United States Department of Agriculture

Food Safety and Inspection Service

Regulatory Programs
Building 306, BARC-East
Beltsville, MD 20705

January 27, 1994

Mr. H. W. Lashmett
B & S Research, Inc.
4345 Highway 21
Embarrass, MN 55732

Dear Mr. Lashmett:

This is in reply to your request for compound authorization received on December 22, 1993 for your product B&S Industrial Achieve.

This product is acceptable for use in sewage and/or drain lines of official establishments operating under the Federal meat, poultry, shell egg grading, and egg products inspection programs.

Acceptance of compounds by this Department is in no way to be construed as an endorsement of the compounds or of any claims made for them.

If any change is made in the labeling information or formulation, the authorization for use in official plants becomes void immediately.

Sincerely,

John M. Damaré

John M. Damaré, Chief
Compounds and Packaging Branch
Product Assessment Division

Marine Oil Spill Bioremediation

With the recent sinking of an oil tanker off the coast of Guimaras, an environmental disaster looms as 200,000 to 300,000 liters of bunker fuel have already found their way into more than 300 km of coastline, as of this writing. The usual response to this emergency is the rapid containment of the oil slick, and if possible, the salvaging of the doomed tanker from more than 3,000 feet of water. It is believed that the tanker still holds 1.8 million liters of fuel, which, if left to surface, will cause the nation's worst oil spill in history.

While containment and recovery efforts are underway, it is undeniable that much oil has already damaged pristine environments such as mangrove forests and coral reefs. Therein lies part of the problem. These pristine environments are most probably devoid of so-called oil-degrading bacteria which have the potential to biodegrade this oil.

About 10 years ago, I conducted my MS thesis on bioremediation and hydrocarbon-degrading bacteria from the Manila Bay when I was a graduate student of the Institute of Biology in UP Diliman. I isolated, characterized, identified and determined the bioremediation potential of a number of isolates from the North Harbor using various chromatography techniques. Among the results that I found was that waters off Manila Bay contain as much as 150,000 oil-degrading bacteria per 100 ml of seawater; this is roughly 10% of the total bacterial population. In pristine environments such as those currently inundated by oil, they comprise less than 0.1%.

Results of my experiments back then have shown that when these bacteria act in consortium under optimum laboratory conditions, as much as 50% of the saturate fraction of heavy oil can be degraded in two weeks. The question then is how do we replicate these optimum conditions in the lab in an oil spill environment.

There are a number of requirements necessary for an effective bioremediation response. First is temperature, the optimum of which is between 20-30 oC. Fortunately, the country's temperature hovers within this range. Next is oxygen. The theoretical oxygen demand is 3.5 g of oil oxidized per g of oxygen. Anaerobic hydrocarbon degradation occurs at negligible rates. Thus, simply tilling and loosening the oil-contaminated sand would considerably help. Another is nutrients. Oil and fuel are essentially carbon-rich, but oil-degrading bacteria cannot survive and proliferate on carbon alone. They also need nitrogen and phosphates, in the same way that we need proteins to grow. Thus, the addition of slow-release fertilizers to the contaminated site is necessary. Ensure, however, that these fertilizers also do not pollute the environment. One study has shown that the optimal concentrations for N and P are 11 and 2 mg, respectively, for the biodegradation of 1 g of oil.

The most important star in this bioremediation show is the hydrocarbon-degrading bacteria, which, unfortunately, is most probably limited in the oil-contaminated sites of Guimaras. It would take months before their numbers increase substantially in response to the overwhelming oil. One way to expedite their impact is introduce them to the oil spill sites. But from where shall we get them then?

The Manila Bay is undoubtedly an environment that has been constantly oil-polluted for decades, and its waters harbor the best, hardiest and most powerful oil-degrading bacteria. If seawater from this and other oil-contaminated sites is introduced to the inundated coasts of Guimaras, we would essentially be inoculating the area with these

natural degraders and benefit from their natural propensities. When the oil is gone, most of these bacteria also die out.

Bioremediation has been tested and used during the 1989 Exxon Valdez oil spill in Alaska and results showed that treated beaches became essentially oil-free within two weeks. Various bioremediation technologies are currently available as inexpensive alternatives to the prohibitively expensive clean up efforts.

Nature can heal itself from the damage caused by man. Now, more than ever, we need nature's help in cleaning up the coastlines of Guimaras. *

The author has been following developments in the oil spill disaster not only because it was his former research but essentially because he is from Negros Occidental (Bacolod City), which is currently threatened by the oil spill. His MS thesis is available at the College of Science library in UP Diliman or at the National Library. He is now based at the University of Tsukuba, Japan, as a research scientist working on various bioprospecting projects. Email him at talorete(at)agbi(dot)tsukuba(dot)ac(dot)jp.