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Sea Shipment of Japanese Plutonium under International Law

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Abstract *The Japanese government's shipment of plutonium from France to Japan raises a number of significant questions under international law. The first shipment, which began in November 1992 on the* Akatsuki Maru, *violated international law in several respects. This article analyzes the international law that governs these shipments, focusing on the rules that govern navigation on the high seas and exclusive economic zones, territorial seas, and international straits, and also addresses the question of liability for damage.*

In November 1992, Japan began the first of a planned series of shipments of plutonium from France to Japan by sea for use in Japanese reactors. The plutonium was extracted from Japanese nuclear power plant waste that had been shipped to Europe for reprocessing.[1] The 2200 pounds (one metric ton) of plutonium in the first shipment was stored in a shipping cask and transported in a refitted freighter called the *Akatsuki Maru*, accompanied by a lightly armed Japanese Coast Guard cutter.[2] In all, Japan is planning to transport up to 45 shipments of plutonium from France and England over the next two decades. Although the route was officially kept secret, the vessel apparently traveled south and went around the Cape of Good Hope at the tip of Africa, and then went east to travel south of Australia and New Zealand, where it finally turned north to pass through the Pacific Islands to Japan.[3]

Plutonium is one of the most radioactive elements known. A minuscule amount will cause fatal cancer,[4] and if a transport accident occurred, plutonium could be released to the environment and would remain a deadly contaminant for tens of thousands of years.[5] Observers from outside Japan expressed a number of concerns about this shipment, including "dangers from (1) lax port security, (2) vulnerability to attack, 'particularly when the vessel is passing through channels, straits, and other restricted waterways . . . or when it is near the coast'; (3) risk of sabotage or collaboration with terrorists by disloyal crew members; and (4) hijacking or attack on the high seas."[6] Another concern is that the shipping cask may not be adequate to prevent leakage of the plutonium in case of a fire, sinking, collision, or other accident.[7]

The plutonium shipment angered a number of the countries along the ship's possible routes, including Australia, South Africa, Malaysia, Indonesia, the Federated States of Micronesia, Fiji, Tonga, Nauru, Brazil, Chile, and Argentina, and several of these countries said that they would bar the ship from their ports, their territorial waters,[8] and in some cases even from their exclusive economic zones.[9] Japan refused to reveal the specific intended route of the vessel, citing security reasons; Japanese government officials

were quoted as stating that the vessel would not pass through any territorial waters or the exclusive economic zones (EEZ) of any coastal states, but the ship apparently did travel through the EEZs of several Pacific Island nations.[10]

The Legal Regime that Governs the Ocean Transport of Nuclear Materials

General Responsibilities

The Duty to Protect and Preserve the Marine Environment. Customary international law imposes on nations the duty to "take adequate steps to control and regulate sources of serious environmental pollution or transboundary harm within their territory or subject to their jurisdiction."[11] This central responsibility is now codified in Article 192 of the 1982 United Nations Law of the Sea Convention,[12] which simply and elegantly says that "States have the obligation to protect and preserve the marine environment." The remaining articles in Part XII expand upon this duty, and Article 235(1) reinforces this obligation by saying, "States are responsible for the fulfillment of their international obligations concerning the protection and preservation of the marine environment. They shall be liable in accordance with international law." Although the 1982 Convention is not yet in force, most commentators view the environmental provisions as reflecting customary international law.

Article 194(3)(b) of the 1982 Convention requires nations to adopt measures

> designed to minimize to the fullest possible extent . . . pollution from vessels, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, preventing intentional and unintentional discharges, and regulating the design, construction, equipment, operation and manning of vessels. . . .[13]

The 1982 Convention also instructs nations to act through the "competent international organization" to "establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels. . . ."[14] Where local conditions require special protections, coastal nations are authorized to develop such protections for the fragile or environmentally sensitive areas in their exclusive economic zones.[15]

The Duty to Avoid Causing Injury to Others. The duty to act in such a way as to avoid causing injury to others, often referred to in its Latin version—*sic utere tuo ut alienum non laedas*—is also a basic norm of international law. A form of this principle can be found in paragraph 2 of Article 87 of the 1982 Law of the Sea Convention, which says—after the freedoms of the high seas are listed—that "[t]hese freedoms shall be exercised by all States with due regard for the interests of other States in their exercise of the freedoms of the high seas. . . ." The principle of "responsibility and liability" found in Article 235(1), quoted above, also reaffirms and reinforces this duty. This topic is discussed in more detail below.[16]

The Duty to Consult. Japan has a duty under international law to inform and consult with the countries along the route of its plutonium shipments because of the significant environmental harm that would occur if the vessel has an accident or mishap at sea. According to the leading book that discusses this obligation, "a prior consultation norm clearly exists

