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# Plastics, the Marine Menace: Causes and Cures

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# PLASTICS, THE MARINE MENACE: CAUSES AND CURES

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## I. INTRODUCTION

Plastics are here to stay. In one respect this is a positive development; plastics are very beneficial to modern society. Historically, the real growth of the plastics industry stemmed from a shortage of natural rubber and light metals during World War II.[1] The crash research and development program which led to substitutes for those materials greatly expanded knowledge of the chemical nature of plastics, spawning a veritable plastics revolution.[2]

In the years since World War II, production of plastics in the United States has grown from 1.8 billion pounds produced in 1951[3] to almost 57 billion pounds produced in 1988.[4] Incredibly, the total annual United States production of plastics now exceeds that of metal, paper, and glass combined.[5] Many goods once made from those materials are increasingly made from plastics.[6] Plastics' light weight, inertness, safety, cost effectiveness, and permanence are characteristics which make it a valuable material and explain its rapid growth.[7]

Unfortunately, while permanence may be an important characteristic for industrial and consumer uses, the results of permanence on the marine environment are disastrous. The problem characteristics of plastics are its inherent resistance to biodegradability and its buoyancy. Since plastics are routinely dumped into the ocean, the cumulative effects of years of dumping is becoming apparent. Worldwide,

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1. J. BRYDSON, PLASTICS MATERIALS 7 (1966).
2. *Id.*
3. *Id.* at 9.
4. *Resin Report 1989*, 66 MOD. PLASTICS 69, 109 (Jan. 1989).
5. Conner & O'Dell, *The Tightening Net of Marine Plastics Pollution*, 30 ENV'T 16, 17 (Jan.-Feb. 1988).
6. Bean, *Legal Strategies for Reducing Persistent Plastics in the Marine Environment*, 18 MARINE POLLUTION BULL. 357, 357 (1987).
7. *Plastic Pollution in the Marine Environment: Hearings on Disposal of Plastic Wastes in the Marine Environment Before the National Ocean Policy Study of the Senate Comm. on Commerce, Science, and Transportation*, 100th Cong., 1st Sess. 105, 106 (1987) [hereinafter *Hearings I*] (statement of C.E. O'Connell, President, Society of the Plastics Industry).

oceans and beaches are littered with plastic debris. As a result, a staggering amount of wildlife is dying.

This paper addresses the effects of the ocean dumping of plastics on the marine environment and discusses and analyzes the measures that have been taken, both nationally and internationally, to deal with this serious problem.

## II. MARINE POLLUTION

Plastics, like so many other inventions of the twentieth century, such as automobiles, synthetic pesticides, fluorocarbons, and nuclear energy, have serious undesirable side effects. Representatives of the plastics industry note, "all modern revolutions involve tradeoffs."[8] While this concept may be generally true, at some point the revolution must be tempered or it will cause more harm than good.

The principal problem with marine-borne plastics is that they do not easily separate into their basic elements through decomposition. Once plastic is introduced into the marine environment, it remains indefinitely, and only gradually does it break-down into smaller particles.[9] For example, a simple six-pack yoke has an estimated life span of 450 years.[10] A report by the National Academy of Sciences states that merchant ships, passenger vessels, and commercial and recreational fishing boats are the source of most directly discharged plastic debris.[11]

Basically, plastic marine debris can be separated into two types: 1) directly discharged manufactured plastic articles such as commercial and recreational fishing nets, ropes, monofilament fishing line, containers, disposable baby diapers, bags, six-pack yokes, styrofoam cups, sheeting, and strapping bands;[12] and, 2) indirectly discharged raw plastic pellets which measure one to five millimeters in diameter.[13] This paper focuses mainly on the former type of plastics. Raw plastic

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8. Guthrie, *Sea Grant Network Tangles with Castoff Plastic Debris*, 31 OCEANUS 29, 30 (Fall 1988).

9. Colton, *Plastics in the Ocean*, 18 OCEANUS 61, 64 (Fall 1974). *See also* Cundell, *Plastics in the Marine Environment*, 1 ENVTL. CONSERVATION 63, 66 (Spring 1974) ("Polyvinyl chloride, polyethylene polystyrene, polyvinylidene chloride, nylon, and cellulose acetate, have been reported as resistent to microbial attack.").

10. *Hearings I*, *supra* note 7, at 58, 59 (statement of the Center for Environmental Education).

11. Guthrie, *supra* note 8, at 34.

12. *Controlling and Reducing Pollution from Plastic Waste: Hearings on S. 599, S. 560, and S. 633 Before the Subcomm. on Envtl. Protection of the Senate Comm. on Environment and Public Works*, 100th Cong., 1st Sess. 34, 35 (1987) [hereinafter *Hearings II*] (report of the United States EPA).

13. Wilber, *Plastic in the North Atlantic*, 30 OCEANUS 61, 61 (Fall 1987).

resin pellets, although not as visible a nuisance or danger, are also a problem. Resin pellets are the raw material supplied by resin manufacturers to thousands of processors around the country who remelt pellets and form them into usable plastic articles. A large amount of pellets is lost during the process and then indirectly deposited into the ocean via waste water discharges.[14]

### *A. Aesthetic Damage*

One significant aspect of plastic pollution in the marine environment is the aesthetic damage to the world's beaches and oceans. According to recent estimates merchant ships dump 639,000 plastic containers and garbage bags daily,[15] and commercial fishing fleets dump 23,000 tons of plastic packaging material into the ocean each year.[16] That most ships dump their plastics at sea rather than at port is evinced by the United States Department of Agriculture's statistics which reveal that of 73,614 foreign ship landings in American ports during 1986, garbage was only off-loaded on 1,731 landings.[17] Since most plastic debris floats, ocean currents transport a great deal of this litter onto the world's beaches and shores.[18]

Padre Island National Seashore in Texas is a good example of litter washing ashore. In 1985, 140 tons of trash including plastic sheeting, plastic milk jugs, and plastic computer rings were reported on a fifty-seven mile stretch of coastline.[19] Private citizens who use the beach are not responsible for most of this plastic waste. Monitoring studies of beach debris on Mustang Island, Texas indicate that seventy-five to ninety-five percent of the beach debris originates from offshore sources.[20] Of course this is not a problem unique to Texas. During a nationwide cleanup effort from late September to early November, 1988, volunteers collected 900 tons of debris.[21] Reports from around

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14. Colton, *supra* note 9, at 63.

15. Laist, *Overview of the Biological Effects of Lost and Discarded Plastic Debris in the Marine Environment*, 18 MARINE POLLUTION BULL. 319, 323 (1987).

16. Pruter, *Sources, Quantities and Distribution of Persistent Plastics in the Marine Environment*, 18 MARINE POLLUTION BULL. 305, 306 (1987).

17. *Hearings II*, *supra* note 12, at 286, 295 (testimony of Garry Maurro, Commissioner of the General Land Office, State of Texas).

