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STUDY TITLE: Solid Waste Pollution on Texas Beaches: A Post-MARPOL Study

REPORT TITLE: Solid Waste Pollution on Texas Beaches: A Post-MARPOL Study, Volume I: Narrative and Volume II: Appendices

CONTRACT NUMBER: 14-35-0001-30546

SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREA: Western Gulf of Mexico; Mustang and San Jose Islands

FISCAL YEARS OF PROJECT: 1991; 1992

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COSTS: FY 1991: $50,045

CUMULATIVE PROJECT COST: $50,045

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KEY WORDS: MARPOL Annex V, beaches, barrier islands, plastics, containers, marine debris, indicator items, micro-litter, macro-litter, galley-waste, beachgoer litter, counts, collections, surveys

BACKGROUND: The investigator started looking at litter on Mustang Island (Texas) gulf beach in 1978 when a survey was initiated to monitor the bird population with the advent of beachfront development. At first the references to litter and debris were anecdotal, in the form of notes and sporadic measurements. In 1983 an attempt was made to estimate the quantities of both man-made and natural debris using some 40 categories of debris types. Estimates were based on the investigator's knowledge of the common items after five years and over 500 observations to that date.

Counts of 84 categories of marine debris items were started in 1987 along an 11.8 km section of Mustang Island Gulf beach, Texas. Counts were done at an eight-day interval. Items large enough to be seen from a slowly moving vehicle were counted and logged into a specially programmed computer in the truck. Also, at the three sites (10m wide from shoreline to high tide line) on the study beach, all debris items were collected

for sorting, weighing and classifying later at the laboratory. This was done to examine the smaller litter items. It was on the basis of this study, done before the enactment of MARPOL

Annex V (in force 1 January 1989), that the investigator proposed to MMS to repeat these surveys some two years after MARPOL Annex V.

OBJECTIVES: To test the effectiveness of MARPOL Annex V in reducing the quantity of Man-made debris littering Gulf of Mexico barrier island gulf beaches, specifically those in Texas.

DESCRIPTION: This study contrasts the "before" and "after" data to see if there is any indication that MARPOL has affected the littering of Texas beaches. A direct link between Annex V and changes in litter on beaches cannot be forged. However, looking at the nature of the debris items before and after MARPOL may give cause to its successful implementation and adherence to by seagoing vessels. This survey is referred to as the "Weekly Counts." About 200 such counts were made, 175 of which are used in this study (the others were special counts done in conjunction with National Cleanups and other events). To examine smaller items, another survey called "Weekly Collections" was made in 1987-88 and repeated 1991-92. All debris and litter items were collected from three sites in the same beach area at the same time that the counts were done. Sites were 10-m wide and stretched from the shoreline to the high-tide line. This study was designed to quantify the smaller litter items and the "uncountable" natural debris items such as seaweed and tar.

Finally, to identify sources of marine debris in detail, we made monthly collections of all containers on San Jose Island to the north of Mustang Island. San Jose Island is inaccessible except by boat and there is no cleaning of its gulf beach.

SIGNIFICANT CONCLUSIONS: The overall conclusion from this study is that after MARPOL the quantity of litter form marine sources on the study beach has been reduced. It cannot be determined statistically from the data that this is due to compliance with MARPOL Annex V regulations. The author believes from the circumstantial evidence that MARPOL is beginning to have a beneficial effect on the beaches in Texas.

STUDY RESULTS: The number of people visiting the beach has increased as has the attendant activity and potential for litter input. Beverage cans, the most common beachgoer litter on the beach, have remained steady; but plastic six-pack rings, cups and lids and cloth have all decreased. Paper products, balloons and toys have increased. Two items of natural debris (*Sargassum* weed and driftwood), important because of their association with floating litter at sea, have increased. Tarballs have decreased and this trend has been of sufficient magnitude to have been noticed by the public at large. Of the items associated with the fishing industry (mainly shrimping in this study area), several have declined including milk jugs and egg cartons, typical shrimp-boat galley waste. In contrast Mexican bleach bottles and produce sacks have

increased. Items associated with the offshore oil industry have decreased: in the case of the large plastic sheeting and write-protect rings, dramatically so. The 5-gallon plastic pail with labels showing various chemicals used by the offshore industry has also declined significantly. Items from the maritime commerce business are more difficult to identify but typically are galley-waste peculiar to that industry with many bearing foreign labels. The one-liter cardboard milk carton, sold almost exclusively by the ship's chandlers, has declined. Galley waste, in general, has declined with the exception of plastic bottles. The source of such bottles is not exclusively galley waste. The origins of the most numerous forms of litter on the beach, styrofoam pieces, plastic bags, and miscellaneous plastic pieces are not known and are probably form multiple sources. Styrofoam and plastic bags have noticeable declined while the miscellaneous material has increased. When assessed by weight rather than count, both styrofoam and (miscellaneous) plastic show declines. Almost $4m^3$ of containers were examined in the 14-month long San Jose Island container study of these. Of these, plastic containers were 63.4% by weight, but 87.2% by volume. Ranked by country, containers originating in the U.S. account for over half of all the plastic, almost all the beverage cans, 75% of the glass, and half of the cardboard containers found. Containers from Mexico ranked second and in some months, exceeded the U.S. totals in the plastic category.

STUDY PRODUCT: Amos, A.F. 1993. Solid Waste Pollution on Texas Beaches: A Post-MARPOL Study. Volume I: Narrative, Volume II: Appendices. A final report for the U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA OCS Study/MMS 93-0013. Contract No. MMS: 14-35-0001-30546. Volume I; 90 pp., Volume II; 206 pp.