. . . in the use of radioactive materials . . . in a way that poses significant risk of appreciable harm to another country, unless the use is directly related to national security."[17]

International law requires prior consultation whenever the activity of one nation creates a significant risk of harm to another nation. Risk of harm can be expressed as the "magnitude of risk times the magnitude of the conceivable harm,"[18] and is assessed on a case-by-case basis.[19] A risk of harm could be significant, therefore, when the possibility of an accident is small but the consequences of such an accident are great. Ultrahazardous activities fall into another category:

> In some cases, the very nature of the activity probably would produce such a plausibly significant risk of harm that the duty to notify, and to consult on request, could not reasonably be denied. . . . [A]n activity that would inject a substantial amount of a known, untreated pollutant into a confined international watercourse, would, by its nature, meet the test.[20]

Before embarking on an activity with significant risk, the acting state should

> notify potentially affected states of its plans in sufficient time to permit consultations if the risk of harm is arguably significant, and . . . engage in consultations if the potentially affected state or states make a plausible case that the risk of harm is indeed significant.[21]

The duty to consult flows from the duty to consider the interests of other states and the duty to inform. The duty to consider the interests of other states was recognized with regard to fishing rights, for instance, in the *Fisheries Jurisdiction* cases,[22] and has been codified in a number of international treaties,[23] including Article 87 (on the freedom of the high seas) of the 1982 U.N. Convention on the Law of the Sea.[24] Article 87 has been described as "the most prominent instance in which the duty to consult must be implied from a duty to consider other states' interests."[25] Another prominent recent recognition of the duty to consult is found in the 1979 Convention on Long-Range Transboundary Air Pollution.[26]

The duty to inform has similarly been identified as "a general principle of international environmental law."[27]

> The underlying idea "is to prevent the commission of unlawful transboundary interferences and to prevent other States from being confronted with *faits accomplis*. The principle may, therefore, also be looked upon as an application of the principle of good faith in international relations."[28]

The International Court of Justice recognized this duty to inform in the *Corfu Channel Case*, where Albania was held to have the duty to disclose the presence of mines in the channel, even though Albania itself apparently did not place the mines there.[29]

The duty to consult is found in a variety of international treaties, agreements, and practices. The International Atomic Energy Agency (IAEA) 1977 Ad Hoc Advisory Group has stated, for instance, that nations that would be affected by nuclear tests should be consulted.[30] In Europe, the Euratom Treaty requires nations to consult regarding their plans for disposing of radioactive waste,[31] and "a prior consultation norm has arisen . . . regarding new activities near an international boundary if there is substantial risk of appreciable transfrontier air pollution or other significant disamenity."[32]

State practices also show that consultation is the norm. The *Restatement (Third) of Foreign Relations*, Section 601 (1987), which codifies obligations with regard to the environment, contains a commentary reporting that

> a state has an obligation to warn another state promptly of any situation that may cause significant pollution damage in that state. A state also has an obligation to consult with another state if a proposed activity within its jurisdiction or control poses a substantial risk of significant injury to the environment of the other state. . . .[33]

In North America, for example, there is a "norm requiring consultation among the littoral states before an activity is undertaken that is particularly hazardous because of the substance involved or because of the fragile ecology of the area (as in the case of some straits)."[34] The United States consulted with Pacific Island governments when it was thinking of storing hazardous waste on Palmyra Island,[35] and Japan consulted with countries that would have been affected by its proposal to dump low level radioactive waste at sea.[36] An example of an international tribunal recognizing the duty of prior consultation—and negotiation—is the Lake Lanoux Arbitral Tribunal.[37]

Consultation would be of substantial assistance to the nations near the route of the plutonium shipment because it would allow them to register their views on the propriety of this action and to prepare for emergencies that might develop during the transport. In order to prepare their citizens for the risks that might develop, the governments need to know what plans have been made by the Japanese authorities.

In sum, Japan has a duty under international law to inform and consult the countries along the plutonium ship's course prior to departure. This necessarily requires disclosing the route. Even if the magnitude of the risk of accident is small, the risk of harm from a plutonium leak is so great as to warrant prior consultation. Furthermore, because a leak would be so catastrophic for the states along the route and for the world environment, it can be forcefully argued that this case falls within the category of activities that in and of themselves create a great risk of harm. Japan must in good faith consider the interests of the states along the ship's route and inform and consult with them to prevent conceivable accidents and mitigate potential environmental harm.

The Duty to Prepare an Environmental Impact Assessment. The United States has required environmental impact assessments for all major governmental activities since 1969. The National Environmental Policy Act (NEPA),[38] requires that each project be fully assessed before the project begins. This assessment process includes not only a full discussion of all likely impacts of the project, but it also requires public input and responses to the public comment. The resulting assessment is an interdisciplinary document that allows decisionmakers to understand the full dimensions of the project and the alternatives that exist.

