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Stuart Weinstein-Bacal

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The Ocean Dumping Dilemma*

STUART WEINSTEIN-BACAL†

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“And I have loved thee, Ocean! and my joy Of youthful sports was
on thy breast to be Borne, like thy bubbles, onward; from a boy I
wantoned with thy breakers, . . . And trusted to thy billows far
and near, And laid my hand upon thy mane, as I do here.”

Lord Byron

* For a comprehensive analysis of ocean dumping and the problems it generates, *see generally* Ocean Dumping: Hearings on H.R. 4297 and Ocean Dumping Oversight Before the Subcomm. on Fisheries and Wildlife and the Subcomm. on Oceanography of the House Merchant Marine and Fisheries Comm., 95th Cong., 1st & 2d Sess. (1977); The Environmental Effects of Dumping in the Oceans and Great Lakes: Hearings Before the Subcomm. on the Environment and the Atmosphere of the House Comm. on Science and Technology, 94th Cong., 1st Sess. (1975); Ocean Dumping: Joint Hearings Before the Subcomm. on Fisheries and Wildlife Conservation and the Environment and the Subcomm. on Oceanography of the House Committee on Merchant Marine and Fisheries, 94th Cong., 1st and 2d Sess., Parts 1, 2 and 3 (1975-76).

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INTRODUCTION

The ecological balance of the earth's oceans is constantly challenged by the industrial nations. These nations use the oceans as an ultimate receptacle for the vast quantities of waste material generated by their production and consumption oriented societies.¹ As the projected goals of the United Nations New International Economic

1.

TABLE I

Amounts of Waste & Other Matter Authorized for Ocean Dumping
by Contracting Parties to the Ocean Dumping Convention

COUNTRY	TYPE OF MATERIAL	NUMBER OF PERMITS	TOTAL AMOUNTS AUTHORIZED
USA	Industrial sludges (drums)	1	25,000 tons
	Industrial sludges (drums)	1	50,000 t
	Ammunition		3.9 t
	Sewage sludges	18	5,750,000 t
	Excavation materials	2	920,000 cu. mtrs. 350,000 t
	Diluted acids	3	2,799,000 t
	Aqueous solutions & liquids	25	915,000 t
	Industrial sludges	6	189,000 t
	Drilling muds	1	7,000 cu. mtrs.
	Dredged materials	187	50,000,000 cu. mtrs.
Canada	Industrial sludges	1	907 t
	Industrial liquids	1	1,820,000 t
	Fish offal	1	400 kg.
	Excavated materials	2	99,500 cu. mtrs.
	Ships	7	2 vessels
	Oil & dispersants	1	350 l
	Radioactive tracer	1	1 kg.
United Kingdom	Sludges (drums)	3	240 t
	Solids (drums)	6	785 t
	Liquids	1	2,500 t
	Sludges	9	6,910 t
	Solids	1	2,000 t
U.K. (Hong Kong Govt.)	Ammunition	1	110,668 cu. mtrs.
The Netherlands	Aqueous solutions & liquids	1	6,000 t
	Dredged materials	3	2,751,000 cu. mtrs
Fed. Republic of Germany	Diluted solids	1	750,000 t
Denmark	Industrial wastes (liquid)	1	22,400 t
	Dredged materials	5	360,000 cu. mtrs.

Order (NIEO)² are realized, and developing nations in the world "progress" to more sophisticated stages of the industrialization process, the future of the oceans will be imperiled by the waste-generating societies which will undoubtedly be spawned across the globe. Despite current trends toward ultimately terminating the dumping of harmful materials into the oceans,³ environmental disruption may be unavoidable as nations neither technologically nor methaphysically⁴ prepared to handle complex waste disposal prob-

TABLE II
UNITED STATES OCEAN DUMPING, 1973-1977 (approx. tons)

WASTE TYPE	1973	1974	1975	1976	1977
Industrial Waste	5,050,800	4,592,000	3,446,000	2,733,500	1,848,800
Sewage Sludge	4,898,900	5,010,000	5,039,600	5,270,900	5,134,000
Construction and Demolition Debris	973,700	770,400	395,900	314,600	379,000
Solid Waste	240	200	0	0	100
Explosives	0	0	0	0	0
Incinerated (wood)	10,600	15,800	6,200	8,700	15,000
Incinerated (chemicals)	0	12,300	4,100	0	29,700
TOTAL	10,934,440	10,400,700	8,891,800	8,327,700	7,406,600

OCEAN DUMPING IN THE UNITED STATES: Sixth Annual Report of the Environmental Protection Agency on Administration of Title I, Marine Protection, Research, and Sanctuaries Act of 1972, as amended, January-December 1977, at 12, 20. See also note 45 *infra*.

2. See Declaration on the Establishment of a New International Economic Order (NIEO), G.A. Res. 3201 (S-VI), *adopted* May 9, 1974, U.N. Doc. A/Res/3201 (S-IV), *reprinted* in 13 INT'L LEGAL MATERIALS, at 715 (1974).

3. Letter from Douglas M. Costle, Administrator, Environmental Protection Agency to Hon. John M. Murphy, Chairman, House of Representatives Committee on Merchant Marine and Fisheries, July 6, 1978 [hereinafter cited as Costle letter], "The United States now has one of the most stringent and advanced ocean dumping regulatory programs in the world, and EPA has the most comprehensive marine pollution research and monitoring program in the Federal government." See also Marine Protection, Research and Sanctuaries Act of 1972, 33 U.S.C. §§ 1401-87 (Supp. IV 1974) [hereinafter cited as the Ocean Dumping Act]; Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters, *signed* at Oslo, Feb. 15, 1972 (*adopted* Nov. 13, 1972), 11 INT'L LEGAL MATERIALS 1294 (1972) [hereinafter cited as the London Convention].

4. Developing nations are unimpressed by the dilatory environmental chivalry of developed nations which while themselves industrializing polluted with impunity. These nations are not easily swayed by arguments favoring strong environmental protection measures, believing that if such stringent standards are applied to them their development will be considerably more difficult, expensive, and inconvenient. England only recently began ocean dumping its sewage sludge and is disturbed by the U.S. example of strictly controlling such dumping. One can imagine how a developing nation might view some developed nations' self righteous attitude toward pollution control.

lems turn increasingly to the oceans as the final disposal system for their wastes.⁵

It is imperative that peoples of all countries comprehend that the oceans, which belong to us all—in fact, resources of the deep seabeds of the oceans have come to be referred to as the “common heritage of mankind”—⁶ are incapable of serving as a garbage-disposal system for all of the detritus of humanity. Certainly, the oceans *are* capable of absorbing vast quantities of pollutants, both natural and artificial. Many of the substances we think of as pollutants exist naturally in varying quantities in the oceans—salts, sediments, metals and other matter, toxic and non-toxic. The *quaere* must be: How much of an “excess”⁷ of these various materials can the oceans tolerate?⁸

Centuries ago, Hugo Grotius’ *mare liberum* envisioned the oceans as:

that expanse of water which antiquity describes as the immense, the infinite, bounded only by the heavens, parent of all things; the ocean which the ancients believed was perpetually supplied with water not only by fountains, rivers, and seas, but by clouds, and by the very stars of heaven themselves; the ocean which, although surrounding this earth, the home of the human race, with the ebb and flow of its tides, can be neither seized nor enclosed; nay, which rather possesses the earth than is by it possessed. . . .⁹

5. It must be considered at the inception of any serious discussion of ocean pollution that:

contamination of the ocean has begun. Chemical wastes from factories, domestic waste and sewage from cities and towns, insecticides and fertilizers from land runoff, atmospheric fallout of gasoline vapors, low level radioactive wastes from reactors, laboratories and hospitals are all flowing into the ocean. The sheer bulk of the material disposed of and the presence of new types of nondegradable waste products are now beginning to affect the ocean at an increasing rate.

See E. WENK, *THE POLITICS OF THE OCEAN* 175 (1973).

6. Declaration of Principles regarding the seabed and the ocean floor and the subsoil thereof, beyond the limits of national jurisdiction, G.A. Res. 2749 (XXV), 25 U.N. GAOR, Supp. (No. 28), at 24, U.N. Doc. A/8028 (1971).

7. Bascom, 231 *SCIENT. AM.* (No. 2) 16, 16 (1974).

8. It becomes alarming, indeed, when concentrations of heavy metals in dredge spoils in a coastal area reach levels of toxicity where the concentration of metal found therein is equivalent to the concentrations of that metal found in a high grade ore. See H.R. REP. NO. 92-732, 94th Cong., 2d Sess. 24 (1977).

9. Waldchuk, *Control of Marine Pollution: An Essay Review*, 4 *OCEAN DEV. AND INT'L LAW J.* 269, 269 (1977).

... most things become exhausted by promiscuous use and ... appropriation, consequently, is the condition of their utility to human beings. But this is not the case with the sea; it can be exhausted neither by navigation nor by fishing, that is to say, in neither of the two ways in which it can be used.¹⁰

The circumstances have, of course, changed dramatically. Not only have Grotius' traditional uses of the sea been expanded immeasurably,¹¹ but, with the relentless augmentation of the world's population, it is particularly convenient to rely on the oceans as a bottomless waste container. New uses of the oceans—ocean dumping, offshore drilling, seabed mining,¹² recreation, mariculture,¹³ and others—have combined with the growth among the traditional uses and greatly accelerated the oceans' demise.

It is already a painful reality what man is doing to what is perhaps his most sacred refuge from the chaotic existence he has created for himself; a reality of which most of the world's citizens are not aware, or perhaps of which they do not like to think. The tragedy of that reality is only too evident.¹⁴

Both the sport and commercial fishing industries have been severely disrupted by ocean pollution.¹⁵ One-fifth of U.S. shellfish beds have been closed because of high levels of contamination. Many fishing areas off the United States and Canada have been closed due

10. C. PEARSON, PERSPECTIVES ON OCEAN POLICY 208 (1974).

11. A scholarly discussion of the expansion of the traditional uses of the oceans is beyond the scope of this article. For a thorough treatment of the subject, see generally G. KNIGHT, THE LAW OF THE SEA: CASES, DOCUMENTS AND READINGS (1978).

12. Seabed mining is expected to generate considerable wastes at sea when the extracted manganese nodules are processed aboard special ships and the resulting wastes are dumped overboard. Although a final decision has not yet been made by EPA, counsel there informed the author that such dumping will probably require an ocean dumping permit from EPA under the Ocean Dumping Act. See also text following note 180 *infra*.

13. For a general discussion of mariculture, see generally Shirley, *Mariculture, The Stepchild of the Law of the Sea*, 10 LAW AM. No. 3 (Winter 1978).

14. Thor Heyerdahl's voyages in the "Ra" illustrated the horrors of oil pollution in the ocean. For 1,400 miles of his voyage, the Atlantic Ocean was covered by floating masses of crude oil lumps. See Mapp, *The Marine Pollution Act of 1974: Is It Obsolete Within Six Months of Its Enactment?* AUCKLAND U.L. REV. 27 (1975).

15. Pesticides and other toxic substances cause fish kills in fresh water, and their concentration levels in the ocean rise annually. Effects on fish are varied and dangerous. Size of mollusk shells are reduced, growth and reproductive activity are impaired. See C.E.Q. Rep. to Pres., *OCEAN DUMPING: A National Policy*, 13-17 (1970). [Hereinafter cited as 1970 Ocean Dumping Report].

to high concentrations of mercury found in fish.¹⁶ All of this disruption has resulted in significant economic loss.¹⁷

But perhaps the most subtle and insidious danger posed by the pollution binge on which the modern world, and especially the developed countries, has gone in recent decades is the extreme peril of contaminating the world's food chain.¹⁸ Shellfish in particular absorb heavy metals such as mercury, sometimes in extraordinary concentrations,¹⁹ becoming poisonous to humans while themselves thriving on these materials. The lethal and sublethal effects of potentially great concentrations of poisons in the food chain need little elaboration.

16. Mercury is perhaps the most frightening of all harmful substances man has introduced into the ocean. In the 1950's, villagers in Minimata Bay, Japan, who had eaten mercury contaminated fish suffered blindness, deafness, uncoordination, and intellectual deterioration similar to the symptoms which had for years plagued industrial workers exposed to mercury. The old expression "mad as a hatter" developed from public awareness of the brain damage suffered by hatmakers who worked with mercury treated pelts. See Silverstein, *The Trouble With Mercury: Can Domestic Laws Contain an International Threat?* 5 CORNELL INT'L L.J. 219 (1972). See also Putman, *Quicksilver and Slow Death*, 142 NAT'L GEOG. 507 (1972). Some 52 people died from mercury poisoning in Minimata Bay, and some young people who still suffer the effects were poisoned while in their mother's womb. . . . "The incidents at Minimata Bay make mercury the only substance which, as a pollutant, has directly taken human life." See Silverstein, *supra* at 220.

17. Clamdigging today is virtually nonexistent due to high levels of pollution. Annual shrimp industry catches fell from 6.5 million pounds in 1936 to only 10,000 pounds in 1965. Pesticide contamination has been responsible for making nine species of fish inedible by humans. See 1970 Ocean Dumping Report, *supra* note 15, at 17.

18. Entry of pollutants into living systems is through biological concentration. Billions of phytoplankton organisms act as a great blotter, picking up nutrients, trace metals, and other materials. Organisms which feed on these phytoplankton are subsequently eaten by higher organisms, and thereby the toxic materials in the water are passed up the food chain. The highest concentrations of toxics in the food chain are found in such predators as marine mammals, birds, and man. See Bascom, *supra* note 7, for an excellent discussion of the case of the brown pelican. The North Atlantic provides a graphic example of the food chain process. One thousand pounds of phytoplankton produces:

- 100 pounds of zooplankton or shellfish,
- 50 pounds of anchovies and other smaller fish,
- 10 pounds of smaller carnivores,
- 1 pound of the carnivores harvested by man.

See 1970 Ocean Dumping Report, *supra* note 15, at 12.

19. Heavy metals have been found in toxic concentrations in shellfish, although levels of concentration in the surrounding water were not high. The ability of biota to concentrate materials varies from a few hundred to several thousand times the concentrations in the surrounding environment. 1970 Ocean Dumping Report, *supra* note 15, at 12. See also note 18 *supra*.

Another frightening implication of such potential contamination is the effect on phytoplankton,²⁰ marine microorganisms responsible for producing a significant proportion of the earth's oxygen supply.²¹ The great difficulties involved in predicting phytoplankton productivity further complicate the dangers posed by increased ocean pollution, because such contamination causes varying degrees of growth inhibition in phytoplankton.²²

The ramifications of polluting the seas' phytoplankton population and its concomitant effect on the world's food supply are also extremely disturbing, and may have demonstrable repercussions in the foreseeable future. In a time of growing world population, it is essential to preserve a potentially principal source of protein.²³ One possibly important source of protein for feeding the ever-increasing world population is krill, a tiny shrimplike creature which exists in great swarms in colder waters and is the major link between phytoplankton and the larger animal life in the area of the Antarctic Convergence.²⁴ Summer there attracts some of the world's largest animals—the blue whale, finback whale, and humpback whale, among others.²⁵ This krill is a protein source which the developing nations of the world can ill afford to see polluted.²⁶

20. For a detailed analysis of the importance and function of phytoplankton, see generally Young and Barber, *Effects of Waste Dumping in New York Bight on the Growth of Natural Populations of Phytoplankton*, 5 ENV'TL POLLUTION 237 (1973).

21. See Mapp, *supra* note 14, at 23. Phytoplankton produce "60 percent" of the world's oxygen. But cf. Young and Barber, *supra* note 20.

