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## The Need for a Ban on All Radioactive Waste Disposal in the Ocean

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# The Need for a Ban on All Radioactive Waste Disposal in the Ocean

## I. INTRODUCTION

*Man is both creature and moulder of his environment, which gives him physical sustenance and affords him the opportunity for intellectual, moral, social and spiritual growth. In the long and tortuous evolution of the human race on this planet a stage has been reached when, through the rapid acceleration of science and technology, man has acquired the power to transform his environment in countless ways and on an unprecedented scale. Both aspects of man's environment, the natural and the man-made, are essential to his well being and to the enjoyment of basic human rights — even the right to life itself.<sup>1</sup>*

The harnessing of nuclear power is the technological advance which best represents the ability of the human race to transform the environment for both good and bad. Nuclear power can be used either to destroy the earth or to improve greatly the quality of life for all persons. Attendant with this power is the problem of what to do with radioactive wastes<sup>2</sup> left behind by the private and public uses of a technology not yet

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<sup>1</sup> Report of the United Nations Conference on the Human Environment, Stockholm, June 5-16, 1972, U.N. Doc. A/Conf.48/14/Rev.1, at 3 (1972) [hereinafter Stockholm Conference].

<sup>2</sup> International law currently distinguishes between high-level and low-level radioactive wastes. High-level radioactive wastes, as defined by the International Atomic Energy Agency, generally have longer half-lives and consist mainly of spent fuel from nuclear reactors and nuclear weapons. Low-level radioactive wastes include a host of substances used in connection with the nuclear fuel process (for instance protective clothing or the water used to cool nuclear reactors) which are found in lesser concentrations than the spent fuel. See International Atomic Energy Agency, Information Circular, Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, the Definition Required by Annex I, ¶ 6 to the Convention, and the Recommendations Required by Annex II, § D, INFCIRC/205/Add.1/Rev.1 (1978), reprinted in 18 INT'L LEGAL MATERIALS 826 (1979) [hereinafter IAEA Definitions and Recommendations]. There is much confusion and debate over precise distinctions between high- and low-level wastes, which is one reason this Comment argues for more restraint in dumping radioactive wastes of any kind at sea. There is even confusion over classifying wastes as falling into only the high- or low-level categories. For instance, the Nuclear Energy Agency of the Organization for Economic Cooperation and Development said that there is no agreed-upon definition of level of wastes, either high, low or medium, because of the infancy of knowledge of radioactive wastes. ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, NUCLEAR ENERGY AGENCY, OBJECTIVES, CONCEPTS AND STRATEGIES FOR THE MANAGEMENT OF RADIOACTIVE WASTE ARISING FROM NUCLEAR POWER PROGRAMMES 25 (1977) [hereinafter NEA OBJECTIVES].

fifty years old.<sup>3</sup>

As wastes from nuclear power plants,<sup>4</sup> government projects,<sup>5</sup> and various fields of science<sup>6</sup> continue to amass, attention is being focused increasingly on the earth's oceans as a potentially viable sink for these wastes.<sup>7</sup> While other alternatives, such as burial in deep geological salt formations,<sup>8</sup> are currently being developed, the full ramifications of these plans remain unknown.<sup>9</sup> The problems presented by radioactive waste disposal are compounded because much of the radioactive waste currently created will remain a hazard, not just for a few generations, but for centuries.<sup>10</sup> Thus, whatever options industry and the international community pursue, such alternatives must be safe for the human population and the environment.

Once a thorough comparative study has been completed, the ocean may someday prove to be an attractive site for radioactive wastes.<sup>11</sup> Currently, however, too many questions persist as to this particular disposal option. Not enough is known about the possible effects on ocean ecosystems and our relationship to them to conclude that the ocean is a viable

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<sup>3</sup> See A. CALDER, *LIVING WITH THE ATOM* (1962).

<sup>4</sup> One estimate put the volume of low-level waste from nuclear power plants in the United States alone at 275 million cubic feet by the year 2000. *Ocean Dumping and Pollution: Hearings before the Subcomm. on Oceanography and the Subcomm. on Fisheries and Wildlife Conservation and the Environment of the House Comm. on Merchant Marine and Fisheries*, 95th Cong., 1st & 2nd Sess. 196 (1977 & 1978) (statement of John Deutch, Office of Energy Research).

<sup>5</sup> Weapons testing and state-owned nuclear power plants are the main sources of government-produced radioactive wastes.

<sup>6</sup> See IAEA Definitions and Recommendations, *supra* note 2, at 838.

<sup>7</sup> See, e.g., *NUCLEAR WASTE MANAGEMENT: THE OCEAN ALTERNATIVE* (T. Jackson ed. 1981); *COMMISSION ON NATURAL RESOURCES OF THE NATIONAL RESEARCH COUNCIL, DISPOSAL IN THE MARINE ENVIRONMENT: AN OCEANOGRAPHIC ASSESSMENT, AN ANALYTICAL STUDY FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY* (1976) [hereinafter *EPA ASSESSMENT*].

<sup>8</sup> The United States Environmental Protection Agency is in the process of selecting primary and secondary site locations for the burial of radioactive wastes, including high-level wastes from nuclear generators. This is currently the favored method of both the United States and Canada. See *The Management of Canada's Nuclear Wastes*, Report EP 77-6 for the Ministry of Energy, Mines and Resources, Aug. 31, 1977 [hereinafter *Canadian Waste*].

<sup>9</sup> *Id.*

<sup>10</sup> See Finn, *Ocean Disposal of Radioactive Wastes: The Obligation of International Cooperation to Protect the Marine Environment*, 21 VA. J. INT'L L. 622, 635 (1981). See also NEA OBJECTIVES, *supra* note 2, at 28. The chart there lists the half-lives of 45 radioactive substances, how they are generated and their major modes of decay (alpha rays or beta-gamma rays). The half-life is equivalent to how long the substance is radioactive, though the danger from a radioactive substance is not constant over the period of the half-life. In other words, the danger posed by a radioactive substance such as Plutonium-238, which has a half-life of 87 years, is much greater in the first few years than the last years of the half-life because of the rate of alpha ray emission. The half-lives of the man-made substances listed in the NEA Objectives chart range from less than two hours (Argon-41) to 17,000,000 years (Iodine-129). *Id.*

<sup>11</sup> *EPA ASSESSMENT*, *supra* note 7, at vii.

disposal site for radioactive wastes.<sup>12</sup> While proponents of this disposal technique argue that the sea has large amounts of naturally occurring radioactivity,<sup>13</sup> this defense ignores the central question of what effect additional man-made radioactive materials will have on the ocean environment.<sup>14</sup>

A tremendous amount of knowledge concerning ocean systems has been obtained in the past decade. Nonetheless, there remains a paucity of conflicting data as to the effects of ocean dumping, not only as to low-level radioactive wastes, but also as to the high-level wastes produced by nuclear power plants.<sup>15</sup> Debate still rages over how best to classify various forms of radioactive waste for disposal at sea or elsewhere, as different international organizations use different categories.<sup>16</sup> Studies comparing the feasibility of reuse or recovery, or disposal on land, in the air, or in the ocean remain incomplete.<sup>17</sup> Indeed, this lack of data led the London Dumping Convention ("LDC") to issue a two-year moratorium on all radioactive waste disposal at sea.<sup>18</sup> This ban expired at the end of 1985, but the need for continued study prompted the LDC to extend the ban pending the completion of further research.<sup>19</sup>

Despite the extension of the ban, pressure will likely build to permit at least the resumption of low-level radioactive waste disposal at sea.<sup>20</sup> A representative of the United States nuclear industry has stated that such a practice is politically impossible for industry in the United States,<sup>21</sup> nonetheless, the United States Environmental Protection Agency ("EPA") is considering ocean disposal. Other nations, such as Great Britain and Japan, are also likely to support waste disposal at sea for their nuclear industries.<sup>22</sup>

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<sup>12</sup> See, e.g., Canadian Waste, *supra* note 8, at 38.

<sup>13</sup> See IAEA Definitions and Recommendations, *supra* note 2, at 839.

<sup>14</sup> *Id.*

<sup>15</sup> *Id.* at 841. See also Finn, *supra* note 10, at 630-35.

<sup>16</sup> See, e.g., Third Consultative Meeting of Contracting Parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter ¶ 6, I.M.C.O. Doc. LDC III/12, Oct. 24, 1978 (Dumping of Radioactive Substances); NEA OBJECTIVES, *supra* note 2, at 25.

<sup>17</sup> Many writers and statesmen call for such research, but present efforts, such as the comparison of alternatives undertaken by Canada, are only preliminary steps. See, e.g., Canadian Waste, *supra* note 8.

<sup>18</sup> Resolution LDC 14(7), Disposal of Radio-Active Wastes and other Radio-Active Matter at Sea, IMO Doc. LDC VII/6 (Feb. 17, 1983).

<sup>19</sup> Resolution LDC 21(9), Dumping of Radioactive Wastes at Sea, IMO Doc. LDC IX/12 (Oct. 18, 1985).

<sup>20</sup> See *U.S. Ocean Dumping of Low-level A-waste not Likely, Despite Report*, The Christian Science Monitor, July 25, 1984, at 5, col. 1.

<sup>21</sup> *Id.*

<sup>22</sup> *Id.* Great Britain was one of only six nations to vote against the dumping ban in 1985 and Japan was one of only seven nations to abstain. Ninth Consultative Meeting of Contracting Parties

The human race is fast approaching a crossroad at which it must decide how the oceans and their resources will be used. Increasingly, the sea is looked to as a future resource base which cannot be wasted. In formulating policy to exploit the sea's resources in the best way, the sea should be treated as an integrated system;<sup>23</sup> what happens in one part of the sea necessarily affects other parts of the sea.<sup>24</sup> Thus, there is a need to reexamine existing international law on radioactive waste disposal at sea to ensure that all of the sea is protected adequately.

