American University International Law Review

Volume 27 | Issue 2 Article 7

2012

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THERE'S SOMETHING IN THE WATER: THE INADEQUACY OF INTERNATIONAL ANTI-DUMPING LAWS AS APPLIED TO THE FUKUSHIMA DAIICHI RADIOACTIVE WATER DISCHARGE

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I.INTRODUCTION

On March 11, 2011, a 9.0 magnitude earthquake and a resulting tsunami struck the coast of Japan.[1] These catastrophic events significantly damaged several nuclear power plants.[2] The

1. *See Japan – Earthquake, Tsunami and Nuclear Crisis (2011)*, N.Y. TIMES, Feb. 27, 2012, *available at* http://topics.nytimes.com/top/news/international/countriesandterritories/japan/index.html (chronicling the damage and response to the emergencies in Japan, including the political turmoil that resulted).

2. *See id.* (recounting the occurrence of explosions and radioactive gas leaks, which led to radiation contamination of Tokyo's water supply).

Japanese Government almost immediately recognized the severity of the damage at Tokyo Electric Power Company's Fukushima Daiichi power plant, declared an emergency, and ordered the evacuation of approximately 20,000 surrounding residents.[3]Within days of the earthquake and tsunami, the Fukushima Daiichi plant experienced two explosions, which resulted in radiation levels just outside the plant equivalent to one year's worth of allowable exposure.[4] The plant operators flooded the damaged reactors with water as a "last-ditch" effort to cool the plant.[5] The Japanese Government ultimately issued evacuation orders to more than 200,000 Japanese citizens.[6] In the aftermath of the damage to the Fukushima Daiichi power plant, radioactive water had both leaked and been dumped directly into the ocean.[7] Japan's dumping of radioactive water has led commenters to question the efficacy of the international framework for radioactive ocean dumping.[8]

3. *See* Yuka Hayashi & Rebecca Smith, *Disaster in Japan: Nuclear Plants Release Radiation --- Government Evacuates 20,000 People Near Troubled Facilities, as Vapor is Vented to Ease Pressure; 11 Reactors are Closed*, WALL ST. J., Mar. 12, 2011, at A6 (describing the steps taken by the Japanese Government after making the emergency declaration, including increasing the security perimeter around the plants to 6 miles, from 1.8 miles).

4. *See* Yuka Hayashi, *Japan Races Against Time --- Officials Struggle to Prevent Meltdown at Two Reactors*, WALL ST. J., Mar. 14, 2011, at A1 (relaying the difficulty plant operators faced in cooling the Fukushima Daiichi power plant and the response of the Japanese Government to the series of explosions that occurred at the plant as a result of the over-heated core).

5. *See* Hiroko Tabuchi & Matthew L. Wald, *Japanese Scramble to Avert Nuclear Meltdowns*, N.Y. TIMES, Mar. 13, 2011, at A1 (describing the need to cool the reactors to avert a nuclear disaster).

6. *See id.* (recognizing the drastic measures the Japanese Government took in response to what seemed to be the greatest nuclear disaster since Chernobyl).

7. *See Japan Dumps Thousands of Tons of Radioactive Water into Sea*, CNN, Apr. 4, 2011 *available at* http://articles.cnn.com/2011-04-04/world/japan.nuclear. reactors_1_radioactive-water-fuel-pool-tokyo-electric-power?_s=PM:WORLD; Ken Belson & Hiroko Tabuchi, *Japan Struggles to Plug Leak as Radioactive Water Seeps into the Sea*, N.Y. TIMES, Apr. 3, 2011, at A12; *Japan – Earthquake, Tsunami and Nuclear Crisis (2011)*, *supra* note 1.

8. *See, e.g.*, Eben Harrel, *Fukushima Dumping: A Violation of International Law?*, TIME ECOCENTRIC BLOG (Apr. 6, 2011, 8:00 AM), http://ecocentric.blogs.time.com/2011/04/06/fukushima-dumping-a-violation-of-international-law/ (noting that international ocean dumping agreements only explicitly cover

This comment examines how two sets of international agreements apply to dumping from the Fukushima Daiichi power plant. Part II discusses the details of the natural disaster, the specific instances of dumping as well as the upkeep of the plant. It further provides necessary background on the London Convention and Protocol and the U.N. Convention on the Law of the Sea ("UNCLOS").[9] Part III analyzes the applicability of the London Convention and Protocol and the UNCLOS to the radioactive water discharge at the Fukushima Daiichi power plant.[10]

Part IV presents recommendations that fill the gap in the existing international legal framework addressing the dumping of nuclear waste from land-based sources into the ocean.[11] First, states should adopt a treaty designed to control land-based sources of ocean dumping based on the framework established in the London Convention and Protocol. Second, states should develop a treaty that appropriately accounts for factors that decision-makers balance when attempting to avert a nuclear crisis; it should include special consideration for coastal facilities. Third, in developing that agreement, states should look to the lessons learned from the planned disposal and trade of hazardous and nuclear waste, including oversight and readiness standards.

II. BACKGROUND

A robust understanding of the events that caused the emergency at the Fukushima Daiichi power plant is required to

dumping into the ocean from ships, aircraft, or other man-made structures and do not explicitly cover dumping into the ocean from land, which is what occurred at the Fukushima Daiichi power plant).

9. *See* discussion *infra* Part II (summarizing the aftermath of the earthquake and tsunami, as well as the history, coverage, and exceptions to the London Convention and Protocol and the UNCLOS).

10. *See* discussion *infra* Part III (applying the facts of the Fukushima dumping to the coverage and exceptions of both the London Convention and Protocol and the UNCLOS).

11. *See* discussion *infra* Part IV (recommending the development of a new international framework that appropriately balances concerns for the marine environment and human health and welfare).

determine if the actions taken by the officials violated international law. Part A examines the impact of the earthquake and tsunami, as well as the specific instances of ocean dumping and historical upkeep of the Fukushima Daiichi plant.[12] Part B discusses relevant international law, starting with the London Convention and Protocol, followed by UNCLOS.[13]

A. SPRINGTIME IN JAPAN: AN EARTHQUAKE, A TSUNAMI, OCEAN DUMPING, AND POWER PLANT UPKEEP

1. Timeline of the Disaster, Immediate Response, and Subsequent Dumping

The Fukushima Daiichi power plant was significantly damaged by the earthquake and tsunami that hit Japan on March 11, 2011, and many feared the damage presented an imminent nuclear crisis.[14] The damage caused by the dual disasters resulted in the failure of diesel backup generators installed at the plant to run the cooling system.[15] As a result, plant operators flooded an overheating reactor with water to manually cool it.[16] This action vented some of the resulting steam, leading to elevated radioactivity in the air.[17]

12. *See* discussion *infra* Part II.A (describing the instances of dumping that occurred relating to the effort to cool the reactor as well as the historical problems associated with the plants generally and the cooling system of the reactors specifically).

13. *See* discussion *infra* Part II.B (summarizing the relevant treaty provisions needed to determine if the Fukushima Daiichi radioactive water discharge violated the treaties).

14. *See* Hayashi & Smith, *supra* note 3, at A6 (highlighting the scale of the challenge to cool nuclear reactors across the country in light of power outages and the resulting closure of eleven reactors across Japan).

15. *See* Matthew Wald, *Evacuations Ordered Near Two Nuclear Plants After Warnings of Small Leaks*, N.Y. TIMES, Mar. 12, 2011, at A10 (speculating that the tsunami caused the disability of the diesel generators that powered the backup cooling system because they stopped functioning only an hour after the earthquake struck).

16. *See* Tabuchi & Wald, *supra* note 5, at A1 (asserting the decision to flood the reactor with seawater was due to the damage to and age of the plant, and also indicating that the plant would no longer operate in the future).

17. *See id.* (chronicling the series of explosions that occurred over a number of days, resulting in the release of radioactive material into the

On Saturday April 2, 2011, about three weeks after the tsunami initially hit, Japanese safety officials discovered that a leak in a maintenance pit had discharged highly radioactive water directly into the ocean.[18] Two days later, on April 4, 2011, the plant's operators began to intentionally dump 11,000 tons of radioactive water directly into the ocean in order to make space in storage facilities for more highly radioactive water that was used to cool the reactors.[19] Because of a lack of onsite storage for the water, plant operators will likely continue to dump used radioactive cooling water into the ocean for years to come.[20]

2. Upkeep of the Nuclear Plant

Within days of the nuclear disaster, it became evident that the power plant was not prepared for tsunamis.[21] The Fukushima Daiichi plant had the highest accident rate of any large-scale Japanese nuclear power plant in the five years preceding the disaster.[22] Specifically, part of the plant's cooling system had

atmosphere); *see also* Hayashi, *supra* note 5, at A1 (juxtaposing the low reported levels of radioactivity in the air with the stockpiling of iodine pills to treat exposure to radiation by the Japanese Government).