This obligation to prepare environmental impact assessments has now been universalized through global and regional conventions. In the 1982 United Nations Convention on the Law of the Sea,[39] for instance, Article 192 says clearly that "States have the obligation to protect and preserve the marine environment." In order to fulfill this obligation, countries that undertake "activities under their jurisdiction or control [that] may cause substantial pollution of or significant and harmful changes to the marine environment shall, as far as practicable, assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments" to

nations that may be affected by the project (Article 206). This provision, along with Articles 204 and 205, presents this responsibility explicitly and thus universalizes the requirement that environmental impact assessments be prepared.

In the South Pacific, this obligation has similarly been recognized with regard to all activities that may have substantial effects on the marine environment. In the Convention for the Protection of the Natural Resources and the Environment of the South Pacific Region, Article 16(2) says that "[e]ach party shall, within its capabilities, assess the potential effects of projects on the marine environment, so that appropriate measures can be taken to prevent any substantial pollution of, or significant and harmful changes within, the Convention Area."[40] Article 16(3) goes on to say that public comment should be part of the assessment process and that the written results of these assessments shall be disseminated to all interested parties.

Elements of an environmental impact assessment. Each environmental impact assessment should discuss the following subjects if it is to fulfill its goal of providing solid information to decisionmakers:[41]

(1) *The probable impact of the proposed action on the environment.* This requires scientific analysis but should also include information from other disciplines relevant to the project.
(2) *The adverse environmental effects that cannot be avoided if the proposal is implemented.* This listing gives decisionmakers a view of the negative effects of the project.
(3) *An analysis of alternatives to the proposed action and a comparison of the costs and benefits of each alternative with the proposed action, including the alternative of no action.* This comparative analysis is crucial to allow the decisionmakers to determine whether all aspects of the proposal have been well designed. The alternative of no action is always important, so that the costs and benefits of the status quo can be understood.
(4) *The relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.* This examination of the long-term consequences is essential to deciding whether to go ahead with the project.
(5) *Any irreversible and irretrievable commitments of resources that would be involved in the proposed action if it is implemented.* Again, this allows the decisionmakers to understand the full implications of the project.

The information in an environmental impact assessment is of essential importance, but the process by which it is undertaken is also important. A sound environmental impact assessment should be the product of interdisciplinary analysis. The scientific data should be analyzed in conjunction with the impact on the human community that will be affected by the proposed project. Ultimately, the scientific data are being collected and analyzed to provide answers for social and political questions. The scientists, therefore, cannot alone make the decision or even provide all the relevant information. Social scientists and persons from other relevant disciplines must also be involved to translate the scientific data and provide a policy perspective on the project.

It is crucial that ample opportunities be provided for public input during the assessment process. Both written and oral comments should be encouraged and responses must be provided to each comment. The best way of undertaking this process is to provide public hearings in which the persons who have prepared the assessments listen to the concerns of the affected public. With regard to a project such as the transportation of

plutonium across the oceans, comments should also be solicited from all the countries adjacent to the route that will be followed by the vessel.

Safety measures and environmental assessments undertaken by the Japanese government. The Japanese government has not been very forthcoming about the tests and assessments it has undertaken to ensure the safety of its transport of plutonium. Toichi Sakata, the director of the Nuclear Fuel Division of the Science and Technology Agency, has stated that the Japanese government has relied on the standards of the International Atomic Energy Agency (IAEA).[42] Pursuant to these standards, the French tested the ability of the casks used to protect the plutonium to withstand a fire of 800°C for 30 minutes.[43] Other observers have noted that many ship fires burn for a day or longer and the heat in these fires can reach 1,000°C.[44] The cask was tested for pressure equivalent to the pressure at a depth of 10,000 meters for 20 minutes.[45] The Marianas Trench in the northwest Pacific is 10,924 meters deep, and, of course, if a cask were to sink to such a depth it would remain there for much longer than 20 minutes. Strains or deformations were noted when the pressure equivalent to a depth of 6,000 meters was reached, and at the 10,000 meter depth the permanent deformation of the cask's cylindrical lower body was 5.2 percent.[46]

The Japanese have stated that an emergency contingency plan was given to the U.S. government,[47] but apparently not to other governments. This comments on emergency port calls, but no specific ports are designated as candidates for emergency visits.[48] The vessel is not defended against a possible ship-to-ship missile attack because "only states, not terrorist groups, are armed with antiship missiles," and the threat analysis prepared by the Japanese and U.S. governments "does not conceive an attack by a state as realistic."[49] The Japanese government has not undertaken a "risk analysis" of the shipment and does not view such an analysis as required by Japanese or international law.[50]