18. Caribbean and Gulf Coast regions are hit particularly hard because of the Gulf Stream and Caribbean currents. These areas act as "sieves," continually "straining" plastics from the ocean. Wilber, *supra* note 13, at 65.

19. *Hearings II*, *supra* note 12, at 5, 8 (testimony of Jane Hopkins of the EPA).

20. Guthrie, *supra* note 8, at 34.

21. *Water Pollution: Volunteers Pick Up 900 Tons of Debris; Data Collected for Pollution Tracking System*, 19 Env't Rep. (BNA) 1499 (Nov. 25, 1988). "Included among the debris were hundreds of miles of fishing line, thousands of plastic six-pack holders, tens of thousands of plastic bottles, and some unexpected items, such as false teeth, artificial limbs, and a Brazilian bowling ball." *Id.*

the world show the problem is truly a global one.[22] Even the remote shores of Antarctica have not escaped plastic pollution.[23]

### B. *Monetary Costs*

The ever increasing problem of plastics on the beaches and shores of our nation is not only unsightly, but also very costly. Coastal area budgets are depleted by cleanup costs and lost tourism revenues. Collectively, Texas coastal communities currently spend in excess of $14,000,000 annually to pick up garbage, including plastics, from their beaches.[24]

The aesthetic damage and accompanying economic impact caused by plastic debris are easily seen and understood. Less apparent are the adverse effects on marine life caused by plastics. Plastic debris harms marine wildlife populations by two principal means: ingestion and entanglement.

### C. *Plastic Ingestion*

Plastic ingestion physically harms marine wildlife in two ways. First, it causes damage or blockage to an animal's digestive system, resulting in physical weakness or even death.[25] Second, ingested plastics release toxic chemicals which cause sickness, death, or tangential problems such as the thinning of eggshells.[26]

The results of towing a neuston net[27] through the surface areas of the ocean reveal the presence of small plastic resin pellets. In some areas, such as the Bahamas, the concentration level exceeds 2000 pellets per square meter.[28] Although concentrations do vary, resin pellets are found in all oceans of the world.[29]

Tragically, approximately fifty species of seabirds ingest plastic resin pellets[30] because the pellets are similar "in color, size and shape—to natural prey items."[31] In one study on the Dutch coast, sev-

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22. Wilber, *supra* note 13, at 65.

23. *Hearings I*, *supra* note 7, at 60 (statement of the Center for Environmental Education).

24. *Hearings II*, *supra* note 12, at 288 (testimony of Garry Maurro, Commissioner of the General Land Office, State of Texas).

25. Ryan, *The Effects of Ingested Plastic on Seabirds: Correlations Between Plastic Load and Body Condition*, 46 ENVTL. POLLUTION 119, 119 (1987).

26. Conner & O'Dell, *supra* note 5, at 18.

27. "Neuston nets are designed to sample air/water interface and down to 25 centimeters below it." Wilber, *supra* note 13, at 61.

28. *Id.* at 63.

29. Pruter, *supra* note 16, at 307.

30. Laist, *supra* note 15, at 321. "This practice appears to be most common in albatrosses, petrels, shearwaters, phalaropes, puffins, and auklets." *Id.*

31. Wehle & Coleman, *Plastics at Sea*, 92 NAT. HIST. 20, 23 (Feb. 1983).

enty-nine fulmars found dead were dissected.[32] The average number of plastic pellets found in their stomachs was 11.9 per bird with a high of 96.[33] Another study showed that ingestion of resin pellets is a significant source of mortality among young chicks.[34]

Plastic resin pellets are clearly not the only menace. Marine wildlife also ingest larger plastic items. Sea turtles suffer by "frequently mistak[ing] floating plastic bags and sheeting for jellyfish, a preferred food item."[35] This tragic error causes intestinal blockage which can kill or weaken the turtle. In Costa Rica, a large number of green sea turtles died after they ingested plastic banana bags which were thrown off a dock.[36] Even whales are victims of plastic ingestion. One dead whale's stomach contained four dozen plastic garbage bags.[37]

Although ingested plastics are thought to be biologically inert to the organism, the large quantities of additives in plastics, such as colorants, softeners, and anti-oxidants may not be inert. Several of the additives are known toxins and can be assimilated from ingested plastic.[38] Many plastics, for example, contain polychlorinated biphenyls (PCBs).[39] One author has noted that plastic ingestion by marine animals may well be "an entry point for PCBs into marine foodchains."[40]

### *D. Entanglement*

Entanglement is the most serious threat to marine life posed by the ocean dumping of plastics. Plastic fishing gear, in the form of pelagic driftnets, trawlnets, gillnets, traps, ropes, and monofilament fishing

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32. Franeker, *Plastic Ingestion in the North Atlantic Fulmar*, 16 MARINE POLLUTION BULL. 367, 368 (1985).

33. *Id.*

34. Laist, *supra* note 15, at 321. Most resin pellets find their way into the marine environment through the outflow pipes of resin plants into rivers and estuaries. None of the laws and conventions discussed in this paper prohibit these discharges. The testimony of L. Freeman of the Society of the Plastics Industry indicates this may no longer be a problem, because systems are being installed to capture resin pellets before they are dumped. *Hearings II*, *supra* note 12 at 257, 263. Legislation should be enacted to mandate these systems. Further, since the United States produces less than thirty percent of the world's resin supply, *id.* at 264, the governments of foreign producers should be urged to take similar action.

35. *Hearings II*, *supra* note 12, at 353, 360 (comments by Steven Moyer & John Ernst of the Fisheries and Wildlife Division, National Wildlife Federation).

36. U.S. Congress, Office of Technology Assessment, *Wastes in Marine Environments*, OTA-0-334, 76 (Apr. 1987).

37. *Hearings I*, *supra* note 7, at 60 (statement of the Center for Environmental Education).

38. Franeker, *supra* note 32, at 369.

39. Morris, *Plastic Debris in the Surface Waters of the South Atlantic*, 11 MARINE POLLUTION BULL. 164, 165 (1980).

40. Cundell, *supra* note 9, at 66.

line, is the main culprit. Although fishing gear is sometimes dumped accidentally, it is most often dumped deliberately. Deliberate dumping of fishing gear usually occurs either for convenience reasons or when foreign fishing vessels seek to avoid capture for illegally fishing in another country's waters.[41] The National Oceanic and Atmospheric Association (NOAA) has determined that approximately 139,000 metric tons of fishing gear is lost worldwide each year.[42] Since fishing gear is designed to be transparent underwater, the effects of lost gear are just as deadly to "non-target" as to "target" organisms.[43]

One of the most deadly forms of fishing gear is the pelagic driftnet.[44] These nets are made of extremely durable, non-biodegradable plastic and are extremely efficient killers.[45] A properly operating pelagic driftnet is only left out for a few hours at a time. Dumped pelagic driftnets, however, are a curtain of death up to thirty miles long and twenty-six feet deep[46] which can continue to "ghostfish" for years afterwards.[47] According to one estimate, 639 miles of derelict pelagic driftnet are annually discarded into the marine environment of the North Pacific fisheries.[48]

Any marine animal may become entangled by swimming into a driftnet or by trying to catch prey already entangled.[49] One of the hardest hit species is the northern fur seal. Government officials estimate that approximately 50,000 of these seals are killed by entanglement each year,[50] a significant proportion of which are killed in

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41. *Hearings II*, *supra* note 12, at 35. *See also* Eisenbud, *Problems and Prospects for the Pelagic Driftnet*, 12 B.C. ENVTL. AFF. L. REV. 473, 479 (1985) (noting that "U.S. government personnel in surveillance aircraft have observed the abandonment of entire pelagic driftnets by fleeing vessels that had been fishing illegally").

