

## **EFFECTS OF SOLIDIFIERS ON BIRDS**

As part of an oil industry project, conducted by the Petroleum Environmental Research Forum in the 1990's, three documents concerning polymers for solidifying products (New Earth Environmental Technologies/Waste-Set PS 3200, Haz-Mat Response Technologies Inc./Rubberizer, and Petroleum Environmental Technologies Inc./Enviro-bond 403) were reviewed and evaluated with regard to the potential product toxicity to birds.

In summary, these polymer products are likely to be nontoxic to birds if ingested, and their presence in the digestive systems of birds is not likely to cause adverse health effects. However, regulatory approval to use these materials will normally require confirmation of low toxicity (chemical) and lack of physical effects.

The acute toxicity tests conducted on these materials indicate they are essentially nontoxic to brine shrimp (*Artemia* sp.) and to the mummichog (*Fundulus heteroclitus*), a fish. Because these materials float, however, they were not bioavailable to these test organisms. However, solid polymers are generally inert and of low toxicity if ingested.

Despite the low toxic potential, there remains a potential for mechanical effects on the digestive system of birds. Available evidence suggests that plastics present risks only when they are consumed in sufficient quantity to cause physical obstruction or stomach ulcerations in birds. Plastic ingestion by seabirds is widespread, because they probably mistake plastics for food. For many seabird species, including gulls, terns, and comorants, indigestible stomach contents such as plastic materials are regurgitated rather than retained. Thus, ingestion of plastics probably does not present a significant risk to adult birds unless large quantities or particularly large objects are ingested and cannot be regurgitated. (Marine Pollution Bulletin, 1987, pp. 217-219, 319-326, 339-343; Marine Pollution Bulletin, 1988, pp. 125-128; NOAA/NMFS, 1990, pp. 623-634; Colonial Waterbirds, 1992, pp. 83-94.)

The results of a 14-year survey of plastic ingestion by seabirds in the North Atlantic showed that seabird health was not affected by the presence of plastics, even in species containing the largest quantities. In addition, it was concluded that plastic ingestion did not cause reduced appetite from false feelings of stomach fullness. In this study, the incidence of ocean-borne plastic particle ingestion was evaluated by analyzing the gut contents of 1,033 birds. Twenty-one of the 38 seabird species (55%) contained plastic particles. The most common plastic types ingested were polyethylene and polypropylene, which float on water. Clear and white were the most common plastic colors ingested. Of the ingested plastic particles, 94% was found in the gizzards, and none was found in the intestines. Thus, plastic debris was apparently regurgitated rather than excreted for the species examined.

Although small plastic particles are unlikely to damage seabird gastrointestinal tracts, large amounts of ingested plastic could block the digestive tract and/or impair foraging efficiency. The severity of these effects would depend upon the types and retention time

of the debris ingested. However, severe physical damage and obstruction of the digestive tract is infrequent in seabirds.

In conclusion, polymer materials such as those used to solidify petroleum products are relatively inert, and thus would probably not be toxic to birds if ingested. Because many species of seabirds normally regurgitate indigestible materials, ingested plastic would not be expected to cause adverse health effects unless consumed in large amounts or as large objects.