In late November 1992 it was discovered that Japan's Science and Technology Agency had commissioned the Japanese Electric Power Industry Central Research Institute to assess the risks to the Japanese people if the *Akatsuki Maru* were to have an accident at either 40 kilometers or 500–1,000 kilometers from the Japanese coast. This report was titled "Study to Establish Plutonium Transport System—Environmental Assessment in Case Studies."[51] This report was apparently submitted to the French and formed the basis of the French decision to grant to Japan an export license for the plutonium.[52]

The report states that if a plutonium cask were to sink to a depth of 500 meters, it would be very difficult to retrieve it. The radioactive material would then leak into the ocean over time as the cask corroded, but according to the assessment the impact on humans would be "negligible, much lower than exposure to natural radiation."[53] This conclusion is based on the assumption that a Japanese consumer would eat 260 grams of marine products from that area.[54]

The evaluation does not address the effect of the leaking cask on the marine environment or the fishing industries or tourist activities in the area. The report also ignores completely the risks created by fires or explosions, which would spew plutonium into the atmosphere where it could be breathed into human and animal lungs. This study is therefore inadequate and should not have justified the issuance of an export license.

Analysis of two U.S. environmental impact assessments. Although Japan has not made public any formal environmental assessment of the transportation of plutonium by sea, two environmental analyses of these shipments have been undertaken by U.S. entities. One was prepared by the United States Department of Energy and the other by the Argonne National Laboratory's Office of International Energy Development. Neither of these documents meets all of the criteria discussed above. They do not contain a full

discussion of the environmental impacts and they ignore some plausible scenarios. The documents appear to have been put together by scientists and do not have an interdisciplinary perspective. They have been prepared without any public input and of course contain no responses to oral and written comments.

The U.S. Department of Energy's contribution, prepared in 1987 and titled *Environmental Assessment of the Proposed New Agreement for Peaceful Nuclear Cooperation Between the United States and Japan and an Associated Subsequent Arrangement for the Return of Recovered Plutonium from Euratom to Japan*,[55] assessed the environmental impact of the transport of plutonium at a time when the United States was recommending that it be moved by airplanes rather than by ship. This effort was required because the plutonium being shipped back from France to Japan originated from uranium shipped from the United States to Japan. Under U.S. law, the United States could veto this reprocessing and shipment by Japan.

The Department of Energy's report begins by explaining quite candidly and repeatedly that the United States supports the shipment of plutonium by Japan in order to encourage Japan to continue to buy nuclear materials and technology from the United States.[56] This document then discusses the probable impact of air shipments on the environment, including risk from an accident or crash. It asserts that the radiological risk from a major plane crash followed by fire is small. It described the health risks from the inhalation of plutonium as "extremely small" compared to normal incidence of cancer in the general population or the hazards from accidental death due to transportation.[57]

This "extremely small" risk is computed by determining the "50 yr. committed effective dose equivalent" to a person 500 meters downwind from a plutonium release, which is said to be 0.7 rem.[58] The report then imagines such a dose being received by ten persons, if the accident were in a remote area, or by 100,000 persons if it was in a more populated area. Using the "health effect risk coefficient" determined by the International Commission on Radiological Protection (ICRP)—165 serious health effects per million person-rems[59]—the report proclaims that if ten persons are exposed to the plutonium radiation,

> the estimated number of adverse health effects from severe aircraft accidents leading to plutonium inhalation exposures is 2 × 10(–10) to 6 × 10(–10) per year, a value extremely small compared to the normal incidence of cancer in the general population or the risk of accidental death due to transportation.[60]

If 100,000 persons were exposed, the report adds, the number of adverse health effects would of course be 10,000 times greater, but, even if this larger group were exposed, "the number of adverse health effects per year is a very low figure, well below one (1)."[61]

These key figures offered so authoritatively by the Department of Energy's report are, however, misleading in several crucial respects:

(1) These figures do not present the health effects likely to result from a single accident, even assuming all the figures used are accurate. They have been determined by including in the computation the low probability of an airline accident, which is said to be 1.5 × 10(–7) to 4.5 × 10(–7). In other words, the risk that would result from a single accident has been discounted by the improbability of such an accident occurring. To determine the likely effect of a single accident, this figure must be removed from the computation. Removing this figure would then magnify the number of adverse health effects by seven orders of magnitude.

(2) If an accident were to occur, the exposure could continue well beyond 50 years. If it is not possible to clean up the material, radioactive emissions will continue for hundreds of thousands of years, because the half-life of plutonium is 25,000 years. The adverse health effects may, therefore, continue far into the future.

(3) The population exposed may be much larger than 100,000. If, for instance, an accident were to occur in a port in Japan, a much larger number of persons could be put at risk of inhaling the deadly plutonium particles.

(4) No attention whatsoever is given to the radiation risks to humans who would have to assist with the efforts that would be necessary to clean up the area affected by the accident.