18. *See* Belson & Tabuchi, *supra* note 8, at A12 (emphasizing the uncertainty surrounding the leak because of the failure of the Japanese government to fully disclose the level of radioactivity in the waters near the damaged plant).

19. *See, e.g.*, Hiroko Tabuchi & Ken Belson, *Japan Releases Low-Level Radioactive Water into Ocean*, N.Y. TIMES, Apr. 4, 2011, http://www.nytimes.com/2011/04/05/world/asia/05japan.html (comparing the level of radiation in the water to be dumped, 100 times the legal limit, with the water which would replace the dumped water in the storage containers, 10,000 times the legal limit).

20. *See* Ken Belson, *Filtering of Tainted Water Begins at Japanese Plant*, N.Y. TIMES, June 18, 2011, at A8 (describing the filtering process put in place at the power plant prior to storing water, the limited remaining space available for more radioactive water, and the projected continued need for storage, resulting in an inevitability of additional dumping).

21. *See* Norihiko Shirouzu & Peter Landers, *Japan Ignored Warning of Nuclear Vulnerability*, WALL ST. J., Mar. 23, 2011, at A1 (detailing the types of cooling system technologies that were installed across the nuclear fleet in Japan, and the lack of backup cooling systems installed at the Fukushima Daiichi nuclear power plant).

22. *See* Andrew Morse & Mitsuru Obe, *Disaster in Japan: Reactors Had High Rate of Problems --- Japanese Records Show Workers Mixed up Plant Plans,*

been improperly installed less than one year before the disaster.[23] The International Atomic Energy Agency ("IAEA"), which promotes the safe and peaceful use of nuclear technology, also found that the plant's operators may have underestimated the potential for damage from tsunamis.[24]

3. Impact of Radiation on Humans and the Environment

Radioactivity is the spontaneous release of radiation from an atom due to an imbalance in charge, mass, or energy in the nucleus.[25] Human exposure to radioactivity is known to cause cancer.[26] In addition, high exposure to radioactivity, common to nuclear disasters such as Chernobyl, causes Acute Radiation Syndrome in which significant damage to organs causes a rapid biological response.[27] Flora and fauna have a more varied sensitivity and response to exposure to radioactivity than humans.[28]

Misconnected Drains; Three Hurt by Radiation in Day's Battles, Wall St. J., Mar. 25, 2011, at A8.

23. *See id.* (discussing the mistaken removal of a cable meant to control the cooling system that went unnoticed for two weeks).

24. *See About the IAEA*, INT'L ATOMIC ENERGY AGENCY [IAEA], http://www.iaea.org/About/about-iaea.html (last visited Apr. 11, 2012) (summarizing the history and purpose of the IAEA including its affiliation with the United Nations); IAEA, *IAEA International Fact Finding Expert Mission of the Nuclear Accident Following the Great East Japan Earthquake and Tsunami: Preliminary Summary*, at 4 (June 1, 2011), http://www.iaea.org/newscenter/focus/fukushima/missionsummary010611.pdf (compiling the findings of the IAEA investigation into the crisis at the Fukushima Daiichi plant, and recommending that designers and operators evaluate and update the perceived risks to nuclear facilities from natural disasters).

25. *See What is Radioactivity?*, U.S. DEP'T OF ENERGY, http://hss.energy.gov/healthsafety/ohre/roadmap/achre/intro_9_2.html (last visited Feb. 22, 2012).

26. *See Fact Sheet on Biological Effects of Radiation*, U.S. NUCLEAR REGULATORY COMM'N, http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bio-effects-radiation.html (last visited Feb. 22, 2012) (explaining that exposure to low doses of radiation can alter the DNA of cells in the human body).

27. *See id.* (describing the impacts, including death, of Acute Radiation Syndrome on the victims of Chernobyl, as well as victims of the atomic bombings during the Second World War, which can cause death in days or months depending on the exposure).

28. *See* Gordon Linsley, *Radiation & the Environment: Assessing Effects on*

B. INTERNATIONAL LAW AND OCEAN DUMPING

The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972[29] ("London Convention") and the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972[30] ("London Protocol") specifically address ocean dumping.[31] The United Nations Convention on the Law of the Sea ("UNCLOS") [32] articles 207 and 213 address land-based ocean dumping.[33] Japan is a party to the London Convention and Protocol and UNCLOS.[34] The Vienna Convention on the Law of

Plants and Animals, IAEA BULLETIN, Jan. 1997, at 17, 18, 20, *available at* http://www.iaea.org/Publications/Magazines/Bulletin/Bull391/39102681720.pdf (discussing the varied impacts of plant and animal exposure to radioactivity and the difficulty in measuring the long-term effects of the exposure because of migration, and natural regeneration that occurs in plant and animal species).

29. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, *opened for signature* Dec. 29, 1972, 26 U.S.T. 2403, 1046 U.N.T.S. 138 [hereinafter London Convention].

30. 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Nov. 7, 1996, 36 I.L.M. 1 [hereinafter London Protocol].

31. *See* London Convention, *supra* note 29, art. I ("Contracting Parties shall . . . pledge themselves especially to take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter . . . ."); London Protocol *supra* note 31, art. 2 ("Contracting Parties shall . . . prevent, reduce and where practicable eliminate pollution caused by dumping or incineration at sea of wastes or other matter.").

32. *See* U.N. Convention on the Law of the Sea arts. 207, 213, *opened for signature* Dec. 10, 1982, 1833 U.N.T.S. 397 (entered into force Nov. 16, 1994) [hereinafter UNCLOS] (creating a framework for controlling land-based sources of marine pollution, which requires states to adopt and enforce domestic laws consistent with UNCLOS and other agreements on land-based ocean dumping).

33. *See id.* art. 207 ("States shall adopt laws and regulations to prevent, reduce, and control pollution of the marine environment from land-based sources . . . ."); *id.* art. 213 (requiring states to enforce the laws and regulations promulgated in compliance with article 207, and implement the international standards relating to land-based marine pollution).

34. *See* Int'l Maritime Org. [IMO] Secretary-General, *Status of the London Convention and Protocol: Report of the Secretary-General on the Status of the London Convention 1972*, at 3, LC 32/2 (July 20, 2010), *available at* http://www.imo.org/blast/blastDataHelper.asp?data_id=30637&filename=2.pdf (indicating that Japan ratified the London Convention on October 15,

Treaties provides the framework for analyzing the meaning of the terms of the London Convention and Protocol and UNCLOS and how these agreements apply to the dumping that occurred at the Fukushima Daiichi power plant.[35] The Vienna Convention requires that words are read to have their plain meaning, which can be inferred from the context of the treaty.[36] Ocean dumping takes several forms, including dumping from ships and platforms at sea, and dumping from land-based sources, into rivers and streams.[37] Several subsequent non-binding agreements, including the Montreal Guidelines for the Protection of the Marine Environment against Pollution from Land-Based Sources, the Washington Declaration on Protection of the Marine Environment from Land-Based Activities, and the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities, provide additional

1980); *1996 Protocol to the London Convention 1972: Status of Contracting States*, IMO, *available at* http://www.imo.org/includes/blastdata.asp?doc_id=7541&type=body (last visited Mar. 22, 2012) (listing the ratification date of Japan, which is October 2, 2007, to the London Protocol); *Chronological Lists of Ratifications of, Accessions and Successions to the Convention and the Related Agreements as of 03 June 2011*, U.N. DIVISION FOR OCEAN AFFAIRS AND THE LAW OF THE SEA (June 3, 2011), http://www.un.org/depts/los/reference_files/chronological_lists_of_ratifications.htm (indicating that Japan ratified UNCLOS on June 20, 1996).

35. *See generally* Vienna Convention on the Law of Treaties, May 23, 1969, 1155 U.N.T.S. 331 [hereinafter Vienna Convention] (providing for a common international framework against which all treaties are to be interpreted).

36. *See id.* art. 31 (requiring the ordinary meaning of the word to be based on a good faith interpretation). *See generally* ULF LINDERFALK, ON THE INTERPRETATION OF TREATIES: THE MODERN INTERNATIONAL LAW AS EXPRESSED IN THE 1969 VIENNA CONVENTION ON THE LAW OF TREATIES (2007) (laying out the principles of treaty interpretation according to the Vienna Convention on the Law of Treaties, which include the context provided by the treaty).