22. See generally Young and Barber, *supra* note 20.

23. The portion of the world's protein which comes from the sea is presently about 70 million metric tons, approximately ten percent of the total protein produced. Although this is not currently a considerable portion, it is estimated that the amount of protein harvested from the oceans will double in the not too distant future. See Waldchuk, *supra* note 9, at 273.

24. The Antarctic Convergence is an area located generally between latitudes 50° and 60° south, where surface waters from various currents converge, carrying these waters below the surface. Surface living forms are concentrated along its length, and great numbers of predators are attracted to the area, taking advantage of this concentration. See McCONNAUGHEY, AN INTRODUCTION TO MARINE BIOLOGY 13, 332 (1974).

25. *Id.* at 127-28, 332-34.

26. The Japanese are already harvesting significant amounts of krill for domestic consumption. Their krill fleet caught 4,500 tons of it during the 1975-76 season in their first attempt at commercial harvesting thereof. The catch expanded to 11,500 tons in 1976-77; 21,000 tons in 1977-78; and is expected to exceed 40,000 tons in 1978-79. National Marine Fisheries Service (NMFS), NOAA, U.S. Dep't of Commerce Language Services Daily 78-19/CKI (Nov. 3, 1978). The Federal Republic of Germany has invested nearly \$5,000,000 in two vessels for krill exploration in the Antarctic. The Chilean government is also doing research. NMFS, NOAA, U.S. Dep't of Commerce Language Services Daily 77-1/JEM.

Numerous bodies of water throughout the globe have already suffered considerably from the adverse impacts of man's abuse. Some eighty-one percent of the lakes and reservoirs selected for study by the National Eutrophication Study—in the northeastern and north-central United States—were found to be in advanced stages of eutrophication.²⁷ Only six percent of the lakes studied were sufficiently free from pollution to be classed as pristine (oligotrophic).

The shores of United States waterways have been so invaded by pollutants, that evidence indicates the nation already has a number of "dead" seas: some parts of Lake Erie, the Houston Ship Canal, San Pedro Bay, the upper Delaware River, off the Hudson Estuary, and others.²⁸ Elsewhere on earth, the Caspian Sea, the Baltic Sea, the Irish Sea, the Sounds between Sweden and Denmark, the North Sea, and the Sea of Japan can be found in varying stages of entrophication.²⁹ Perhaps the most shocking example of the developed nations' apparent lack of concern about the quality of their waters is the Cuyahoga River in Cleveland, Ohio, which actually burst into flame in 1969.³⁰

Much of the pollution which eventually makes its way into the oceans is not deposited directly into them; they are polluted by means of erosion (natural and man-induced), industrial discharge into rivers, lakes and estuaries,³¹ atmospheric fallout from air pollution,

27. Eutrophication is when a body of water is in a state characterized by an abundant accumulation of nutrients which support a dense growth of plant and animal life, the decay of which depletes the shallow waters of oxygen in warm weather. Random House Dictionary of the English Language, (1967), at 493. See also note 94 *infra*.

This occurs most often when nitrates and phosphates enter the water from agricultural and urban runoff and from sewage treatment plants and industrial discharges. 7 C.E.Q. ANN. REP. 276-77 (1976).

28. See WENK, *supra* note 5, at 176.

29. See Mapp, *supra* note 14, at 24. See also note 93 *infra*. Entrophication is the unrestricted release of organic matter, which ultimately destroys every form of life save anaerobic bacteria.

30. See New York Times, Oct. 8, 1969.

31. See note 37 *infra*. The Federal Water Pollution Control Act (FWPCA), 33 U.S.C. §§ 1251-1376 (Supp. 1970-1977), guidelines should go a long way toward cleaning up pollution in rivers and estuaries in the United States. Such pollution must be closely regulated because of the delicate nature of the ecological balance in these areas. See generally CLARK, COASTAL ECOSYSTEMS MANAGEMENT (1977) and THE WATER'S EDGE: CRITICAL PROBLEMS OF THE COASTAL ZONE (Ketchum ed. 1972).

and leaching³² from solid waste sites. The process by which pollutants are introduced by man directly into the oceans is known familiarly as "ocean dumping", and it is with that aspect of ocean pollution and the regulation thereof with which the remainder of this article will be concerned.

It should already be apparent that there is an urgent need to control man-induced ocean pollution, and the measures which have been implemented at both the domestic and international levels to effectuate such control are occasionally encouraging.³³ Obviously, "our planet cannot indefinitely absorb the insults of man-induced change,"³⁴ and any forthcoming damage caused may be irreversible. It is the purpose of this article to enumerate and evaluate some of the perils, extant and imminent, confronting the oceans, and to consider some of the alternatives available to man for preventing the oceans from becoming a "chemical broth."³⁵

DUMPING

It has been said of ocean dumping—generally, the process by which waste is collected, placed on an ocean going vessel such as a barge, and dumped at sea—that "of the ways modern society insults the ocean environment, it is over this most intentional form of ocean pollution that man has the greatest control."³⁶ Industrial pollution

32. Leaching is the process by which rainwater percolating through rocks and earth (and land disposed waste) dissolves and carries off soluble materials. Such materials often end up in the water table. See generally GENERAL ACCOUNTING OFFICE, COMPTROLLER GENERAL'S REPORT TO CONGRESS, *Waste Disposal Practices—A Threat to Health and the Nation's Water Supply* (1978) [hereinafter cited as GAO Water Supply Report].

33. See note 3 *supra* and text generally, beginning note 110 *infra* for a discussion of the encouraging aspects of ocean dumping regulation. But a recent development in the United States Senate is disconcerting. H.R. 10661 (discussed in note 58 *infra*) was intended to amend the Ocean Dumping Act by amending Section 4 of Public Law 95-153 (which prohibits the ocean dumping of sewage sludge after Dec. 30, 1981) by adding to it the same prohibition against the dumping of industrial wastes. The bill passed the House, but in the final hours of the 95th Congress, was killed by Senator Edmund Muskie because his Environment and Public Work Committee was not to have jurisdiction over Title II Research. Saving the oceans will only be possible if sensitive political egos are subrogated to the greater issue of the welfare of the nation's and the world's waters.

34. WENK, *supra* note 5, at 207.

35. *Id.* at 175.

36. Rogers, *Ocean Dumping*, 7 ENV'T L. 1, 1 (1976).

from point sources,³⁷ the process by which many pollutants eventually reach the ocean,³⁸ has been largely controlled by the Federal Water Pollution Control Act of 1972 (FWPCA) and its amendments,³⁹ which prohibit (subject to exceptions) the "discharge of any pollutant by any person. . . ." ⁴⁰ These control measures, termed "effluent limitations," ⁴¹ will eventually decrease the toxicity of materials reaching the ocean. By reducing the quantities of pollutants, especially toxic ones, which enter such waste streams as sewers and rivulets, the toxicity of dredge spoils and sewage sludge will be significantly diminished. This can be accomplished through pretreatment programs such as those envisioned by the Environmental Protection Agency (EPA), the Interstate Sanitation Commission (ISC), and by the author.⁴²

Present water quality goals of the United States are exceedingly ambitious. The National Council on Water Quality (NCWQ) recently recommended retaining the substance of the FWPCA's 1983 goal of "fishable and swimmable waters," while acknowledging possible delay, and also recommended the 1985 goal of "zero discharge."⁴³

While the amount of wastes presently introduced by ocean dumping comprises only about ten percent of all pollutants,⁴⁴ that

37. Point sources are locations where pollutants are discharged directly into waters such as rivers, lakes, and estuaries, generally through pipes. In places on the west coast of the United States, sewage is pumped into the ocean directly through outfall pipes which reach as far as three miles.

38. Pollutants emitted through point sources flow down rivers and settle at the bottoms of bays, riverbeds, and estuaries. When the sediments at the bottoms of these water bodies are dredged up to improve navigation, the "dredge spoils" contain significant amounts of the pollutants originally discharged at the point sources. The FWPCA designates point sources as "any discernible, confined and discrete conveyance . . . from which pollutants are or may be discharged." 33 U.S.C. § 1362(14) (Supp. 1970-1977).

39. 33 U.S.C. §§ 1251-1376 (Supp. 1970-1977).

40. 33 U.S.C. § 1311 (Supp. 1970-1977).

41. "Effluent limitations" are "any restriction . . . on quantities, rates and concentrations of chemical, physical, biological and other constituents which are discharged from point sources." 33 U.S.C. § 1362(11) (Supp. 1970-1977).

42. See notes 280-315 *infra* for a further discussion. Note 59 *infra*; see also INTERSTATE SANITATION COMMISSION (ISC), NEW YORK-NEW JERSEY METROPOLITAN AREA SEWAGE SLUDGE DISPOSAL MANAGEMENT PROGRAM 27-32 (1976). [Hereinafter cited as ISC NY-NJ Study].

43. 33 U.S.C. § 1251 (Supp. 1976-1977). The ambitious nature of these goals is demonstrated by the statement of Dr. Larry Swanson, Director of NOAA's MESA study on the New York Bight, *infra* note 60, that "there will be no more swimming in the Hudson River."

44. For a cataloguing of other sources, see notes 1, 31, 32 *supra* and accompanying text.

percentage is expected to increase rapidly as the world population increases and the less developed nations of the earth commence industrialization.⁴⁵ Also, although the percentage of materials deliberately dumped in the ocean is small, it must be remembered that, particularly in view of the FWPCA's effluent limitations, those materials are the most dangerous and highly toxic wastes.

SOURCES OF OCEAN DUMPING

The primary sources of materials dumped into the oceans are, in descending order of their contribution:

1. *Dredge spoils*, the solid sediments, which may or may not be toxic, found at the bottom of rivers and bays when these water bodies are dredged to improve navigation.⁴⁶ Dredge spoils are generally proximate to urban and port areas and they are often polluted by waste runoff from nearby industrial sites.

Dredge spoils account for about eighty percent of all ocean dumping;⁴⁷ their disposal is currently regulated by the Army Corps of Engineers,⁴⁸ which does most of the dredging itself. Most dredge spoils are dumped at sites within the three mile territorial sea of the United States.⁴⁹ Were the toxic pollutants found in dredge spoils to be removed prior to their entry into the waterways, the toxicity of the spoils, and thereby some of the negative effects of dumping them in the ocean, could be reduced considerably.⁵⁰

45. To imagine the potential waste generating capabilities of the entire population on the earth, given the orderly development of humankind, it is worth noting that: Americans are increasingly resource hungry. In 1959, the United States consumed the equivalent of 26,000 pounds per capita of new minerals. In 1972, the figure rose to 40,000 pounds.

Rogers, *supra* note 36, at 9 n.39.

46. Dredge spoils are composed primarily of sand, clay, rocks, silt, and various toxic and non-toxic pollutants. To illustrate the extent of toxics in dredge spoils: "in 1968 industries ocean-dumped wastes which contained cyanides, heavy metals such as mercury, cadmium and arsenic, pesticide by-products, and chlorinated hydrocarbons, while the federal government dumped radioactive wastes, explosives, and nerve gas." Rogers, *supra* note 45, at 2.

47. It was estimated that in 1975, 87,826,362 cubic yards of dredge spoils were dumped in U.S. waters.

48. 33 U.S.C. § 1413 (Supp. 1970-1977).

49. Such dumping is generally done in less than 100 feet of water. When dredge spoils are dumped in sufficient quantities, much of the bottom dwelling marine organisms are smothered. See Lumsdaine, *Ocean Dumping Regulation: An Overview*, 5 *ECOLOGICAL L.Q.* 753, 755 (1976).

50. See notes 42 *supra* and 280-315 *infra* and accompanying text. Problems with land based sites for disposal of contaminated dredge spoils could develop if leachates

Since the inception of the Marine Protection, Research and Sanctuaries Act (hereafter the Ocean Dumping Act),⁵¹ the Army Corps of Engineers has been extremely generous in granting applicants permits to dump dredge spoils. In late 1975, the National Wildlife Federation sued in Federal District Court in the District of Columbia,⁵² alleging that the criteria promulgated by EPA under its authority under the Ocean Dumping Act were violated in four areas.⁵³ That suit is in progress.

More recently, in May of 1978, the National Wildlife Federation and the Environmental Defense Fund filed a complaint in U.S. District Court for the Southern District of New York, to stop the ocean dumping of toxic chemicals off the coasts of Long Island and New Jersey.⁵⁴ The suit charges that the Corps of Engineers, since 1973, has illegally authorized the dumping of dredged spoils from the bottoms of waterways contaminated with deadly polychlorinated

from the wastes enter fish-bearing streams and, through the toxic materials therein released, cause greater damage than if they were disposed of at sea.

51. 33 U.S.C. §§ 1401-1487 (Supp. 1970-1977).

52. National Wildlife Federation (NWF) v. Costle, C.A. No. 78-2167 (D.C. Cir. 1978). The case is on appeal to the D.C. Circuit following the District Court's unpublished denial of NWF's motion for summary judgment on Aug. 30, 1978. According to Kenneth Kamlett, counsel for NWF, "the battle in the Court of Appeals has just started." At the time of this writing, appellate briefs are being prepared.

53. According to the National Wildlife Federation, the EPA criteria:

- (i) Fail to prohibit and avoid the ocean dumping of dredged material which may unreasonably degrade or endanger the marine environment or human health (contrary to MPRSA §§ 102(a) and 104(e));
- (ii) Apply different and less restrictive evaluation factors to the review of ocean dumping permits and projects involving dredged material than they apply to other ocean-dumped waste (contrary to MPRSA § 103(b));
- (iii) Allow the issuance of permits or other approvals for the ocean dumping of dredged material, without requiring full prior consideration of all evaluation factors specified in annex III of the Ocean Dumping Convention and in section 102(a) of the MPRSA; and
- (iv) Allow the ocean dumping of dredged material containing substances the dumping of which is prohibited under article IV and Annex I of the Convention.

See Committee Print, SENATE COMMERCE COMMITTEE, OCEAN DUMPING REGULATION: AN APPRAISAL OF IMPLEMENTATION, 26 (1976) [Hereinafter cited as Senate Commerce Committee Print].

NWF has urged that the court require dredge spoil dumpers to make a determination that the material to be dumped will not be harmful to the marine environment prior to the issuance of a dumping permit. This is not the procedure currently followed by the Army Corps of Engineers (COE). For a further discussion of the case, see *id.* at 26-32.

54. National Wildlife Federation v. Benn, C.A. 78-2118 (S.D.N.Y. 1978). At the time of this writing, the judge in the case is considering cross motions for summary judgment.

biphenyls (PCBs), mercury and cadmium compounds.⁵⁵ The decisions of the courts in the above mentioned cases will significantly affect the future of the ocean dumping of dredge spoils.

2. *Industrial wastes* from factories, refineries, mills and other industrial enterprises comprise about ten percent of all materials dumped into the ocean.⁵⁶ These wastes are generally barged as far as 125 miles to sea and dumped.⁵⁷ Industrial wastes are estimated to be increasing at about three times the rate of the population, and if H.R. 10661⁵⁸ is not passed by the Congress, the waxing generation of industrial wastes in coastal areas is certain to create an increased demand for disposal at sea. The EPA pretreatment guidelines,⁵⁹ when they come into effect in 1984, will have an ameliorative effect on this problem.

3. *Sewage sludge*, the delightful byproduct of the wastes of industry and humanity, comprises another ten percent of the wastes dumped into the ocean, and is the most infamous of such wastes.⁶⁰ As sewage treatment technology is improved,⁶¹ the quantities of sewage

55. Letter from Marine Environmental Council of Long Island to Hon. John M. Murphy, Chairman, House Merchant Marine and Fisheries Committee (June 14, 1978).

56. See 1970 Ocean Dumping Report, *supra* note 15, at 4. Prior to the passage of the Ocean Dumping Act, these wastes contained significantly concentrated amounts of such highly toxic substances as cyanides, arsenical and mercuric compounds. Due to the diversity of outflow of different kinds of factories, the kinds of pollutants in industrial wastes vary widely.