This report also contains no discussion of the effects of this activity on the nonhuman environment, or to the costs associated with possibly having to evacuate and abandon a portion of our planet for thousands of years. The analysis is limited to environmental impacts over United States territory,[62] and possible effects on other countries are ignored. The document concludes that the consequence of an accident on the global commons is the same as that for the United States,[63] but this conclusion does not take into account emergency response abilities that may differ greatly among nations.[64]

The assessment considered several alternatives: rejecting the proposed agreement (no action),[65] concluding the agreement but consenting to plutonium shipments on a case-by-case basis,[66] using other modes of transportation such as sea transport[67] or a combination of sea and air transport,[68] putting smaller quantities of plutonium on each flight and using an increased number of flights,[69] and using a nonpolar route.[70] Except for the alternatives of increased air flights and sea shipments, the environmental consequences of these alternatives were found to be similar to effects of the air shipments.[71] The risk of air accidents increases with the number of flights.[72] The report found that sea shipments were not at all desirable,[73] because they take too long and are "extremely expensive" if "escort surveillance by U.S. military forces" are provided,[74] and because a ship would be easier to find and approach by a terrorist group or rogue state.[75] This report finds little risk from an accident at sea because, in its view, the plutonium would be diluted in the ocean,[76] and identifies the greatest risks as coming from an explosion or fire in port[77] or the seizure of the plutonium by terrorists.[78] These possibilities are not addressed in detail, largely because the report views their likelihood as extremely low.

Subsequent to this Department of Energy report, the U.S. Congress rejected the air transport option—primarily because of opposition by residents of Alaska who were concerned about accidents during the refueling stop at an Alaskan airport—and mandated that the plutonium be shipped by sea.[79] A second nine-page "assessment" was thus hurriedly prepared. This document, titled *Environmental Analysis of Sea Shipment of Plutonium from Europe to Japan*,[80] was prepared by the Argonne National Laboratory in September 1988 to evaluate environmental impacts of sea shipments under normal[81] and accident[82] conditions. It considers the effects of an accident if a cask sinks to a level where the pressure will crack it (3,600 meters), thereby causing the release of radioactivity into the ocean. The report concludes that the risk is small and comparable to the risk of transporting the plutonium by air.

The report does not contain all of the essential elements of an environmental impact assessment. It discusses the probable impact of the shipments on the environment under routine conditions, finding negligible risk because the casks meet international guidelines for the transport of dangerous goods.[83] Under accident conditions, where a cask sinks into the ocean, the report asserts that no risk will be created if the cask sinks in 200

meters of water and no substantial risk in greater than 200 meters, because the cask would remain intact. If the cask sinks to depths of more than 3600 meters, however, it will collapse and leak plutonium into the ocean. Some of the plutonium would be ingested by fish and shellfish and ultimately humans, but the report states that the effect would still be small because of the dispersion of the plutonium into the ocean waters and because plutonium oxide is "exceedingly insoluble in water."[84] The report thus assumes that only 1 percent of the plutonium would be soluble in seawater. The estimated plutonium concentration is then multiplied by the estimated consumption rate of the contaminated seafood and the ICRP ingestion dose rate *and* the probability of an ocean accident to produce an annual risk rate of 2 × 10(–8) person-rem for the individual and 2 × 10 (–5) for the population at large. No citations are provided for any of the figures used in these computations.

Because of the almost cavalier manner in which this report handles the various elements necessary to determine risks, it is difficult to determine whether any of its data or results are accurate. A report issued in 1992 by ECO Engineering, a private consultant firm that reviewed these two "official" reports, concluded that "the entire system is not defined sufficiently to make any expert judgments on risk."[85] To analyze the effects of radioactive material in a marine environment requires understanding and analysis of marine biology, physical oceanography, and the effects of radioactive materials.[86] The environmental assessment prepared by the U.S. Navy when it was considering disposing of decommissioned nuclear submarines into the ocean is a huge multivolume document.[87] The report prepared for the shipment of plutonium, which presents much greater potential risks, does not contain any of the detail or rigor actually necessary to enable a serious decisionmaker to evaluate this matter.

The plutonium shipment report does not analyze the risk to the marine environment. The study concludes that there is minimal risk from theft of the plutonium at sea because there are sufficient security guidelines and a protocol for a careful choice of a secret route away from areas prone to "civil disorder or natural disaster."[88] This assessment contains no discussion on the effects of a fire at sea or in port, asserting that this subject was adequately covered in the 1987 Department of Energy report.

As to environmental effects that cannot be avoided, the plutonium shipment report only discusses the impact on sea and ground crew under routine conditions. The report does not analyze alternatives except to say that the risk is comparable to air transport.