37. *See* DONALD K. ANTON ET AL., INTERNATIONAL ENVIRONMENTAL LAW: CASES, MATERIALS, PROBLEMS 900-01 (2007) (introducing land-based ocean dumping as a product of routine daily human activities and remarking that it typically comes from raw material development and agriculture); *see also* DAUD HASSAN, PROTECTING THE MARINE ENVIRONMENT FROM LAND-BASED SOURCES OF POLLUTION: TOWARDS EFFECTIVE INTERNATIONAL COOPERATION 15-16 (2006) (defining sources of pollution that constitute ocean dumping, and highlighting recent scholarship that suggests land-based ocean dumping plays a critical role in the overall ocean dumping context).

clarity on the steps states can take to limit or eliminate land-based ocean dumping in accordance with UNCLOS articles 207 and 213.[38]

The London Convention and Protocol have not been historically interpreted to apply to land-based ocean dumping.[39] In addition, Article V of the London Convention and Article 8 of the London Protocol contain emergency exceptions that will allow otherwise prohibited dumping to occur.[40] For example, one such exception applies when infrastructure damage poses a threat to safety.[41] Articles 207 and 213 of UNCLOS generally

38. *See* U.N. Env't Programme [UNEP], *Montreal Guidelines for the Protection of the Marine Environment against Pollution from Land-Based Sources*, UNEP/GC 13/18/II (May 24, 1985), *available at* http://hqweb.unep.org/law/ PDF/UNEPEnv-LawGuide&PrincN07.pdf ("This set of guidelines is addressed to Governments with a view to assisting them in the process of developing appropriate bilateral, regional and multilateral agreements and national legislation for the protection of the marine environment against pollution from land-based sources."); UNEP, *Washington Declaration on Protection of the Marine Environment from Land-Based Activities* (Nov. 1, 1995), *available at* http://www.gpa.unep.org/index.php?option=com_docman&task=doc_download&gid=25&Itemid=81 (declaring the intention of the parties to undertake measures to mitigate the impacts of land-based pollution, including radioactive substances); UNEP, *Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities*, UNEP(OCA)/LBA/IG.2/7 (Dec. 5, 1995), *available at* http://coralreef.noaa.gov/threats/pollution/resources/unep_lbsp_prgrm.pdf (providing assistance in developing domestic and international policies and priorities to prevent and reduce the pollution of the marine environment, caused by the effects of land-based activities).

39. *See* HASSAN, *supra* note 37, at 79-80 (noting that absent express inclusion in the London Protocol, land-based sources would not likely fall under the definition of dumping in the agreement).

40. *See* London Convention, *supra* note 30, art. V (establishing two exceptions from the requirements: one in the case of force majeure, and the second when permitted by the contracting Party after consulting with those countries that are likely affected by the dumping); London Protocol *supra* note 31, art. 8 (providing the same emergency exceptions as article V of the London Convention).

41. *See* Jill S. Murakami, Comment, *The Dumping of the New Carissa: An Analysis of the Emergency Provisions of the London Convention*, 8 PAC. RIM. L. & POL'Y J. 705, 714 (1999) (detailing instances in which the emergency exceptions to the London Convention and Protocol have been granted, including ships ablaze at sea, and a faulty pier in the Antarctic).

require states to regulate land-based ocean dumping in accordance with their limited guidance to control dumping to the extent feasible.[42]

1. London Convention and Protocol: History, Coverage and Exceptions

The early 1970s was an era of growing environmental concern domestically and internationally.[43] Accordingly, several states adopted the London Convention in 1972.[44] Consistent with the newfound concern for the environment, the parties to the Convention agreed to "promote the effective control of all sources of pollution of the marine environment . . . ."[45] Articles II through XXII establish the specific coverage and requirements of the London Convention.[46] Generally, the London Convention establishes a two-tiered system for regulating ocean dumping.[47] There is an outright prohibition on intentionally dumping materials on the "black list," while less hazardous materials on the "grey list" can be dumped if permitted by the International Maritime Organization ("IMO").[48]

42. *See generally* UNCLOS, *supra* note 33, arts. 207, 213 (requiring states to implement domestic and international rules in accordance with the Convention and other international standards, instead of providing specific requirements and prohibitions with which states must comply).

43. *See* HASSAN, *supra* note 37, at 78-79 (linking the development of several international environmental conventions, including ones concerning the protection of the marine environment, to an era of heightened environmental interest in the early 1970s).

44. *London Convention and Protocol*, INT'L MARITIME ORG., http://www.imo.org/OurWork/Environment/SpecialProgrammesAndInitiatives/Pages/London-Convention-and-Protocol.aspx (last visited Feb. 27, 2012) (asserting that the London Convention became one of the first international conventions to advance the protection of the marine environment from the impact of human activity).

45. *See* London Convention, *supra* note 29, art. I (establishing the highest level aspirations of compliance with the Convention as taking all practicable steps to reduce dumping of waste into the sea).

46. *See generally id.* arts. II-XXII.

47. *See* DAVID HUNTER ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 735 (2d ed. 2002) (distinguishing between the London Convention's treatment of dumping high level versus low level radioactive wastes).

48. *See* London Convention, *supra* note 29, Annex I-II (enumerating the materials that are prohibited from being dumped in Annex I, including

In 1996, the parties to the London Convention came together and produced the London Protocol.[49] The Protocol shares the same general principles as the Convention.[50] In an effort to build on the success of the London Convention in limiting intentional ocean dumping, the London Protocol further restricted intentional ocean dumping by banning it outright, with the exception of materials that are found on a "reverse list."[51]

In addition to the categorization of wastes, the London Convention and Protocol specifically define the term dumping as "deliberate disposal at sea of wastes . . . from . . . man-made structures at sea."[52] The main element of this definition is the requirement that the dumping occur at sea.[53]

radioactive material, and those that can be dumped if a proper permit is obtained in Annex II, including scrap metal); *Introduction to IMO*, INT'L MARITIME ORG., http://www.imo.org/About/Pages/Default.aspx (last visited Feb. 27, 2012) (summarizing the history and activities of the IMO, which is responsible for controlling international ocean pollution); *see also* HUNTER ET. AL, *supra* note 47, at 734 (arguing that the drafters of the London Protocol rejected the "black" and "grey" list framework of London Convention).

49. *See generally* London Protocol, *supra* note 30 (introducing a new framework for controlling ocean dumping building on the framework established in the London Convention).

50. *Compare* London Convention, *supra* note 29, art. I (establishing the highest level principles of the agreement as the prevention of pollution of the ocean from intentional dumping), *with* London Protocol, *supra* note 30, art. 2 (articulating the objective of the agreement as the protection and preservation of the ocean from pollution with special emphasis on intentional dumping at sea).

51. *See* London Protocol, *supra* note 30, art. 4 ("Contracting Parties shall prohibit the dumping of any wastes or other matter with the exception of those listed in Annex 1."); *see also* HUNTER ET AL., *supra* note 47, at 732, 734 (remarking retrospectively on the success of the London Convention in attaining its goals, and distinguishing the structure of the dumping prohibition present in the London Convention from the approach in the London Protocol, which is more precautionary).

52. London Convention, *supra* note 29, art. III; London Protocol, *supra* note 30, art. 1.

53. *See* London Convention, *supra* note 29, art. III; London Protocol, *supra* note 31, art. 1; *see also* Ray Purdy, *Geological Carbon Dioxide Storage and the Law*, *in* CARBON CAPTURE AND ITS STORAGE 103-04 (Simon Shackley & Clair Gough, eds., 2006) (recognizing that the London Convention only concerned dumping at sea, whereas the London Protocol expanded its scope of the term "sea" to include the seabed and subsoil as well).

Article V of the London Convention and Article 8 of the London Protocol provide two identical exceptions to the requirements of the Convention.[54] First, the "Safety at Sea" Exception allows dumping if the dumping is the only way to avoid danger to life or property that is caused by an emergency weather event.[55] To qualify under the Safety at Sea Exception, however, the dumping must minimize the impact of the purported threat,[56] yet there is no standard present in Article V of the London Convention or Article 8 of the London Protocol against which an emergency weather event can be measured.[57] Second, if there is not an immediate weather emergency then a party to the Convention and Protocol can issue a permit excepting the situation from the

54. *Compare* London Convention, *supra* note 29, art. V (providing that instances of adverse weather events, or emergencies where a party to the agreement permits the dumping after consulting potentially affected states, constitute exceptions to the prohibition of dumping pursuant to the Convention), *with* London Protocol, *supra* note 30, art. 8 (providing the same exceptions to the London Protocol that exist in Article V of the London Convention).

55. *See* Murakami, *supra* note 41, at 721 (arguing force majeure is traditionally caused by a weather event that would not be reasonably predicted, and thus would not permit adequate preparation).

56. *See* London Protocol, *supra* note 30, art. 8 (allowing for an exception if a weather event, or any other event, "constitutes a danger to human life or a real threat to vessels, aircraft, platforms or other man-made structures . . ." then dumping is allowed if it "appears to be the only way of averting the threat and if there is every probability that the damage consequent upon such dumping will be less than would otherwise occur."). *See generally* IMO, *Procedures and Criteria for Determining and Addressing Emergency Situations as Referred to in Articles 8 and 18.1.6 of the London Protocol*, at 6–7, LC 28/15 (Sept. 17, 2010) [hereinafter *IMO Procedures*], *available at* http://www.imo.org/blast/blastDataHelper.asp?data_id=30801&filename=Emergencyprocedures.pdf (providing guidance as to the required consultation of the dumping party with potentially affected countries).