This Comment will examine existing international law concerning ocean dumping of radioactive waste, including the first and third United Nations Conferences on the Law of the Sea Treaties ("UNCLOS I" and "UNCLOS III"), the LDC, and various United Nations resolutions.<sup>25</sup> As part of the analysis, particular attention will be paid to seabed implantation of radioactive wastes, as there seems to be confusion as to whether seabed disposal constitutes ocean dumping.<sup>26</sup> Despite the promise of international law to protect and preserve the maritime environment for future generations, analysis of international law will show that it has been ineffective in achieving these objectives.<sup>27</sup> This failure has led many commentators to propose solutions which are, at best, only partially satisfactory, not reflecting the true intent of international law.<sup>28</sup> In contrast, this Comment will propose a foundation for protecting humans and the marine environment from long- and short-term hazards of radioactive wastes<sup>29</sup> based on a planetary trust.<sup>30</sup> The theory advocates that, until safer methods are developed, all radioactive waste disposal at sea be halted.<sup>31</sup>

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to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter ¶ 4.91, IMO Doc. LDC IX/12, Oct. 18, 1985 [hereinafter Ninth LDC Meeting]. See also *Plan for Sea Dumping of Atomic Waste*, Manchester Guardian Weekly, Sept. 25, 1983, at 4, col. 1; and *Energy Poor Japan Looks to the Atom but Where to Dispose of the Waste*, United Press International, May 9, 1984 [hereinafter *Japanese Waste*].

<sup>23</sup> See Schwebel, *Second Report on the Law of the Non-Navigational Uses of International Watercourses* ¶ 140, [1980] 2, pt. 1 Y.B. INT'L L. COMM'N 159, 180, U.N. Doc. A/CN.4/332. See generally IAEA Definitions and Recommendations, *supra* note 2, at 841 (radioactivity from all sources must be included in any assessment of release rate limit).

<sup>24</sup> *Id.*

<sup>25</sup> See *infra* notes 32-123 and accompanying text.

<sup>26</sup> See Curtis, *Legality of Seabed Disposal of High-Level Radioactive Wastes Under the London Dumping Convention*, 14 OCEAN DEV. & INT'L L. 383 (1985). See also Ninth LDC Meeting ¶ 5, *supra* note 22.

<sup>27</sup> See *infra* notes 124-52 and accompanying text.

<sup>28</sup> See *infra* notes 153-98 and accompanying text.

<sup>29</sup> See *infra* notes 199-229 and accompanying text.

<sup>30</sup> Brown-Weiss, *The Planetary Trust: Conservation and Intergenerational Equity*, 11 ECOLOGY L.Q. 495 (1984).

<sup>31</sup> See *infra* notes 213-29 and accompanying text.

## II. INTERNATIONAL LAW, RADIOACTIVE WASTE, AND THE OCEANS

As the human race has become more interested in ocean use, the international legal community has become more active in setting guidelines for the present use and future preservation of ocean resources.<sup>32</sup> The guidelines far exceed the narrow regulations of international shipping on the high seas, which are the oldest international laws involving the sea. While seabed mining, fishing rights, and boundary disputes are current areas of concern, pollution of the sea has received the most constant attention.<sup>33</sup> In particular, radioactive wastes as a source of such pollution has received greater scrutiny than any form of marine pollution with the exception of oil pollution.<sup>34</sup>

There are three important global treaties concerning ocean pollution by radioactive wastes.<sup>35</sup> These agreements and other international declarations, regulations, and United Nations resolutions form the framework in which the international community handles the problem of radioactive waste disposal at sea. Most, if not all, of these agreements share common themes prevalent in other fields of international law. Those themes include preservation of the marine environment, the equitable use of marine resources, the need for international cooperation, and a recognition of the continuing responsibility to pass on to future generations a livable world.

### A. The Early Efforts

UNCLOS I<sup>36</sup> was the first major treaty to address ocean disposal of radioactive waste. The adoption of the treaty occurred before nuclear power became a viable energy source and well before industrial radioactive waste disposal became a major pollution issue. Although they were

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<sup>32</sup> This is evident not only in the abundance of law concerning sea disposal of radioactive wastes, but also in the number of laws regulating seabed mining and other uses of the sea. See The Third United Nations Conference on the Law of the Sea, *opened for signature* Dec. 10, 1982, U.N. Doc. A/CONF.62/122, reprinted in 21 INT'L LEGAL MATERIALS 1261 (regulating seabed mining) [hereinafter UNCLOS III].

<sup>33</sup> For example, oil pollution has received significant attention. See Dempsey, *Compliance and Enforcement in International Law—Oil Pollution of the Marine Environment by Ocean Vessels*, 6 Nw. J. INT'L L. & BUS. 459 (1985).

<sup>34</sup> Finn, *supra* note 10, at 623. See also Boehme, *The Use of the Seabed as a Dumping Site*, in THE LAW OF THE SEA TOWARDS AN OCEAN SPACE REGIME 93, 117 (1972).

<sup>35</sup> The three treaties are: the first United Nations Conference on the Law of the Sea, April 29, 1958, 450 U.N.T.S. 11 [hereinafter UNCLOS I]; Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Dec. 29, 1972, 26 U.S.T. 2403, T.I.A.S. No. 8165 [hereinafter LDC]; and UNCLOS III, *supra* note 31.

<sup>36</sup> UNCLOS I, *supra* note 35.

unable to agree on the primary issue before them — nuclear weapons testing<sup>37</sup> — the conferees did recognize “the need for cooperative international action to control disposal of radioactive wastes in the sea.”<sup>38</sup> The Geneva Convention on the High Seas,<sup>39</sup> adopted as part of UNCLOS I, laid the groundwork for international cooperation in controlling radioactive waste pollution of the ocean. This convention states in part:

1. Every state shall take measures to prevent pollution of the seas from the dumping of radio-active waste, taking into account any standards and regulations which may be formulated by the competent international organization.
2. All states shall co-operate with the competent international organizations in taking measures for the prevention of pollution of the seas or air space above, resulting from any activities with radio-active materials or other harmful agents.<sup>40</sup>

UNCLOS I called upon the International Atomic Energy Agency (“IAEA”) and other organizations to “pursue whatever studies and take whatever action” necessary to control the problem of radioactive waste disposal at sea. Furthermore, the treaty encouraged these organizations to propose regulations for the prevention of ocean pollution resulting from wastes which “adversely affect man and his marine resources.”<sup>41</sup>

Commentators disagree on how to interpret this language.<sup>42</sup> Some suggest that UNCLOS I merely urges international cooperation and deems radioactive waste disposal at sea a reasonable use of man’s ocean resources given proper circumstances.<sup>43</sup> Others argue that the treaty should be read as promoting the development of international scientific and substantive norms for regulating dumping.<sup>44</sup> Regardless of the interpretation, the failure of UNCLOS I to ban explicitly radioactive waste disposal in the oceans has not meant that it is reasonable to dump all radioactive wastes in the seas. The IAEA did not recommend disposing high-level radioactive wastes; it did say that low-level wastes might be dumped, but only under tightly controlled circumstances.<sup>45</sup> The IAEA also emphasized that its recommendations were provisional pending the results of important research on the effects of radioactive wastes on ocean

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<sup>37</sup> See Finn, *supra* note 10, at 646.

<sup>38</sup> *Id.* (quoting M. McDUGAL & W. BURKE, *THE PUBLIC ORDER OF THE OCEANS* 864-65 (1962)).

<sup>39</sup> Geneva Convention on the High Seas, Apr. 29, 1958, 13 U.S.T. 2312, T.I.A.S. No. 5200, 450 U.N.T.S. 82.

<sup>40</sup> *Id.*

<sup>41</sup> UNCLOS I, *supra* note 35, at 58.

<sup>42</sup> See Finn, *supra* note 10, at 646-47.

<sup>43</sup> See M. McDUGAL & W. BURKE, *supra* note 38, at 867.

<sup>44</sup> See Finn, *supra* note 10, at 647.

<sup>45</sup> *Id.* at 647-48.

environments.<sup>46</sup> Despite the varying interpretations of the treaty's efforts to control radioactive waste disposal at sea, the language of UNCLOS I stresses three of the four basic directives of international law concerning radioactive waste disposal at sea: environmental preservation, international cooperation, and international equity.<sup>47</sup>

UNCLOS I stood alone in the field of international agreements on ocean dumping until the late 1960s and early 1970s. At that time, a flurry of activity, including several United Nations resolutions,<sup>48</sup> led to the LDC.<sup>49</sup> It was this convention which established a specific framework for international control of waste disposal in the oceans, a provision not included in UNCLOS I. The LDC remains "the only global agreement concerned solely with the disposal of wastes in the marine environment by dumping."<sup>50</sup> Fifty-five nations have ratified the LDC<sup>51</sup> since it came into force in 1975.<sup>52</sup>

When the LDC was drafted in 1972, United Nations resolutions and declarations concerning uses of the sea and seabed reinforced the LDC's basic provisions of international law. One of the earliest statements on the subject, United Nations Resolution 2467,<sup>53</sup> echoes the principles of equity, cooperation, and responsibility to future generations. The resolution urges "international co-operation" in promoting peaceful uses of the sea and seabed "taking into account the foreseeable development of technology and the economic implications of such exploitations and bearing in mind the fact that such exploitation should benefit mankind as a whole."<sup>54</sup> Further, the resolution urges that "measures of co-operation . . . be adopted by the international community in order to prevent the marine pollution which may result from the exploration and exploitation of the resources of this area."<sup>55</sup>

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<sup>46</sup> *Id.*

<sup>47</sup> See *supra* note 40 and accompanying text.