57. *Id.*

58. H.R. 10661 was introduced on January 31, 1978, by Rep. John M. Murphy, Chairman, House Merchant Marine and Fisheries Committee. The bill amended the Ocean Dumping Act by transferring Title II jurisdiction to EPA and NOAA, and prohibiting, after Dec. 30, 1981, the ocean dumping of industrial wastes. For an explanation of the death of H.R. 10661, see note 33 *supra*.

59. General Pretreatment Regulations for Existing and New Sources of Pollution, Fed. Reg. 27736 (1978). But see notes 290-295 *infra* and accompanying text.

60. The New York metropolitan area is responsible for about 90% of the sewage sludge which is ocean dumped annually in the United States. Most of the remainder comes from Philadelphia. New York dumps its sludge in the New York Bight, the ocean area extending roughly out to the edge of the Continental Shelf from the tip of Long Island to near Cape May, New Jersey. For an amusing account of the public consternation which arose when alleged "black mayonnaise" from New York's sewage sludge dump site crept alarmingly near Long Island beaches, see Soucie, *Here Come de Sludge*, 76 AUDUBON 110 (1974). For a scholarly perspective of what is happening to the ecological balance in the New York Bight, see generally National Oceanic and Atmospheric Administration, Marine Ecosystems Analysis Program, Ocean Dumping in the New York Bight (1975) [hereinafter cited as NOAA/MESA study]; see also Young and Barder, *supra* note 20.

61. The majority of sewage sludge is incinerated or disposed of on land. Most sewage sludge receives primary treatment—the straining of solids from sewer waste

sludge which are generated will increase significantly.⁶² The heavy metals and pathogens concentrated in sewage sludge make it particularly odious (and odorous) for at-sea disposal because of its negative impact on marine organisms and the food chain,⁶³ as well as its potential for disrupting human recreation. The current debate concerning ocean dumping centers around sewage sludge dumping, particularly by the New York and Philadelphia metropolitan area municipalities and their confrontation with the 1981 deadline imposed by Public Law 95-153⁶⁴ for implementing alternatives to ocean dumping.⁶⁵

New York and Philadelphia are having immense problems in implementing alternatives to dumping their sludge into the ocean. While New York struggles to find a suitable alternative,⁶⁶ Philadelphia and the EPA are engaged in a legal imbroglio over the methods the city is employing in phasing out ocean dumping. At the request of the EPA, the U.S. Attorney for the Eastern District of Pennsylvania recently filed suit against the City of Philadelphia seeking in-

flows. Primary sludge is the agglomeration of these solids. Some sewage, with the vast majority of municipalities moving towards such implementation, receives secondary or tertiary treatment. This includes introducing micro-organisms into the wastewater which "eat" the oxygen-consuming materials in the sewage. Following secondary treatment, the water is very nearly as clean as the water in a community swimming pool, by chemical measurement. (Statistics given in an interview on July 17, 1978 with the chief engineer of the Blue Plains Sewage Treatment Plant in Washington, D.C.—"the largest sewage treatment plant in the world.") The problems the Blue Plains plant is having with the United States District Court for the District of Columbia are interesting. The District of Columbia was scheduled to build a compost site in Oxon Hill, Maryland, but withdrew from the project because of commotion over *astrogelus fumigatus*, a fungus compost carried through the air and potentially harmful to persons with respiratory problems. EPA sued the District of Columbia to require that the plant be built, a move which might have closed down the Blue Plains facility. The matter is still in the courts.

62. It has been estimated that because of the difficulty in implementing alternatives, compounded by population growth and expanding consumption, output of sewage sludge will increase by 200% in 1981 CEQ ANN. REP. (1976), *supra* note 28, at 282.

63. See notes 18-26 *supra* and accompanying text.

64. 33 U.S.C. § 1412(a) (Supp. 1970-1977).

65. The law does allow, though, the dumping of sludge which will not "unreasonably degrade or endanger human health, amenities, or the marine environment, ecological systems, or economic potentialities." *Id.* If pretreatment programs can clean up the sludge, it may be ecologically more sensible to continue ocean dumping it, instead of implementing alternatives which may be more damaging to the environment.

66. See generally Interstate Sanitation Commission (ISC), New York-New Jersey Metropolitan Area Sewage Sludge Disposal Management Program (1976). See also ISC NY-NJ Study, *supra* note 42, at 44-47.

junctive relief requiring Philadelphia to take the necessary steps to reduce its dumping of sewage sludge periodically, and to cease dumping completely by January 1, 1979. The suit also sought to enforce collection of a \$225,000 fine levied by the EPA against Philadelphia for past violations of their ocean dumping permit.⁶⁷ Philadelphia counterclaimed against EPA claiming that the suit was arbitrary and frivolous. The matter is *pendente lite*.

The EPA is reluctant to file a similar suit against New York City to expedite the City's compliance with its interim deadlines for phasing out sewage sludge dumping. The author was informed by the EPA's Marine Protection Division Chief that EPA's concern is that if it takes New York into the courts, the courts may extend the 1981 deadline imposed by Public Law 95-153, and foil Congressional intent in passing the law. Numerous officials of various federal, multistate and private agencies and organizations consulted by this author are of the opinion that because of this possibility, New York City is employing this advantage and being intentionally dilatory in its progress towards implementing a land-based alternative to sewage sludge disposal.⁶⁸ New York City environmental officials maintain that the vastness and complexity of the waste disposal systems there preclude timely implementation of an alternative.⁶⁹

Current plans of New York City envision processing sewage sludge into compost,⁷⁰ with heavy metals from the sludge contained therein, and applying the compost as a soil conditioner on public parklands in the City.⁷¹ The theory behind this plan is that, although heavy metals will eventually leach into the groundwater beneath parks where the compost is applied, groundwater in New York City is not used for drinking, and will ultimately carry the metals out

67. Costle Letter, note 3 *supra*, at 3.

68. To date, New York City has not timely complied with its EPA mandated interim schedule for phasing out dumping. For a general discussion of its progress, see note 66, *supra*.

69. Such was the tenor of New York City officials at the EPA's Technology Transfer Joint Municipal and Industrial Seminar on Pretreatment of Industrial Wastes, held in New York, August 8 and 9, 1978. [Hereinafter cited as EPA Pretreatment Conference]. New York has combined sewers; industrial and municipal (domestic) wastes are mixed prior to reaching treatment plants.

70. See generally ISC NY-NJ Study, note 42 *supra*, at 11-15; EPA Sixth Annual Report, Ocean Dumping in the United States, January-December 1977 [hereinafter cited as EPA 6th OD Report].

71. The author was told this at the EPA Pretreatment Conference, *supra* note 69, by a New York City official.

to the ocean in a significantly less concentrated form than directly dumping the sludge.⁷² Assuming that such a plan can be implemented with public approval—a task which will require a significant public relations campaign to minimize public apprehensions about such a program⁷³—it would provide a mechanism which would simplify activating a complete waste recovery program when the EPA pretreatment regulations become effective in 1984.⁷⁴ What such a comprehensive waste recovery program might entail will be discussed later in this article.⁷⁵

Although New York's proposed alternative to ocean dumping is certain to meet with political opposition, it is a positive step in a direction which encourages maximum beneficial use of all resources, in itself a laudable purpose.⁷⁶ The public must be educated regarding the urgency with which practicable and economically feasible technology must be developed to deal with the ever increasing quantity of sewage sludge and other wastes being produced by the rapidly growing population of the East Coast megalopolis.⁷⁷ The public must

72. The effects of the toxics which reach the ocean in this manner will be less concentrated, and the marine life in the New York Bight will be less severely degraded. This solution is temporary at best.

73. During the administration of President Gerald Ford, arrangements were contemplated whereby, as a gesture to increase public awareness of the potential value of sewage sludge, some 500 tons of compost from the USDA Beltsville facility were to be applied to the White House lawns and the Ellipse. President Ford demurred. This kind of response is indicative of the public relations problems to be confronted in using what is really a beneficial resource, rather than a true waste product. Perhaps President Carter could be encouraged to promote such a public benefit.

74. See note 59 *supra*.

75. See generally notes 292-317 *infra*.

76. The time is now upon the industrialized nations of the world to accept their responsibility and act decisively to stop the dumping of wastes into the oceans while the oceans can still be preserved in an unspoiled state.

Congressman John Murphy, chairman of the House of Representatives Merchant Marine and Fisheries Committee has indicated that new laws are needed to "force a cessation of ocean dumping by the end of this decade," and that thus far, "the anti-ocean dumping program has been a flop." Congressman Murphy introduced H.R. 10661 and considerable other legislation attempting to extricate the United States from the ocean dumping dilemma. *But see* note 33 *supra*. As a Congressman from New York City, Murphy's familiarity with the problems of ocean dumping is profound, and his desire to ameliorate it great.

77. The most recent (1975) EPA estimate is that 136 million tons of municipal solid waste is being generated annually—about 3.4 pounds per person daily—and that this volume will increase by another 89 million tons by the year 1990. This estimate does not include the millions of tons of industrial wastes, sewage sludge, junk automobiles, and construction and demolition wastes. If all wastes were considered, the total volume would be about 3 to 4 billion tons annually.

See GAO Water Supply Report, *supra* note 32, at 1.

realize that there are beneficial uses to which all of these wastes can be put.⁷⁸

4. *Construction and demolition debris.* The only significant dumping of these inert and non-toxic materials is done by New York City at sites about nine miles offshore, and only because of the paucity of nearby land sites.⁷⁹

5. *Solid Waste*, the detritus of our civilized society, amounts to about five and one-half pounds per capita daily.⁸⁰ Ocean dumping of these wastes without a permit is proscribed by the Ocean Dumping Act,⁸¹ and is primarily restricted to cannery operations on the Pacific Coast.⁸²

6. *Explosives* have for years been dumped by governments when inoperative or obsolete. Some of this munitions dumping has been rather unnerving.⁸³ It is hoped that such affronts to the oceans' integrity will be terminated in the near future.

7. *Radioactive wastes.* Ocean dumping of high level radioactive wastes has been banned by the Ocean Dumping Act and by the London Convention.⁸⁴ A problem could develop, though, if countries not party to the London Convention have, or develop, nuclear materials and dump them outside the jurisdiction of a signatory state.⁸⁵ Even in the case of low level radioactive wastes, which are also regu-

78. This is especially true of sewage and industrial sludges. See notes 292-317 *infra* and accompanying text.

79. 1970 Ocean Dumping Report, *supra* note 15, at 5.

80. *Id.*

81. 33 U.S.C. § 1411 (Supp. 1970-1977); 40 C.F.R. § 227.21(d) (1977).

82. 1970 Ocean Dumping Report, *supra* note 7, at 6. One particularly troublesome and irritating aspect of solid waste is the long life-span of dumped plastics, which may not degrade for decades, or perhaps for centuries.

83. In recent decades, 19 gutted World War II Liberty ships have been scuttled filled with munitions. Since 1964, nearly 20,000 tons of ammunition and explosives have been disposed of in this manner. The early 70's saw a tremendous increase in ocean disposal of munitions. Detonation of such explosives can release trace amounts of nickel, lead, bronze, and other metals into the water. *Id.* at 6, 11.

84. 40 C.F.R. § 227.21(a) (1977); London Convention, *supra* note 2. Annex I (6).

85. Signatory states to the Convention as of September 1977 are Afghanistan, Byelorussia SSR, Canada, Cape Verde, Chile, Cuba, Denmark, Dominican Republic, France, German Democratic Republic, Guatemala, Haiti, Hungary, Iceland, Jordan, Nigeria, Norway, Panama, Kenya, Libya, Arab Jamahiriya, Mexico, Monaco, Morocco, New Zealand, Philippines, Spain, Sweden, Tunisia, Ukrainian SSR, United Arab Emirates, UK, USA, USSR, Yugoslavia, Zaire. See generally Hodges, *International Law and Radioactive Pollution by Ocean Dumping—'With all their genius and with all their skill.'* 11 SAN DIEGO L. REV. 757 (1974).

lated by both the Ocean Dumping Act and the London Convention, there is the disturbing potential for imposition on the food chain.⁸⁶

THE EFFECTS OF DUMPING

The paucity of technologically accurate information for measuring the effects of pollution on the oceans hinders analysis of the specific effects of each of the various forms of contamination. Technology is not always sufficiently advanced, even in the developed nations,⁸⁷ to evaluate the present and imminent dangers. Often there is no reliable data available on which to base recommendations concerning water quality criteria. This inability to recommend basic regulatory schemes based on reliable criteria poses myriad economic, environmental, and other problems in determining the amounts of particular substances which can be safely discharged into the sea. If standards are not sufficiently stringent, dangerous amounts of harmful pollutants may be introduced into the marine environment, producing various adverse consequences. Conversely, if standards are too strict, or based on unreliable data, the costs to the producer of alternative disposal of prohibited waste materials may prove an unnecessary economic burden.⁸⁸ Before the national and international means of controlling ocean pollution are effectively implemented, a sound scientific and statistical base is necessary for measuring both the amounts of pollutants present in any given area at any given time, and their effect on the marine life in the area under study.

Monitoring and enforcement of violations of regulations on ocean dumping activity present further problems in preventing dumping.⁸⁹

86. [E]very time radioactive waste is dumped into a stream, buried, dropped into the ocean, discharged into the air, or otherwise released from human control, it passes into the complex world of living things. It will pass from living thing to living thing, sometimes being concentrated, at other times being dispersed, with an efficiency and ingenuity which man has not yet come to understand. At unpredictable times and places, this radioactive waste will reappear in man's food, air, or water. It will not go away, for decades, or centuries, or even millenia.

Id. at 758.

87. See Waldchuk, *supra* note 9, at 283.

88. *Id.*

89. See generally UNITED STATES COAST GUARD, 1977 REPORT TO CONGRESS ON ADMINISTRATION OF OCEAN DUMPING ACTIVITIES, as required by Title I of the Ocean Dumping Act. See also GENERAL ACCOUNTING OFFICE, COMPTROLLER GENERAL'S REPORT TO CONGRESS, Problems and Progress in Regulating Ocean Dumping of Sewage and Industrial Wastes (1977). [Hereinafter cited as GAO Ocean Dumping Report].

Enforcement of such regulations has been rather erratic, and will be discussed further in a subsequent portion of this article.⁹⁰ It is worth noting that since the enactment of the Ocean Dumping Act, the number of authorized dumpers in the United States has been reduced by 269, and that EPA's revised Ocean Dumping Regulations published in January 1977 require that, as of April 23, 1978, the permittees demonstrate best efforts to cease ocean dumping by January 1981 and have an implementable schedule for effecting a land-based alternative.⁹¹

Consequences to marine life of the different forms of ocean dumping are significant. The predominant ways by which marine organisms and their environment are directly affected by ocean dumping are by a) toxicity introduced into the water;⁹² b) oxygen depletion;⁹³ c) biostimulation;⁹⁴ and d) habitat changes.⁹⁵

90. See notes 257-59 *infra* and accompanying text.

91. See notes 97-99 *infra*.

92. When sufficient levels of toxic substances are introduced into the water, they are capable of killing some forms of marine life. Even where marine life is not destroyed, the effects on it may be significant and disturbing. Such effects include: reduced vitality or growth, reproductive failure, and interference with sensory functions. In the New York Bight, copper contamination has had significant deleterious effects on marine life. Annually increasing pesticide concentrations, as indicated previously, reduce the size of mollusk shells, and reduce the growth and reproductive rates of some fish. The problems introduced into the food chain through such contaminants are now familiar. Oil in the marine environment can alter reproduction, weaken the respiratory systems and clog the filtering mechanism of animals. Certain waste products cause cancer in fish. As previously mentioned, contamination in the New York Bight area measurably inhibited phytoplankton growth.

