FINAL REPORT
A Continuation of

A Study of Economically Feasible Technologies to Remove Dioxin and Dioxin-Like Toxicants from Animal Co-Products

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As reported in the July Final Report of the initial investigation, several in-depth national and international studies have been conducted to measure the concentration and TEQs for dioxin and dioxin-like contaminants in a variety of food categories, including meat, poultry, milk, eggs, fats and oils, fish, and fruits and vegetables; and animal feedstuffs. Parts per trillion TEQs seldom exceeded 2, a limit currently adopted in the European community for fats and oils. This limit may be reduced in 2006. Depending on limits promulgated in the United States, there may be the potential for some concern. Since that time several more reports have been published in the European community further detailing the dietary intake of dioxin and dioxin-like toxicants from a variety of five food groups (fish, meat, dairy products, eggs, and fats/oils). Reported contaminant levels continue to be below the TEQ of 2 parts per trillion. Some toxicants namely DDTs, p,p'-DDE and Chlordane were reported above the EC limit.

If the current EC limit is significantly reduces during the 2006 year,It will be pragmatic to investigate plausible technologies to further reduce the levels of these toxicants in fats and oils. As previously reported,numerous investigations have shown that bacteria and fungi are capable of degrading dioxin and dioxin-like toxicants by various enzymatic pathways. Our previous report noted that Terrabacter sp. strain DBF63 and Pseudomonas sp. strain CA10 possess the ability to use their angular dioxygenases to degrade dibenzo-p-dioxins and dibenzofurans. Our most recent preliminary review of the literature since the 2005 report indicates that several intracellular enzymes are capable of hydroxylating aromatic rings. In addition, dibenzofuran 4,4a-dioxygenase and carbazole 1,9a-dioxygenase also degrade these types of toxicants. A more

thorough investigation during the coming months may uncover several more enzymatic systems that may be plausible systems to degrade these toxicants in fats and oils.

At present an effective process to remove dioxin-like contaminants from animal co-products (fats and oils) without degrading the product is unknown. However, a potentially plausible remediation technique centers on the ability of microorganisms to degrade the contaminants. If microorganisms are capable of degrading the contaminants, they must first synthesize the enzymes to catalyze the degradation. Since it is not practical to treat the fats and oils with microorganisms, it is plausible to isolate the cellular enzymes and subsequently add the enzymes to the fats and oils to achieve enzymatic catalysis. To remove the enzymes from the fats and oils before further processing to edible or inedible products, system temperatures could be elevated to denature the then unwanted enzymes.