In summary, the two U.S. reports prepared regarding the possible environmental consequences of the plutonium shipment are altogether inadequate to provide the background and analysis necessary to evaluate this program. Because this shipment clearly presents a risk of serious pollution, the failure to prepare an adequate environmental assessment is a clear violation of international law.

The Law of the Sea

Passage Through Territorial Seas. Under the 1982 Law of the Sea Convention, ships of all states enjoy the right of innocent passage through the territorial seas of other states.[89] Nonetheless, Argentina,[90] Chile,[91] Indonesia,[92] and the Philippines,[93] among others, have asked the Japanese plutonium ship to stay out of their territorial waters. The Philippine Navy has said that it will prevent the *Akatsuki Maru* from entering its territorial waters and will board the vessel if necessary to keep it out.[94]

Although the 1982 Convention does not include a provision allowing countries to impose a requirement of prior permission for vessels seeking to exercise their right of

innocent passage,[95] several countries, including China, do impose such limitations, at least for warships.[96]

The 1930 Hague Conference declared that "[p]assage is not innocent when a vessel makes use of the territorial sea of a coastal State for the purpose of doing any act prejudicial to the security, to the public policy or to the fiscal interests of that State."[97] This test is objective, requiring an actual act rather than intent. This formulation has been reinforced in arbitration,[98] legislation[99] and jurisprudence.[100] In the *Corfu Channel* case, the International Court of Justice specifically looked to the actual acts, the manner of the passage, and, furthermore, made it clear that the manner of the passage is for independent determination. The International Law Commission found the test to be whether there were "acts prejudicial to the security of the coastal State or contrary to the present rules or to other rules of international law."[101]

The 1958 Territorial Sea Convention restated this rule by saying that "[p]assage is innocent so long as it is not prejudicial to the peace, good order or security of the coastal State. Such passage shall take place in conformity with these articles and with other rules of international law."[102] That innocent passage was not an absolute right was made clear by the next paragraph, which stated that foreign fishing vessels would be deprived of their "innocent" status if they violated coastal laws and regulations.[103] Under the 1958 Convention, a coastal state could take necessary steps in its territorial sea to prevent noninnocent passage[104] and could suspend innocent passage if such suspension was essential for the protection of its security, provided that such suspension was duly published.[105]

The 1982 Law of the Sea Convention[106] spells out the activities that are deemed to be "noninnocent" in nature, and includes "(h) any act of wilful and serious pollution contrary to this Convention." The transportation of a cargo that is so risky that it could be considered akin to a wilful act of serious pollution would thus be prohibited under this provision. Article 25(1) allows a coastal nation to "take the necessary steps in its territorial sea to prevent passage that is not innocent." This provision allows a coastal state to stop a vessel carrying hazardous cargo from entering the territorial sea if it has suffered an accident involving its cargo.

Coastal states also have the right to take and enforce measures beyond the territorial sea to protect their coastal areas from pollution. These rights are "proportionate to the actual or threatened damage" that may reasonably be expected to follow from a maritime casualty.[107]

Article 211(4) of the 1982 Convention allows coastal states to protect the marine environment of their territorial sea by adopting laws and regulations affecting foreign vessels exercising their right of innocent passage provided that the right of passage is not barred.[108] Nuclear-powered vessels and vessels carrying radioactive material must, in exercising innocent passage, carry documents and observe special precautionary measures established for such ships by international agreements, and must use designated sea lanes and traffic separation schemes, under Articles 22 and 23 of the 1982 Convention.[109] Although this provision falls short of authorizing coastal states to require permission of nuclear ships prior to innocent passage, it is common for flag states to request permission prior to entry into ports, and such permission could be premised on the observance of certain conditions. As a matter of practical international comity, a nation would be reluctant to commit an act that had the effect of significantly alienating another nation unless a vital security interest is at stake.

Passage Through the Exclusive Economic Zone (EEZ). A number of states, including South Africa[110] and Portugal,[111] have asked Japan to refrain from passing through their

exclusive economic zones (EEZ). The EEZ extends to 200 nautical miles from the baselines from which the breadth of the territorial sea is measured.[112] The 1982 Convention grants to coastal states jurisdiction in this zone with regard to the protection and preservation of the marine environment.[113] Other states have rights of navigation in this zone, and the Convention establishes a sophisticated dispute-resolution procedure for states to use when the navigational claims of a maritime state conflict with the environmental claims of a coastal state.[114]