42. *Hearings II*, *supra* note 12, at 35.

43. *Hearings II*, *supra* note 12, at 356-58 (comments by Steven Moyer & John Ernst of the Fisheries and Wildlife Division, National Wildlife Federation).

44. The pelagic driftnet is a passive fishing device which is suspended vertically in the water by the use of floats and weights. The pelagic driftnet

> entangles the gill plates and other body parts of a fish and other creatures that swim into it. By adjusting the buoyancy of the net with floats and weights, the net can be suspended like a curtain at any depth in the water column and can be either anchored to fish in one place or left to drift with wind and current.

Eisenbud, *supra* note 41, at 473.

45. *Id.* at 479.

46. Conner & O'Dell, *supra* note 5, at 19.

47. *Hearings II*, *supra* note 35, at 358 (comments by Steven Moyer & John Ernst of the Fisheries and Wildlife Division, National Wildlife Federation).

48. Eisenbud, *supra* note 41, at 479.

49. Degange & Newby, *Mortality of Seabirds and Fish in a Lost Salmon Driftnet*, 11 MARINE POLLUTION BULL. 322, 322 (1980).

50. Laist, *supra* note 15, at 323. "Research conducted on captive northern fur seals, for example, suggests that seals, particularly juveniles, will approach small plastic packing bands and net fragments to nudge, bite, and poke their heads into them." *Id.*

derelict pelagic driftnets.[51] Pelagic drift netting is not the only plastic killer. Sea creatures and birds also get entangled in other types of nets, traps, packing bands, monofilament line, and six-pack yokes.[52] In total, it is estimated that the ocean dumping of plastics causes the death of over 1,000,000 birds and over 100,000 marine mammals and sea turtles each year.[53]

## III. Legal Controls On Plastic Pollution — Land-Based Source Pollution

The problem of marine pollution has been addressed by many agencies. The United Nations, the United States Congress, and other governments around the world have adopted various treaties, conventions, and laws in an effort to control the marine pollution problem.

The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Dumping Convention),[54] and the International Convention for the Prevention of Pollution from Ships (MARPOL)[55] are two comprehensive United Nations conventions that are of particular relevance to the problem of plastics in the marine environment. Each of these conventions has been ratified by the United States, and domestic enabling legislation has been passed to implement the terms of both—the former by the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA)[56] and the latter by the Marine Plastic Pollution Research and Control Act of 1987 (Marine Plastic Control Act).[57]

### *A. The London Dumping Convention*

In response to worldwide concern over the general deterioration of the environment, the United Nations met in Stockholm, Sweden in

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51. Wehle & Coleman, *supra* note 31, at 24. During the commercial seal harvests on the Pribilof Islands from 1981-1984, 403 fur seals were entangled in plastic: sixty-six percent were entangled in net fragments, twenty-one percent in plastic packing bands, and thirteen percent in other debris. Conner & O'Dell, *supra* note 5, at 19.

52. *Hearings II*, *supra* note 12, at 317, 320 (testimony of the Entanglement Network Coalition).

53. *Marine Affairs: Dumping of Plastics, Debris from Ships Would Be Banned Under Coast Guard Proposal*, 19 Env't Rep. (BNA) 1278 (Nov. 4, 1988).

54. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Dec. 29, 1972, 26 U.S.T. 2403, T.I.A.S. No. 8165 [hereinafter London Dumping Convention].

55. International Convention for the Prevention of Pollution from Ships, 12 I.L.M. 1319 (1973) [hereinafter MARPOL].

56. Marine Protection, Research, and Sanctuaries Act of 1972, 16 U.S.C. §§ 1431-1434 (1988) and 33 U.S.C. §§ 1401-1445 (1982 & Supp. V 1987) [hereinafter MPRSA].

57. 33 U.S.C.A. §§ 1901-1912 (West Supp. 1989) [hereinafter Marine Plastic Control Act].

1972 to develop a general framework to address and solve the world's environmental problems.[58] The members of the Stockholm Conference declared, "[s]tates shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea."[59] By the end of 1972 the United Nations acted on this mandate by drafting the London Dumping Convention.

The London Dumping Convention was the first comprehensive international agreement to regulate dumping of non-oil wastes. Sixty-five countries have ratified the London Dumping Convention, including all of the major sea-going nations.[60] The fundamental philosophy behind the Convention is that the contracting parties should work individually and together to protect the marine environment from the dangers of dumping.[61]

### *1. Scope*

To accomplish this general intent the London Dumping Convention obligates contracting parties to prohibit "the dumping [at sea][62] of any wastes or other matter in whatever form or condition" which are classified as dangerous substances under Annex I of the Convention.[63] Those substances include "[p]ersistent plastics and other persistent synthetic materials, for example netting and ropes, which may float or remain in suspension in the sea."[64] Dumping is defined by the Convention as "any deliberate disposal at sea of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea."[65] But dumping does not include

> [t]he disposal at sea of wastes or other matter incidental to, or derived from the normal operations of vessels . . . and their

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58. United Nations Conference on the Human Environment, 11 I.L.M. 1416 (1973).

59. *Id.* at 1418 (Principle 7).

60. TREATY AFFAIRS, U.S. DEP'T OF STATE, TREATIES IN FORCE 333-34 (1989).

61. London Dumping Convention, *supra* note 54, art. I, at 2406.

62. "'Sea' means all marine waters other than internal waters of States." *Id.* art. III, para. 3, at 2407.

63. *Id.*, art. IV, para. 1, at 2408. The London Dumping Convention allows the dumping of less dangerous materials under Annex II by establishing a permitting system which considers a long list of criteria in order to lessen potential harm to the marine environment. These criteria are enumerated in Annex III of the Convention.

64. *Id.* Annex I, para. 4, at 2465. Also included as banned substances are: organohalogen compounds; mercury and mercury compounds; cadmium and cadmium compounds; crude, fuel, heavy diesel, and lubricating oils; hydraulic fluids; high level radioactive waste and matter; and, biological and chemical warfare materials. *Id.* Annex I, para. 1-7, at 2465.

65. *Id.* art. III, para. 1, at 2407.

> equipment, other than wastes or other matter transported by or to vessels . . . operating for the purpose of disposal of such matter or derived from the treatment of such wastes or other matter on such vessels. [66]

Based on these definitions the Convention does not apply to ship-generated plastic garbage resulting from a ship's normal operations.