57. *See* London Convention, *supra* note 29, art. V (describing the requirements to qualify for an exception as being in response to a force majeure event, but providing no additional guidance); London Protocol, *supra* note 30, art. 8 (containing the same exception present in Article V of the London Convention, and similarly providing little additional information); *see also* Murakami, *supra* note 41, at 713 (detailing that the force majeure text was added to earlier drafts of the London Convention, but that the drafters provided no additional guidance once the language was added to the final version).

requirements.[58] This is called the Emergency Exception.[59] This permit can be issued if there is an emergency posing an unacceptable threat to human health, safety or the marine environment, there is no alternative solution, and other impacted parties to the Convention and Protocol are consulted.[60]

The IMO has issued "procedures and criteria" for compliance with the emergency dumping exceptions.[61] Recognizing that there may not be adequate time to perform the requisite consultations to comply with the Emergency Exception, the IMO established a procedure for determining which actions are necessary by the party to the Convention and Protocol.[62] If there is an emergency situation and immediate action is necessary with no time to consider alternatives, then the party to the Convention only has to comply with the requirements of the Safety at Sea Exception, even when not responding to an inclement weather event.[63]

2. United Nations Convention on the Law of the Sea and Subsequent Non-binding Agreements Relating to Land-based Ocean Dumping

The United Nations Convention on the Law of the Sea ("UNCLOS") is a comprehensive international agreement

58. *See* IMO Procedures, *supra* note 56, at 3 (displaying the flow chart used to determine which exception to the requirements of the London Protocol applies, if any).

59. *See* Murakami, *supra* note 41, at 713.

60. *See* IMO Procedures, *supra* note 56, at 2-4 (informing the parties of the requirements to qualify for the exceptions through a flow chart which determines what specific steps parties must take depending on the nature of the exception sought).

61. *See generally id.* (providing a differentiated set of requirements for states to qualify for an exception to the dumping ban in the London Convention and Protocol and a differentiated set of reporting requirements once the exception has been granted).

62. *See id.*

63. *See id.* (directing parties to follow the requirements of Article 8.1, which delineates the Safety at Sea Exception; the requirements include dumping to reduce the likelihood of damage to human health or the marine environment, sending reports to the Coastal and Flag State, and reporting to the Secretariat regarding whether the exercise of due care would have prevented the situation).

regarding the law of the sea.[64] UNCLOS, which has 17 parts, 9 annexes, and over 300 articles, covers topics as varied as exclusive economic zones, piracy, and rights of access of land locked nations; it covers virtually every element of the law of the sea.[65] Part XII of the Convention specifically deals with protection of the marine environment, and covers dumping, research, and technology transfer.[66]

Within Part XII, Articles 207 and 213 specifically address land-based ocean dumping.[67] Article 207 requires states to pass domestic laws to reduce and control land-based ocean dumping.[68] In addition to considering other international laws, states can also consider non-environmental factors.[69] For example, developing nations may consider the need for economic development.[70] Article 207 specifically guides states to develop rules that aim to fully reduce and control pollution.[71] Article 213 requires states to enforce domestic laws and implement other international rules relating to land-based sources of ocean dumping.[72]

64. *See* HASSAN, *supra* note 37, at 81 (arguing UNCLOS established a "comprehensive framework" for the stewardship of the ocean).

65. *See* HUNTER ET AL., *supra* note 47, at 659 (asserting that UNCLOS covers "all aspects" of international law relating to the ocean). *See generally* UNCLOS, *supra* note 33.

66. *See* UNCLOS, *supra* note 32, pt. XII. *See generally* UNITED NATIONS CONVENTION ON THE LAW OF THE SEA, 1982: A COMMENTARY (Myron H. Nordquist et al. eds., 1991) (providing additional information and analysis of the articles of the Convention).

67. *See* UNCLOS, *supra* note 32, arts. 207, 213 (covering reduction of land-based marine pollution and the domestic enforcement of the laws promulgated to fulfill Article 207).

68. *See id.* art. 207 ("States shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment from land-based sources . . . .").

69. *See id.* ("States shall take other measures as may be necessary to prevent, reduce, and control such pollution.")

70. *See id.* (specifying that states shall consider the economic capacity of developing states when establishing rules and standards to minimize pollution).

71. *See id.* (requiring states to reduce to the "fullest extent possible" those pollutants that tend to persist in the marine environment).

72. *See id.* art. 213 (requiring states to "adopt and pass domestic laws in accordance with UNCLOS article 207," and to "take other measures to

III. ANALYSIS

The dumping that occurred at the Fukushima Daiichi power plant in response to the earthquake and tsunami does not violate either the London Convention and Protocol or UNCLOS, and thus reveals the inadequacy of the existing international framework for this category of dumping.[73] The London Convention and Protocol do not apply to the dumping at the Fukushima Daiichi nuclear plant because the radioactive water was discharged from land.[74] Furthermore, even if the nature of the pollution does not render the Convention and Protocol inapplicable, the emergency exceptions to treaty compliance in Article V of the Convention and Article 8 of the Protocol would apply, excepting the dumping from the Convention and Protocol's requirements.[75] In addition, the dumping does not violate UNCLOS because the treaty only requires the control of dumping to the extent feasible, and controlling this dumping was not feasible.[76]

A. THE LONDON CONVENTION AND PROTOCOL DO NOT APPLY TO THE NUCLEAR WASTE DUMPING AT FUKUSHIMA DAIICHI BECAUSE THE DUMPING WAS LAND-BASED AND IN RESPONSE TO AN EMERGENCY SITUATION.

The exception of land-based ocean dumping from the London

implement any subsequent agreements to reduce land-based ocean dumping").

73. *See* discussion *infra* Part III.A (assessing the London Convention and Protocol, and determining that the language of the agreements, and the exceptions therein, limit their applicability in this case); discussion *infra* Part III.B (analyzing the limited applicability of the land-based ocean dumping sections of UNCLOS, concluding they do not prohibit the activity that occurred at the Fukushima Daiichi plant).

74. *See* HASSAN, *supra* note 38, at 79-80 (arguing the London Convention and Protocol do not apply to land-based ocean dumping because it is not expressly included in the agreements).

75. *See* discussion *infra* Part III.A (analyzing the applicability of the London Convention and Protocol, including exceptions, to the radioactive water discharge that occurred at the Fukushima Daiichi power plant in an effort to cool the reactors).

76. *See* discussion *infra* part III.B (applying Articles 207 and 213 as well as the Montreal Guidelines, the Washington Declaration, and the Global Programme of Action to the events that resulted in the discharge).

Convention and Protocol, and the applicability of the emergency exceptions to the Fukushima Daiichi dumping, prevent the London Convention and Protocol from applying to the Fukushima Daiichi radioactive water discharge. Two instances of dumping were accidental,[77] and therefore do not bear on the analysis of the Convention and Protocol.[78] The intentional dumping that occurred in early April 2011 is the focus of this analysis.[79] First, this section will analyze the type of dumping that occurred at the Fukushima Daiichi plant in light of the definition of dumping provided by the Convention and Protocol.[80] Second, this section will analyze the applicability of the emergency exceptions in the Convention and Protocol to the dumping at the plant.[81]

1. The London Convention and Protocol only apply to dumping that is "at sea" and therefore do not apply to the Fukushima Daiichi dumping because the radioactive water was discharged from land.

The radioactive water discharge at the Fukushima Daiichi power plant is not "deliberate disposal into the sea of wastes . . . from man-made structures at sea."[82] The Fukushima Daiichi

77. *See* Belson & Tabuchi, *supra* note 7, at A12 (detailing the discovery of damage to a storage container that resulted in a leak to the ocean that was deemed accidental dumping).

78. *Compare* London Convention, *supra* note 29, art. III (defining dumping as deliberate at sea disposal), *with* London Protocol, *supra* note 30, art. 1 (defining dumping as deliberate at sea disposal, including sub-seabed storage of materials, and abandonment of structures solely for disposal).

79. *See Japan – Earthquake, Tsunami and Nuclear Crisis*, *supra* note 1 (reporting that the plant's operators intentionally dumped radioactive water to make room in a storage container for more highly radioactive water).

80. *See* discussion *infra* Part III.A.1 (determining that the language and context of the London Convention and Protocol prohibit dumping that occurs on the ocean, which limits their applicability to the radioactive water discharge from the Fukushima Daiichi power plant).

81. *See* discussion *infra* Part III.A.2 (analyzing the two exceptions to the requirements of the London Convention and Protocol and determining that the circumstances surrounding the dumping at the Fukushima Daiichi power plant would have qualified for these exceptions).