Coastal states can exercise jurisdiction to enforce their rules where "there are clear grounds for believing that a vessel navigating in the exclusive economic zone or the territorial sea has, in the exclusive economic zone, committed a violation of applicable international rules and standards for the prevention, reduction and control of pollution from vessels or laws and regulations of that State conforming to and giving effect to such rules and standards. . . ."[115] The coastal state may require the vessel to give information to determine whether a violation has occurred. If the circumstances warrant it, the coastal state can undertake a physical inspection of the vessel.[116] And if "there is clear objective evidence" that a vessel navigating in the EEZ or territorial sea has engaged in activities that have caused "major damage" or threatens to cause such damage to the coastal interests, the coastal state may detain the vessel and institute appropriate proceedings.[117] This provision is subject to applicable provisions with respect to bonding or other appropriate financial security.[118]

The Japanese government told the Australian government in early October that "in principle" its plutonium vessel would stay outside the 200-nautical-mile exclusive economic zones of all other nations, but clarified this statement a few days later by saying that "the ship could enter the 200-nautical-mile zone of some country under unavoidable circumstances or under conditions where avoiding to enter the zone is considered impractical."[119] Because the legitimate interest of coastal nations in their exclusive economic zones is the protection of the environment and its resources, coastal nations can be expected to be nervous and vigilant with regard to the risks presented by the plutonium ship. The Law of the Sea Convention recognizes the legitimate interests of the coastal nations and establishes a procedure to resolve disputes between maritime and coastal interests.[120] Because the Convention is not yet in force, it is not clear how such disputes should be resolved at the present time.

Transit Passage through Straits and Archipelagic Waters. The maritime nations have long insisted that international law protects free passage as a matter of right through international straits, and this position was adopted in Part III (Articles 34–45) of the 1982 Law of the Sea Convention. However, because the Convention has not been ratified by the major maritime powers, and is not yet in force, some doubts still exist regarding whether the regime of transit passage established by the Convention is now binding international law.[121] In addition, some straits that may be on the route of the plutonium ship are governed by unique legal regimes that are unaffected by the 1982 Convention's provisions.[122]

The rules developed in the 1982 Convention do not allow suspension of transit passage[123] and do not require innocence[124] but they do impose *inter alia* the following restrictions on transit passage: (1) transit passage must be solely for the purpose of continuous and expeditious transit;[125] (2) transiting ships must comply with generally accepted international regulations, procedures, and practices for safety at sea[126] and for the prevention, reduction, and control of pollution from ships;[127] and (3) ships exercising the right of transit passage must proceed without delay through the strait and must refrain from any threat or use of force.[128]

Any activity that is not an exercise of the right of transit passage through a strait remains subject to the other applicable provisions of the Convention.[129] Such activity would thus bring the passage in territorial waters within the innocent passage provisions: the passage could, for instance, be prevented if noninnocent.

The 1982 Convention would, furthermore, allow states bordering straits to adopt laws and regulations in respect of "the prevention, reduction and control of pollution, by giving effect to applicable international regulations regarding the discharge of oil, oily wastes and other noxious substances in the strait,"[130] provided that such laws and regulations are not discriminatory and do not "in their application have the practical effect of denying, hampering or impairing the right of transit passage"[131] and have been duly publicized.[132]

The Strait of Magellan. Since the conclusion of a Boundary Treaty in 1881 between Chile and Argentina, it has been established that Chile has sovereignty over the Strait of Magellan, which intersects the southern tip of South America.[133] Article V of this 1881 treaty states that "The Straits of Magellan shall be neutralized for ever, and free navigation assured to the flags of all nations."

The 1982 Law of the Sea Convention and its regime of transit passage as a matter of right through international straits does not literally apply to the Strait of Magellan because of Article 35, which states that "Nothing in this Part affects: . . . (c) the legal regime in straits in which passage is regulated in whole or in part by longstanding international conventions in force specifically relating to such straits." Because the regime established by the 1881 treaty is still in force, the 1982 Convention would not apply. One commentator has interpreted the 1881 Boundary Treaty to say that "[t]here would seem to be no basic differences between the regime of transit as it exists now, based on the 1881 treaty, and that guaranteed in the 1982 Convention."[134] Another author, however, has stated that the appropriate regime governing this strait "would appear to be innocent passage rather than transit passage," and he states that "Chilean authors have explicitly rejected the application of the transit passage regime to the Strait of Magellan."[135] The significance of this distinction would be that under an "innocent passage" regime, Chile could require submarines to travel on the surface of the strait, could prohibit overflight, and could prohibit "noninnocent" passage. This latter point is particularly important because Chile could argue that the transport of an ultrahazardous product like plutonium through a narrow passageway such as the Strait of Magellan is an "act of wilful and serious pollution" that would be viewed as "noninnocent" under Article 19(h) of the 1982 Convention.

The question of suspension of passage under the 1881 treaty is unclear because the treaty is vague,[136] but some Chilean legal authorities have said that noninnocent passage may be suspended.[137] Even though Chile has never suspended passage in modern times,[138] if it were to determine that the transport of plutonium was noninnocent, it might have grounds to suspend passage or impose conditions.