The first problem with the scope of the Convention's definition of dumping, relating to plastics, is that it only applies to the dumping of plastics loaded onto a ship from land-based sources for the intended purpose of ocean dumping. Most plastics which enter the marine environment are ship-generated. The second problem is the phrase "normal operations". Under the Convention, dumping plastic at sea is allowed if it results from a ship's normal operations. The term "normal" is vague when applied to the varied ways plastics are dumped into the ocean. Fishing, merchant, passenger, and recreational vessels normally dump a great proportion of their plastic debris and often lose a great deal of fishing gear. The Convention has no effect on these "normal" practices. Consequently, the Convention's effectiveness is seriously undermined.

### 2. *Enforcement*

Enforcement is a problem which plagues multilateral treaties. Often there is no real incentive to comply or authority to force compliance. The London Dumping Convention suffers from this enforcement problem. Contracting parties to the Convention are required to enforce its terms to all "(a)vessels . . . registered in its territory or flying its flag; (b)vessels . . . loading in its territory or territorial seas matter which is to be dumped; [and] (c)vessels . . . under its jurisdiction believed to be engaged in dumping."[67] Thus, enforcement of the Convention is left solely to the contracting states. The states have sole authority to enforce the provisions of the Convention within their own territorial waters against any vessel.[68] Such an approach could lead to the establishment of "pollution havens" as some authors have argued, meaning some countries could ignore illegal dumping in order to further a national development policy.[69] Thus, an international enforcement mechanism would be more effective.[70]

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66. *Id.*

67. *Id.* art. VII, para. 1, at 2409.

68. This is permitted by the Convention on the Territorial Sea and Contiguous Zone, Apr. 29, 1958, art. 16, 15 U.S.T. 1607, 1611, T.I.A.S. No. 5639.

69. 2 J. KINDT, MARINE POLLUTION AND THE LAW OF THE SEA 1128 (1986).

70. *Id.*

Furthermore, the Convention obligates a contracting party to enforce the Convention in international waters against a vessel flying its flag or one registered in its territory.[71] This requirement seems impractical for plastic pollution control. If taken literally it would force contracting parties to develop some kind of high seas police force, which is neither practical nor economically feasible. Unfortunately, the London Dumping Convention deprives coastal states the power to enforce the Convention against foreign ships outside their territorial waters. This is "a limitation which must be viewed as a serious defect."[72]

### *B. The Marine Protection, Research, and Sanctuaries Act of 1972*

Since the London Dumping Convention is not self-executing, all contracting parties must pass domestic enabling legislation. Several months before work on the London Dumping Convention was completed the United States Congress passed the MPRSA.[73] Passage of the Act was prompted by a report from the Council on Environmental Quality (CEQ) which revealed that current ocean dumping practices posed an ominous threat to the marine environment. Based on the CEQ report, Congress "undertook to write the most comprehensive ocean dumping law in the world."[74] The MPRSA and the London Dumping Convention are very similar in substance and structure.[75]

The MPRSA has three titles: Title I regulates ocean dumping; Title II authorizes the Secretary of Commerce to initiate comprehensive research and monitoring activities focusing on the long-range effects of ocean dumping;[76] and, Title III authorizes the Secretary to designate marine sanctuaries "for the purpose of preserving or restoring such areas for their conservation, recreational, ecological, or aesthetic values."[77] Thus, the ocean dumping of plastics is covered by Title I.

#### *1. MPRSA Compliance with the London Dumping Convention*

Title I of the MPRSA prohibits the dumping of certain dangerous materials, as does Annex I of the London Dumping Convention. Sim-

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71. London Dumping Convention, *supra* note 54, art. VII, para. 1, at 2409.

72. Note, *Saving a Dying Sea*, 7 CORNELL INT'L L.J. 32, 45 (1973).

73. Pub. L. No. 92-532, 86 Stat. 1052 (codified at 16 U.S.C. §§ 1431-1434 (1988) and 33 U.S.C. §§ 1401-1445 (1982 & Supp. V 1987)).

74. Bakalian, *Regulation and Control of United States Ocean Dumping: A Decade of Progress, An Appraisal for the Future*, 8 HARV. ENVTL. L. REV. 193, 194 (1984).

75. *Id.* at 227. The MPRSA was amended by Pub. L. No. 96-572, 94 Stat. 3345 (1974) to bring it in full compliance with the London Dumping Convention.

76. 33 U.S.C. § 1442(a) (1982 & Supp. V 1987).

77. Pub. L. No. 92-532, § 302, 86 Stat. 1052, 1061 (1972) (codified at 16 U.S.C. § 1432 (1988)).

ilar to Annexes II & III of the London Dumping Convention, Title I also allows the dumping of less dangerous materials through an EPA established permitting scheme. The MPRSA, however, does not specifically include plastics in its blacklist of prohibited materials. Nevertheless, plastics are included in the dumping blacklist of the EPA regulations implementing the Act: "The ocean dumping of the following materials will not be approved . . . (d)[p]ersistent inert synthetic or natural materials which may float or remain in suspension in the ocean."[78] This definition is nearly identical to the definition of persistent materials in the London Dumping Convention. Likewise, the blacklists of prohibited materials in the Convention and the MPRSA are very similar with one exception; the MPRSA goes beyond the obligations imposed by the London Dumping Convention by also prohibiting the ocean dumping of "[k]nown carcinogens, mutagens, or teratogens or materials suspected to be carcinogens, mutagens, or teratogens by responsible scientific opinion."[79] Although there is no evidence that the EPA has treated plastics as though they were potentially cancer causing, this section technically covers certain plastics.

The EPA implementation regulations curiously separate the materials, which fall under the dumping blacklist, into two categories. Category one materials include plastics, high-level radioactive wastes, and chemical and biological warfare agents.[80] As required by the London Dumping Convention, category one materials cannot be dumped under any condition. Category two covers the remaining prohibited materials: organohalogen, mercury and its compounds, cadmium and its compounds, oil of any kind, and materials which are, or suspected to be, carcinogens, mutagens, or teratogens.[81]

Unfortunately, there is a major loophole in the MPRSA. The second category of materials may be dumped under emergency conditions. On its face this seems acceptable; the London Dumping Convention allows emergency dumping to protect human life when the vessel is threatened and dumping is the only way to lessen the threat.[82] The EPA, however, allows emergency dumping when there is no other feasible solution and does not limit this "to circumstances requiring immediate action."[83] The result is that one can get a permit

78. 40 C.F.R. § 227.5(d) (1989).
79. 40 C.F.R. § 227.6(a)(5) (1989).
80. 40 C.F.R. § 227.5 (1989).
81. 40 C.F.R. § 227.6 (1989).
82. London Dumping Convention, *supra* note 54, art. V, para. 1, at 2408.
83. 40 C.F.R. § 220.3(c) (1989).

to "emergency" dump blacklisted materials.[84] This is contrary to the obligations imposed by the London Dumping Convention and is "susceptible to abusive application."[85]