82. *Compare* London Convention, *supra* note 29, art. III (defining dumping as deliberate at sea disposal from or of "vessels, aircraft, platforms or other

radioactive water discharge was not "at sea" within the meaning of Article III of the London Convention and Article I of the London Protocol when examined through the analytical framework established by Article 31 of the Vienna Convention.[83] The Vienna Convention requires the use of the ordinary meaning of the term "at sea" and a comparison of the present instance of dumping to those instances that have been subject to the treaty in the past.[84]

Article 31 of the Vienna Convention requires interpreters to consider the context of a treaty when determining the meaning of terms found within the treaty.[85] The definition of dumping present in the London Convention and Protocol provides context for understanding the plain meaning of the term "at sea" through the text accompanying that term.[86] Where these treaties provide

man-made structures" and explicitly excluding these materials "incidental" to the operations of those enumerated elements), *with* London Protocol, *supra* note 30, art. 1 (defining dumping as the deliberate at sea disposal from or of "vessels, aircraft, platforms or other man-made structures," excluding the materials incidental to their operation, but including sub-seabed storage of materials, and abandonment of structures solely for disposal).

83. *See* Vienna Convention, *supra* note 35, art. 31 (establishing a good faith basis standard for interpreting the terms of treaties). *Compare* London Convention, *supra* note 29, art. III (establishing the meaning of the term dumping for the purpose of the treaty as deliberate at sea disposal from, or of, "vessels, aircraft, platforms or other man-made structures"), *and* London Protocol, supra note 30, art. 1 (using the same definition of dumping provided in article III of the London Convention), *with* Tabuchi & Belson, *supra* note 19 (detailing the plans to dump 11,000 tons of radioactive water into the sea from the onshore power plant to mitigate the damage to the onshore plant).

84. *See* Vienna Convention, *supra* note 35, art. 31 (requiring a good faith interpretation of the ordinary meaning of a word to be given to the terms of a treaty, within the context of the treaty). *See generally* LINDERFALK *supra* note 36 (highlighting that context is a part of the treaty interpretation framework established by the Vienna Convention).

85. *See* Vienna Convention, *supra* note 35, art. 31 (providing that subsequent agreements, subsequent applications of the treaty, and relevant international law must be taken into account as context for treaty interpretation); RICHARD K. GARDINER, TREATY INTERPRETATION 162, 177-78 (2008) (discussing the importance of the immediate context in properly understanding the meaning of a treaty).

86. *See* London Convention, *supra* note 29, art. III (listing several specific objects from which dumping is prohibited, including vessels and platforms); *see* London Protocol, *supra* note 30, art. 1 (containing the same named objects

a catch-all category of "man-made structures at sea," the definitions specifically name "ships," "aircraft," and "platforms."[87] Dumping from these categories of facilities and vessels occurs either on or over the ocean, thus "at sea" refers to dumping from vessels on top of or over the ocean. The dumping from the Fukushima Daiichi power plant occurred from a facility that is on land, not on or over the ocean. The context surrounding the term "at sea" provided by the definition of dumping in the treaty language means that the Fukushima Daiichi dumping would not fall under the definition of dumping provided by Article III of the London Convention or Article 8 of the London Protocol.

Examining state performance in compliance with the London Convention and Protocol further supports the conclusion that the ocean dumping at the Fukushima Daiichi power plant is not the type of dumping banned by the London Convention and Protocol.[88] Instances where exceptions to the London Convention and Protocol dumping ban were approved highlight the type of dumping that is typically banned without approval for use of an exception. In one instance, the U.S. Environmental Protection Agency ("EPA") granted an exception to the ban when the United States' National Science Foundation ("NSF") dumped a pier off the coast of Antarctica.[89] In that situation the pier was a man-made structure and was dumped in the middle of the sea,

from which dumping is prohibited as included in Article III of the London Convention).

87. *See* London Convention, *supra* note 29, art. III; London Protocol, *supra* note 30, art. 1.

88. *Compare* Issuance of an Emergency Ocean Dumping Permit to the National Science Foundation for Disposal of an Ice Pier From its Base at McMurdo Station, Antarctica, 64 Fed. Reg. 5790-91 (Feb. 5, 1999) [hereinafter Issuance of Emergency Ocean Dumping Permit] (describing the ocean dumping of a pier that was permitted in compliance with the London Convention and Protocol because of the risk posed to human health and because the dumping occurred subsequent to transport to sea); *with* Tabuchi & Belson, *supra* note 19 (detailing the direct dumping of radioactive water from the Fukushima Daiichi power plant into the ocean because of the risks to human health posed by a potential meltdown of the plant).

89. *See generally* Issuance of an Emergency Ocean Dumping Permit, *supra* note 88, at 5790-92 (permitting the National Science Foundation to tow a pier located at a research facility off of Antarctica to McMurdo sound in order to dump it into the ocean).

and thus qualified as "at sea" dumping that was banned under the London Convention and Protocol. The pier, however, posed a danger to human safety.[90] Because it determined that the pier was a threat to human safety and that there was no alternative to dumping the pier at sea, the EPA concluded that the terms of the exception to the London Convention were met; therefore, the EPA permitted the NSF to dump the pier in the ocean.[91] In contrast, the dumping that occurred at the Fukushima Daiichi plant involved discharge of nuclear waste from the shore into the sea, which unlike dumping a pier in the middle of the sea, does not satisfy the plain language of "at sea" in the London Convention and Protocol.[92]

Beyond the obvious difference between radioactive water and a pier, the NSF pier dumping case illustrates the "at sea" element required for an incident to qualify as ocean dumping under the London Convention and Protocol. The pier was towed to sea and then released, not pushed into the sea from the coast.[93] The radioactive water at Fukushima Daiichi was dumped directly into the ocean from the coastal power plant, not "at sea."[94] The Fukushima Daiichi dumping would have met the "at sea" requirement of the London Convention and Protocol if the radioactive water had been placed on a ship, hauled out to sea, and then dumped into the ocean.[95] The construction of the

90. *See id.* (describing the continued freezing and thawing that made the pier vulnerable to potentially collapsing during the offloading of cargo ships).

91. *See* Murakami, *supra* note 41, at 714 (summarizing that the reasoning of the Environmental Protection Agency for issuing the permit was that the threat to human welfare and the lack of alternative options satisfied the requirements of the London Convention and Protocol).

92. *Compare id.* (describing the pier that was dragged out to sea from Antarctica because of the danger it posed to humans), *with* Tabuchi & Belson, *supra* note 20 (detailing the dumping of water from the plant directly into the ocean in response to the risk of a nuclear emergency).

93. *See* Murakami, *supra* note 41, at 714-715 (summarizing the safety reasoning behind the removal of a pier from Antarctica as qualifying for an exception to the London Convention).

94. *See* Tabuchi & Belson, *supra* note 19 (relating the intended plans of the plant operators to dump radioactive water into the ocean to create storage opportunity for significantly more highly radioactive water).

95. *See* London Convention, *supra* note 29, art. III (defining dumping as the at sea disposal of wastes from a man-made structure); London Protocol,

definition of dumping creates a situation where a state is permitted to pollute directly, but is prohibited from doing so indirectly.[96]

The context provided by the London Convention and Protocol as to the meaning of the term "at sea" limits the definition of dumping to instances where the dumping occurred on or over the sea.[97] The exclusion of land-based sources from the London Convention and Protocol is further supported by historical examples of dumping that were permitted in accordance with the Convention and Protocol.[98] Historical examples also illustrate the type of dumping the London Convention and Protocol prohibit and that the Fukushima Daiichi dumping does not fall under the definition of dumping in the Convention and Protocol.[99] Even if the dumping at the Fukushima Daiichi plant was subject to the London Convention and Protocol despite the narrow definition of dumping provided therein, the exceptions in the two agreements still would have permitted the dumping at Fukushima Daiichi.[100]

supra note 31, art. 1 (using a similar definition of dumping as London Convention article III); *see also* Issuance of an Emergency Dumping Permit, *supra* note 88, at 5790-91 (permitting the dumping of a pier after it had been dragged out to sea, otherwise it would have violated the London Convention).

96. *See generally* London Convention, *supra* note 29 (creating an international regulatory regime for ocean dumping which prohibits ocean dumping from "at sea" sources, but not coastal facilities); London Protocol, *supra* note 30 (updating the London Convention by creating a stricter international regime, while still only covering "at sea" sources of ocean dumping—again omitting coastal or land-based facilities).

97. *See* London Convention, *supra* note 29, art. III (enumerating specific sources from which dumping is prohibited, including vessels and platforms); London Protocol, *supra* note 30, art. 1 (replicating the same named sources from which dumping is prohibited present in article III of the London Convention).