<sup>48</sup> Among them are Resolution on the Charter of Economic Rights and Duties of States, G.A. Res. 3281, 29 U.N. GAOR Supp. (No. 31), at 50 (1974); Resolution on the Protection of the Marine Environment, G.A. Res. 3133, U.N. Doc. A/RES/3133, *reprinted in* 13 INT'L LEGAL MATERIALS 234 (1973); Resolution on the Declaration of Principles Governing the Sea-Bed and the Ocean Floor, and the Subsoil Thereof, beyond the Limits of National Jurisdiction, G.A. Res. 2749, 25 U.N. GAOR Supp. (No. 28), at 24 (1970); and U.N. General Assembly Resolutions on Reservation of Sea-Bed and Ocean Floor for Peaceful Purposes, G.A. Res. 2467, U.N. Doc. A/RES/2467 (1968), *reprinted in* 8 INT'L LEGAL MATERIALS 201.

<sup>49</sup> LDC, *supra* note 35.

<sup>50</sup> See Curtis, *supra* note 26, at 392.

<sup>51</sup> *Id.* at 393.

<sup>52</sup> *Id.*

<sup>53</sup> G.A. Res. 2467, *supra* note 48.

<sup>54</sup> *Id.* at 202.

<sup>55</sup> *Id.*

Subsequent resolutions parallel these sentiments. United Nations Resolution 2749,<sup>56</sup> explicitly referred to in the preamble of the LDC as the declaration of principles governing the seabed and its subsoil,<sup>57</sup> states that the sea, its subsoil, and resources "are the common heritage of mankind."<sup>58</sup> It further instructs nations to take measures for "the prevention of pollution . . . to the marine environment, including the coastline, and of the interference with the ecological balance of the marine environment."<sup>59</sup> The resolution calls for international cooperation to achieve this aim and for the "equitable sharing" of the benefits derived from the sea.<sup>60</sup>

The most articulate expression of the concepts contained within these declarations came in June 1972 (immediately before the opening of the LDC) at the United Nations Conference on the Environment held in Stockholm.<sup>61</sup> There the conferees articulated an "imperative goal for mankind:"<sup>62</sup> that present and future generations owe a duty to defend and improve the human environment.<sup>63</sup> In total, the conferees adopted twenty-six principles.

The Stockholm Conference declarations contain equally strong provisions concerning attempts to combat pollution, international cooperation, and international equity. Principle Seven calls upon nations to "take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea."<sup>64</sup> Principle Thirteen instructs nations to "adopt an integrated and co-ordinated approach to their development."<sup>65</sup> The conferees concluded that, in order to achieve the goals established at the convention, "[i]nternational matters concerning the protection and improvement of the environment" would be handled best in a "co-operative spirit by all countries, big and small, on an equal footing."<sup>66</sup>

These international resolutions form the background to the LDC and UNCLOS III. These two treaties attempt to create a framework for managing radioactive waste disposal at sea. At the same time, they re-

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<sup>56</sup> G.A. Res. 2749, *supra* note 48.

<sup>57</sup> LDC, *supra* note 35, at 2406.

<sup>58</sup> G.A. Res. 2749, *supra* note 48, at 24.

<sup>59</sup> *Id.*

<sup>60</sup> *Id.*

<sup>61</sup> Stockholm Conference, *supra* note 1.

<sup>62</sup> *Id.* at 3.

<sup>63</sup> *Id.* at 4.

<sup>64</sup> *Id.*

<sup>65</sup> *Id.*

<sup>66</sup> *Id.* Principle 24, at 5.

tain the same spirit and intent expressed in earlier resolutions and declarations.

### B. The London Dumping Convention

Plans for the LDC had been made before the Stockholm Conference. It is clear from the text of the treaty, however, that the conference influenced the LDC. For example, Article I of the LDC provides:

Contracting parties shall individually and collectively promote the effective control of all sources of pollution of the marine environment, and pledge themselves especially to take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.<sup>67</sup>

Other sections of the agreement repeatedly stress the need to protect human health and interests in the sea as well as the total marine environment. The preamble in particular notes the "vital importance to humanity" of the total marine environment. It recognizes that the sea is not an unlimited resource and cannot be an open disposal site for every waste. The agreement provides that, while nations have a right to exploit the ocean resources within their jurisdiction, they also have "responsibility to ensure that activities within their jurisdiction or control do not cause damage to their environment, to the environment of other States, or to areas beyond the limits of national jurisdiction."<sup>68</sup>

The LDC banned outright the dumping of high-level radioactive wastes.<sup>69</sup> It was left to the IAEA to define what radioactive wastes were "high-level."<sup>70</sup> The convention allows dumping of low-level radioactive wastes, but only after careful analysis and impact studies are completed and special permits are issued by the IAEA and recorded under the convention.<sup>71</sup> The convention also allows individual nations to ban the

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<sup>67</sup> LDC, *supra* note 35, at 2406.

<sup>68</sup> *Id.*

<sup>69</sup> Article IV of the LDC prohibits the dumping of any materials listed in Annex I. *Id.* at 2408. The materials listed in Annex I include "high-level radio-active wastes . . . defined . . . by the competent international body in this field, at the present the International Atomic Energy Agency, as unsuitable for dumping at sea." *Id.* at 2465.

<sup>70</sup> *Id.* For the technical definition of high-level radioactive wastes, see IAEA Definitions and Recommendations, *supra* note 2, at 828-29. The IAEA also stressed that "[t]he Definition must not be taken to imply that material falling outside the Definition is thereby deemed to be suitable for dumping." *Id.* at 823, ¶ A.1.2.

<sup>71</sup> Article IV states that the dumping of materials listed in Annex II require prior special permits based on factors listed in Annex III. *Id.* at 2408. Annex II includes "radio-active wastes . . . not included in Annex I." *Id.* at 2466. For a description of the factors to be considered before issuing a permit, see Annex III and the IAEA Definitions and Recommendations. *Id.* at 2467-68. See also IAEA Definitions and Recommendations, *supra* note 2, at 829-31. Note that even here the IAEA urges caution and restraint: "[t]he doses to individual members of the public should not reach the

dumping of low-level radioactive wastes.<sup>72</sup> It also calls upon contracting states to implement "measures to prevent and punish conduct in contravention of the provisions of this Convention."<sup>73</sup> To the extent any state may be responsible for damage to the marine environment as a result of dumping, Article X states that the contracting parties should develop procedures in international law for assessing liability and settling disputes regarding dumping.<sup>74</sup> The convention also urges the formation of regional agreements on marine dumping.<sup>75</sup> Consequently, while dumping high-level radioactive wastes in the ocean is illegal under international law for the fifty-five contracting parties of the LDC,<sup>76</sup> the legality of low-level radioactive waste dumping and seabed disposal of all levels of radioactive waste remains at issue.<sup>77</sup> (The propriety of such activities is a separate question and will be addressed later in this Comment.<sup>78</sup>)

The organization which promulgates standards for the LDC, the IAEA,<sup>79</sup> issued recommendations in 1978 for "a detailed environmental and ecological assessment" of each application for a permit to dump Annex II radioactive wastes.<sup>80</sup> Justifications favoring sea disposal over land disposal are to be included in such assessments.<sup>81</sup> Other issues to be considered by the IAEA include: the likely exposure doses to humans and

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appropriate dose limits, now or in the future. . . . No special permit should be issued which would cause these limits to be approached." *Id.* at 829-30, ¶ B.1.2.(3). Subsequent amendments to the Annexes have not materially altered how permits should be considered with respect to radioactive wastes. See Tenth Consultative Meeting of the Contracting Parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter, Annexes 2-5, IMO Doc. LDC X/15, Nov. 5, 1986 [hereinafter Tenth LDC Meeting].

<sup>72</sup> See LDC art. IV, *supra* note 71, at 2408, which states that: "No provision of this Convention is to be interpreted to prevent a Contracting Party from prohibiting, insofar as that Party is concerned, the dumping of wastes or other matter not mentioned in Annex I." *Id.* This reinforces the notion that nations should be very reluctant to allow sea dumping of materials as potentially hazardous as even low-level radioactive waste.

<sup>73</sup> *Id.* art. VII(2), at 2410.

<sup>74</sup> *Id.* art. X, at 2411. Outside of arbitration provisions present in such treaties as UNCLOS III, there is nothing in international law to punish transgressors. The success of agreements is up to the good graces of the participants.

<sup>75</sup> *Id.* art. VIII, at 2410.

<sup>76</sup> See *supra* note 69 and accompanying text.

<sup>77</sup> See generally Curtis, *supra* note 26.

<sup>78</sup> See *infra* notes 199-229 and accompanying text.

<sup>79</sup> For a more complete and detailed examination, see LDC, *supra* note 35, arts. III(7), IV, & XIV(2) and annexes I, II, & III, at 2407-08, 2412, 2465-68.

<sup>80</sup> IAEA Definitions and Recommendations, *supra* note 2, at 829, ¶ B.1.1. The IAEA issued updated recommendations to the LDC at the Tenth LDC Meeting. Publication deadlines prevented time to obtain updated material, though the report of the Tenth LDC Meeting indicates little change in the IAEA standards except to toughen limits for radioactive substances. Tenth LDC Meeting, *supra* note 71, ¶¶ 5.13-5.16.

<sup>81</sup> IAEA Definitions and Recommendations, *supra* note 2, at 830, ¶ B.1.4.

risks to sea ecosystems;<sup>82</sup> the degree by which pretreatment, containment, and site selection can reduce exposure levels;<sup>83</sup> the availability of sites away from heavily fished areas, underwater cables, areas of difficult navigation, and areas of biologically productive or potentially productive resources;<sup>84</sup> and the ability to monitor the site after dumping.<sup>85</sup> The IAEA also recommends that all sites for this type of radioactive waste disposal be located below fifty degrees latitude, deeper than 4,000 meters, away from continental margins and islands, and smaller than 10,000 square kilometers.<sup>86</sup> Also, the number of sites should be strictly limited.<sup>87</sup> A mere cursory reading of the 1978 recommendations gives rise to the inference that the IAEA was extremely reluctant to allow special permits for the disposal of even low-level radioactive wastes at sea under the LDC. The recommendations suggest that extreme caution be taken given the uncertainties surrounding such disposal actions.