### 2. *Scope of the MPRSA*

The London Dumping Convention and the MPRSA do not bar every type of dumping of the blacklisted materials. The MRPSA focuses on the purposeful transportation and ocean dumping of prohibited materials from land-based sources in the United States. Under the MPRSA, dumping does "not include an activity which has as its primary purpose a result other than 'a disposition of material' . . . ."[86] Under the Act if the transportation[87] is by a vessel or aircraft registered in the United States or flying the United States flag, the dumping of banned substances is prohibited in ocean waters[88] anywhere in the world.[89] The MPRSA also prohibits the transportation and dumping of any material transported from the United States or from outside the United States into the territorial sea or contiguous zone of the United States. At the time of the Act's passage in 1972, the territorial sea and contiguous zone extended twelve miles.[90]

### 3. *Extending the Reach of the MPRSA*

Under the 1982 United Nations Convention on the Law of the Sea (UNCLOS III),[91] signatories are allowed to establish an exclusive economic zone (EEZ) which can extend two hundred nautical miles from the baselines from which the breadth of the territorial sea is measured.[92] Under Article 56 of UNCLOS III, states are allowed to exercise sovereign rights for particular purposes in the EEZ, such as the jurisdiction to protect and preserve the marine environment. Although

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84. *Id.*

85. W. RODGERS, ENVIRONMENTAL LAW § 4.16, at 494 (1977).

86. S. REP. NO. 451, 92d Cong., 2d Sess. 3 (1971), *reprinted in* 1972 U.S. CODE CONG. & ADMIN. NEWS 4234, 4255.

87. The MPRSA defines "transportation" or "transport" as "the carriage and related handling of any material by a vessel, or by any other vehicle, including aircraft." 33 U.S.C. § 1402(k) (1982).

88. "'Ocean waters' means those waters of the open seas lying seaward of the base line from which the territorial sea is measured . . . ." 33 U.S.C. § 1402(b) (1982).

89. *But see supra* text accompanying notes 83-84.

90. J. KINDT, *supra* note 69, at 1111.

91. U.N. Doc. A/CONF.62/122 (1982), *reprinted in* 21 I.L.M. 1261-1354 (1982) [hereinafter UNCLOS III].

92. *Id.* art. 57.

states have some sovereign rights in the EEZ, they do not have absolute sovereignty over the zone.[93]

UNCLOS III gives a state certain rights within its EEZ to protect the marine environment. Under Article 211(5) coastal states may "adopt laws and regulations for the prevention, reduction and control of pollution from vessels conforming to and giving effect to generally accepted international rules and standards."[94] If a vessel violates these rules or standards while in the EEZ, the coastal state may take enforcement action. When there is reason to believe that a vessel in the EEZ has violated a state's lawful environmental rules and regulations, the state may require the vessel to give any relevant information to establish whether a violation has occurred.[95] If the vessel has committed a violation resulting in a "substantial discharge causing or threatening significant pollution of the marine environment" or has refused to supply, or has given misleading information, the coastal state may then physically inspect the vessel.[96] Based on the information obtained, if there is clear objective evidence that the violation has caused or threatens "major damage to the coastline or related interests of the coastal State," the state may institute proceedings against the vessel which may include detention.[97]

Although the United States was not one of the 149 delegations that signed UNCLOS III,[98] the EEZ provisions may apply to the United States as customary international law. Whether UNCLOS III has achieved the status of customary international law is uncertain. In support of the proposition that UNCLOS III has achieved this status, one author has stated "[o]nce a convention is signed by a vast majority of the international community, its stature as customary international law is thereby strengthened, as such signatures are a clear evidence of an *opinio juris* that the convention contains generally acceptable principles."[99]

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93. The "sovereign rights" versus "sovereignty" wording was deliberate and was the same approach used in the 1958 Continental Shelf Convention. It underscores the intent of UNCLOS III that a state's jurisdiction in the EEZ is limited. Juda, *The Exclusive Economic Zone: Compatibility of National Claims and the UN Convention on the Law of the Sea*, 16 OCEAN DEV. AND INT'L L. 1, 5-6 (1986).

94. UNCLOS III, *supra* note 91.

95. *Id.* art. 220(3).

96. *Id.* art. 220(5).

97. *Id.* art. 220(6).

98. The United States refused to sign UNCLOS III because of its seabed mining provisions. Malone, *Law of the Sea and Oceans Policy*, 82 DEP'T ST. BULL., Oct. 1982, at 48-50 (statement before the House Foreign Affairs Comm., Aug. 12, 1982).

99. Sohn, *The Law of the Sea: Customary International Law Developments*, 34 AM. U.L. REV. 271, 279 (1985). *See also* MaCrae, *Customary International Law and the United Nation's*

Apparently the United States also regards a substantial part of UNCLOS III as customary international law. On March 10, 1983, President Reagan declared a two hundred nautical mile EEZ for the United States.[100] One reason cited by the President for doing so was to "enable the United States to take limited additional steps to protect the marine environment."[101] On September 24, 1984, the Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs stated "the United States believes that most of the provisions of the treaty, apart from the seabed mining text . . . , fairly balance the interests of all states and are fully consistent with norms of customary international law."[102]

Assuming both international law and domestic policy now recognize the right to regulate the ocean dumping of plastics within the EEZ, the United States should go beyond the jurisdictional confines imposed by the London Dumping Convention by expanding the reach of the MPRSA. The MPRSA, in its present form, does not prohibit foreign source dumping by non-United States flag ships within its EEZ; it only prohibits such dumping in U.S. territorial waters. The United States should amend the MPRSA to prohibit such dumping through the enforcement procedures established in Article 220 of UNCLOS III. It has both the right and responsibility to do that under international law.

### 4. *Enforcement*

To enable the enforcement of the MPRSA, the Coast Guard has authority to conduct surveillance and any other appropriate activity.[103] If a violation can be proved, the Act provides several remedies. First, one who violates any provision of the Act or its promulgated regulations may be civilly liable for up to $50,000 for each violation.[104] A knowing violation is a criminal offense which may result in a fine of up to $50,000, or up to one year imprisonment, or both.[105] Equitable

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*Law of the Sea Treaty*, 13 CALIF. W. INT'L L.J. 181, 222 (1983). It is clear that extensions such as the EEZ "have been greeted with majority support of the nations of the world, making such extension[s] the new customary norm." *Id.*

100. President's Statement on United States Ocean Policy, 19 WEEKLY COMP. PRES. DOC. 383-85 (Mar. 10, 1983), *reprinted in* 22 I.L.M. 464-65 (1983).

101. *Id.* at 464.

102. Malone, *Freedom and Opportunity: Foundation for a Dynamic Oceans Policy*, 84 DEP'T ST. BULL., Dec. 1984, at 76, 77 (speaking before the Law of the Sea Institute, Sept. 24, 1984).

103. 33 U.S.C. § 1417(c) (1982).

104. 33 U.S.C. § 1415(a) (1982).