93. See 1970 Ocean Dumping Report *supra* note 15, at 12-14. While oxygen, produced in significant proportion by phytoplankton, is necessary to support marine life, it is also necessary to biodegrade organic wastes. When such wastes (especially sewage sludge) are introduced into the marine environment, vast quantities of oxygen are consumed in biodegrading them, altering the ecostructure of given areas. This oxygen depletion process also kills some organisms, and the entire process is accelerated by the decomposition of the organisms which die. This creates an oxygen deficient area which may remain so for some time. See Lumsdaine *Ocean Dumping Regulation: An Overview* 5, *ECOLOGY* L.Q. 753, 755 (1976). See generally Mapp, *supra* note 14.

94. This accelerated fertilization of plant life, caused by the excessive nutrients (such as phosphates and nitrates) found in such wastes as sewage sludge, also creates various problems. Unpleasant odors on beaches are caused by the decomposition of dead organisms. The bottom structure transformation which is caused by this process can also alter the kinds of bottom-life which can survive. For example, surf clams can no longer survive in the algal mud produced by this process. See 1970 Ocean Dumping Report, *supra* note 15, at 14. See also note 27 *supra*.

95. The New York Bight provides the most pronounced illustration of such effects of pollution. Nematode worms, which can normally survive in rather polluted waters, disappeared from the center of the Bight dredge spoil dump, and their concentration diminished considerably in the center of the Bight's sewage sludge dumping area.

The adverse impacts of all this pollution on humans—public health hazards, loss of amenities, economic loss, and many others—are tremendous. With the vast amounts of waste generated by man—and particularly by those of us in the United States⁹⁶—these problems can only be expected to increase unless stringent and innovative tactics are employed to ameliorate them. One might be prompted to wonder what, if he doesn't dump it in the oceans, man is ever going to do with all of this waste.

THE ALTERNATIVES

The various attractions of ocean dumping are in its relative ease, its obvious convenience, and its economic efficiency. Problems in developing alternatives, and the concomitant expense involved are the obverse of these attractions. It is expensive to transport wastes because significant distances are usually involved—land sites near principal waste-generating areas are generally exhausted, requiring wastes to travel far to ultimate disposal sites. Once such sites are located, political and public relations problems abound in dealing with local populations who do not fancy having their lands despoiled by the garbage of the city folks. Further, there is the possibility of air pollution from the wastes, as well as the potential for leaching into the groundwater.

Available land-based alternatives to ocean dumping presently under consideration include land application,⁹⁷ incineration (on land

The sediment which protects the Crown of Thorns starfish, found near the Pacific islands and the Great Barrier Reef off Australia, has enabled it to multiply rapidly, safe from predators. These coral-eating starfish have thereby devastated large coral reef areas. Wastes off the southern California coast created a population explosion among sea urchins, which then consumed much of the giant kelp beds near the sewer outfalls, destroying not only the commercial value of the kelp, but also the habitat it provided for other marine animals, which subsequently had to relocate. *Id.* at 15.

96. See notes 1 and 45 *supra*.

97. Waste materials can be disposed of on land in two ways. Sludges and solid wastes can be applied as landfill or used to reclaim strip mines and gravel spoils. It has been estimated that in such areas as upstate New York, sludge can be used to reclaim gravel spoils at a rate of 100 tons per acre of gravel spoils. See 1970 Ocean Dumping Report, *supra* note 7, at 20.

In the mid-Atlantic States of Ohio, Pennsylvania, West Virginia, Virginia, New York, and New Jersey, over 660,000 acres of unreclaimed surface-mined land are available. Over 300,000 additional unreclaimed acres are available in the Gulf Coast States, Texas, Alabama, Mississippi, Louisiana, and Florida. On the West Coast, California and Nevada have approximately 150,000 acres of available, unreclaimed surface-mined land.

and at sea),⁹⁸ and pyrolysis.⁹⁹ There are also other considerations.¹⁰⁰ Although pyrolysis has been frequently recommended as the best solution to the ocean dumping problem, it has significant

Nationwide, surface mining has disturbed over 3.2 million acres of land. The Department of the Interior estimates that over two-thirds of this acreage is completely unreclaimed. This 2 million acres represents 3,300 square miles of potential . . . waste disposal sites.

The second manner by which wastes can be land applied is in the form of compost, or soil conditioner. Compost results in a product free of pathogens and good for use as fertilizer or for conditioning soil. Use of compost, if freed from the dangers of heavy metal contamination through pretreatment programs, makes significant beneficial use of a valuable resource.

For a general discussion of the composting process and its benefits, see ISC NY-NJ Study, note 42 *supra*, at 11-15.

The costs of composting sewage sludge are estimated to be in the \$73-\$90 per dry ton range.

98. Wastes are incinerated in various parts of the United States in several kinds of incinerators, including the multiple hearth furnace, by co-incineration with solid wastes, and by the Carver-Greenfield dehydration incineration process. New types of incinerators under contracts with the government are being, and have been, developed. See 1970 Ocean Dumping Report, *supra* note 7, at 21, for a description of the new CPU-400 incinerator. Incineration, though, poses significant environmental problems. First is the problem of air pollution. Despite anti-pollution devices on smokestacks, quantities of vapors and particulate matter do enter the outdoor atmosphere. See ISC NY-NJ Study, note 42 *supra*, at 15. But see note 104 *infra*. Another problem is the objectionable odors which occur during incineration unless the incinerator is operated at very high temperatures. The primary problem posed by incineration alternatives, though, is the significant ash residue which remains after the incineration process is completed. For a discussion of this problem, see note 105 *supra*. Costs of incineration are estimated to be between \$80 and \$100 per dry ton. See ISC NY-NJ Study *supra* note 42, at 18.

An interesting process currently in the experimental stage is ocean incineration of wastes. In 1975, Shell Chemical Company incinerated organochlorine wastes successfully on the S.S. Vulcanis, a Dutch incineration vessel, under a research permit from EPA. For a discussion of this experiment, see Senate Commerce Committee Print, note 53 *supra*, at 42-44; EPA 6th OD Report, *supra* note 70, at 37-41, EPA Fifth Annual Report, Ocean Dumping in the United States, January-December 1976.

99. Pyrolysis, like incineration, is a combustion process. Unlike incineration, though, pyrolysis occurs in a limited air atmosphere. This significantly reduces the amount of pollutants emitted into the air. Pyrolysis can recover usable energy from the process which could reduce the cost of sludge disposal. The primary problem with the pyrolysis process, though, is similar to the incineration problem—the disposal of the toxic residue ash, which can be up to 50% of the weight of the original material incinerated. Also, pyrolysis is extremely expensive to implement. Aside from construction costs, per dry ton costs of pyrolysis are estimated to be from \$90 to \$160 and up. See generally ISC NY-NJ Study, *supra* note 42, at 16-17.

100. Among these other proposals:

The State Department is investigating the possibility of the United States shipping liquid sludge to West African nations for use in reclaiming land for agricultural purposes. Aside from the obvious public relations implications, the idea is not an unsound one. Such a use could possibly take advantage of empty oil tankers returning to that area of the world.

shortcomings. The pyrolysis process is capital intensive,¹⁰¹ rather than labor intensive,¹⁰² and per ton costs for disposal are significantly higher than other alternatives.¹⁰³ Another problem is the potential for air pollution; it has been suggested that scrubbers on smokestacks can clean emissions sufficiently to comply with emission limits prescribed by the Clean Air Act.¹⁰⁴ Perhaps the most disturbing problem associated with pyrolysis—or any other form of incineration for that matter—is the residue of ash¹⁰⁵ which remains after the process is completed. This ash is contaminated with the toxic heavy metals found in municipal and industrial sludges, and must be disposed of, posing further threats to the oceans. Furthermore, incineration is counterproductive, as it makes no beneficial use of the valuable metal resources recoverable¹⁰⁶ from the wastes. Nor does incineration make use of the sludge itself, which is extremely useful.¹⁰⁷

An extremely interesting method of alleviating the future incentives for ocean dumping is a theory developed by Professor Charles S. Pearson, who evaluates ocean dumping in terms of "external diseconomies," by which "real costs to society are not recognized in the private calculus of polluters, but are passed on and (unwillingly) accepted by beneficial users of the resource." Costs external to the offending party—industrial polluters, oil spilling ships, commuters, power companies—are borne by the offended members of society, those whose streams are polluted, whose beaches are spoiled, whose air is fouled, and so forth. Pearson proposes extracting "rent" from ocean dumpers, to be divided and distributed in accordance with the principle of the "common heritage of mankind." See Pearson, *Extracting Rent from Ocean Resources*, 1 OCEAN DEV. AND INT'L LAW J. 221 (1973). See also note 6, *supra*. See United Nations Third Law of the Sea Conference, Informal Composite Negotiating Text (ICNT), U.N. Doc. Conf. 62/WP.10, adopted July 15, 1977, Art. 136.

101. As far back as three years ago, estimates were that implementing a pyrolysis alternative to ocean dumping of sludges would cost approximately one-half billion dollars. GAO Ocean Dumping Study, *supra* note 42, at 30.

102. Composting, on the other hand, is a labor intensive process, requiring minimal capital investment. See generally notes 309-313 *infra*.

103. See note 99 *supra*.

104. 42 U.S.C. § 7401 (1978). The incinerator for solid waste in North Dade County, Florida, is EPA's standard as to what can be accomplished with regard to removing particulate matter from emissions and reducing air pollution.

105. This residue remains after sludges are incinerated, and constitutes about 50% of the weight of the original incinerated matter. As the incineration process does not destroy the toxic heavy metals in the sludges, they remain in the ash residue. This poses significant problems in disposing of the ash, particularly leaching. The residue must be disposed of in an environmentally safe manner before the sludge may truly be said to have been removed from the environment. ISC NY-NJ Study, *supra* note 42, at 15.

106. See generally notes 297-307 *infra* and accompanying text.

107. See generally notes 282-317 *infra* and accompanying text.

A number of informed and sensitive sources have reported to the author that pyrolysis may be the solution most frequently recommended by waste management consultants because it is the process requiring the greatest appropriation of funds, and will therefore produce correspondingly large fees. Other solutions lack the glamour of such capital and equipment intensive programs. It is hoped that such motives do not exist, because if waste management systems are developed for such reasons, the ultimate detriment will be to future generations. Presently pyrolysis programs do not seem viable, since the costs of pyrolysis and other forms of incineration appear to outweigh their ultimate benefits. Other alternatives are being more actively considered.¹⁰⁸

Existing legislation is available for implementing a comprehensive alternative to ocean dumping municipal and industrial wastes (which, as in New York City, may be combined). The manner by which such legislation can be interpreted to effectively implement such a program will be discussed subsequent to an evaluation of the Ocean Dumping Act and its predecessors, the London Convention, and the cases relevant to them.¹⁰⁹

A BRIEF HISTORY OF CONTROL

Before reviewing the recent actions taken by the United States and the international community to control the dumping of wastes in the ocean, it is appropriate to review briefly the history of water pollution regulation. Control over water pollution is not a concept indigenous to modern industrial society, though it is here that the process has been sophisticated. Water pollution control began, if not as early as Rome, then at the latest during the reign of Henry VIII. Between 1531 and 1534, several laws limiting pollution of rivers were enacted.¹¹⁰ In the Twentieth Century laws regulating water pollution began to emerge in the wake of the industrialization of the West, and especially that of the United States. In 1926, the nations of the world attempted, in Washington, D.C., to agree on a prohibition of intentionally discharged oil from ships. They were unable to agree.¹¹¹ In London, in 1954, a convention was signed controlling

108. See notes 97, 98, and 100 *supra*.

109. See generally notes 288-317 *infra* and accompanying text.

110. An Act for the Preservation of the River of Severn, 34 & 35 Hen. 8, c.9 §§ 2, 6 (1542-43); (an untitled Act protecting the Thames River), 27 Hen. 8, c.18 (1535). See Schenker, *Saving A Dying Sea? The London Convention on Ocean Dumping*, 7 CORNELL INT'L L.J. 32, 34 (1973).

111. Schenker, *supra* note 110, at 35.

oil pollution of the ocean.¹¹² In 1958, the United Nations Law of the Sea Conference ratified a Convention on the High Seas.¹¹³ The provisions of the High Seas Convention concerning pollution were primarily limited to oil from a flag state's own vessels, and pollution from radioactive wastes. No specific mention was made of controlling other types of pollutants which were at that time being dumped into the ocean.¹¹⁴ Coastal states, the primary victims of marine pollution, were preempted from acting against foreign ships polluting on the high seas, even when such pollution negatively impacted on the coastal state. It is thus apparent that even as recently as two decades ago marine pollution was not seriously considered a problem.¹¹⁵

Subsequent to the infamous *Torrey Canyon* oil spill in 1967,¹¹⁶ the impetus of international agreements regarding oil pollution was redirected. Gradually, the flag state's peremptory jurisdiction over polluting vessels was loosened, and coastal states were permitted some jurisdiction over such vessels. The 1969 Convention on Intervention¹¹⁷ permitted coastal states to:

take such measures on the high seas as may be necessary to prevent, mitigate, or eliminate grave and imminent danger to their coastline or related interests from pollution or threat of pollution of the sea by oil, following upon a maritime casualty,¹¹⁸

and:

in cases of extreme urgency requiring measures to be taken immediately, the coastal state may take measures rendered necessary by the urgency of the situation, without prior notification of consultation with the flag state.¹¹⁹

112. International Convention for the Prevention of Pollution of the Sea by Oil [1954] 327 U.N.T.S.

113. Convention on the High Seas, done April 29, 1958, [1962] 450 U.N.T.S. 82 [hereinafter cited as the High Seas Convention].

114. See Schenker, *supra* note 110, at 37.

115. *Id.*

116. An oil tanker, the *Torrey Canyon*, ran aground in the high seas off the English coast in March of 1967 and ruptured, spewing thousands of gallons of oil along the beaches of France and England. More recently was the *Argo Merchant* disaster off the east coast of the United States.

117. International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969, done November 29, 1969, reprinted in 9 INT'L LEGAL MATERIALS 25 (1970).

118. *Id.* art. I(1).

119. *Id.* art. III(d).

Civil liability was finally imposed on oil polluters by treaty,¹²⁰ allowing a coastal state to claim for damages resulting from oil pollution, and making the shipowner liable subsequent to legal action in the coastal state's courts,¹²¹ subject to evaluation in conciliation and arbitration procedures.¹²² While the flag state's jurisdiction was shared in part with coastal states, little was said in either of these conventions regarding the dumping of other undesirable pollutants into the ocean. In 1972, for the first time, the international community faced up to the vast problems and potential damage threatening the ocean if the dumping of objectionable substances into it was allowed to continue unabated. The London Convention¹²³ was, it is reasonable to believe, a response to the Ocean Dumping Act passed earlier in the United States, and the Ocean Dumping Report which prompted the Act.

Whether the London Convention was a natural outgrowth of the rising concern of nations over the potential dangers of ocean pollution, or a response to the American initiative, its eventuality was certainly accelerated by public consternation and indignation over the dumping of such extremely contaminative materials as highly toxic nerve gas by the United States Army in the Atlantic in 1970,¹²⁴ and the revelation of the British dumping of mustard gas in the Atlantic in the 1950's,¹²⁵ as well as by the memory of the *Torrey Canyon* disaster and the potential for even greater disasters. "That dumping itself is now history, but its effects on future approaches to acceptable uses of the world's ocean could be significant."¹²⁶

Although the United States Ocean Dumping Act was passed in October of 1972, and the London Convention in December of the same year, this paper will consider the Convention first, in order to establish the present world attitude on the dumping of wastes into

120. International Convention on Civil Liability for Oil Pollution Damage, done November 29, 1969, reprinted in INT'L LEGAL MATERIALS 45 (1970). [Hereinafter cited as the Convention on Civil Liability]. For a discussion of such civil liability in Great Britain as imposed by the Shipping (Oil Pollution) Act (1971), see generally FORSTER, CIVIL LIABILITY OF SHIPOWNERS FOR OIL POLLUTION.