Other problems have arisen in the wake of the LDC. One of the most troubling is the suggestion that, instead of "dumping" radioactive wastes at sea, they be "implanted" in the seabed.<sup>88</sup> Seabed implantation is problematic because it is possible to argue that the LDC neither bars nor regulates such activity.<sup>89</sup> One commentator has argued recently that the LDC does prohibit such activity.<sup>90</sup> Barring this argument, however, seabed implantation of radioactive wastes may not be covered fully by international law. Until this gap is closed, the international controls and discussion provided by the annual LDC meetings will be lost.

The question whether the LDC covers seabed disposal was raised seriously for the first time at the Seventh Consultative Meeting of the Contracting Parties in 1983.<sup>91</sup> At that meeting, several nations expressed either doubts or concerns as to the coverage of the LDC.<sup>92</sup> The primary reason for this concern was that seabed disposal was not considered an

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<sup>82</sup> *Id.* at 832, ¶ B.1.4.(4) & (5).

<sup>83</sup> *Id.* ¶ B.1.4.(6).

<sup>84</sup> *Id.* ¶ C.2.1.

<sup>85</sup> *Id.* at 831, ¶ B.2.

<sup>86</sup> *Id.* at 832, ¶ C.2.

<sup>87</sup> *Id.* ¶ C.2.1.(6).

<sup>88</sup> See Curtis, *supra* note 26.

<sup>89</sup> This is true because of the LDC definition of the term "dumping" in art. III(1)(a) and its confusing use of the term "at sea" in that definition. See LDC, *supra* note 35, at 2407.

<sup>90</sup> Curtis, *supra* note 26.

<sup>91</sup> *Id.* at 384-86. The Norwegian delegation noted that the work of the Seabed Working Group may lead to seabed implantation of radioactive wastes carried out on a national basis. It queried whether such activity was covered under the LDC. The Finnish, Spanish, and West German delegations echoed that concern and drafted a resolution (Resolution LDC.15/7) calling for special inter-sessional study of the matter. *Id.*

<sup>92</sup> *Id.*

option for radioactive waste disposal at the time of the original drafting.<sup>93</sup> The concern also reflected international recognition of the danger radioactive wastes pose as a marine pollutant because they are "long-lived" and "accumulate in certain parts of the ecosystem, including living organisms."<sup>94</sup> The ecological and biological effects of such accumulations represent hazards to human health.<sup>95</sup>

The concerns expressed were significant enough that the LDC issued a two-year moratorium on ocean disposal of all radioactive wastes pending the results of scientific studies to be presented at the LDC's Ninth Consultative Meeting.<sup>96</sup> The parties did not discuss, however, the legality of seabed implantation despite the obvious concern for the marine environment.<sup>97</sup> The LDC discussed the matter briefly at its Ninth and Tenth meetings, but little progress was made toward settling the issue.<sup>98</sup> All parties agreed that the LDC was the proper forum for discussing seabed implantation, but they left unresolved the key question of whether to permit high-level radioactive waste disposal in the seabed for experimentation.<sup>99</sup>

Any discussion of the legality of seabed disposal must be made with reference to the Vienna Convention on the Law of Treaties<sup>100</sup> as it presents the most widely accepted and customary means of interpreting international law. Article 31 of the convention states that a treaty or an agreement should be interpreted in accordance with the expressions of the parties' intent.<sup>101</sup> Furthermore, a treaty should be interpreted in good faith, in accordance with the ordinary meaning of its terms in their context, and in light of the treaty's object and purpose.<sup>102</sup> It follows then that the LDC should be read in light of its basic purpose as stated in the preamble: to protect the marine environment.<sup>103</sup>

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<sup>93</sup> *Id.* at 393.

<sup>94</sup> *Id.* at 389.

<sup>95</sup> *Id.*

<sup>96</sup> *Id.* at 389-90.

<sup>97</sup> *Id.* at 393.

<sup>98</sup> See Ninth LDC Meeting, *supra* note 22, ¶ 5, and Tenth LDC Meeting, *supra* note 71, ¶¶ 5.1-5.7.

<sup>99</sup> Tenth LDC Meeting, *supra* note 71, ¶¶ 5.2-5.3.

<sup>100</sup> Vienna Convention on the Law of Treaties, Jan. 27, 1969. As of April 1983, 21 nations had ratified or acceded to both the LDC and the Vienna Convention. The United States and five other nations have signed the LDC but have not approved the Vienna Convention. See Curtis, *supra* note 50, at 411 n.17.

<sup>101</sup> Curtis, *supra* note 26, at 391. Clarifying whether seabed implantation is included within the term "dumping" is the aim of the Resolution LDC.15/7. *Id.* at 385-86.

<sup>102</sup> *Id.* at 392.

<sup>103</sup> *Id.* at 393. Thus, "an interpretation which makes the treaty effective, rather than ineffective, should be preferred as long as it does not frustrate the object and purpose of the treaty." *Id.* at 392.

One of the paragraphs contained in the LDC's preamble sheds light on the status of seabed disposal. The paragraph reflects Resolution 2749 of the United Nations General Assembly on the Principles Governing the Sea-Bed and the Ocean Floor and the Subsoil Thereof, Beyond the Limits of National Jurisdiction.<sup>104</sup> As discussed earlier, Resolution 2749<sup>105</sup> calls upon nations to take measures to prevent "pollution and contamination, and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment" and to protect and conserve the ocean's natural resources and the flora and fauna of the marine environment.<sup>106</sup>

The first two articles of the LDC call on the contracting parties to control "all sources of pollution of the marine environment, . . . to take all practicable steps to prevent the pollution of the sea"<sup>107</sup> by dumping, and to harmonize efforts and policies.<sup>108</sup> Article III(1)(a) defines "dumping" as "any deliberate disposal at sea of wastes or other matter from vessels, aircraft, platforms, or other manmade structures at sea."<sup>109</sup> Article XII speaks more broadly of the contracting parties protecting the marine environment against pollution from the most dangerous sources, such as radioactive pollutants from all sources, including vessels.<sup>110</sup> As one commentator has stated, "[t]he express listing of radioactive substances in this broader context reinforces the extreme caution and restraint that is reflected by the Contracting Parties decision to prohibit the dumping of high level wastes."<sup>111</sup> Consequently, the provisions of the LDC and other pertinent international agreements seem to indicate that, for purposes of disposing radioactive wastes at sea, no distinction should be made between marine waters and the seabed and subsoil.

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Including seabed implantation of wastes within the ambit of ocean dumping is certainly consistent with the object and purpose of the LDC while, at the same time, making the treaty effective rather than ineffective.

<sup>104</sup> LDC, *supra* note 35, at 2406.

<sup>105</sup> G.A. Res. 2749, *supra* note 48, at 24.

<sup>106</sup> *Id.*

<sup>107</sup> LDC, *supra* note 35, at 2406.

<sup>108</sup> *Id.* at 2407.

<sup>109</sup> *Id.*

<sup>110</sup> *Id.* at 2411.

<sup>111</sup> Curtis, *supra* note 26, at 398. The factors for issuing permits listed in Annex III support this reading. The provisions to be considered include "[a]ccumulation and biotransformation in biological materials or *sediments*; . . . location in relation to other areas; . . . [b]ottom characteristics (*e.g.* "topography, geochemical and geological characteristics and biological productivity;") and "[p]ossible effects on other uses of the sea (*e.g.*, . . . interference with fishing or navigation through deposit of waste or solid objects on the sea floor. . . .)" LDC, *supra* note 35, at 2467-68 (emphasis added).

C. The Third United Nations Conference on  
the Law of the Sea

UNCLOS III<sup>112</sup> opened for signature in 1983 and has been signed by 159 nations.<sup>113</sup> The treaty will not come into force, however, until one year after sixty nations ratify it.<sup>114</sup> UNCLOS III furthers the aim of the LDC to prevent marine pollution and removes doubt as to whether waste disposal in the seabed is prohibited by international law. Part XII is devoted exclusively to detailing the duties of participating nations "to protect and preserve the marine environment."<sup>115</sup>

In general, UNCLOS III seeks to prevent and reduce pollution of the marine environment from any source.<sup>116</sup> UNCLOS III very broadly defines pollution as:

the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.<sup>117</sup>

The treaty emphasizes the need to prevent and minimize "the release of toxic, harmful or noxious substances, especially those which are persistent, from land-based sources, from or through the atmosphere or by dumping."<sup>118</sup> It further clarifies the LDC definition of dumping to read "any deliberate disposal of wastes or other matter from vessels, aircraft, platforms, or other man-made structures at sea."<sup>119</sup> This wording leaves little doubt that UNCLOS III applies to seabed disposal and not just the traditional methods of waste disposal at sea.<sup>120</sup>

UNCLOS III also reinforces the themes presented in the other international resolutions, declarations, and treaties discussed above. International equity, protection of the environment, responsibility to future

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<sup>112</sup> UNCLOS III, *supra* note 32.

<sup>113</sup> See *Recent Action Regarding Treaties to Which the United States Is Not a Party*, 24 INT'L LEGAL MATERIALS 268 (1985). It should be noted that all the major nations which have industries producing radioactive waste signed UNCLOS III. Whether this will lead to ratification is another question, as the Reagan Administration has so far successfully fought efforts to gain Senate Ratification in the United States.

<sup>114</sup> See Curtis, *supra* note 26, at 400.