105. 33 U.S.C. § 1415(b) (1982).

relief, in the form of an injunction, is also provided in the Act.[106] The vessels of violating parties are liable *in rem* for any unpaid penalty or fine.[107] In addition to government enforcement of the MPRSA, civil suits by private persons are allowed. Any person may bring suit in federal district court "to enjoin any person, including the United States and any other governmental instrumentality or agency . . . who is alleged to be in violation of any prohibition, limitation, criterion, or permit established or issued by or under this subchapter."[108]

In *Save Our Sound Fisheries Association v. Callaway*,[109] a question arose as to the scope of the citizen suit provision of the MPRSA. The Secretary of the Army argued that the citizen suit provision of the MPRSA was designed only to insure that all persons comply with the substantive standards provided by law "and that no provision is made for a 'citizen suit' to enforce agency compliance with the procedural requirements of the law."[110] In dicta, the court refuted the Secretary's argument based on the statute's broad language allowing such suits.[111] Thus, if this dicta is subsequently followed, the federal courts should be available to all persons wishing to enforce the procedural and substantive standards of the MPRSA.[112]

### C. *Effectiveness of the London Dumping Convention and the MPRSA*

The London Dumping Convention and the MPRSA have been in force since 1975 and 1972, respectively. The problem of plastics in the marine environment, however, continues to grow. Both the London Dumping Convention and the MPRSA contemplate regulation of vessels which intend to dump. These regulating mechanisms are designed to set up permitting conditions for materials which can be safely dumped and to prohibit the dumping of unsafe materials. The principal sources of marine plastics are vessels which dump plastics as a byproduct of their primary mission. Vessels whose primary mission is fishing, cargo transport, or carrying passengers are primary examples.

One way to make the MPRSA more effective would be to amend it to cover incidental ocean dumping as well. If this were done all pollu-

106. 33 U.S.C. § 1415(d) (1982).
107. 33 U.S.C. § 1415(e) (1982). Exceptions are provided for certain public vessels. *Id.*
108. 33 U.S.C. § 1415(g)(1) (1982).
109. 387 F. Supp. 292, 298 (D.R.I. 1974).
110. *Id.* at 299.
111. *Id.* at 299-300.
112. *See* Kuersteiner & Herbach, *In Pursuit of Clean Oceans — A Review of the Marine Protection, Research, and Sanctuaries Act*, 18 SANTA CLARA L. REV. 157, 173-75 (1978).

ters would be potentially liable. This would create an enforcement problem, however, because the number of potential violators is equal to the number of ships in the ocean. By amending MPRSA to cover incidental dumping, the Act, which includes a very beneficial citizen suit provision, could then be used in conjunction with more recent legislative efforts for a more effective result.

## IV. LEGAL CONTROLS ON PLASTIC POLLUTION — VESSEL-SOURCE POLLUTION

The London Dumping Convention and the MPRSA have proved not to be successful in dealing with plastic marine pollution, even though this was one of their main purposes. As discussed earlier, the focus of the Convention and the MPRSA is ineffective when applied to plastics. More recent legal mechanisms that focus on vessel-source pollution may prove to be more successful.

### *A. The International Convention for the Prevention of Pollution from Ships*

Vessel-source pollution refers to all types of pollution which originate from vessels regardless of their type or purpose.[113] This concept is distinguishable from the notion of pollution from ships whose sole purpose is to ocean dump pollutants from land-based sources. The London Dumping Convention and the MPRSA only address the latter source.

Pushed by a strong domestic environmental movement, the United States took the initiative to organize the International Conference on Marine Pollution, which was held on October 8, 1973.[114] The result of the conference was the International Convention for the Prevention of Pollution from Ships (MARPOL).[115] MARPOL provides the legal mechanism for regulating five particular types of ship-generated pollution through each of its five annexes: Annex I—oil; Annex II—noxious liquid substances carried in bulk;[116] Annex III —harmful

113. J. KINDT, *supra* note 69, at 1155.

114. Comment, *Vessel-Source Oil Pollution and MARPOL 73/78: An International Success Story?*, 15 ENVTL. L. 679, 693 (1985).

115. MARPOL, *supra* note 55.

116. Annexes I and II are known as the mandatory annexes. MARPOL could not enter into force until a sufficient number of countries accepted both. Because of the strict standards imposed by Annex II, MARPOL did not enter into force until the standards were amended by the 1978 Protocol to MARPOL. Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, Feb. 17, 1978, *reprinted in* 17 I.L.M. 546 (1982).

In 1980 the United States adopted the mandatory annexes of MARPOL, as amended by the MARPOL protocol of 1978, by its passage of the Act to Prevent Pollution from Ships, Pub. L. No. 96-478, 94 Stat. 2297 (1980) (codified as amended at 33 U.S.C. §§ 1901-1911 (1987)).

substances in packaged form; Annex IV—sewage; and, Annex V—garbage, including plastics.[117]

### 1. *Scope*

The basic objective of Annex V of MARPOL is to eliminate the indiscriminate dumping of floatable wastes in order to protect the marine environment, water quality, and the aesthetic benefits of clean oceans and beaches.[118] To accomplish this goal Annex V acts as a total bar to the dumping of plastics in the marine environment. It prohibits "the disposal into the sea of all plastics, including but not limited to synthetic ropes, synthetic fishing nets and plastic garbage bags."[119] If a country adopts Annex V, all ships[120] flying the flag of that country or under the authority of that country must comply, regardless of location.[121] The only exceptions to the plastic dumping prohibitions of Annex V are: 1) when the dumping is necessary to secure the safety of the ship or crew, or to save life at sea; 2) when plastic is dumped resulting from damage to a ship or its equipment after all reasonable precautions are taken to prevent the escape of plastics; and, 3) when synthetic fishing nets are lost, provided all reasonable efforts are taken to minimize or prevent such a loss.[122] From a pollution prevention viewpoint, the first two exceptions are insignificant; however, the third exception does weaken the effectiveness of Annex V. In addition, MARPOL, and more specifically Annex V, does not apply to warships and other government vessels in operation for non-commercial services.[123]

### 2. *Enforcement*

MARPOL contains a number of enforcement provisions concerning inspection of ships and reporting of any violations found pursuant to an inspection. Parties to MARPOL may, at any of their ports or offshore terminal facilities, inspect any ship to determine if it has

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117. Annexes III, IV, and V are known as the optional annexes. A country can become a party to MARPOL without accepting any of the optional annexes, but they can adopt them later if they wish. MARPOL, *supra* note 55, art. 14, at 1328.

118. *Hearings I*, *supra* note 7, at 24, 25 (testimony of Senator Bentsen).

119. MARPOL, *supra* note 55, Annex V, reg. 3, at 1435.

120. A ship is defined as "any vessel of any type whatsoever operating in the marine environment and includes hydrofoil boats, air-cushion vehicles, submersibles, floating craft and fixed or floating platforms." *Id.* art. 2, at 1321.

121. *Id.* art. 3, at 1321.