98. *See* Murakami, *supra* note 41, at 714 (summarizing the procedure for dumping a dock in accordance with a permit under the London Convention which required that the dock first be dragged out to sea).

99. *See id.* (detailing a series of ship fires that received exceptions from the London Protocol because of the immediate danger faced by the crew of the ships).

100. *Compare* London Convention, *supra* note 29, art. V (providing two exceptions from the requirements of the convention, the first in the instance of an adverse weather event, the second when a party to the agreement

2. The emergency conditions at the Fukushima Daiichi plant excepted the plant operators from the requirements of the Convention and Protocol.

The London Convention and Protocol recognize two situations that permit an exception to the requirements of the agreements, the Safety at Sea Exception and the Emergency Exception.[101] Even if Article III of the London Convention and Article 1 of the London Protocol do apply to the Fukushima Daiichi dumping, the Emergency Exception prevents Japan from violating the Convention and Protocol.

a. The Safety at Sea exception does not apply to the Fukushima Daiichi dumping.

The Safety at Sea Exception to the requirements of the London Convention and Protocol does not apply to the Fukushima Daiichi dumping because, even though there was an immediate risk to human safety, the plant's operators could have reasonably prepared for the emergency.[102] The first element of the exception is that the event must pose an immediate risk to human safety.[103] The reaction of the Japanese authorities in the immediate aftermath of the damage to the plant and the further actions taken a few days later illustrate the nature, magnitude, and likelihood of danger posed to humans and thus meets the

permits the dumping after consulting potentially affected states or in the aftermath of a non-force majeure emergency), *with* London Protocol, *supra* note 30, art. 8 (creating the same exceptions to the London Protocol that exist in article V of the London Convention).

101. London Convention, *supra* note 29, art. V; London Protocol, *supra* note 30, art. 8; Murakami, *supra* note 41, at 721 (summarizing the two enumerated exceptions by detailing circumstances under which prohibitions on dumping may be lifted).

102. *See* London Convention, *supra* note 29, art. V (creating an exception for "at sea" dumping to preserve the safety of human life in instances of force majeure due to weather); London Protocol, *supra* note 30, art. 8 (establishing the same exception to the London Protocol found in the London Convention).

103. *See* London Convention, *supra* note 29, art. V (permitting dumping to save lives if dumping is the only way to prevent death and the damage caused by dumping is less than that which would occur otherwise); London Protocol, *supra* note 30, art. 8 (providing for similar requirements for an exception as provided by article V of the London Convention).

first element of the exception.[104]

The second element requires that the emergency-causing event could not have been reasonably predicted or prepared for.[105] Whether the second element of the exception is satisfied in the Fukushima Daiichi case is seemingly difficult to determine, however it ultimately is not satisfied.[106] Because the occurrence of an earthquake and tsunami could have been predicted to occur during the lifetime of the Fukushima Daiichi power plant and because the plant had a checkered safety and repair record, the second element of the Safety at Sea Exception is not met.[107] The seismic history of Japan in the past century reveals numerous earthquakes that caused tsunamis.[108] Neither the text of the Convention and Protocol nor the IMO protocol, established to assist states in determining the applicability of these exceptions, provides guidance for assessing whether an event

104. *Compare* Hayashi & Smith, *supra* note 3 (noting the 20,000 Japanese citizens evacuated from the vicinity of the plant by March 12, 2011), *with* Tabuchi & Wald, *supra* note 5 (estimating 200,000 Japanese citizens had been evacuated by March 13, 2011 due to increasing concerns of a nuclear catastrophe).

105. *See* London Convention, *supra* note 29, art. V (permitting dumping to ensure the "safety of human life or of vessels, aircraft, platforms or other man-made structures at sea in cases of force majeure . . . ."); London Protocol, *supra* note 30, art. 8 (establishing the same requirement); Murakami, *supra* note 41, at 721 (defining the historical interpretation of force majeure as an event that could not have been adequately predicted nor adequately handled despite reasonable preparedness of the party involved).

106. *See* Kenji Hall and Mitchell Landsberg, *Japan Quake Preparedness No Match for 8.9*, L.A. TIMES (Mar. 12, 2011), http://articles.latimes.com/2011/mar/12/world/la-fg-japan-quake-ready-20110312 (describing Japan as a state accustomed to large earthquakes and equipped with one of the most advanced tsunami warning systems in the world, yet it still was not prepared for the reality of a massive earthquake).

107. *See* Morse & Obe, *supra* note 22 (relaying the checkered safety history of the Fukushima Daiichi power plant relative to other power plants in Japan); *see also Interactive Graphic: Japan's Deadly Seismic History*, NEW SCIENTIST, http://www.newscientist.com/blogs/shortsharpscience/2011/03/interactive-graphic-japans-dea.html (last modified, Mar. 12, 2011) (detailing the last century of seismic history of Japan).

108. *See Interactive Graphic*, *supra* note 107 (displaying an earthquake in 1933 that caused a tsunami in a similar location and of a similar magnitude to the earthquake that struck on March 11, 2011).

can be reasonably predicted.[109] Predicting earthquakes in isolation is difficult;[110] however the plant had been operating for several decades.[111] Because the occurrence of an earthquake over the course of several decades in a seismically active region of the world is sufficiently predictable, this event does not qualify under the Safety at Sea Exception. [112]

In addition to the requisite rarity of an event to trigger the Safety at Sea Exception to the London Convention and Protocol, the event must have been one for which a party could not have adequately prepared.[113] The Fukushima Daiichi power plant's safety record indicates a lack of preparedness for an earthquake or a tsunami.[114] This element of the Safety at Sea Exception has no standards in the Convention and Protocol or the IMO procedures against which to measure the upkeep of the plant.[115]

109. *See* London Convention, *supra* note 29, art. V (detailing the requirements of the exceptions to the Convention, but not providing a precise meaning for force majeure); London Protocol, *supra* note 30, art. 8 (providing similar requirements for an exception as provided by Article V of the London Convention, again not providing a precise meaning of force majeure); *see generally* IMO Procedures, *supra* note 56 (detailing the procedural compliance requirements of the exceptions to the London Convention and Protocol, but not explaining the meaning of force majeure).

110. *See* Robert J. Geller, *Predicting Earthquakes is Impossible; Temblors: Seismologists Can be Useful in Protecting Public Safety, but No One Can Say When the Big One is Coming*, L.A. TIMES, Feb. 2, 1997, at M5 (explaining that the lack of information regarding an accurate precursor to earthquakes makes them difficult to predict).

111. *See Daiichi Plant Historically Problem-Prone*, UPI (Mar. 21, 2011), *available at* http://www.upi.com/Top_News/World-News/2011/03/21/Daiichi-plant-historically-problem-prone/UPI-87341300751832/ (noting that the reactors of the Fukushima Daiichi power plant came online in the 1970s).

112. *See Interactive Graphic*, *supra* note 107 (depicting the significant number of earthquakes that have occurred in and around Japan in the past century).

113. *See* Murakami, *supra* note 41, at 721 (arguing that the reasonable preparedness of the parties seeking to claim force majeure is a traditional part of the definition).

114. *See* Morse & Obe, *supra* note 22 (reporting on the historical problems with the plant, including records documenting issues with the cooling systems).

115. *See* London Convention, *supra* note 29, art. V (lacking a precise meaning for the upkeep of the associated facilities); London Protocol, *supra*

While the lack of guidance provided by the treaties inhibits clear analysis, the degree of predictability and non-preparedness present make it apparent that the Safety at Sea Exception does not apply to the Fukushima Daiichi radioactive water discharge.

b. The Emergency Exception applies to the Fukushima Daiichi ocean dumping.

A state must invoke the Emergency Exception in one of two ways.[116] Ideally, a state would consult neighboring states and the relevant international organizations if there is adequate time to do so.[117] Alternatively, when time to react is limited and the time required to consult the neighboring parties is not available, a state must comply with the after-the-fact reporting requirements of the Safety at Sea Exception.[118] The Fukushima Daiichi radioactive water discharge falls into this second category, and thus, qualifies for the Emergency Exception.[119]

Historically, the time-limited form of the Emergency Exception has been applied to incidents of ship fires at sea.[120] In those

note 30, art. 8 (failing to provide a precise requirement for the upkeep of facilities); *see generally* IMO Procedures, *supra* note 56, at 2 (detailing the procedural compliance requirements of the exceptions to the London Convention and Protocol, but not the requirement for the upkeep of facilities).

116. London Convention, *supra* note 29, art. V; London Protocol, *supra* note 30, art. 8. *See generally* IMO Procedures, *supra* note 56 (outlining the requirements of the exceptions to the London Convention and Protocol).

117. *See* IMO Procedures, *supra* note 56, at 4 (requiring that parties consult with the countries that would be affected by the dumping, the IMO, and other regional organizations that are concerned with ocean dumping).