<sup>115</sup> See UNCLOS III, *supra* note 32, at 1308-16, part XII.

<sup>116</sup> *Id.* at 1308, art. 194.

<sup>117</sup> *Id.* at 1271.

<sup>118</sup> *Id.* at 1308.

<sup>119</sup> *Id.* at 1271.

<sup>120</sup> Curtis, *supra* note 26, at 401-03. Curtis concludes that there should not be any conflict between the LDC and UNCLOS III, as both seek the same goal for the marine environment. *Id.* at 403.

generations, and international cooperation are repeatedly stressed in the document, particularly in Part XII.<sup>121</sup> Thus, UNCLOS III both repeats and strengthens the ideas asserted in the past thirty years to control internationally radioactive waste disposal at sea. When this latest treaty enters into force, the international community should pursue aggressively the goals expressed in these documents.

Based upon the LDC and UNCLOS I and III, it is clear that the international community is seeking to prevent, to the greatest extent possible, damage to human life and the marine environment from radioactive waste disposal in the sea. International law already bans sea disposal of high-level radioactive wastes, which constitute the bulk of all radioactive wastes.<sup>122</sup> It appears that the international community is now becoming increasingly skeptical of low-level radioactive wastes as well. The restrictive IAEA 1978 and 1986 recommendations and the strong language used in the LDC and UNCLOS III also evidence this trend.<sup>123</sup> Whether this message is being perceived by industry and national governments producing radioactive wastes is the question to which this Comment now turns.

### III. CONTROLLING RADIOACTIVE WASTE DISPOSAL AT SEA

Since 1946, when the United States began dumping radioactive wastes off the northeastern Atlantic coastline of New England and in the Gulf of Mexico, at least one nuclear nation has been disposing of its radioactive wastes at sea.<sup>124</sup> In more recent years, those wastes have included various amounts of radioactive wastes from industrial sources.<sup>125</sup>

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<sup>121</sup> UNCLOS III, *supra* note 32, at 1308-16. The environmental protection theme is present throughout this part of UNCLOS. Article 192 provides: "States have the obligation to protect and preserve the marine environment." Article 194 states that nations shall take all measures "necessary to prevent, reduce and control pollution of the marine environment from any source" and that measures taken under the treaty "shall deal with all sources of pollution of the marine environment." *Id.* at 1308. The themes of equity and international cooperation are present in Article 194, which provides that in the endeavor to reduce marine pollution, nations "shall endeavor to harmonize their policies in this connection." Article 194 further states that nations should not "cause damage by pollution to other States and their environment." Article 197 declares that: "States shall co-operate on a global basis and, as appropriate, on a regional basis, . . . in formulating and elaborating international rules, standards and recommended practices and procedures consistent with this Convention . . . ." *Id.* The concern over future generations is expressed in the statements citing the need to preserve the marine environment in articles 192, 193, 194, and 197 among others. *Id.*

<sup>122</sup> See *supra* notes 49-76 and accompanying text.

<sup>123</sup> See *supra* notes 67-121 and accompanying text.

<sup>124</sup> See *Hearings before the Subcomm. on Oceanography of the House Comm. on Merchant Marine and Fisheries*, 96th Cong., 1st & 2nd Sess. 341 (1979 & 1980) [hereinafter *Oceanography Hearings*] (statement of Roger Mattson). See also Wasserman, *Disposal of Radoactive Waste*, 19 J. WORLD TRADE L. 425.

<sup>125</sup> Wasserman, *supra* note 124, at 427.

The United States ceased disposing of such wastes in 1970,<sup>126</sup> prior to the LDC. Several nations,<sup>127</sup> however, including Great Britain and Belgium, have continued to dump radioactive waste into the sea following the LDC. Other nations, notably Japan, were on the verge of initiating major dumping operations, but halted plans because of pressure from their neighbors.<sup>128</sup>

Traditional methods of radioactive waste disposal at sea are not the only questions of international law being studied. Research into the viability of seabed implantation of high-level radioactive wastes is being conducted under the auspices of the Organization for Economic Cooperation and Development's ("OECD") Nuclear Energy Agency ("NEA").<sup>129</sup> The NEA formed the Seabed Working Group to coordinate these research efforts.<sup>130</sup> The NEA has delegates from the major nuclear power producing nations, including the United States, Great Britain, France, and Japan.

If the research conducted by the Seabed Working Group results in radioactive wastes being implanted in the sea subsoil, then the LDC will probably be violated<sup>131</sup> and UNCLOS III will most certainly be violated.<sup>132</sup> Whether these violations would be significant enough to deter waste implantation is questionable, given that neither treaty provides explicit procedures for punishing violators other than the general treaty enforcement powers assigned to each nation.<sup>133</sup> It is unlikely that any nation which either dumps radioactive wastes at sea or allows an industry within its jurisdiction to do the same would prosecute the dumping party for violating international law. Additional problems, such as proof of damage to specific victims, would also be difficult to solve.<sup>134</sup> Consideration of this question would be reached only if the plaintiff could establish standing. Finally, impartial international courts do not exist to try

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<sup>126</sup> See *Oceanography Hearings*, *supra* note 124.

<sup>127</sup> Wasserman, *supra* note 124, at 427.

<sup>128</sup> See *Japanese Waste*, *supra* note 22.

<sup>129</sup> See Wasserman, *supra* note 124, at 425.

<sup>130</sup> *Id.* at 425-26.

<sup>131</sup> See Curtis, *supra* note 26, at 395-98.

<sup>132</sup> *Id.* at 400-03.

<sup>133</sup> See LDC, *supra* note 35, art. X, at 2411.

<sup>134</sup> UNCLOS III leaves regulation and enforcement to nations with coastline territory, urging them to harmonize their policies. This leaves questions of proof of damage up to national, rather than international, standards. Thus, UNCLOS III adds to the already difficult problem of establishing the origins of dumped radioactive waste and the responsibility for damage to the marine environment especially considering that the damage may not come to light for many years. See UNCLOS III, *supra* note 32, part XII, §§ 5 & 6, at 1310-13.

such a case, award damages, or order a cleanup.<sup>135</sup>

The chance that a situation will arise which will test the scope of the treaties is not remote. A ready parallel continues to unfold in Great Britain. There, the government permits the dumping of low-level radioactive wastes into the northeastern Atlantic.<sup>136</sup> This activity did not cease with the adoption of the LDC and the British government did not conduct the obligatory impact studies or grant the necessary permit required by the LDC. The dumping did not stop even in 1982, when the European Parliament adopted a resolution urging the cessation of radioactive waste dumping in the northeastern Atlantic either through "action within the Community framework, or through international agreements."<sup>137</sup> The British government still refused to stop when the LDC adopted the two-year moratorium on all radioactive waste disposal at sea.<sup>138</sup> It remains to be seen whether Great Britain will heed the latest extension of that moratorium.

Five Nordic countries — Sweden, Denmark, Finland, Iceland, and Norway — officially protested the British refusal to comply with international law and its plan to increase by 60% the amount of radioactive wastes being dumped.<sup>139</sup> The British National Union of Seamen also protested the government's action.<sup>140</sup> Evidence of an unusually high rate of radioactivity-linked cancer in children living near one of the dumpsites in the Irish Sea has been published.<sup>141</sup> It is suspected that there is a connection between the dumping and the high cancer rate. Neither the protests nor the research deterred the British government which continued dumping in the summer of 1985.<sup>142</sup>

When dumping has been stopped it usually has not been as a result of an international agreement. The United States suspended dumping in 1970, in part, in reaction to the Council on Environmental Quality report on ocean dumping.<sup>143</sup> That report noted that radioactive waste dumping at sea was not as economical as other forms of radioactive waste dispo-

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<sup>135</sup> While arbitration is possible, no competent international body can bring suit against a polluter, enter a judgment, and enforce the penalty assessed. *See id.* § 6.

<sup>136</sup> *See* Wasserman, *supra* note 124, at 427.

<sup>137</sup> *Id.* The Council of European Municipalities adopted almost the identical resolution a year later. *Id.*

<sup>138</sup> *Id.* That letter was sent to "once again inform the United Kingdom authorities of the strong concern in the Nordic countries with respect to the planned and increased dumping operations of the United Kingdom . . . representing an increase in the amount of waste of 60 per cent." *Id.*

<sup>139</sup> *Id.*

<sup>140</sup> *Id.*

<sup>141</sup> *Id.* The government itself initiated an investigation more than two years ago. *Id.*

<sup>142</sup> *Id.*

<sup>143</sup> COUNCIL ON ENVIRONMENTAL QUALITY, OCEAN DUMPING: A NATIONAL POLICY (1970).

sal.<sup>144</sup> The Netherlands stopped the sea disposal of radioactive wastes from its nuclear power plants and industrial, medical, and scientific sources in response to public opinion. As one Dutch government official stated, "[t]his ministry is convinced that ocean dumping is a safe disposal for wastes. But it is clear that our society does not want ocean dumping."<sup>145</sup> Japan changed its plans to dispose of radioactive wastes in the Pacific only after protests from island nations near the disposal sites.<sup>146</sup>

Perhaps the major reason that international law generally, and the LDC and UNCLOS III specifically, have not been effective is that they lack enforcement provisions to punish violators.<sup>147</sup> There is little recourse for contracting parties or the International Court of Justice to stop a nation or its industry from violating the treaties. The only viable options are direct appeals on a nation-to-nation or nation-to-industry basis. As in the case of Great Britain's industrial radioactive waste disposal, these appeals are not always successful.