122. *Id.* Annex V, reg. 6, at 1438.

123. *Id.* art. 3, at 1321.

dumped any harmful substances.[124] If an inspection reveals a violation of MARPOL, a report shall be made to the government of the State under whose authority the ship is operating.[125] Generally, the report should: identify the ship; give the time, date, and place of the incident; include wind and sea conditions at the time of the incident; and, include any relevant details as to the condition of the ship.[126] Specifically, the report must describe the unlawful discharge.[127] The government of the violator is required to investigate the matter, and may request the reporting party to furnish additional or better evidence of the alleged violation. If the government of the alleged violator determines the evidence in the report is sufficient to find a violation, it is then required to take action against the violating ship and promptly inform the reporting state and the Inter-Governmental Maritime Consultative Organization (IMCO) of what action was taken.[128]

Instead of reporting a violation of MARPOL to the government of the violating ship, a party to MARPOL has the option of instituting proceedings against the violator on its own.[129] In either case the penalties given "shall be adequate in severity to discourage violations of the present Convention and shall be equally severe irrespective of where the violations occur."[130]

These detailed enforcement provisions of MARPOL appear to be slanted towards enforcement against dumpers of chemicals and oils. Given that plastics, as opposed to chemicals and oils, are usually difficult to trace to a violating vessel, the reporting and enforcement provisions of the main body are of questionable value. Even if plastic dumping could be traced, since every ship is a potential dumper, significant enforcement would be economically burdensome.

### 3. *Annex V*

Annex V of MARPOL resolves some of the shortcomings of MARPOL by imposing additional requirements on contracting parties. Contracting parties to Annex V are required to provide at their ports and offshore terminals, facilities for the reception of plastics and other garbage according to the needs of the ships using them.[131] Since all ships generate plastic garbage to some extent, by the terms of this

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124. *Id.* art. 6(2), at 1324.
125. *Id.*
126. *Id.* Protocol I, art. IV, at 1440.
127. *Id.*
128. *Id.* art. 4(3), at 1322.
129. *Id.* art. 4(2)(a), at 1322.
130. *Id.* art. 4(4), at 1322.
131. *Id.* Annex V, reg. 7, at 1438.

Annex all ports and offshore terminal facilities must be equipped to handle plastics disposal. Further, these reception facilities must be sufficient to prevent "undue delay to ships."[132] Parties to Annex V may complain to the IMCO if they believe the facilities of another party are inadequate.[133] Presumably, these reception facilities would make voluntary compliance on the part of vessel operators much easier and, as a result, make significant progress toward plastics control. Mandating these facilities is the major innovation of MARPOL. Rather than merely outlawing the dumping of certain substances, it provides an alternative to ocean disposal.

The presence of plastics in the marine environment is so widespread, and the sources so limitless, that the only effective way to deal with this problem is through voluntary compliance bolstered by education. Annex V makes voluntary compliance much easier.

### *B. The Marine Plastic Pollution Research and Control Act of 1987*

As one of the optional annexes, Annex V would only take effect one year after fifteen states, representing at least fifty percent of the world's merchant shipping tonnage, became parties to the Annex.[134] This eventuality occurred when the United States Senate ratified Annex V of MARPOL on November 5, 1987[135] and the President signed the Marine Plastic Pollution Research and Control Act of 1987, on December 29, 1987.[136] Therefore, Annex V went into force on December 31, 1988.[137]

Simply stated, the Marine Plastic Control Act declares that no person on board a United States ship, wherever located, may dump plastics into the sea. Moreover, no person on board a foreign flag ship, either a party or non-party to MARPOL, may dump plastics into the navigable waters or EEZ of the United States.[138] In order to enforce Annex V of MARPOL, the Marine Plastic Control Act amends the Act to Prevent Pollution from Ships.[139] Since the Marine Plastic Control Act is not separate free-standing legislation, most of the provi-

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132. *Id.*
133. *Id.* Annex V, reg. 7(2), at 1438.
134. *Id.* art. 15(1), at 1329.
135. 133 CONG. REC. S15845 (daily ed. Nov. 5, 1987) (ratification of MARPOL).
136. 33 U.S.C.A. §§ 1901-1912 (West Supp. 1989).
137. 53 Fed. Reg. 23,884, 23,885 (1988) (background for rules codified at 33 C.F.R. pts. 151, 158) (proposed June 24, 1988).
138. 33 U.S.C.A. § 1902 (West Supp. 1989).
139. 33 U.S.C. §§ 1901-1911 (1982).

sions of the Act to Prevent Pollution From Ships apply to the Marine Plastic Control Act as well.

### 1. *Ship Inspections*

As required by Annex V of MARPOL, the Marine Plastic Control Act provides for port and offshore terminal inspections. Unlike Annex V, it allows for inspections of any ship anywhere in the navigable waters or EEZ of the United States.[140] This extension is apparently based on recent developments in international law.

### 2. *Garbage Reception Facilities*

Pursuant to Annex V, the Marine Plastic Control Act requires ports and offshore terminals to provide garbage reception facilities.[141] These facilities are required to adhere to certain regulations.[142] If a port or offshore terminal does not comply with these regulations, the Secretary of Commerce has authority to deny a ship entry to the port or terminal. The cost of providing such facilities is not likely to be substantial. For example, one solid and hazardous waste disposal company says it would cost only thirty to seventy-five dollars to dispose of the solid waste a ship with a crew of fifty would produce on a ten day voyage.[143]

### 3. *Penalties*

The Marine Plastic Control Act adopts the penalty provisions of the Act to Prevent Pollution From Ships. Any person[144] can be found civilly liable for up to $25,000 for each violation and up to $5,000 for false, fictitious statements or representations made to the Secretary of Commerce.[145] Moreover, persons who knowingly violate the Act are subject to a criminal fine not to exceed $50,000 or may be imprisoned for up to five years, or both.[146] Failure to pay a fine can be enforced

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140. 33 U.S.C.A. § 1901 (West Supp. 1989).

141. *Id.* § 1905.

142. Reception Facilities for Oil, Noxious Liquid Substances, and Garbage, 33 C.F.R. pt. 158 (1989).

143. *Hearings II*, *supra* note 12, at 340, 345-46 (statement of J. Greco, Browning-Ferris Industries).

144. A "person" is defined as an "individual, firm, public or private corporation, partnership, association, State, municipality, commission, political subdivision of a State, or any interstate body." 33 U.S.C.A. § 1901(6) (West Supp. 1989).