121. See Convention on Civil Liability, *supra* note 132, art. IX.

122. *Id.* art. VII.

123. London Convention, *supra* note 31.

124. See generally Cundick, *Army Nerve Gas Dumping: International Atrocity*, 56 MIL. L. REV. 165, 167-68 (1972).

125. *Id.* at 188 n.103. The British Defense Ministry revealed that it dumped some 67 tons of German nerve gas and 8,000 tons of British mustard gas into the Atlantic about 250 miles west of Scotland between 1955 and 1957.

126. *Id.* at 168.

the ocean, and then analyze the United States Act and the EPA implementing guidelines thereof, in detail, with the purpose of discerning what further advances and improvements the United States has made with respect to the Convention in the implementation of its Act.¹²⁷

THE LONDON CONVENTION

The London Convention has been called "a hopeful beginning."¹²⁸ Indeed, it was a response to a problem which, perhaps as much as any other confronting modern man, is of international proportions. With winds and ocean currents carrying dumped waste throughout the globe, no nation can claim that it has the right to dump in the ocean with impunity. The implications of the international nature of ocean dumping can be found, perhaps, by evaluating the decisions in two earlier international disputes. In the *Corfu Channel Case*,¹²⁹ two British warships were damaged by Albanian mines while engaged in innocent passage through the Corfu Strait in Albanian territorial waters. The International Court held that under international law, Albania was responsible for the damage and bound to compensate the British on "certain general and well-recognized principles of international law," including "every State's obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States."¹³⁰

In the *Trail Smelter Arbitration*,¹³¹ Canada was held liable to the United States for damages caused by fumes when a privately owned Canadian smelter polluted the air on the American side of the border. The Court, analogizing the case of air pollution to water pollution (and finding no cases on either), and to United States Supreme Court decisions, concluded that "under the principles of international law, no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties of persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence."¹³² This principle is analogous to restricting the freedom

127. See generally Environmental Protection Agency, Ocean Dumping, Final Regulations and Criteria, 40 C.F.R. §§ 220-227 (1977).

128. Leitzell, *The Ocean Dumping Convention—A Hopeful Beginning*, 10 SAN DIEGO L. REV. 502 (1973).

129. *Corfu Channel case*, [1949] I.C.J. Rep. 4.

130. *Id.* at 22.

131. *Trail Smelter Arbitration* (U.S. v. Canada), 3 Int'l Arb. Awards 1905 (1949).

132. *Id.*

of states to pollute the ocean when that pollution will have cognizable effects within the territory (or territorial waters) of another state—a potential which exists for all dumping.

The Stockholm Declaration on the Human Environment (Stockholm Declaration),¹³³ adopted by the United Nations Conference on the Human Environment in June 1972 (UNCHE), declared that:

man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality which permits a life of dignity and well-being, and bears a solemn responsibility to protect and improve the environment for the present and the future generations.¹³⁴

The various national and international meetings and developments concerning ocean dumping¹³⁵ led to the London Conference, which met pursuant to the recommendations adopted by UNCHE in London in October and November of 1972. Out of this Conference emerged the London Convention.

The London Convention was "a major policy objective of the United States . . . a historic step toward the control of global pollution."¹³⁶ According to Russell E. Train, chairman of the Council on Environmental Quality, it achieved "substantially all of the objectives which the United States [had] been seeking," bringing all matters dumped into the ocean under regulation.¹³⁷ The results of the Convention depend primarily on its implementation by national laws in the signatory states.¹³⁸ Prior to the Convention, the United States had already passed legislation with even stricter requirements than those which emerged therefrom. The EPA recently issued updated guidelines directing its implementation.¹³⁹ Those guidelines will be discussed after an evaluation of the London Convention.¹⁴⁰

133. Declaration of the United Nations Conference on the Human Environment, adopted June 16, 1972, U.N. Doc. A/Conf. 48/14, reprinted in 11 INT'L LEGAL MATERIALS 1416 (1972). [Hereinafter cited as the Stockholm Declaration]. See also principles 6, 7 and 22 of the Stockholm Declaration.

134. *Id.*

135. See Timagenis, *International Control of Dumping at Sea*, 1973 ANGLO-AMERICAN LAW REV. 157, 173-76 (1973) for a cataloging of those meetings and developments.

136. DEPT OF STATE BULL., December 18, 1972, at 710.

137. *Id.*

138. London Convention, *supra* note 3, art. VI.

139. 40 C.F.R. §§ 220-227 (1977).

140. See generally notes 186-272 *infra* and accompanying text.

The London Conference grew out of the realization by the nations of the world that the ocean did not have an endless capacity to assimilate man's wastes and still regenerate natural resources.¹⁴¹ While tacitly recognizing the non-interference principles of the *Corfu Channel* and *Trail Smelter* cases,¹⁴² the Convention mandated that contracting parties enact all reasonable measures to prevent dumping in the ocean which would endanger human health, harm marine life, infringe upon the uses of the oceans for pleasure, or interfere with other legitimate uses thereof.¹⁴³ Omitted from the definition of dumping were disposal at sea of waste incidental to normal navigation operations,¹⁴⁴ and waste arising from seabed exploration and exploitation.¹⁴⁵ Nor were effluent emissions¹⁴⁶ covered in the Convention. The fact that some disposal of waste in the ocean was permitted acknowledged the fact that the ocean is capable of absorbing waste to some degree and, indeed, appreciates some of the materials man introduces into it.¹⁴⁷

Perhaps the most significant weaknesses of the Convention are the enforcement procedures set out in Article VI, whereby "each Contracting Party shall designate an appropriate authority or authorities" to: issue "special"¹⁴⁸ and "general"¹⁴⁹ permits, and in Article III, "take in its territory appropriate measures to prevent and punish conduct in contravention of the provisions of this Convention."¹⁵⁰ It is feared by several commentators that the confusion created by scores of different interpretations of and approaches to regulating dumping will lead to the creation of "pollution havens,"

141. London Convention, *supra* note 3, Preamble:

Recognizing that States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. . .

142. See notes 129-132 *supra* and accompanying text. Cf. note 141 *supra*.

143. London Convention, *supra* note 3, Preamble.

144. *Id.* art. III(1)(b)(i).

145. *Id.* art. III(1)(c).

146. *Supra* notes 38-41.

147. See Bascom, *supra* note 7, at 22.

148. London Convention, *supra* note 3, art. III(5) defines a "special permit" as "permission granted specifically on application in advance and in accordance with Annex II and Annex III."

149. *Id.* art. III(6) defines "general permit" as "permission granted in advance and in accordance with Annex III."

150. *Id.* art. VII(2).

with varying enforcement procedures, akin to the problems created by the existence and use of "flags of convenience."¹⁵¹

Although in some respects disagreeable to the United States,¹⁵² the Convention does provide exceptions from the proscriptions against dumping: when certain "emergency" situations arise,¹⁵³ "posing unacceptable risk relating to human health and admitting no other feasible solution."¹⁵⁴

As to provisions concerning the dumping of waste, Annex I of the Convention, the "blacklist," *prohibits* the dumping of certain materials. Among those proscribed materials are organohalogen compounds,¹⁵⁵ mercury and its compounds, cadmium and its compounds, persistent plastics (such as netting and ropes which float and interfere with navigation, fishing, and other legitimate uses of the sea), various kinds of oil, high level radioactive wastes, and the products of chemical and biological warfare. The "blacklist" permits the disposal of those substances which are "rapidly rendered harmless by physical, chemical, or biological processes in the sea provided they do not: (i) make edible marine organisms unpalatable, or (ii) endanger human health or that of domestic animals."¹⁵⁶ This is an unfortunate exception, as it lends itself to considerable ambiguity in interpretation, particularly as relates to the Convention's "Consultative Procedure."¹⁵⁷ Finally, and again ambiguously, Annex I "does not apply to wastes or other materials (e.g., sewage sludge and dredged spoils) containing the matters referred to . . . as trace contaminants," subjecting such

151. See generally Schenker, *supra* note 110, and *Legislative Developments*, 6 L. & POL'Y INT'L BUS. 575 (1974).

152. DEPT STATE BULLETIN, *supra* note 136, at 713. The United States delegation submitted an interpretative statement to the article V(2) exception for "emergencies":

The United States understands that the word 'emergency' as used in article V(2) refers to situations requiring action with a marked degree of urgency, but is not limited in its application to circumstances requiring immediate action.

153. London Convention, *supra* note 3, art. V(2).

154. *Id.*

155. See Rogers, *supra* note 36, at 12 n.50. "Organohalogen is a term encompassing a broad group of materials, some highly toxic, persistent, carcinogenic and mutagenic, others relatively harmless. The more infamous members of the category include DDT, Aldrin/Dieldrin, polychlorinated biphenyls (PCB's), endrin and toxaphene. It was to exclude the far less harmful substances—carbon tetrachloride and methyl chloride were used by the U.S. delegation as examples—that Paragraph 8 was inserted in Annex I. That provision excludes those substances otherwise covered which "are rapidly rendered harmless by physical, chemical or biological processes."

156. *Id.*

157. London Convention, *supra* note 3, art. XIV.

materials to the permit regulations of Annexes II and III.¹⁵⁸ This allowance, which will permit some quantities of mercury to be dumped, would seem to be disturbing to Japan, in light of the previous discussion of mercury.¹⁵⁹ Because of the confusion over what exactly "trace contaminants" are, implementation of the provisions of Annex I has not been uniform.¹⁶⁰

Annex II of the Convention lists materials requiring "special permit" prior to being dumped, issued after consideration of a number of "factors" enumerated in Annex III.¹⁶¹ The list of materials requiring a special permit includes: (a) wastes containing significant amounts of arsenic, lead, copper, zinc, cyanides, flourides, pesticides, and organosilicon compounds; (b) acids and alkalis containing those or beryllium, chromium, nickel, or vanadium; (c) containers scrap metal and other bulky objects likely to present a hazard to fishing and navigation; and (d) low level radioactive wastes.¹⁶² The dumping of any materials not listed in Annexes I and II requires a "general permit," which also necessitates a review of the "factors" enumerated in Annex III.

By no means are the lists in Annexes I and II complete. Any state is left free to prohibit the dumping of wastes and other matters not mentioned in either Annex.¹⁶³

While not a complete prohibition of ocean dumping, the Convention goes a long way towards demonstrating an international awakening to the urgent necessity of improving the environmental status of the ocean. Enforcement is permitted not only by the flag state of the offending vessel, but, in international waters, by the state where the matter to be dumped is originally loaded.¹⁶⁴ Unfortunately, no specific international enforcement mechanism is provided

158. *Id.* Annex I(a).

159. See note 16 *supra* and accompanying text. *But cf.* Rogers, *supra* note 36, at 15-16, for a discussion of why Japan wanted this included in the Annex.

160. See Rogers, *supra* note 36, at 19-20, for a discussion of this confusion. But according to the U.S. EPA representative to the IMCO consultative meeting in London in June 1978, agreement was reached that "trace contamination" would be defined as in the FWPCA.

161. The list of factors is too lengthy to include here, but some considerations are: amount, composition, form, properties, toxicity, persistence, accumulation, etc. of the material to be dumped, as well as characteristics of the dump site, and other general considerations.

162. London Convention, *supra* note 3, Annex II.

163. *Id.* art. IV.

164. *Id.* art. VII(1).

for, nor any method of dispute settlement (which was left for later discussions among the parties).¹⁶⁵

While on the whole the Convention is a strong step in the direction of pollution control, a comprehensive treaty covering all forms of oceanic pollution would have been more desirable. Perhaps such a comprehensive treaty will emerge from the current Law of the Sea negotiations, although that is doubtful.¹⁶⁶ The consciousness of the world has at least been raised to the dangers presented by continued unregulated pollution of the ocean. The United States, with its enactment of the Ocean Dumping Act, and the EPA guidelines implementing the Act, has set a good example for the rest of the world to follow in putting the Convention into effect. Time will tell whether the world will follow that example. As pointed out by Acting Secretary of State Alexis Johnson, however, the London Convention "[i]s the first international treaty devoted to environmental protection on a global basis."¹⁶⁷

THE OCEAN DUMPING ACT AND ITS PREDECESSORS

United States regulation of ocean dumping began at the end of the Nineteenth Century, although regulation then was minimal. The Supervisory Harbors Act of 1888¹⁶⁸ gave jurisdiction over removal of materials in New York, Baltimore, and Hampton Roads, Virginia to the Army Corps of Engineers.¹⁶⁹ The Rivers and Harbors Act of 1899 (the Refuse Act)¹⁷⁰ applied to discharges of refuse matter "into any navigable water of the United States, or into any tributary of any navigable water from which the same shall float or be washed into such navigable water."¹⁷¹ Section 13 of the Refuse Act and section 4 of the Rivers and Harbors Act of 1905¹⁷² gave some legal control over dumping activities to the Army Corps of Engineers.

Public awareness of the undesirable ramifications of ocean dumping grew in the late 1960's, with the revelations discussed previously,¹⁷³ and the publicity concerning the significant ill effects of pol-

165. *Id.* art. XI.

166. See notes 117 *supra* and 276-279 *infra* and accompanying text.

167. DEP'T STATE BULL., January 22, 1973, at 95.

168. 33 U.S.C. § 441-454 (1970).

169. *Id.*

170. 33 U.S.C. § 407 (1970).

171. *Id.* For a discussion of the Refuse Act and its current applicability, see *United States v. Rohm & Haas Co.*, 500 F.2d 167 (5th Cir. 1974).

172. 33 U.S.C. § 419 (1970).

173. See notes 116, 124-126 *supra* and accompanying text.

lution in the New York Bight.¹⁷⁴ Basing its action on the Council on Environmental Quality 1970 Report to the Congress on ocean dumping,¹⁷⁵ Congress passed the Ocean Dumping Act. The Act was, in a sense, the parent, rather than the child, of the London Convention.¹⁷⁶ Recognizing the imminent dangers to human health and amenities, the marine environment, and the potential economic damages of haphazardly regulated ocean dumping,¹⁷⁷ the Act generally prohibits dumping into the territorial sea or contiguous zone of the United States.¹⁷⁸

If materials are to be transported from the United States for dumping, or brought from elsewhere and dumped into the territorial sea or contiguous zone of the United States, a permit is required.¹⁷⁹ One commentator has pointed out a flaw in this portion of the Act: "Basing the Act on transportation for the *purpose* of dumping, however, fails to provide for instances where materials originally shipped for some other purpose subsequently may be dumped on the high seas."¹⁸⁰ Deep seabed mining is a good example of how this problem could arise. Chemicals transported to sea for use in shipboard processing of manganese nodules are arguably not transported "for the *purpose* of dumping." EPA counsel have indicated that, while they were unable to procure the insertion of any mention of ocean dumping in the pending U.S. seabeds legislation, and were unsure of how to require ocean dumping permits for such activity, a permit under EPA's Ocean Dumping Act regulations will probably be required.

The Ocean Dumping Act complements the FWPCA, in that its definition of "materials"¹⁸¹ is nearly identical to the FWPCA's defini-

174. For an interesting account of the environmental situation in the New York Bight see Kent, *The Battle Over Sludge*, SKIN DIVER (Nov. 1978).

