the goal would be to raise certainty on spill response options through field demonstrations and testing following established environmental protection standards with complete and usable documentation for oil spill response plans that contain an implemental practice that will restore shorelines to be healthy habitat for all flora and fauna more quickly than previous systems with greater environmental protection certainty.

QUALIFIED PARTICIPANTS

Those who will be the primary participants:

1. Dr. Paul Sammarco, PhD. Lumcon. Will act as team leader and

Science Coordinator for Lawrence Anthony Earth Organization. NOAA Liaison.

2. Dr. Bill Adams:

- provide scientific advice on oil spills and off-shore oil impacts especially in cold/icy and Arctic waters
- assist in developing and maintaining scientific collaboration amongst our consortium members
- advise and take part in preparing and presenting scientific and technical reports arising from the project
- work closely with any testing done by the National Research Council of Canada especially in their Ottawa facilities

3. Dr. David Wright: Expertise in Bio toxicology - effects of inorganic pollutants on marine and estuarine organisms.

<http://www.umces.edu/cbl/people/dwright>

4. Dr. Pat Hilgard: Science Advisor, Toxicology and Risk Assessor; assist with Scientific Reports Quality Control and Editing.

5. Dr. Norman Duke—Mangrove and Estuary oil spill expert.

Diane Wagenbrenner-Senior VP Operations LAEO

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Dr. Paul Sammarco-Lumcon