One other major problem with regard to the goals of international law concerning radioactive waste disposal at sea is the changing standards defining which materials may be dumped and determining how those materials may be dumped.<sup>148</sup> While the different standards provided by international agencies are not great, they do pose some problems. For example, it is unclear which agency regulations members of the OECD must follow, as many OECD members are also members of the LDC.<sup>149</sup> Both the OECD's Nuclear Energy Agency and the IAEA,

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<sup>144</sup> *Id.* at 7. The report also noted that the Atomic Energy Commission placed a moratorium on new permits for ocean disposal of radioactive wastes as of 1960. As of 1970 only one commercial organization, one university, and two government agencies had outstanding permits. *Id.* "The policy recommended would continue the practice of prohibiting high-level radioactive wastes in the ocean. Dumping other radioactive materials would be prohibited, except in a very few cases for which no practical alternative offers less risk to man and his environment." *Id.* at 27.

<sup>145</sup> *Dutch to Stop Dumping Nuclear Wastes at Sea*, N.Y. Times, Sept. 23, 1982, at A5, col. 1.

<sup>146</sup> *Japanese Waste*, *supra* note 22.

<sup>147</sup> See *supra* note 133 and accompanying text. Again, this is a fundamental problem with international law as a whole. Short of each nation sacrificing some measure of sovereignty (which is extremely unlikely), the most feasible change is one of attitude. Nations must be willing to accept more of a commonality of interest in the preservation of a global environment. Certainly there will be nations such as Great Britain which will not be willing to share this view. In those situations, international pressure can isolate and contain the problem nation's transgressions. This is perhaps the biggest problem the intergenerational trust faces, but it is neither fatal nor intractable.

<sup>148</sup> Several international agencies have issued guidelines and recommendations on the various rules for site selection, packaging, monitoring, and allowable exposure levels. See, e.g., NEA OBJECTIVES, *supra* note 2; IAEA Definitions and Recommendations, *supra* note 2; and UNITED NATIONS SCIENTIFIC COMMITTEE ON THE EFFECTS OF ATOMIC RADIATION, IONIZING RADIATION: SOURCES AND BIOLOGICAL EFFECTS, U.N. Sales No. 2.82.1x.8 (1982)[hereinafter UNSCEAR REPORT].

<sup>149</sup> Included in this group are the United States, Great Britain, France, Belgium, West Germany, and the Netherlands.

which is the designated authority for regulatory purposes, have issued guidelines.<sup>150</sup> The United Nations Scientific Committee on the Effects of Atomic Radiation also issues periodic reports recommending maximum radiation exposure levels and presents models which indicate how radioactive waste disposal at sea may effect actual exposure levels.<sup>151</sup> Each agency has updated its guidelines repeatedly, restricting more types of radioactive waste and the way in which the wastes should be packaged.<sup>152</sup> The potential for conflict is apparent; the solution is equally obvious. The definitional and regulatory function should fall under the auspices of one international agency which should consider the advice of the other agencies.

It may be argued that fears of low-level radioactive waste disposal at sea are unwarranted as low-level wastes do not constitute as significant a threat as high-level wastes. In its crudest form, the argument suggests that, if the LDC and UNCLOS III do not ban low-level radioactive waste disposal at sea, it must be safe. The next section of this Comment examines this position. The Comment does not review the scientific data concerning the dangers of radioactive wastes to the marine environment and its potential impact on man, as that data is rudimentary at best and subject to rapid change.

#### IV. THE REASONABLENESS PERSUASION AND ITS SUPPORT

This section focuses on two arguments supporting low-level radioactive waste disposal at sea. The first concludes that dumping should be permitted if nations can equitably and fairly distribute the costs and benefits to all affected by the dumping.<sup>153</sup> The second argument urges the adoption of an ocean dumping fee system which would require all governments and private parties wishing to dump radioactive wastes at sea to pay for the privilege, thereby creating a fund to compensate future pollution victims.<sup>154</sup> Both ideas are premised explicitly or implicitly on a

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<sup>150</sup> See IAEA Definitions and Recommendations, *supra* note 2. See also NEA OBJECTIVES, *supra* note 2.

<sup>151</sup> See, e.g., UNSCEAR REPORT, *supra* note 148.

<sup>152</sup> For instance, the IAEA recommendations were changed a mere three years after the LDC came into force. IAEA Definitions and Recommendations, *supra* note 2. These recommendations were changed again in 1986. See *supra* note 80. UNSCEAR has issued updated exposure level reports six times in the last three decades, often revising and adding whole new concerns. UNSCEAR REPORT, *supra* note 148, at 5 n.2. Clearly, the dangers of radioactivity have not yet been fully exposed or understood. Advancement of current knowledge of the dangers of radioactivity requires more research and more time to digest new information.

<sup>153</sup> Finn, *supra* note 10.

<sup>154</sup> Lahey, *Economic Changes for Environmental Protection: Ocean Dumping Fees*, 11 *ECOLOGY* L.Q. 305 (1984).

theory that ocean disposal of low-level radioactive wastes is reasonable compared to the relative safety of ocean disposal by other means.

Proponents of the first argument — which may be termed an equity argument<sup>155</sup> — provide several reasons why the ocean disposal option might be preferable to land-based methods. Such justification includes the potential development of monitoring systems of ocean disposal locations,<sup>156</sup> the geological stability of certain seabed sediments,<sup>157</sup> the ocean's capacity to dilute wastes escaping from a disposal site,<sup>158</sup> the ability to isolate wastes from human intrusion,<sup>159</sup> and the political advantage of not storing wastes near human habitation.<sup>160</sup> Once the sea is chosen as a radioactive waste repository, the equity argument proceeds on the basis that states have an international obligation to cooperate in resolving the scientific and legal issues, as well as "to ensure that such activities are reasonable in the circumstances."<sup>161</sup>

The equity argument recognizes that "international environmental law is poorly equipped to deal with situations in which national actions create a risk to the global commons or other transfrontier areas."<sup>162</sup> As discussed earlier, this condition exists largely because of the lack of sanctions.<sup>163</sup> In order to compensate, the equity argument relies on existing international organizations such as the IAEA and the NEA to act as centers for information, management, and operation of radioactive waste disposal at sea. "Within these functions it is possible to implement a common framework for policy making, adopt a common policy, promul-

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<sup>155</sup> Finn, *supra* note 10.

<sup>156</sup> *Id.* at 640. Finn's acceptance of this point may be misplaced. He cites no scientific report of such monitoring systems being more advanced than those available for land-based disposal. Indeed, it is hard to conceive that monitoring of the oceans would be easier than monitoring wastes in stable salt formations on land.

<sup>157</sup> *Id.* at 640-41.

<sup>158</sup> *Id.* at 641.

<sup>159</sup> *Id.* This may in fact prove to be a negative reason for ocean dumping of radioactive wastes. One method of minimizing the damage to the environment would be to remove the hazard. If that cannot be accomplished, the hazard will be maximized. While land-based disposal may pose a slightly greater security risk, it does not also limit access in case of emergency. For instance, if monitors detect a leak of wastes into ground water, it will be easier to remove the hazard from the problem area, minimizing the human and environmental impact.

<sup>160</sup> *Id.*

<sup>161</sup> *Id.* at 664. Just what is "reasonable" presents another problem. What is a reasonable course of action for Great Britain may not be reasonable in light of long-range consequences for the people and environment around the Irish Sea. This is fundamentally a problem of reasonableness, suggesting a reason why the needs of future generations require direct representation in the decisional process. See *infra* notes 225-29 and accompanying text.

<sup>162</sup> Finn, *supra* note 10, at 673.

<sup>163</sup> See *supra* notes 124-47 and accompanying text.

gate a single policy, or conduct joint operations.”<sup>164</sup> Such cooperation is possible in part because of the responsibility of each sovereign to avoid polluting the global commons.<sup>165</sup> This responsibility comes from the doctrine of reasonable use of the high seas found in traditional maritime law and standards of international diplomacy and is intended “to insure equitable international sharing of the resources of such domains through special arrangements.”<sup>166</sup>

The equity argument recognizes that, even if ocean disposal of radioactive wastes is conducted on a limited basis, the activity creates risks which counterbalance any benefits derived from marine resources.<sup>167</sup> While the risks are shared by all in the global environment, the benefits of the risks go only to a few of the highly developed nuclear nations and their nuclear industries.<sup>168</sup> The equity argument requires that, if these nations create the risks, they must remedy the imbalance in a variety of ways.<sup>169</sup> These remedies include sharing the technology with non-nuclear nations, establishing an international agency to manage nuclear fuel cycle technology, and establishing an international corporation to provide fuel cycle services.<sup>170</sup>

The options provided by the equity argument are unsatisfactory because each presents unique problems. Of foremost concern is the need to prevent the stockpiling of materials generated by nuclear power plant operations which could be used later to construct nuclear weapons by nations or terrorist groups. Even if this problem could be remedied, the equity argument encourages the international organization charged with the waste task to be economically efficient, reduce environmental hazards, and provide “equitable provision of disposal services” to developing nations.<sup>171</sup> The proponents of the equity argument recognize that developing such an organization would require the resolution of “many delicate questions about the powers and structure of the organization.”<sup>172</sup> In addition, the equally sensitive and perplexing issues sur-

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<sup>164</sup> Finn, *supra* note 10, at 685.

<sup>165</sup> *Id.* This idea is present in a much stronger formulation in Part IV of this Comment and in Brown-Weiss, *supra* note 30.

<sup>166</sup> Finn, *supra* note 10, at 687.

<sup>167</sup> *Id.*

<sup>168</sup> *Id.* at 687-88.

<sup>169</sup> *Id.* at 688.

<sup>170</sup> *Id.*

<sup>171</sup> *Id.* at 689.

<sup>172</sup> *Id.* This appears to be Finn’s recognition of the problems with the equity argument. To some extent, the same criticisms can be made of the planetary trust theory, but the planetary trust theory offers the advantage of time to resolve these problems—by halting sea disposal of radioactive wastes. Thus, there is less need to share the potentially dangerous technology. See *infra* notes 199-229 and accompanying text.

rounding the peaceful and lethal uses of nuclear technology must be resolved. If these difficult issues are not resolved, the equity argument cannot provide an answer to the radioactive waste disposal question.