175. See note 15, *supra*.

176. McManus, *The New Law on Ocean Dumping—Statute and Treaty*, 6 OCEANS MAGAZINE 25 (1973).

177. 33 U.S.C. § 1401(a) (Supp. 1970-1977).

178. Currently, the territorial sea of the United States is 3 miles and the contiguous zone extends to 12 miles. If the ICNT provisions are adopted by the Law of the Sea Conference, the territorial sea will be extended to 12 miles (as has already been done by a number of nations) and the 200 mile exclusive economic zone will replace the contiguous zone. See ICNT, *supra* note 100, art. 3.

179. 33 U.S.C. § 1411(c) (Supp. 1970-1977); 40 C.F.R. § 220.1 (1977).

180. Lumsdaine, *supra* note 49, at 761.

181. 33 U.S.C. § 1402(c) (Supp. 1970-1977): "Material" means matter of any kind or description, including, but not limited to, dredged material, solid waste, incinerator residue, garbage, sewage, sewage sludge, munitions, radiological, chemical and biological warfare agents, radioactive materials, chemicals, biological and laborat-

tion of "pollutants."¹⁸² This similarity assures uniformity in regulation of harmful materials (or pollutants) discharged into both the internal waters and the oceans.

The Act, as implemented by the EPA, excludes from its prohibitions the dumping of fish wastes outside enclosed coastal waters, and the placing of materials to enhance fisheries.¹⁸³ The EPA Administrator (with the competence to delegate his authority to Regional Administrators)¹⁸⁴ is empowered by the Act,¹⁸⁵ upon consideration of several of enumerated factors,¹⁸⁶ to issue permits for ocean dumping. Prior to the issue of any permit, public notice and an opportunity for public hearings is required.¹⁸⁷

In *State of Maryland v. Train*,¹⁸⁸ Maryland sought to enjoin the city of Camden, New Jersey from dumping sewage sludge in the Atlantic Ocean at a site some fifty miles southeast of the mouth of the Delaware Bay, off Cape May, New Jersey. The EPA Regional Administrator had previously issued an interim permit¹⁸⁹ to Philadelphia to dump its sewage sludge at the same site. In issuing Philadelphia's permit, procedures required by the Ocean Dumping Act and the EPA implementing guidelines had been complied with, and public hearings had been held in January 1975. That permit limited the permissible amount of Philadelphia's sludge dumping to 150 million gallons, and required Philadelphia to proceed without delay to develop alternatives to ocean dumping.¹⁹⁰ One term of the permit required Philadelphia to reduce dumping by one half by the end of 1978, and entirely eliminate ocean dumping of its sewage sludge by 1980.¹⁹¹

ory waste, wreck or discarded equipment, rock, sand, excavation debris, and industrial, municipal, agricultural and other waste.

182. 33 U.S.C. § 1362(12) (Supp. 1970-1977): "Pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

183. 40 C.F.R. § 220.1(c) (1977).

184. 40 C.F.R. § 220.4(a) (1977).

185. 33 U.S.C. § 1412(a) (Supp. 1970-1977).

186. 33 U.S.C. § 1412(b) (Supp. 1970-1977). Those factors include the need for, the effect on human health of, the effect on fisheries resources of, the effect on marine ecosystems of, the persistence and permanence of, and alternate uses and recommended sites for the proposed dumping.

187. 33 U.S.C. § 1412(a) (Supp. 1970-1977).

188. 415 F. Supp. 116 (D. Md. 1976).

189. See note 191 *infra* and accompanying text.

190. 415 F. Supp. at 117.

191. *Id.* at 119.

An appeal was filed by Philadelphia and allowed by the EPA Administrator despite the fact that no formal appeal procedures were provided for in the EPA guidelines. Tumultuous public hearings followed, which

became a forum for review of the scientific evidence relating to the Cape May site as well as for general analysis of the many ways in which sewage sludge can be used or disposed of. The hearings examined the scientific difficulties encountered in monitoring deep marine ecological interactions and evaluating potential dangers to the waters of the northeast coast of the United States should dumping sludge continue unabated.¹⁹²

The hearing panel subsequently submitted a sixty five page report to the Administrator,¹⁹³ confirming that there was substantial reason to phase out Philadelphia's ocean dumping of sewage sludge.¹⁹⁴ Based on that report, the Administrator affirmed the Regional Administrator's mandate that Philadelphia's dumping be phased out by 1980, "to insure that the dumping does not result in irreversible harm."¹⁹⁵

While the Philadelphia hearings were underway, Camden applied for a renewal of its interim permit to allow the dumping of some fifteen million gallons of sludge at the Cape May site.¹⁹⁶ The permit was approved without a hearing because the EPA felt that the findings of the Philadelphia hearing were equally applicable to Camden. One term of the permit was that Camden was to cease dumping by 1979.¹⁹⁷ Although the state of Maryland did not challenge the issuance of the permit to Philadelphia, it did challenge the EPA's issuance of the permit to Camden without either public notice or opportunity for a public hearing, as required by the EPA implementing guidelines.¹⁹⁸

The United States District Court for the District of Maryland, while finding that an Environmental Impact Statement (EIS)¹⁹⁹ was not required by either the Act or the EPA guidelines, did find that

192. *Id.* at 120.

193. See Rogers, *supra* note 36, at 5 n.21.

194. 415 F. Supp. at 120.

195. *Id.*

196. *Id.* For a discussion of interim permits see notes 242-245 and accompanying text.

197. 415 F. Supp. at 121.

198. *Id.*

199. Environmental Impact Statements are a creature of section 102(C) of the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. §§ 4321-47 (1970).

the EPA regulations required, despite the circumstances of the case (i.e., the Philadelphia hearings), a hearing and opportunity for public comment, as alternatives to the filing of an EIS.²⁰⁰ The court required the EPA to conduct a public hearing regarding the Camden permit, but felt that the merits of the litigation and the public interest dictated that Camden be permitted to continue dumping at the site under its already issued permit, until the EPA's hearing requirements were complied with fully.²⁰¹

The case is particularly significant in that it demonstrates that the EPA, in implementing guidelines requiring public notice and opportunity for a public hearing, is, in fact, serious. This is particularly true considering the facts of the case. Although the presentation of evidence at the Camden hearing was bound to be redundant, the court determined that a separate permit would require a separate public hearing. This decision appears to have put teeth into the EPA's implementing guidelines' requirements, and hearings have apparently been conducted, or at least public notice given, in relevant cases since then, because there has been a minimum of litigation since *State of Maryland v. Train* concerning the public notice and public hearing requirements.

The Ocean Dumping Act provides that (a) no permits are to be issued for the dumping of any material violative of applicable water quality standards,²⁰² and (b) the Administrator of the EPA shall apply the standards and criteria binding upon the United States under the London Convention, including its Annexes.²⁰³ Permits for dumping all materials except dredge spoils are to be authorized by the Administrator. For dredge spoils, permits are to be issued by the Army Corps of Engineers, applying EPA's criteria, after public notice and opportunity for public hearings, and with the approval of the Administrator.²⁰⁴ One astute observer of the bureaucratic process involved in situations in which the Corps and the Administrator are unable to agree whether to issue a permit describes said process in this fashion:

But for hard cases, the Act prescribes a sort of bureaucratic ping-pong volley of remarkable conceptual intricacy. Before the Corps

200. 415 F. Supp. at 122.

201. *Id.* at 124.

202. 33 U.S.C. § 1412(b) (Supp. 1970-1977).

203. *Id.* See notes 167-175 *supra* and accompanying text for a discussion of those criteria.

204. 33 U.S.C. § 1413 (Supp. 1970-1977).

may issue a permit on the basis of its own interpretation of EPA's criteria, it must seek EPA's approval, and EPA may veto the Corps' decision.²⁰⁵ The Corps, however, may then request a waiver from EPA,²⁰⁶ if it first finds that there is no 'economically feasible' alternative to ocean dumping; notwithstanding the economic problems perceived by the Corps, the EPA may deny the waiver—but only if it first finds that the ocean dumping of the dredged spoil would have 'unacceptable adverse impacts' on certain enumerated facets of the marine environment.²⁰⁷ (As might be inferred, such legislative frippery represents a delicate compromise between two schools of congressional thought on the relative merits of dredging and environmental protection).²⁰⁸

Save Our Sound Fisheries v. Calloway,²⁰⁹ was a case concerning the issuance of such a permit. Plaintiffs, a non-business corporation comprised of fish, shellfish, and lobster fishermen and processors, sued to enjoin dumping of dredged spoil from a Corps of Engineers project deepening the Providence River in Rhode Island. The spoils were intended to be dumped off the coast of Newport, Rhode Island.²¹⁰ Plaintiffs alleged that the dumping at a point only a few miles from the coast would materially damage the marine environment and fisheries resources from which they gained their livelihood; plaintiffs further alleged that defendants were in violation of several supposedly applicable federal statutes. The statutory violations asserted were that defendants failed to (a) obtain permits, (b) give public notice and opportunity for public hearing, and (c) file an EIS as required.²¹¹ The United States District Court for the District of Rhode Island found that, although an EIS has been filed for a previous 9.8 million cubic yards of material which had been dumped between 1969 and 1971 from the same project,²¹² since the funding for the final stage of the project in 1973 (that part *sub judice*) was separately appropriated, the final stage fell within the regulations of the Ocean Dumping Act.²¹³ The court therefore enjoined any further dumping at the specified site until all permit procedures mandated by

205. *Id.* § 1413(b)(c).

206. *Id.* § 1413(d).

207. *Id.*

208. McManus, *supra* note 176, at 27. See generally Lumsdaine, *supra* note 49, at 764-66.

209. 387 F. Supp. 292 (D.R.I. 1974).

210. *Id.* at 294.

211. *Id.* at 297.

212. *Id.* at 294.

213. *Id.* at 301.

the Ocean Dumping Act were complied with fully.²¹⁴ Again, it was demonstrated in the courts that the Ocean Dumping Act was not a "paper tiger," and its requirements were intended to be, and were going to be, strictly complied with and enforced, at least by the courts.

As in the London Convention, the EPA regulations implementing the Act absolutely prohibit an almost identical list of materials from being dumped,²¹⁵ and further specify the specific amounts permissible as "trace contaminants" of certain materials,²¹⁶ an omission of the London Convention which has since been corrected.²¹⁷

The Permit System

For materials of which ocean dumping is permitted, the EPA implementing guidelines enumerate five classes of permits available:

1. *General permits*: These permits are basically for materials of a non-toxic nature disposed of in small quantities with "minimal adverse environmental impacts."²¹⁸ For materials in this category, bioassays²¹⁹ are not required. General permits must be published in the Federal Register and specify the types, amounts, sites, and other conditions deemed appropriate by the Administrator.²²⁰

2. *Special permits*: If no "absolutely prohibited"²²¹ materials are present, and "prohibited"²²² materials are present only as trace contaminants, within special certified ratios,²²³ or "limiting permissible concentrations" (LPC)²²⁴ a special permit may be issued for up to three years, with renewal allowed.²²⁵ A special permit applicant is

214. *Id.* at 310.

215. See London Convention, *supra* note 3, Annexes I and II.

216. 40 C.F.R. § 227.21(f) (1977). Maximum limits are specified for mercury, cadmium, organohalogens, and oils.

217. See note 160 *supra*.

218. 33 U.S.C. § 1414(c) (Supp. 1970-1977).

219. A "bioassay" is a laboratory analysis of the tolerance levels of marine organisms to various toxic substances.

220. 40 C.F.R. § 220.3 (1977).

221. "Absolutely prohibited" materials are those which under no circumstances are allowed to be dumped in the ocean. See Lumsdaine, *supra* note 49, at 768.

222. "Prohibited" materials are organohalogens, mercury, cadmium, oil, and their various compounds, and are permitted when contained only as trace contaminants.

223. See 40 C.F.R. § 227.22 (1977) for a breakdown of permissible ratios.

224. LPC is the concentration of a material which is no more than one percent of a concentration of the material which would harm sensitive marine organisms in a bioassay, or otherwise present a danger to the marine environment. See Lumsdaine, *supra* note 49, at 770 n.114.

225. 40 C.F.R. § 220.3 (1977).

required to describe available alternative means of disposal and explain why he feels each of the alternatives is inappropriate.²²⁶

3. *Emergency permits*: After consultation with the State Department and other appropriate persons, the Administrator may issue an emergency dumping permit for prohibited materials,²²⁷ providing it can be shown that they pose no "unacceptable risk relating to human health which admits of no other feasible solution."²²⁸ Issuance of this class of permit requires a "marked degree of urgency."²²⁹

4. *Interim permits*: For the dumping of waste containing prohibited materials in excess of trace contaminants of LPC limitations, an interim permit is required prior to any dumping.²³⁰ Interim permit applications undergo stringent scrutiny far in excess of the requirements which must be met to qualify for a general or special permit. The rationale for interim permits is to accommodate disposal of toxic materials into the ocean until suitable alternatives can be developed.²³¹ Prior to the issuance of an interim permit, an EIS must be filed, assessing possible environmental impacts of the proposed dumping as well as the actual need for the dumping. A thorough discussion of suitable alternatives must also be included.²³² The person receiving the permit is also required to develop and actively implement a plan to either entirely eliminate the discharge or bring it within the limitations of the strictly regulated dumping provisions of C.F.R. section 227.30 (limiting toxic concentrations).²³³ There is a paucity of case law as yet concerning the EIS requirement for dumping under interim permits.²³⁴

In *Natural Resources Defense Council (NRDC) v. Calloway*,²³⁵ an action in the United States District Court for the District of Connecticut, plaintiffs (representing environmental and general public in-

226. 40 C.F.R. § 221.1(j) (1977).

227. 40 C.F.R. § 227.22 (1977).

228. 40 C.F.R. § 220.3 (1977).

229. *Id.*

230. 40 C.F.R. § 220.3(a) (1977).

231. Lumsdaine, *supra* note 49, at 774.

232. 40 C.F.R. § 220.4(d)(1) (1977).

233. 40 C.F.R. § 220.4(2) (1977).

234. For cases touching on the EIS requirement as it pertains to ocean dumping, see generally *Natural Resources Defense Council v. Calloway*, 524 F.2d 79 (2d Cir. 1975); *State of Maryland v. Train*, 415 F. Supp. 116 (D. Md. 1976); *Natural Resources Defense Council v. Calloway*, 389 F. Supp. 1263 (D. Conn. 1974); *Save Our Sound Fisheries v. Calloway*, 387 F. Supp. 292 (D.R.I. 1974).

235. 389 F. Supp. 1263 (D. Conn. 1974).

terests) sued to enjoin the dumping of dredge spoils under an interim permit issued to the Government to dredge the Thames River near New London, Connecticut, in order to enable the Navy's new SSN 688 submarine to use the submarine facility at Groton, Connecticut.²³⁶ The NRDC alleged that such dredging would contaminate a relatively pure area²³⁷ in the Long Island Sound, two miles off the entrance to New London Harbor. Plaintiffs contended that the EIS was improperly filed by the Navy because the Corps of Engineers (which was doing the dredging) was really the "lead" federal agency involved in the project, and therefore the proper party to prepare the EIS. Plaintiffs further alleged that, regardless of which agency filed the EIS, it was inadequate in that (a) it was not actually prepared by the Navy, but by an independent consultant, and (b) the EIS did not discuss the "bandwagon effect" that the project would have on the marine environment when considered in conjunction with other proposed dumping projects in the area.²³⁸ The Navy argued that it would be "scientifically and practically very difficult, although desirable, to ascertain what impact the dumping of dredge spoil at the New London dump site would have throughout the entire Sound."²³⁹ The court, agreeing with the Navy after long and careful deliberation, *held* that the Navy's EIS discussions were adequate (and that the Navy was the proper federal agency to prepare the EIS, independent consultants notwithstanding). The court rejected the NRDC's claim and allowed the dumping to continue.²⁴⁰

On appeal before the United States Circuit Court of Appeals for the Second Circuit,²⁴¹ plaintiffs reiterated their previous allegations *in toto*. The circuit court, relying on the Ocean Dumping Criteria, 40 C.F.R. Part 220 et seq., *held* that although the Navy was the "lead" federal agency, and therefore the proper party to prepare the EIS, the EIS was *inadequate* in that it failed to discuss other proposed projects in the dump site area and analyze the possible cumulative effects those projects would have in conjunction with the project under consideration.²⁴² The EIS, therefore, did not "furnish infor-

236. *Id.* at 1267.