118. *See id.* at 1-2 (identifying what parties seeking to comply with article 8.1 of the London Protocol after-the-fact should address in reports, including the need to save human life, or a vessel; that dumping at sea is the only means of averting that danger to humans; that the activity of dumping is done in accordance with any monitoring procedures in order to reduce the impact to the marine environment; and that the incident is reported to the IMO).

119. *See* Hayashi, *supra* note 4 (revealing the time-sensitive reaction by the government in acquiring iodine pills to treat radiation sickness); *see also* Hayashi & Smith, *supra* note 3 (detailing the last-minute evacuations ordered near the Fukushima Daiichi power plant).

120. *See* Murakami, *supra* note 41, at 714 (chronicling a series of ship fires that received exceptions from the London Protocol, including ships off the coasts of Canada, Greenland, and Puerto Rico).

instances, the lives of the individuals on the ships required the immediate dumping of waste into the ocean.[121] In the case of the Fukushima plant, the immediate danger to those surrounding the plant was apparent through the actions taken by the Japanese authorities in the immediate aftermath of the earthquake and tsunami.[122] The plant operators dumped low-level radioactive water from a storage tank and replaced it with higher-level radioactive water in an effort to cool the plant and avoid a meltdown.[123] The Emergency Exception applies because the dumping at the plant meets the criteria established by the IMO guidelines, and is analogous to prior cases in which the exception was applied.[124]

B. THE RADIOACTIVE WATER DISCHARGE AT THE FUKUSHIMA DAIICHI POWER PLANT DOES NOT VIOLATE ARTICLES 207 AND 213 OF UNCLOS OR SUBSEQUENT AGREEMENTS BECAUSE OF THE GENERAL NATURE OF THE TREATY LANGUAGE.

Articles 207 and 213 of UNCLOS do not provide any specific methodology for assessing treaty compliance and thus highlight the inadequacy of the existing framework.[125] The radioactive water discharge at the Fukushima plant does not violate these provisions because the provisions allow for land-based ocean dumping when alternatives are unfeasible. This was the case at the Fukushima Daiichi plant. Although the Montreal Guidelines, the Washington Declaration, and the Global Program of Action have specific provisions that apply to instances of land-based

121. *See id.* (implying that the fires on the ships were sufficient to qualify for the risk to human life requirement of the exception to the London Protocol).

122. *See* Hayashi, *supra* note 4 (reporting the efforts of the Japanese Government to acquire iodine pills to treat exposure to radiation as an emergency precaution).

123. *See* Tabuchi & Belson, *supra* note 19 (recounting the decision process of the plant operators to dump lower level radioactivity water to make room for significantly higher radioactive water).

124. *See* IMO Procedures, *supra* note 56, at 1-2 (enumerating the requirements for parties seeking to comply with the article 8.1 of the London Protocol).

125. *See generally* UNCLOS, *supra* note 32, arts. 207, 213 (requiring states to develop domestic laws to manage and reduce land-based sources of ocean dumping).

ocean dumping, their non-binding nature obviates the need for analyzing the radioactive water discharge at the Fukushima Daiichi power plant in light of these provisions.[126] The nonbinding nature of these declarations leaves only the language of Articles 207 and 213 of UNCLOS against which to analyze the radioactive water discharge at the Fukushima Daiichi power plant.[127]

Compliance with articles 207 and 213 of UNCLOS traditionally relies on the good faith actions of individual states.[128] UNCLOS requires states to control dumping to the fullest extent possible, which essentially creates a feasibility standard.[129] Article 31 of the Vienna Convention specifies that treaties should be interpreted according to their plain meaning.[130] The invocation of a feasibility standard implies that the drafters anticipated instances that would require dumping and did not want to ban the practice outright.[131]

The Oxford English Dictionary defines feasible as "possible to do easily or conveniently."[132] In the situation at the Fukushima

126. *See* HASSAN, *supra* note 37, at 96-100 (arguing the Global Program of Action has been unsuccessful because it is non-binding, but that it is an important step toward global governance); HUNTER ET AL., *supra* note 47, at 752-53 (concluding that the Montreal Guidelines were not implemented widely and, as recommendations, lacked force).

127. *See generally* UNCLOS, *supra* note 33, art. 207, 213 (offering discretion to parties to develop Convention-required land-based ocean dumping reduction laws on their own).

128. *See* Alan E. Boyle, *Marine Pollution Under the Law of the Sea Convention*, 79 AM. J. INT'L L. 347, 354 (1985) (arguing that reliance on state discretion to implement articles 207 and 212 leads to a lack of regulation).

129. *See* UNCLOS, *supra* note 32, art. 207 (describing the requirement that states control land-based ocean dumping in accordance with the agreement, specifically limiting the requirements for states to limit land-based ocean dumping to the extent possible); *Feasible Definition*, OXFORD DICTIONARY, http://oxford dictionaries.com/definition/feasible ("possible, practical, easy to do, convenient").

130. *See* Vienna Convention, *supra* note 35, art. 31 (creating an ordinary meaning standard by which the text of treaties should be interpreted).

131. *Compare* UNCLOS, *supra* note 32, art. 207 (requiring the control of land-based ocean dumping to the fullest extent possible), *with id.* art. 99 (specifically banning the transportation of slaves under the agreement).

132. *Compare Feasible Definition*, OXFORD DICTIONARY, http://oxford dictionaries.com/definition/feasible ("possible, practical, easy to do,

Daiichi plant, it would not be practical to prohibit the dumping of the radioactive water. The rescue workers at the plant were balancing the risk to human health with the risk to the marine environment at the time the water was discharged into the ocean.[133] Preventing the dumping was not feasible in this instance because of the risk posed to human life if the dumping had not occurred.[134]

Other facts support the argument that the dumping was a good faith effort to comply with Article 207 of UNCLOS. The radioactive water discharged into the ocean was dumped in order to create room for water that was even more radioactive.[135] These actions served to minimize the disaster's overall impact on the environment while continuing the attempt to cool the power plant.[136] Because they were taken to avert further disaster, these actions are consistent with a good faith effort to comply with the limitations on land-based ocean dumping in article 207 of UNCLOS.[137] Neither the UNCLOS nor

convenient"), *with Feasible Definition*, MERRIAM WEBSTER DICTIONARY, http://www.merriam-webster.com/dictionary/feasible ("capable of being done or carried out; capable of being used or dealt with successfully").

133. *See* Hayashi, *supra* note 4 (juxtaposing the low reported levels of radioactivity in the air with the stockpiling of the iodine pills to treat exposure to radiation by the Japanese Government to demonstrate the overarching concern for human welfare in the decision to dump coolant water).

134. *See* Justin McCurry & Suzanne Goldenberg, *Fukushima's Partial Meltdown Increases Fears of Contaminated Seawater and Soil*, THE GUARDIAN (Mar. 28, 2011), http://www.guardian.co. uk/world/2011/mar/28/japan-nuclear-plant-partial-meltdown (describing the need to release radioactive water and pump in fresher water to prevent a more life-threatening meltdown).

135. *See* Tabuchi & Belson, *supra* note 19 (reporting that the impetus for the dumping was to make room in a storage container for more highly radioactive water).

136. *See id.* (reporting the need to store more highly radioactive water from the damaged reactor as the reason for dumping the radioactive water into the ocean); Linsley, *supra* note 28, at 19 (displaying the levels of radiation exposure that are lethal to different types of animals, thus showing the risks associated with dumping radioactive water into the ocean).

137. *See* UNCLOS *supra* note 32, art. 207 (requiring states to control land-based sources of marine pollution to the furthest extent possible); Vienna Convention, *supra* note 35, art. 31 (establishing the basis for interpreting terms of a treaty on a good faith basis according to the ordinary meaning of

the London Convention and Protocol provide a framework that clearly applies to the crisis at the Fukushima Daiichi power plant.

IV. RECOMMENDATIONS

As illustrated by the events at the Fukushima Daiichi plant, Articles III and V of the London Convention, Articles 1 and 8 of the London Protocol, and Articles 207 and 213 of UNCLOS do not adequately address dumping of radioactive water into the sea to prevent damage to the ocean environment and risk to human health and welfare.[138] Absent an agreement to control direct dumping into the ocean from land-based sources, the international framework to control ocean dumping is incomplete.[139] This comment recommends three main approaches to resolving the gap in the existing international framework. First, states should adopt a treaty designed to control land-based sources of ocean dumping based on the framework established in the London Convention and Protocol.[140] Second, states should develop a treaty that appropriately accounts for factors that decision-makers balance when attempting to avert a nuclear crisis, including special consideration for coastal facilities.[141] Third, in developing that agreement, states should look to the lessons learned from the planned disposal and trade of hazardous and nuclear waste,

the words and the context surrounding them).