145. *Id.* § 1908(b). Civil penalties are assessed by the Secretary of Commerce. *Id.*

146. *Id.*

in federal district court where vessels are liable *in rem* and become jural entities for the proceedings.[147]

The Marine Plastic Control Act does add one interesting feature to the Act to Prevent Pollution From Ships. It contains a "squealer" provision which allows an informer to collect up to one-half of the resulting fine or penalty for information leading to a conviction or civil assessment.[148] The squealer provision should lead to more effective enforcement. Potentially, Annex V can be very successful in stemming the tide of plastic marine pollution for two reasons: first, it requires shoreside reception facilities; and second, it has been shown that the compliance rate for Annexes I and II is over ninety-five percent for several countries.[149]

### 4. *The High Seas*

Like the London Dumping Convention and its domestic twin the MPRSA, Annex V of MARPOL does not solve the problem of the ocean dumping of plastics. A significant part of the dumping problem occurs outside any state's territorial waters and the policing powers of Annex V are ineffective on the high seas. Although Annex V does not provide for the policing of the high seas, it does allow for the inspection of ships when they dock. It would be difficult for a ship's captain to explain to an inspector that a two-week cruise through the Caribbean produced no garbage. The proposed regulations for the implementation of Annex V envisioned this problem and provided for a rebuttable presumption of noncompliance:

> unless the person in charge of a ship can prove that no plastics are on board which might require disposal ashore, that person must discharge ship-generated garbage . . . . If the master, operator, or person in charge of a ship has plastics requiring disposal aboard the ship and cannot show compliance . . . it will be presumed that Annex V of MARPOL 73/78 has been violated.[150]

These regulations when enacted, however, were not as strong because they lost the rebuttable presumption. The current regulations require the ship's master to properly dispose of ship's garbage, and list fac-

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147. *Id.* § 1908(d).

148. *Id.* § 1908(a).

149. *Hearings II*, *supra* note 12, at 76, 79 (testimony of Rear Admiral J. William Kime).

150. 53 Fed. Reg. 43,622, 43,629 (1988) (proposed Oct. 27, 1988) (codified as amended at 33 C.F.R. § 151.63 (1989)).

tors which can be considered by inspectors in evaluating compliance.[151]

Thus, ships seeking entry to the United States have several options in complying with Annex V. They can eliminate the use of plastic disposable items, use on-board incinerators to incinerate their plastics at sea, dispose of their plastics at a port or offshore terminal reception facility, or face a compliance inspection.

## C. *Derelict Netting*

Although Annex V of MARPOL appears promising in controlling most vessel-source pollution, its treatment of derelict netting is a definite weakness. MARPOL has no system in place to verify if a loss is accidental or an allowable exception, or to determine the purposeful discharge of netting on the high seas.

### *1. Accidental Loss Within the EEZ*

Annex V does not apply specifically to "the accidental loss of synthetic fishing nets or synthetic material incidental to the repair of such nets, provided that all reasonable precautions have been taken."[152] Unfortunately, it is virtually impossible to determine if a loss of such material is accidental unless a fishing vessel is in the EEZ of a country and that country has an observer on board to verify net loss.

An observer program for foreign vessels is provided for under the Magnuson Fisheries Conservation and Management Act.[153] This observer program, however, is only designed to guard against intentional discarding of netting.[154] The program could be more effective by requiring observers to report accidental losses to the Coast Guard for possible recovery. Since observers are not on domestic vessels, the Magnuson Act's permit system should be modified to implement a reporting and inventory system to prevent accidental losses. "By requiring vessel operators to inventory their gear before going to sea and upon return, the government could maintain accurate records of lost gear and penalize the operator accordingly."[155] That requirement would encourage fishing vessels to take added precautions against accidental losses.

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151. 33 C.F.R. § 151.63 (1989).

152. MARPOL, *supra* note 55, Annex V, reg. 6(c), at 1438.

153. 16 U.S.C.A. § 1821(i) (West 1985 & Supp. 1989).

154. 50 C.F.R. § 611.12 (1987).

155. Comment, *The Ghosts of Fishing Nets Past: A Proposal for Regulating Derelict Synthetic Fishing Nets*, 63 WASH. L. REV. 677, 691 (1988).

### 2. *Control of Derelict Netting on the High Seas*

Controlling the loss of netting on the high seas is an even more difficult problem than doing so within the EEZ. No high seas observer program exists and requiring flag states to police their own fishing vessels has not been effective. The Driftnet Impact Monitoring, Assessment, and Control Act of 1987 attempts to address this problem.[156] In part, this Act calls for the Secretary of Commerce to evaluate the feasibility "of a driftnet marking, registry, and identification system to provide a reliable method for the determination of the origin by vessel of lost, discarded, or abandoned driftnets."[157] The Act also calls for an evaluation of the feasibility of constructing driftnets from materials with faster decomposition rates.[158] Finally, the Act requires a feasibility study of a driftnet bounty system.[159] If these studies bear fruit, solutions to this difficult problem may be implemented soon.

## V. CONCLUSION

Annex V of MARPOL and the London Dumping Convention are both significant steps toward controlling the problem of plastics in the marine environment. Annex V promises to be much more effective than the London Dumping Convention has been thus far. One might even be tempted to conclude that the London Dumping Convention is fatally flawed and that it would be a waste of time to continue to use the Convention as a vehicle to address the problem of the ocean dumping of plastics. This conclusion would be a mistake.

The London Dumping Convention has been ratified by sixty-five countries; only thirty-eight countries have ratified MARPOL and even less have ratified Annex V.[160] Until a more significant number of countries are alerted to the problem and convinced to adopt MARPOL and Annex V, the London Dumping Convention will have to suffice. As such, it should be interpreted as broadly as possible and perhaps amended to achieve its fundamental goals.

In the effort to control plastic pollution, education is one tool that cannot be overlooked. All people and industries who use the sea must be made aware of the plastics problem through educational programs.

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156. *See* Pub. L. No. 100-220, §§ 4001-4009, 101 Stat. 1458, 1477-1480 (codified at 16 U.S.C.A. § 1822 note (West Supp. 1989)).

157. *Id.* § 4007(a).

158. *Id.* § 4007(b).

159. *Id.* § 4007(c).

160. Lentz, *Plastics in the Marine Environment: Legal Approaches for International Action*, 18 MARINE POLLUTION BULL. 361, 363 (1987).

One such program is conducted by the National Marine Fisheries Service to educate members of the fishing industry about the problems created by lost fishing gear.[161] Similar programs directed toward other plastic polluters should be initiated. Voluntary compliance cannot be overemphasized; forced compliance can only go so far.

Other efforts may also help to solve the problem. Recently, Congress passed legislation which requires all plastic beverage ring carriers to be made from naturally degradable material.[162] Sixteen states had previously passed similar laws.[163] Other plastic devices could also be made degradable.

The very serious problem of plastics in the marine environment is being addressed through many varied and well-intended programs. Those programs are only the foundation for the total effort required to win this ever-expanding battle. We must continue to fight this battle with the tools available and develop new weapons to combat future problems. We cannot leave future generations a legacy of unclean and unhealthy oceans. Our conscience requires solutions, our oceans demand them.

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161. *Hearings II*, *supra* note 12, at 322 (testimony of the Entanglement Network Coalition).

162. Act of Oct. 28, 1988, Pub. L. No. 100-556, 102 Stat. 2779 (codified at 42 U.S.C.A. 6914B (West Supp. 1989)).

163. *Id.* § 101.