237. Plaintiffs said that dispersal of the dredge spoil from the dump site would lead to contamination of estuaries and nursery grounds for marine life which existed inshore to the northwest of the dump site along the Connecticut coast. *Id.* at 1268.

238. *Id.* at 1278.

239. *Id.* at 1281.

240. *Id.* at 1292.

241. *Natural Resources Defense Council v. Calloway*, 521 F.2d 79 (2d Cir. 1975).

242. *Id.* at 87.

mation essential to the environmental decisionmaking process.”²⁴³ Further, the court found that a “major flaw” in the EIS was “the absence of a coherent, understandable presentation of any comparison of all the major alternatives to the New London site.”²⁴⁴ The court said that since the plaintiffs had

made out a clear case on the merits and irreparable damage could be caused by resumption of further dumping at the New London site, the district court is directed to issue appropriate temporary injunctive relief designed to maintain the status quo until the . . . claim is resolved and the defects in the EIS are remedied.²⁴⁵

The predominant significance of *NRDC v. Calloway* is that it firmly establishes the mandate of the EPA guidelines requiring an EIS for interim permits, and serves to convince prospective dumpers that the Ocean Dumping Act is completely serious in requiring that viable alternatives to ocean dumping be formulated as rapidly and effectively as feasible.²⁴⁶ This decision squares well with the prior decisions discussed, and cumulatively, taken with the one case remaining to be considered,²⁴⁷ indicates the air of cooperation the courts are manifesting in assuring that politically powerful polluters do not succeed in circumventing the provisions of the Ocean Dumping Act and the EPA criteria implementing it.

As a result of the EPA requirement of EIS filing, there are no finally approved dumping sites, only “approved interim sites,” with fixed geographical coordinates, and describing the substances which may be dumped there.²⁴⁸ A complete list of available sites follows 40 C.F.R. 228.

5. *Research permits*: Following submission of a detailed statement assessing the proposed project, and a public notice and opportunity for public hearing, permits may be issued by the Administrator for the purpose of research into the impact of materials on the marine environment. These permits are limited to eighteen months duration.²⁴⁹ The most interesting research project to date was done on

243. *Id.*

244. *Id.* at 93.

245. *Id.* at 95.

246. *But see* notes 64-78 *supra* and accompanying text.

247. *See* notes 258-263 *infra* and accompanying text.

248. Rogers, *supra* note 36, at 5-6.

249. 40 C.F.R. § 220.4(e).

the permit issued to the S.S. Vulcanis, a Dutch ship, to experiment with ocean incineration of industrial toxic chemical wastes (organochlorine).²⁵⁰

Other Provisions

Further portions of the EPA guidelines provide for action on applications,²⁵¹ contents of permits,²⁵² records,²⁵³ and Corps of Engineers permits.²⁵⁴ As regards Corps of Engineers permits, "dredged material" is defined as "material excavated or dredged from the navigable waters of the United States."²⁵⁵ Civil penalties for violations of the permit requirements are punishable by a fine of not more than \$50,000 for each violation of the Act, and violators are entitled to notice and a hearing sixty days subsequent to that notice.²⁵⁶

Enforcement

Enforcement of the Act and the EPA guidelines is assisted by a provision for citizen suits,²⁵⁷ allowing for attorney's fees.²⁵⁸ Such fees were awarded in *Save Our Sound Fisheries v. Calloway*,²⁵⁹ an appeal three years subsequent to the above discussed case of the same name.²⁶⁰ The court there said, "[t]he possibility of such fees serves as an incentive for private parties to enforce provisions of the various statutes deemed too important to be left to the limited enforcement resources of the Justice Department."²⁶¹

Unfortunately, citizen enforcement is extremely difficult, in view of the problems in gathering evidence and successfully prosecuting lawsuits under the Act,²⁶² and it is unlikely that there will be many suits as successful as *Save Our Sound Fisheries v. Calloway*, *supra*.

250. See Senate Commerce Committee Print, note 53 *supra*, at 42-44 for an extensive discussion of the S.S. Vulcanis experiment.

251. 40 C.F.R. § 222 (1977).

252. 40 C.F.R. § 223 (1977).

253. 40 C.F.R. § 224 (1977).

254. 40 C.F.R. § 225 (1977).

255. 40 C.F.R. § 225.1 (1977).

256. 40 C.F.R. § 226.1 (1977).

257. 33 U.S.C. § 1415(g) (Supp. 1970-1977).

258. 33 U.S.C. § 1415(f)(4) (Supp. 1970-1977).

259. 429 F. Supp. 1136 (D.R.I. 1977).

260. See notes 209-214 *supra* and accompanying text.

261. 429 F. Supp. at 1139.

262. See McManus, *supra* note 176, at 27.

Interestingly, the House of Representatives version of the ocean dumping bill contained a significant (but subsequently deleted) clause designed to ameliorate the problems of citizen enforcement. It provided that any individual who furnished information leading to a criminal conviction, which provides for up to one year in prison and up to a \$50,000 fine for each day of violation,²⁶³ would receive one half of the fine levied up to a \$2,500 maximum.²⁶⁴ Apparently, the Senate did not approve of the idea of Congressionally subsidized stool pigeons. Instead, the enforcement of the Act must rely primarily on Coast Guard surveillance,²⁶⁵ monitoring the dumping of toxic wastes and selected non-toxic wastes, taking samples of dumped materials when dumping violations are suspected.

The primary methods of surveillance and monitoring are the use of vessel and aircraft patrols, shipriders,²⁶⁶ radio reports of dumping activity, shore based radar and other electronic methods, and vessel boarding.²⁶⁷ The Government Accounting Office report to Congress on ocean dumping²⁶⁸ concluded that Coast Guard surveillance and enforcement of its duties under the Ocean Dumping Act are inadequate.²⁶⁹ The Coast Guard justifies its limited enforcement procedures²⁷⁰ on the grounds that it lacks expertise and facilities for analyzing samples taken. Coast Guard officials stated that in addition to a shortage of personnel and other resources, the program did not have a high priority compared to other missions.²⁷¹ In its 1977 report, though, the Coast Guard stated that "increased emphasis on the

263. 33 U.S.C. § 1415(b)(c) (Supp. 1970-1977).

264. See McManus, *supra* note 176, at 28.

265. 33 U.S.C. § 1417(c) (Supp. 1970-1977). The Coast Guard's present enforcement scheme envisions 75% surveillance of the transportation and dumping of materials at EPA's mixed industrial waste dump sites and 10 percent of other disposal operations such as sewage sludge, construction debris and dredged materials. See DEPARTMENT OF TRANSPORTATION, UNITED STATES COAST GUARD, 1977 REPORT TO CONGRESS ON ADMINISTRATION OF OCEAN DUMPING ACTIVITIES, 12-13 (1977). [Hereinafter cited as 1977 Coast Guard Report].

266. The Coast Guard is of the opinion that the use of shipriders, Coast Guard officers or petty officers assigned to ride with ships during an entire dumping operation—especially when such missions are conducted at night or at distant dump sites—is the most effective means of controlling ocean dumping. Over 7,000 ship-rider hours were utilized in 1977. *Id.* at 8.

267. See generally *id.* at 6-11. Contrary to the Coast Guard's goal of boarding 10% of all dumping vessels prior to departure to check for permits, in 1975 no vessels were boarded. See GAO Ocean Dumping Report, *supra* note 89, at 18.

268. See note 89 *supra*.

269. *Id.* at 17-19.

270. See generally 1977 Coast Guard Report, *supra* note 265.

271. GAO Ocean Dumping Report, *supra* note 89, at 18.

ocean dumping program resulted in a substantial improvement in this year's level of surveillance activity."²⁷²

It has been suggested that the Coast Guard work in conjunction with the EPA or commercial laboratories in analyzing the samples it collects, and work more closely with EPA to facilitate more effective monitoring of dumping activities.²⁷³ It has also been recommended that the Coast Guard expand considerably the number of shipriders it employs as an enforcement measure.²⁷⁴

The United States, by means of the EPA's promulgation of implementing guidelines under the Act, has made considerable progress towards eliminating ocean dumping in the waters adjacent to it by any ships, and in the waters anywhere by ships flying the United States' flag. The ultimate goal must be to encourage industries to develop new and functional ways to dispose of or reuse their waste products. Simultaneously, people must be encouraged to consume less voraciously. As new waste disposal technologies are developed,²⁷⁵ it is imperative that development of alternative methods of waste disposal which are more harmful to the environment than ocean disposal be avoided. Hopefully, current air and water quality controls will assure that this does not occur. What is paramount among reasonable concerns is to instill in the developing peoples of the world—as the UNCHE has already begun to do so well—a sense of community and protectiveness toward their oceans. Surely, as these nations develop, they will want to partake of the material pleasures of life, and will most assuredly feel an urge to discard their wastes in the ocean. This desire has already manifested itself in the reluctance of the developing nations to concede away their opportunity to pollute in the future. The Law of the Sea Conference (ICNT)²⁷⁶ is indicative of this reluctance.

Although there are provisions in the ICNT relating to the regulation of ocean dumping,²⁷⁷ they are decidedly vague, and do not extend international obligations beyond those to which the international

272. 1977 Coast Guard Report, *supra* note 265, at 2.

273. See Lumsdaine, *supra* note 93, at 792.

274. GAO Ocean Dumping Report, *supra* note 89, at 23.

275. One new and interesting technology is the Swedish Clivus Multrum composting toilet system, a low energy, inexpensive, on site method of turning human household wastes into usable compost. See *Alternative Waste Disposal: An Interview with Abby Rockefeller*, 4 EPA J. 24, 24-25 (1978).

276. See generally, ICNT *supra* note 100.

277. *Id.* art. 195, 211, 217.

community committed itself in the London Convention in 1972. At least, though, broad jurisdiction has been extended to nations for dealing with ocean dumpers. The ICNT provides:

(1) Laws and regulations adopted in accordance with the present Convention and applicable international rules and standards established through competent international organizations or diplomatic conferences [ostensibly the London Convention] for the prevention, reduction and control of pollution of the marine environment from dumping shall be enforced:

- (a) by the coastal state with regard to dumping within its territorial sea or its exclusive economic zone or onto its Continental Shelf;
- (b) by the flag state with regard to vessels and aircraft registered in its territory or flying its flag;
- (c) by *any state* with regard to acts of loading of wastes or other matters occurring within its territory or at its offshore terminals.²⁷⁸

This is not a genuine concerted effort to clean up the ocean, or prevent it from getting considerably dirtier. Perhaps states conceded ocean pollution issues in order to gain leverage for bargaining on other more important issues (to them, at least), such as the exclusive economic zones, deep seabed mining, and the myriad other geographic, economic, and political matters being negotiated at the Conference.²⁷⁹ Whatever the motives, it is imperative that all the nations of the earth rise in unison to confront the challenge of cleaning up the oceans and assuring for the oceans a clean and healthy future, so that they may be used for food and sustenance, travel, and enjoyment by the future generations of mankind.

Food is only one reason, of course, for keeping the oceans clean, although it is perhaps the predominant one. If the ocean is permitted to deteriorate at its present rate, future generations will be unable to enjoy the pleasures of picknicking or swimming on clean beaches, sailing or fishing in sanitary bays, snorkeling and diving on pristine reefs, or any of the other innumerable pleasures man derives and has appreciated in the past from his most precious and beloved resource—his oceans. Most of all, as mentioned above, alternatives to ocean dumping must be carefully scrutinized and monitored to assure that the new waste disposal techniques do not present greater environmental dangers than the ocean dumping they replace.

278. *Id.* art. 217 (bracketed material added).

279. See generally ICNT *supra* note 100. A glance at the table of contents of the ICNT will acquaint the reader with the issues on the negotiating table.

The United States Congress has already taken some further initiatives in the war against ocean pollution. There is presently pending before the House of Representatives legislation providing for funding of research and development projects to find alternative methods of waste disposal and relieve the current pressures mounting on the ocean.²⁸⁰ Perhaps it is because of cumulative societal guilt feeling, having been the primary dumper of wastes into the ocean for some time. Fortunately, the nation's lawmakers have apparently come to their senses and realized the need to enact immediate and pervasive laws proscribing ocean dumping, without which there will be minimal incentives for industries and cities and other major dumpers to develop environmentally sound alternatives. Numerous alternative theories have been discussed in this paper, and it is hoped that these theories will be promptly evaluated and implemented.

In the recently concluded Geneva and New York sessions of the Third United Nations Law of the Sea Conference, there have been hopeful signs that perhaps something more will be done on the international level to help save the ocean for posterity.²⁸¹ Although the task of restoring the ocean to its pristine condition seems sometimes like the task of Sisyphus, the world has made great strides in the past decades, and will surely strive in the future to save the greatest "common heritage of mankind."

A POSSIBLE SOLUTION TO THE DILEMMA

Myriad alternatives to ocean dumping have been considered and most of them abandoned for a wide variety of reasons: economic, political, technological, and others. What has emerged from prolonged analyses and investigations of potential alternatives to ocean dumping is a comprehensive program which, technologically at least, appears to most of the experts consulted by this author²⁸² to be not only

280. There are various bills pending in the House of Representatives which propose to provide funds for such things as (a) state efforts to remove sludge from navigable waters (H.R. 851, Jan. 4, 1977); (b) grants to states and localities for construction of sewage sludge disposal facilities (H.R. 1247, Jan. 4, 1977); (c) efforts to recover potential energy sources from discarded material (H.R. 1214, Jan. 4, 1977); (d) the promoting of recycling of all materials (H.R. 11203, Feb. 28, 1978); and others.

281. Wall St. J., May 18, 1978, at 16, col. 2.

282. Those experts consulted by the author, among others, include the chief engineer of the Interstate Sanitation Commission, the director of the USDA Experimental Composting Facility at Beltsville, Maryland, the chief engineer of the Blue Plains Sewage Treatment Plant in Washington, D.C., the director of the NOAA/MESA Study of the New York Bight, numerous officials from USEPA, including the chief of the Marine Protection Branch, and myriad other concerned and expert indi-

possible, but barring economic political and social opposition, implementable in sufficient time to comply with PL 95-153's mandated 1981 deadline for the ocean dumping of sewage sludge.²⁸³ New York would be the logical place to commence experimentation and implementation of a program such as the one to be proposed herein, but general public opposition to the idea of spending more federal money, particularly on New York City—the chief offender on the sludge dumping scene—presents a considerable obstacle.²⁸⁴

The "Pretreatment/Composting" solution herein proposed would eliminate the waste of resources inevitable in other proposed alternatives to ocean dumping and make beneficial use of all materials at all of the stages of waste production and disposal.