The reason the equity argument creates certain problems is that it ignores two themes in international law concerning radioactive waste disposal at sea. First, the argument does not consider the interests of future generations. Second, it does not reflect the true spirit of environmental protection fostered by the Stockholm Conference, the LDC, UNCLOS III, and other international agreements.<sup>173</sup> Selecting one or two of these themes at the expense of others betrays the intent expressed by international lawmakers.

The ocean dumping fee alternative is beset by a different set of problems.<sup>174</sup> The premise to this argument is that pollution is an economic market failure.<sup>175</sup> The failure results in part from dealing with pollution through regulation instead of fee charges. "Under the charge system, those with low control costs will reduce their pollution more than those with higher control costs. Thus the fee system's incentives will induce dischargers to choose the least costly methods of reducing overall pollutant discharge."<sup>176</sup>

The proponents of this alternative argue that the fee system will lead to the development of more socially desirable disposal technology. Unlike a regulatory scheme, the fee system creates a constant incentive for innovation because the fee is imposed even on small amounts of discharge.<sup>177</sup> Nonetheless, the actual effect on innovation and development of new technologies resulting from the fee system is not well documented.<sup>178</sup>

The fee system could operate in various ways, based on attainment of an environmental standard, social cost, revenue generation, or a combination of these methods.<sup>179</sup> The social cost approach imposes a charge equalling the external costs created by the polluter. Thus, the fee "re-

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<sup>173</sup> See *supra* notes 35-123 and accompanying text.

<sup>174</sup> Lahey, *supra* note 154.

<sup>175</sup> *Id.* at 315. Note that Lahey's argument applies for ocean dumping of waste in general, not radioactive wastes in particular. Lahey makes no distinction among different types of wastes, so one may assume the argument applies to each type of waste as well.

<sup>176</sup> *Id.* at 316.

<sup>177</sup> *Id.* at 317. The claim is that the fee system will also discourage delaying tactics by the industry since fee payment continues throughout the delay. The same idea, it is argued, will push industry toward innovation so as to reduce the fee it pays. *Id.*

<sup>178</sup> *Id.* at 318. The same can be said for understanding how the current scheme of regulation works. *Id.* This uncertainty over a very basic idea behind the fee system leads to skepticism as to the success of the whole alternative.

<sup>179</sup> *Id.* at 317.

flects the pure price of pollution. The government . . . must therefore determine the amount of harm caused by each marginal unit of discharge."<sup>180</sup> The problems stemming from the fee system are obvious. It is difficult to measure the amount of environmental damage caused by any pollution and it is difficult to place a value on that damage.<sup>181</sup>

A second suggested form of the charge system is what some economists call the ambient standards approach. Under this system, a desired level of environmental quality is established, then a fee is fixed to bring about that standard of quality.<sup>182</sup> "This approach encourages the polluter to reduce emissions to the level where the cost of reducing another unit of pollution, the marginal treatment cost, is greater or equal to the unit emission charge."<sup>183</sup> In order to establish this figure, the agency would need to collect data on the relative cost of abatement technologies or other disposal methods.<sup>184</sup> This procedure is used in several Soviet bloc nations<sup>185</sup> where the level of cooperation between the fee setting authority and the polluter is greater than that between private industries and government agencies in Europe and the United States.

The final method for establishing a fee system is the revenue generating approach. Under this method, the level of the fee is based on how much revenue it creates.<sup>186</sup> The revenue generating approach may be divided further into three subcategories depending upon the use of the income: 1) compensating victims, 2) financing environmental protection efforts, or 3) "reimbursing the government for special services rendered to the polluter."<sup>187</sup> The first subcategory has been used in Europe<sup>188</sup> and the United States.<sup>189</sup> The Superfund for toxic waste cleanup is, perhaps, the best example in the United States. Since 1973, Japan has used this income as compensation for victims of sulfur dioxide air pollution.<sup>190</sup> The revenue creating scheme is used in a variety of other contexts, such

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<sup>180</sup> *Id.* Another problem is valuing future pollution, considering the long-term hazard of radioactive wastes. The United States legal system has had some idea of the problems such time delays cause in the tort cases concerning DES and asbestos. Those delays lasted just over a few decades. Problems arising from radioactivity, as already noted, may be compounded over much longer periods of time.

<sup>181</sup> *Id.*

<sup>182</sup> *Id.* at 320.

<sup>183</sup> *Id.* Again, attention to the future hazard is missing. The idea of preserving and improving the environment is seemingly ignored here.

<sup>184</sup> *Id.*

<sup>185</sup> *Id.*

<sup>186</sup> *Id.* at 321.

<sup>187</sup> *Id.*

<sup>188</sup> *Id.*

<sup>189</sup> *Id.* at 321-22.

<sup>190</sup> *Id.* at 322.

as motor vehicle taxes, harbor fees, and federal aviation services.<sup>191</sup> It is easy to imagine a fee system combining all three uses for the income generated by the dumping fees.

Proponents suggest several justifications for the adoption of a fee system for ocean dumping. They argue that a fee system "calculated in light of alternative waste disposal costs" would reduce the actual amount of waste disposed in the ocean by bringing ocean disposal into political and economic parity with other disposal methods.<sup>192</sup> This parity is necessary because few constituencies represent the interests of the sea.<sup>193</sup> A fee system would shift disposal decisions from the political to the environmental arena.<sup>194</sup> A variable fee which increases proportionally with the increased hazard from the waste (i.e., from low-level to high-level radioactive wastes), makes it less desirable to dump more dangerous materials at sea.<sup>195</sup> The same variable fee structure would be used to determine the location of the dumpsites; the more appropriate the dumpsite, the lower the fee.<sup>196</sup> It is suggested that this fee system will reduce the overall environmental impact on the sea.<sup>197</sup>

A significant drawback to the fee system is its danger, given that "our current knowledge of the marine environment is rudimentary and incapable of accurately predicting the effects of ocean dumping."<sup>198</sup> In essence, the fee system would permit ocean disposal of materials which may or may not cause irreversible damage to the marine environment. The fees generated might allow government and industry to conduct the necessary studies to determine the effects and proper techniques for ocean dumping. By the time those studies are completed, however, significant damage may have already occurred.

There is a need to examine radioactive waste disposal at sea in a way which reflects the lack of knowledge of both the sea and the effects of radioactivity on that environment. This view should also consider the long-term problems of radioactive waste disposal which will affect future generations and which the other solutions fail to address. The solution proposed in the Comment is that of a planetary trust. The argument

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<sup>191</sup> *Id.*

<sup>192</sup> *Id.* at 324-25. This, like the incentives for innovation, is not documented. *See supra* note 178.

<sup>193</sup> Lahey, *supra* note 154, at 324. Of course, this is one of the main problems the intergenerational trust attempts to solve. Focusing attention on the long-term, not short-term, consequences of radioactive dumping assures future generations some voice in policy decisions. *See infra* notes 225-29 and accompanying text.

<sup>194</sup> Lahey, *supra* note 154, at 325.

<sup>195</sup> *Id.*

<sup>196</sup> *Id.* at 326.

<sup>197</sup> *Id.* The major flaw is that the impact is, as yet, unknown.

<sup>198</sup> *Id.*

places proper emphasis on all four themes of international law concerning radioactive waste disposal at sea. It is to this solution which this Comment now turns.

## V. THE PLANETARY TRUST AND RADIOACTIVE WASTE DISPOSAL AT SEA

The planetary trust<sup>199</sup> recognizes two fundamental ideas: 1) the world's resources are both renewable and exhaustible, and 2) the assumption developed in Western thought over several centuries that the future will be better than the past.<sup>200</sup> The technologies created in recent times, such as nuclear technology, have threatened this latter idea of perpetual progress:

While the human species has always had the ability to harm its local environment, sometimes in devastating ways, we never before had the capacity to do so on a global scale, through so many means.

Our capacity to harm the environment globally forces us for the first time to be concerned at a global level with the survival of the natural and cultural heritage that we pass to future generations.<sup>201</sup>

Under the global trust, each generation has a fiduciary duty to future generations to ensure that they will inherit a fair share of the global heritage.<sup>202</sup> A large part of that fiduciary duty is to maintain the global resources and environment so that future generations may use and enjoy the same benefits derived from the earth and have the same chance to develop new resources.<sup>203</sup> This view may extend to preserving other forms of life whether they are viewed as existing solely for the benefit of the human population or whether a fiduciary duty exists to other species.<sup>204</sup> The fiduciary duty is based on the desire of existing communities to transcend current events and understand the role of future generations.<sup>205</sup> This philosophy has been codified in current environmental legislation and treaties, including the LDC, UNCLOS III, and the other

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<sup>199</sup> Brown-Weiss, *supra* note 30.

<sup>200</sup> *Id.* at 495.

<sup>201</sup> *Id.* at 497-98. Although the same argument could be made for the effects of the invention of the cross-bow or the machine gun, never before have so few individuals, with so few arms, possessed the means to cause global damage.

<sup>202</sup> *Id.* at 498. This is not to say that the current generation must merely subsist with what it has, but it must balance its own interests with those of future generations and other species. *Id.* at 48 n.13.

<sup>203</sup> *Id.* at 499.

<sup>204</sup> *Id.* at 498-99 nn.13-14. The idea that man has a responsibility to other species has been expounded by many, including Laurence Tribe, a United States constitutional scholar, and St. Francis of Assisi, so by no means is this idea new to this generation. *Id.*

<sup>205</sup> *Id.* at 501.

international declarations and agreements discussed earlier.<sup>206</sup> The problem of the global trust is balancing the desire to maximize current and immediate future benefits with the prospects of leaving future generations a despoiled environment.