138. *See* discussion *infra* Part III (analyzing the applicability of the definition of dumping and the emergency exceptions found in Articles III and V of the London Convention, Articles 1 and 8 of the London Protocol, and Articles 207 and 213 of UNCLOS to the Fukushima Daiichi radioactive water discharge, and determining that the discharge does not violate any of the articles of the London Convention and Protocol or UNCLOS).

139. *See generally* HASSAN, *supra* note 37, at 37-47 (outlining the reasons for the inadequacy of the current international regulatory regime in regulating land-based sources of ocean dumping).

140. *See* discussion *infra* Part IV.A (recommending the implementation of a treaty to specifically address land-based sources of dumping due to their significant role in global marine pollution).

141. *See* discussion *infra* Part IV.B (arguing that the high risk situation of a potential nuclear power plant meltdown requires a separate international framework because of the unique factors a decision maker would face in that situation).

including oversight and readiness standards.[142]

A. STATES SHOULD DEVELOP A TREATY THAT DIRECTLY CONTROLS LAND-BASED SOURCES OF OCEAN DUMPING.

States should draw inspiration from the London Convention and Protocol to develop a treaty to control emissions from land-based sources of marine pollution. The London Convention and Protocol are successful in reducing ocean dumping.[143] A treaty to control land-based ocean dumping could be modeled after the London Convention, banning dumping of some materials expressly, allowing dumping of other materials with a permit, and requiring notice of dumping all other materials.[144] Alternatively, the structure of the agreement could reflect the more restrictive requirements of the London Protocol, prohibiting dumping for all but a few enumerated materials.[145] Because there are no express and binding requirements on states to control land-based sources of marine pollution, widespread agreement on an aggressive pollution control mechanism could be difficult to achieve.[146] It is better to gradually progress from a

142. *See generally* Sylvia F. Liu, Note, *The Koko Incident: Developing International Norms for the Transboundary Movement of Hazardous Waste*, 8 J. NAT. RESOURCES & ENVTL. L. 121 (1992) (describing the international response to a hazardous waste spill in Africa); Christopher Meisenkothen, Note, *Subseabed Disposal of Nuclear Waste: An International Policy Perspective*, 14 CONN. J. INT'L L. 631 (1999) (proposing an international framework to store nuclear waste beneath the seabed).

143. *See* HUNTER, *supra* note 47, at 732 (asserting that a retrospective analysis of the London Convention, and subsequent updates thereto, in attaining its goals distinguish it as one of the "most successful treaties addressing marine pollution").

144. *See* London Convention, *supra* note 29, art. IV, Annex I, Annex II (creating a tiered framework to control dumping that bans the dumping of material in Annex I, allows for the permitted dumping of materials on Annex II and requires reporting of occurrences of dumping of any materials not expressly listed in Annex I or Annex II).

145. *See* London Protocol, *supra* note 30, art. 4, Annex 1 (prohibiting the dumping of any materials not found in Annex 1 which includes dredged material and sewage sludge); HUNTER, *supra* note 47, at 734 (noting the successful incorporation of the polluter pays and the precautionary principles in the London Convention is reflective of the approach taken by several other multilateral environmental statutes).

146. *See* discussion *infra* Part III (analyzing the deficiencies of the London

less restrictive framework, akin to that of the London Convention, to a more restrictive framework, like that of the London Protocol.[147]

B. STATES SHOULD DEVELOP A SPECIFIC TREATY COVERING NUCLEAR EMERGENCIES.

Because a treaty of this type may not be sufficient to control dumping that results from a nuclear crisis, incidents like the Fukushima Daiichi meltdown should be governed by an international agreement covering coastal nuclear facilities. The actions of the Japanese Government and the plant operators are indicative of the complex decision-making processes in a nuclear disaster.[148] Appropriately balancing the occasionally opposing interests of environmental welfare and the protection of human life requires a specialized treaty with robust enforcement requirements.

C. STATES CAN DRAW LESSONS IN OVERSIGHT AND PREPAREDNESS FROM TRADE IN HAZARDOUS WASTE AND THE SUB-SEABED DISPOSAL OF

Convention and Protocol, UNCLOS and associated non-binding agreements when applied to the Fukushima Daiichi radioactive water discharge, an instance of land-based marine pollution); discussion *infra* Part V (concluding the frameworks established by the London Convention and Protocol, UNCLOS, and associated non-binding agreements are insufficient to control land-based sources of marine pollution); *see also* HASSAN *supra* note 37, at 80, 87 (arguing that both the London Convention and Protocol and UNCLOS are insufficient to appropriately control land-based sources of marine pollution).

147. *See* HUNTER, *supra* note 47, at 734 (describing the more progressive standard of the London Protocol, which prohibited all dumping except for those described in an appendix, relative to the London Convention, which only prohibited the dumping of certain materials).

148. *See* Hayashi, *supra* note 4 (noting that the Japanese Government prepared to treat potential exposure to radiation from the damaged reactors by stockpiling iodine tablets); *see also* Tabuchi & Belson, *supra* note 19 (comparing the radioactivity of the water that was dumped into the ocean, 100 times the legal limit, with the radioactivity of the water that was then stored in the newly available storage space, 10,000 times the legal limit). *Compare* Hayashi & Smith, *supra* note 3 (stating that 20,000 Japanese citizens had been ordered to evacuate the area near the power plant by March 12, 2011), *with* Tabuchi & Wald, *supra* note 5 (reporting on the order of the Japanese Government to evacuate 200,000 citizens from the area near the Fukushima Daiichi power plant by March 13, 2011).

NUCLEAR WASTE.

Trade in hazardous waste and the sub-seabed disposal of nuclear waste offer two key lessons.[149] First, oversight of emergency dumping requires an international organization to oversee the dumping operations.[150] This organization should be independent of political involvement because of the high level of risk associated with nuclear waste disposal and the dangers of politicization of the issues surrounding the disposal of nuclear waste.[151] The IAEA has published directives for nuclear accidents,[152] and states have disclosure requirements when dumping may impact other states.[153] However, the existing level of oversight is not sufficient when considering the sustained impact on the environment that may result from such dumping.[154] A more robust oversight organization or a more robust oversight role in an existing organization, like the IAEA, is necessary to appropriately monitor dumping at coastal facilities.[155]

Second, states should develop more thorough plans for emergency situations involving coastal nuclear facilities.[156] Some

149. *See generally* Meisenkothen, *supra* note 142 (proposing the creation of an international framework to store nuclear waste under the ocean floor and outlining considerations for drafting such an agreement); Liu, *supra* note 142 (describing the international response to hazardous waste spill in Africa and ways to prevent hazardous waste trade abuse in the future).

150. *See* Meisenkothen, *supra* note 142, at 653 (emphasizing the importance of oversight in hazardous waste disposal).

151. *See id.* (cautioning the oversight organization to stay above international politics in order to appropriately address the serious issues surrounding nuclear waste disposal).

152. *See* Alexandre Kiss, *State Responsibility and Liability for Nuclear Damage*, 35 DENV. J. INT'L L. & POL'Y 67, 74 (2006) (describing the ineffective standards for emergency response established by IAEA).

153. *See id.* at 79 (providing background on the requirements that states must abide by when dumping hazardous waste into the ocean).

154. *See* Linsley, *supra* note 28, at 20 (describing the varied impact of nuclear waste on plants and animals).

155. *See* Meisenkothen, *supra* note 142, at 653 (promoting the importance of oversight in the subseabed disposal of nuclear waste because of the magnitude and nature of the risks involved).

156. *See* Liu, *supra* note 142, at 142-43 (indicating that preparation is important for domestic implementation of an international environmental

scholars recommend enhanced domestic preparedness as a mitigation tool for the environmental impacts of hazardous waste trading.[157] Mandatory domestic preparedness for coastal nuclear accidents would lead to a more robust framework for emergency dumping and to an appropriate balancing of the impact on humans and on the ocean environment.[158] The implementation of these recommendations would result in a more appropriate international framework for radioactive waste dumping from coastal facilities.

V. CONCLUSION

The existing international environmental framework failed to appropriately control the most significant nuclear incident in nearly three decades. The London Convention and London Protocol do not apply to the dumping that occurred at the Fukushima Daiichi power plant following the earthquake and tsunami in March 2011 because the dumping was from land and even if they had applied, the dumping would have been permitted under the Emergency Exception to the treaties. The ocean dumping in this case does not violate UNCLOS because of the flexible nature of its treaty language. Filling the gaps in the existing international environmental framework with new agreements for land-based ocean dumping and nuclear facilities are the first steps needed to ensure that another nuclear incident like Fukushima does not occur in the future.

agreement).

157. *See id.* (highlighting a provision of the Basel Convention that requires states to have certain amounts of domestic hazardous waste storage available).

158. *See id.* (highlighting the importance of requiring domestic preparedness for safely maintaining hazardous materials in international agreements managing the trade of those wastes).