The element most essential to any successful implementation of the proposed program or one like it is a monumental effort at cooperation in the spirit of the Resource Conservation and Recovery Act of 1976,²⁸⁵ an effort which the necessary parties²⁸⁶ may not be capable of producing. Clearly, some centralized committee or organization is necessary to motivate such cooperation.²⁸⁷

A conclusion agreed upon subsequent to virtually all of the above-mentioned consultations is that some sort of legislation will probably be required to provide the impetus for such a program. The Clean Water Act (CWA), PL 95-217,²⁸⁸ the Resource Conservation and Recovery Act (RCRA), PL 94-580,²⁸⁹ and the Marine Protection Research and Sanctuaries Act (MPRSA), PL 95-532²⁹⁰ are the laws pri-

viduals from such organizations as the House of Representatives Merchant Marine and Fisheries Committee staff, the National Wildlife Federation, the GAO, the U.S. Department of Commerce, and from state and local governments, environmental protection agencies and organizations, and private industry.

283. See note 48 *supra*.

284. Considerable federal funds have already been expended to help clean up New York's proliferating pollution, and other parts of the nation cast a covetous eye towards any further funds to be appropriated for environmental cleanup. These various entities feel strongly, if not vehemently, that New York has already received more than its fair share of the federal pie. See notes 67-78 *supra* and accompanying text for a discussion of New York's current problems.

285. 42 U.S.C. §§ 6901-6986 (1976).

286. Such a cooperative effort would include most significantly the efforts of USEPA, the Congress, State and local waste control authorities, private industry at all levels, and the individual citizens of our nation.

287. The Inter-Agency Ocean Dumping Coordinating Committee, set up to deal with the ocean dumping dilemma, has been eminently inconspicuous thus far, but could perhaps be induced to provide the necessary impetus for such a program.

288. 33 U.S.C. §§ 1251-1376 *as amended* (Supp. 1970-1977).

289. 42 U.S.C. §§ 6901-6986 (1976).

290. 33 U.S.C. §§ 1401-1444 (Supp. 1970-1977).

marily amendable to effectuate such a program, and will be discussed subsequently. The consensus among the consulted parties eliminates any doubt that implementing such a program is possible and desirable. As the earth's resources are diminished, the need to recycle and reuse materials will become increasingly mandated.²⁹¹ The opportunity now exists to develop and implement the kinds of technology necessary to overcome the problems of the future. It is submitted that the proposed program is one effective way to commence meeting that challenge. Dialogue has begun, and will hopefully continue to be encouraged in this direction.

The relevant parties helping to overcome the ocean dumping dilemma appear to be on the right course; the preeminent challenge is avoiding dispersal of efforts and combatting the problem through a coordinated and harmonious effort.

The proposed program for disposing of municipal and industrial wastes consists of the following four steps:

1. PRETREATMENT of industrial wastes.
2. TREATMENT of wastewater at POTWs.
3. COMPOSTING of sewage sludge.
4. LAND APPLICATION and distribution of clean compost.

1. Pretreatment

EPA guidelines for industrial pretreatment²⁹² call for implementation of industrial waste discharge cleanup by 1984, too late to effect the 1981 ocean dumping deadline imposed by PL 95-153.²⁹³ The program for waste cleanup promulgated by EPA is expected to impose a severe economic burden on many of the smaller manufacturers listed in the twenty-one specified industries.²⁹⁴ This is particularly the case according to New York City environmental protection officials.²⁹⁵ Industries affected will be required to neu-

291. As costs of metals on the world market continue to rise, and the technology for metals reclamation is improved, the cost/benefit analyses of the respective methods of obtaining metals will ultimately make recycling economically attractive. The point at which the rising cost of metals will intersect with the declining costs of recycling will vary with each metal and its corresponding cost and state of the technology. But once costs of new metals exceed the costs of recycling the metals now dumped in the ocean, the benefits of such a program become obvious.

292. See note 59 *supra*.

293. 33 U.S.C. § 1412(a) (Supp. 1970-1977).

294. See EPA Pretreatment Guideline, note 59 *supra*.

295. The complaints of New York City officials at the EPA Pretreatment Conference, note 71 *supra*, were vocalized loudly. They believe that when EPA's Pretreatment regulations become effective, industries in the 21 most severely regulated

tralize toxics in their waste flows prior to discharging into public sewers, and will be required to dispose of their neutralized toxic wastes in State or EPA permitted land disposal sites.

Such a pretreatment program is contrary to the spirit of RCRA, the policy of which is to "conserve valuable material and energy resources,"²⁹⁶ as no beneficial use is to be made of the valuable waste products, especially the heavy metals, generated by the various industrial processes regulated. The proposed comprehensive waste treatment program here under consideration would beneficially use most of these valuable industrial waste products.

The initial step in the proposed pretreatment/composting strategy is to identify all significant sources of toxic pollutants presently introduced into the sewer systems which ultimately reach publicly owned treatment works (POTWs). New York City currently has a reporting system along these lines, and the EPA pretreatment regulations will also assist in assembling a tally of the affected industries. Severe penalties should be imposed for a waste producer's failure to comply with the registration requirements of the appropriate environmental authority.

Once toxic waste sources are identified, the next logical procedure is to preclude the entry of toxic metals into industrial waste streams discharged into sewer systems. This can be done in two ways. First, if various waste metal products are already mixed in aqueous solution (i.e., nickel and copper in the same solution), chemicals can be added which will precipitate the heavy metals into storage tanks installed for the purpose of collecting the precipitated wastes. According to several engineers consulted,²⁹⁷ the technology required to recycle these metals, once mixed, is still perhaps ten years in the future. This is especially true if no concerted effort is promoted to expedite the development of such technology.²⁹⁸ The

categories of industry (including electroplating, printing operations, plastics manufacturers and others) will be devastated. City officials estimate, for example, that over half of the city's thousands of electroplating facilities will be forced to close because the expenses of compliance with EPA regulations will be prohibitive. For the list of the 21 affected industries and the 65 specified toxic substances, see EPA Pretreatment Guidelines, *supra* note 59, at 27770-27773.

296. 42 U.S.C. § 6902 (1976).

297. Including Fred Steward and Dr. Leslie Lancy of Lancy Labs in Zelianople, Pennsylvania, a leader in metals reclamation technology, and Robert Baker, electroplating superintendent at Warner-Lambert in Milford, Connecticut.

298. The development of the requisite metals reclamation technology is certain to require the decade estimated if the efforts at developing such a technology are fragmented and multi-directional. Central coordination will be necessary. (See note 287

real key to metal recycling is the segregation of the various heavy metal wastes produced, the second method of preventing their entry into the sewers. This can be accomplished by repiping in the various businesses in order to alter the waste flows so that the numerous heavy metal wastes are not mixed. Recycling technology for segregated metal wastes is currently in existence.²⁹⁹

It is estimated that the expense of such repiping would be great, depending of course on the space limitations of a particular establishment.³⁰⁰ Much of the repiping expenses in such a program will have to be borne by the industrial waste producer, as RCRA and CWA provide for grants only to such public operations as sewer authorities or POTWs.³⁰¹ Legislation could be implemented to aid the affected facilities in meeting the burden imposed. Various tax incentives are also available.³⁰² Storage tanks for precipitating out heavy metals, if installed by municipal sewer authorities, are eligible for RCRA grant funds.³⁰³ Funds could be provided by amending RCRA in fiscal year 1979 or 1980 to allow for making the New York metropolitan area a "demonstration" project or by such other methods, as amending existing legislation or creating new legislation.³⁰⁴

The floc or slurry of metals, once collected, can then be delivered for recycling and redistribution to a concern established specifi-

supra). It is submitted that a massive government sponsored effort at all levels to encourage cooperation among the various interested industries—especially among such giants of technology as Allied, Warner-Lambert, Dow, DuPont, Union Carbide and any number of other companies—could expedite the development of the necessary technology considerably.

299. A good example of heavy metal reclamation can be seen at Warner-Lambert's Schick electroplating operation in Milford, Connecticut, where valuable metals are recycled through a reverse osmosis process.

300. Dr. Lancy (*supra* note 297) is of the opinion that many of the older establishments will be unable to meet the financial burdens of new environmental legislation and will succumb to those burdens which is the cost of developing technology. Dr. Lancy built his facility many years ago, and it still conforms today to EPA's proposed guidelines.

301. See generally notes 288, 289 *supra*.

302. These incentives include the standard investment tax credit of 10% and five-year amortization of investment under the Internal Revenue Code, 26 U.S.C. § 169 (1978).

303. This is according to a responsible official in USEPA's Construction Grants Program office in Washington, D.C.

304. It is hoped that the cumbersome process of developing new legislation will not be required to lead the United States out of the ocean dumping dilemma; nor a further extension of the federal bureaucracy. Proper interpretation of the Clean Water Act, the Resources Conservation and Recovery Act, and the Marine Protection, Research and Sanctuaries Act, and cooperation among the appropriate federal agencies, states, and municipalities ought to be sufficient to promote the development of a workable solution.

cally for such purposes. Such a concern should be established in accordance with RCRA § 1003(8),³⁰⁵ which promotes the objectives of the Act by encouraging "establishing a cooperative effort among the Federal, State and local governments and private enterprise in order to recover valuable materials and energy from solid waste." The proposed consortium should be formed through the cooperative efforts of the large American chemical companies. With the initial financial support of the State and Federal governments. In this manner, the development of the necessary technology could be expedited considerably. Such a consortium could also serve as the central dispensary for the chemicals required to precipitate out heavy metals found in the wastes of the various businesses affected. In many instances, the waste products of one process can serve as the precipitants for another process.³⁰⁶

As the world prices for various metals rise in the future, recycling will become economically attractive. That attraction will increase as the technology for such recycling becomes more advanced and less expensive. With a concerted effort, such technology can be in place in time to take full advantage of these future opportunities. Corporations involved at the early stages of such a program would have a distinct edge in the world market for metals recycling. As an inducement to cooperation in such a process, eventual profits may potentially be shared by the waste producers and the municipalities involved. Not to be forgotten, of course, is the great reduction in future damage to the environment, which would result from the interdiction of such harmful materials, whether they are dispensed into the sea by dumping, onto the land by leaching, or into the air by incineration.³⁰⁷

Such is the pretreatment phase of the proposed waste cleanup strategy. With the undesirable heavy metals and other toxics thus removed from the wastewater flow, the next phase in the proposed strategy is the regular primary, secondary, and advanced wastewater treatment processes at the POTWs.

305. 42 U.S.C. § 6902 (1976).

306. Interviews with chief engineer, Blue Plains Sewage Treatment Plant, Washington, D.C., and others, including scientists at the USDA composting facility at Beltsville, Maryland.

307. The environmental costs of such pollution cannot be measured in dollars.

2. Treatment at POTWs

As secondary, tertiary and other advanced treatment of wastewater³⁰⁸ is implemented in the New York area and throughout the nation, the volume of sewage sludge resulting will increase dramatically.³⁰⁹ Through the above-described program of pretreatment, that sludge will be considerably less toxic, and in compliance with EPA standards for maximum toxic levels for disposal. Actually, according to a number of authorities, such clean sludge could be safely disposed of in the ocean, although that policy is hardly encouraged,³¹⁰ as dumping sludge would not be putting it to any of the beneficial uses for which it would be suited once clean, in such a form as compost.

3. Composting

Composting can be done in facilities modeled after the United States Department of Agriculture's experimental composting facility at Beltsville, Maryland.³¹¹ Funding for such facilities is available through the Clean Water Act Construction Grants program.³¹² Grants can cover the cost of vehicles to transport sludge from sewage treatment plants to a composting facility, although in New York, if the facilities for composting are constructed adjacent to navigable waters, barges currently used to ocean dump sludge could be employed to transport it to compost sites.

CWA grants may also pay for the land required for composting;³¹³ for necessary construction at composting sites, including the cement pads on which the composting process takes place; and for storage facilities needed to store finished compost in inclement weather.

308. See note 61 *supra*. See also USEPA TECHNOLOGY TRANSFER, ENVIRONMENTAL POLLUTION CONTROL ALTERNATIVES: MUNICIPAL WASTEWATER (1976).

309. See note 62 *supra*.

310. PL 95-153 prohibits only the dumping of sludge which "may unreasonably degrade or endanger. . ." 33 U.S.C. § 1412(a) (Supp. 1970-1977). It is the position of the Interstate Sanitation Commission that if sludge is cleaned up through pretreatment it may be the best policy to carefully dump it into the oceans. See ISC NY-NJ Study, *supra* note 42, at 32.

311. See note 70 *supra*.

312. See generally USEPA MUNICIPAL WASTEWATER TREATMENT WORKS CONSTRUCTION GRANTS PROGRAM, (1978); USEPA, HOW TO OBTAIN FEDERAL GRANTS TO BUILD MUNICIPAL WASTEWATER TREATMENT WORKS, (1976); USEPA, ALL YOU NEED TO KNOW ABOUT SEWAGE TREATMENT CONSTRUCTION GRANTS (1976).

313. *Supra* note 303. The official indicated that although such an EPA determination is likely, a final decision has not yet been made.

Requisite front-end loaders are in most instances already owned by municipalities, and should therefore require no funding. Separators needed to remove wood chips to be used for drying the final compost product³¹⁴ would probably not qualify for CWA funding.³¹⁵ Any significant gaps in available funding could possibly be filled by amending existing legislation or by allocating already appropriated funds.

4. Land Application and Distribution of Compost

The final phase in the proposed pretreatment/composting program is use of the finished compost product. Although compost, once thorough pretreatment is implemented, should be clean enough for home garden or cropland application, the proposed program envisions applying compost exclusively to nonagricultural public lands such as parks, golf courses, and highway sidings as a soil conditioner. Also possible is using compost to reclaim gravel spoils and exhausted stripmines where compost can be used at a rate of up to 100 tons per acre for reclamation.³¹⁶ Consideration should be given to the possibility of marketing of finished compost.³¹⁷

CONCLUSION

Essentially, the above exposition embodies the entire pretreatment/composting program offered as a solution to the as yet inconclusive search for an environmentally safe alternative to ocean dumping. According to nearly all of the many experts consulted, the technology is available at all levels to implement such a program by December 31, 1981. A massive cooperative effort will need to be undertaken in order to so do. Whether funding could come from already

314. In New York, the problem is a difficulty in finding a suitable wood for the drying process. Dr. Rufus Cheney, a scientist at USDA's Beltsville composting facility indicated that synthetic material to substitute for wood chips can be developed at reasonable expense if necessary.

315. *Supra* note 303.

316. Interview with director, USDA Beltsville, Maryland composting facility. *See also* note 97 *supra*.

317. According to the director of the USDA composting facility, Los Angeles has recently contracted with a Mr. Kellog, who has been marketing compost for a number of years. He has done extremely well, and does not like his inventory of compost to fall below 100,000 tons. By the terms of the contract, Los Angeles will construct a composting facility modeled after the USDA's Beltsville facility, and Kellog will buy all of the finished compost and wholesale it for public distribution as a fertilizer for use on commercial crop land.

appropriated EPA managed funds, by reinterpreting RCRA, CWA, or MPRSA or through future appropriations implementing any of these acts, or through amendments to any of those acts must be ultimately determined by the appropriate authorities.

The program proposed here has as its ultimate goal the optimum beneficial use of our nation's and the earth's resources. Perhaps entirely new legislation will be necessary to meet such an ambitious goal. If a program along the lines of the proposed solution were to be implemented, it appears practicable that all of the possible materials reusable would be reused, and virtually no harm would be inflicted on the environment as a result of the industrial and human wastes generated.

Furthermore, if such a program were successfully implemented in New York, the blueprint could be applied in practically any area in the United States or the world. The ultimate ramifications of such a waste conservation system need no elaboration.

Procrastination in developing a solution will only augment the list of already dead or dying bodies of water across the globe.³¹⁸ As the predominant polluter of the oceans, the United States has a moral obligation to develop a comprehensive waste disposal program which can be adopted by the world's developing nations so they need not (nor could they justifiably) turn to the oceans as the ultimate receptacle for the wastes generated by their industrialization processes.

318. See notes 27-29 *supra* and accompanying text.