The problem could be solved by creating a perpetual trust for future generations through positive law. This trust would require the current trustees — the generation now controlling the planet's future — to meet a standard of behavior equal to that of any trustee: that of a prudent person dealing with their own property.<sup>207</sup> No speculative activity would be permitted.<sup>208</sup> The corpus of the trust would be the resources of the earth; its basic purpose would be "to sustain the welfare of future generations."<sup>209</sup> This central purpose is broken down into three subdivisions: 1) sustaining the life support systems of the planet, 2) sustaining the systems necessary to the survival of the human species, and 3) sustaining a healthy environment.<sup>210</sup>

There are a variety of ways to consider the interests of future generations with respect to natural resources. The preservation of resources requires that each generation leave future generations resources in approximately the same condition.<sup>211</sup> Another way to respect future interests is to prohibit waste.<sup>212</sup> This idea is contained in a number of environmental treaties relating to radioactive waste disposal at sea, including the Stockholm Declaration and UNCLOS III.<sup>213</sup> Still other forms of trust administration, such as economic efficiency, diversification of risk, and preservation of the quality of the trust assets, might also be considered.<sup>214</sup>

The duty of the planetary trustees is "to sustain the welfare of future generations."<sup>215</sup> Of the methods just described to administer the trust,

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<sup>206</sup> Both treaties refer to the need to protect the sea environment in a way which would preserve it for the future. See *supra* notes 49-123 and accompanying text.

<sup>207</sup> Brown-Weiss, *supra* note 30, at 507.

<sup>208</sup> *Id.* Brown-Weiss bases her idea of the trust on United States law, particularly the Restatement (Second) of Trusts (1959). While this is not essential, it does provide a well-developed basis for constructing the details of the intergenerational trust administration.

<sup>209</sup> *Id.* at 508.

<sup>210</sup> *Id.* at 508-09.

<sup>211</sup> *Id.* at 510.

<sup>212</sup> *Id.* at 512-16. In the radioactive waste context, this would dictate a prohibition against preventable damage to the marine environment akin to a prohibition against waste in property law. The typical classroom case of waste is when a trustee holding the land is prevented from cutting timber except for use in building a house or heating it.

<sup>213</sup> *Id.* at 512-13 nn.87 & 94. See *supra* notes 1, 61-66, & 121-23 and accompanying text.

<sup>214</sup> Brown-Weiss, *supra* note 30, at 516-23.

<sup>215</sup> *Id.* at 523.

none should be used exclusively. There are four principles to guide the selection of those trust administration ideas:

1. Equity among generations. The present generation would not have license to use resources to the exclusion of future generations or to burden unreasonably the present generation in favor of future generations;
2. Flexible values among generations. The present generation is not required to predict the values of future generations;
3. Clarity in the administration of the trust. The trustees must administer the trust with regard to foreseeable situations; and
4. The principles should be shared by different cultural traditions. Since the planetary trust is global, it should not favor one economic or political system.<sup>216</sup>

Radioactive waste disposal at sea would violate these principles unless the current generation could guarantee the safety of such disposal. Ocean dumping would violate equity among generations if it damaged the marine environment and its resources. This suggests that safety be of paramount concern because, once resources are destroyed, future generations will not be able to take advantage of them. The harm to the marine environment resulting from radioactive wastes would also violate the flexibility principle as it decreases the options available for future generations in ordering their values. The foreseeability principle dictates that the current generation refrain from damaging the marine environment by dumping known hazards, including radioactive wastes. Finally, radioactive waste disposal at sea violates the cultural equity principle by damaging a shared resource. Dumping benefits only those nations with nuclear capacities at the expense of developing nations. Other forms of radioactive waste disposal do not share this inequity because they involve the use of the land of the waste-producing nation and generally avoid harming other nations.

In addition to these principles, two other requirements should guide the administration of the trust: conservation of options and conservation of quality.<sup>217</sup> The conservation of options entails preserving biological natural resources and cultural diversity.<sup>218</sup> The former is particularly important in terms of radioactive waste disposal at sea:

While no one would claim that all existing species are ecologically essential to human culture, scientists do not yet know the critical threshold at which the extermination of the species will seriously disrupt our ecosystem. We do know, however, that it takes thousands of years for species to evolve and that extinction is final.<sup>219</sup>

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<sup>216</sup> *Id.* at 525.

<sup>217</sup> *Id.*

<sup>218</sup> *Id.* at 526-31.

<sup>219</sup> *Id.* at 527.

Radioactive wastes clearly have the potential to harm our ecosystems. That we do not know the impact of these materials on ocean ecosystems should lead to great restraint based upon principles of equity. The present generation should not force future generations to bear the burden of cleaning up inherited radioactive wastes because the future generations cannot share the earlier benefits.<sup>220</sup>

Establishing a planetary trust conforms to the four themes of international law concerning radioactive waste disposal at sea. While it may be difficult to implement internationally, the trust strives for international cooperation and offers an equitable sharing of the burdens and benefits. In addition, the trust recognizes the need to preserve and improve the environment in order to fulfill the duty to future generations. Admittedly, establishing the trust as positive law is not probable today. Nonetheless, it is possible to create the same effect by implementing the fiduciary duty as part of customary international law. This would eliminate the pressure to make the trust part of positive law, as customary obligations extend to each nation.<sup>221</sup> The prohibitions against genocide and slavery are other examples of such international customary obligations.<sup>222</sup>

While not specifically mentioning the planetary trust, treaties and other international agreements aimed at protecting the environment represent progress towards this ideal.<sup>223</sup> The LDC's prohibition on dumping high-level radioactive wastes at sea recognizes, at least implicitly, the need to protect the environment for future generations. Nonetheless, the LDC and other agreements are only rudimentary first steps as national and international organizations are equipped to handle only those problems lasting a few years, not generations.<sup>224</sup>

There are four possible strategies which may be used to combat the inherent defects of existing institutions: 1) the representation of future generations in decision making, 2) the development of a global information network, 3) the promotion of scientific research, and 4) the establishment of a trust fund for future generations.<sup>225</sup> Each strategy, except the trust fund, could be implemented on a national, regional, or global level. In fact, the LDC and UNCLOS III already provide for the development

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<sup>220</sup> *Id.* at 534. There is, of course, debate as to whether ocean disposal or land-based disposal presents the better alternative waste system if the need arises to remove the radioactive wastes to another location. See *supra* note 156 and accompanying text.

<sup>221</sup> *Id.* at 540-41.

<sup>222</sup> *Id.* at 541.

<sup>223</sup> See *supra* notes 36-123 and accompanying text.

<sup>224</sup> Brown-Weiss, *supra* note 30, at 563.

<sup>225</sup> *Id.* at 563-64.

of global information networks and the promotion of scientific research. The more difficult strategies to implement, particularly on a global scale, will be the representation of future generations in decision making.<sup>226</sup> It is not sufficient that future interests are recognized in United Nations resolutions and treaties.<sup>227</sup> Unfortunately, it is highly unlikely that either the actual representation of future generations or the trust fund will become a reality.

The representation of future generations in the decisional process is not as foreign as it may appear. The concept parallels the representation by lawmakers of the interests of those too young to vote; it approaches an idea of virtual representation. One way of maintaining the idea of virtual representation of future generations is to postpone certain decisions, such as whether to dispose of radioactive wastes at sea. This delay would give future generations the time to develop technologies to protect themselves, their environment, and their descendants. By postponing the technological decisions which we are currently unable to make, we also avoid subjecting future generations to today's mistakes.

This discussion provides just a brief sketch of intergenerational representation. While the idea needs to be developed further, it could be useful in resolving problems posed by radioactive waste disposal at sea. The failure of the international community to provide for future generations is the most compelling reason to halt present sea dumping. The failure to provide future generations adequate representation in the decision-making process is apparent by the lack of sanctions in any of the international agreements regulating ocean dumping.<sup>228</sup> If members of the current generation have no recourse for injury from radioactive wastes dumped at sea, then this lack of sanction inevitably will translate into a lack of cleanup funds in the future.

Society does possess the structural framework for developing a global information network and promoting scientific research. Organizations such as the OECD and the IAEA can be employed. They should be used to gather and distribute research funds to examine the feasibility of the oceans as sites for radioactive waste in comparison with other disposal methods. The private sector should be given incentives to assist in this research. In fact, it would be best if the industry which creates much of the radioactive waste were required or strongly encouraged to participate in this research.

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<sup>226</sup> *Id.* at 564.

<sup>227</sup> See *supra* notes 36-123 and accompanying text.

<sup>228</sup> See *supra* note 133 and accompanying text.

## VI. CONCLUSION

Until the protection of current and future generations can be assured, dumping radioactive waste at sea should cease. Other disposal methods, particularly some forms of land containment, have several short-term advantages and should be explored. One advantage to this approach is that it is much easier to contain radioactive wastes than it is to dive thousands of meters into the sea to recover the wastes.<sup>229</sup> Another advantage is that it avoids the current lack of ocean disposal monitoring. Since the current generation has created the problem of radioactive waste disposal at sea, it is incumbent upon this generation both to contain and solve the problem. This generation can start first by recognizing the themes repeatedly expressed by international lawmakers over the past thirty years. The interests of future generations must be fully considered and assured. Future generations deserve to inherit a healthy, robust environment. Cooperation based on a system of international equity is essential if the present generation intends to meet the goals established by international law.

*David G. Spak*

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<sup>229</sup> It is interesting to note that the LDC finally voted to establish a panel to examine the wider political, social, economic, and legal questions of radioactive waste disposal at sea. Included in this examination will be a comparison of other disposal methods. Resolution LDC 28(10), Studies and Assessments Pursuant to Resolution LDC 21(9), IMO Doc. LDC X/15 (Nov. 5, 1986).