The Straits of Malacca. The Straits of Malacca are critical to Japan and international shipping in general as they link the Pacific and Indian oceans and are a major artery for the transport of Japanese oil and other commodities.[139] About 150 ships per day pass through the straits.[140] The Straits of Malacca are dangerous for shipping because they are quite shallow, the water level changes with the tides,[141] and the seabed shifts, creating a grave risk of grounding.[142] Danger from collisions also exists because the waterway is often congested and the ships' speeds make it difficult for them to stop quickly.[143]

The waters of the Straits of Malacca are divided among the three "straits states"—Singapore, Malaysia, and Indonesia. All three have a common interest in safety in navigation, but Singapore's overriding interest has always been in freedom of navigation.[144]

Japan, a major user of the straits, conducted and paid for a number of hydrographic studies to improve safety and has been vitally concerned with keeping the straits open for its supertankers.[145] In 1971, the three straits states asserted "[e]xclusive rights to cooperate and coordinate efforts for the safety of navigation in the straits."[146] By the end of 1975, a series of accidents had increased the safety and environmental concerns, and Malaysia and Indonesia asserted their right to control the straits at the Third UN Law of the Sea Conference.[147] A Safety Agreement was signed in Manila in February 1977 during a meeting of the Association of South-East Asian Nations (ASEAN), which included "a traffic separation scheme incorporating two deep water channels."[148] Finance and control of pollution was left to the users of the straits.[149] The safety regime was not seen as contrary to the interests of Japan, the United States, and other marine powers,[150] and it has significantly improved the safety record in the straits.[151]

Both Malaysia and Indonesia have previously asserted that straits are part of their territorial seas[152] and that "the Straits of Malacca and Singapore are not international straits."[153] The earlier position of Indonesia and Malaysia has been that "the regime of innocent passage should obtain in straits used for international navigation that have been assimilated either by territorial or internal waters,"[154] such as the Straits of Malacca. The major marine powers objected to this position as too restrictive, and, as noted earlier, the 1982 Convention adopted the transit passage regime through international straits to ensure that straits would be open to navigation. If the plutonium ship were to attempt passage through the Malacca Straits, it might lead to a confrontation between the straits states and the maritime powers over what regime actually governs this vital waterway. Singapore and Indonesia have opposed the passage of the plutonium ship through the Malacca Straits because of the danger of collisions and piracy.[155] Malaysia has developed a plan to escort the ship through the straits if that route is taken,[156] but has also threatened to block passage as a threat to its national security.[157]

The Lombok Strait and Archipelagic Waters. An archipelagic state[158] enjoys a special status under the 1982 Law of the Sea Convention. The breadth of the territorial sea[159] of such a state is measured from straight baselines around the islands under the rules articulated in Article 47.[160] The waters inside such baselines are archipelagic waters[161] and internal waters.[162] Archipelagic states are required to designate "archipelagic sea lanes," through which the vessels of all states can exercise the right of "archipelagic sea lanes passage," which is similar to the right of "transit passage through international straits."[163] Vessels also have a right of innocent passage through archipelagic waters,[164] subject to specific restrictions.[165]

The Lombok Strait passes between the Indonesian islands of Lombok and Bali.[166] It is an alternative route to the Malacca Straits and unlike the Straits of Malacca is easily navigable.[167] The Japanese use the Lombok route extensively for its supertankers because it is deep, even though it requires a longer route than Malacca.[168]

Indonesia considers the Strait of Lombok to be part of its archipelagic waters.[169] Although Indonesia has not yet formally designated its "archipelagic sea lanes," the Lombok Strait is almost automatically in this category under Article 53(12), which says that "[i]f an archipelagic State does not designate sea lanes . . . , the right of archipelagic sea lanes passage may be exercised through the routes normally used for international navigation." The 1982 Convention has not yet come into force and "the concepts of transit passage and archipelagic sea lanes passage do not effectively exist in customary law outside the 1982 Convention,"[170] but Indonesia has "accepted both the concepts of transit passage and archipelagic sea lanes passage, although in the case of archipelagic passage discussions have continued over its application."[171]

Indonesia would prefer that the plutonium ship avoid its archipelagic waters, but it has expressed concern that it does not have the power to prohibit the ship from passage through its sea lanes.[172] Indonesia has offered protection to the ship if it does pass through its waters.[173]

Access to ports. International law would permit a country to prevent the plutonium ship from entering its port on the grounds of national security or vital state interests in light of the potentially devastating pollution consequences of an accident and its resulting civil disorder. The Convention and Statute on the International Regime of Maritime Ports,[174] for instance, states that an exception to the usual requirement of reciprocal treatment may be based on the grounds of "the vital interests of the country" or "an emergency affecting the safety of the state."[175]

Judicial *dicta*[176] also support the principle that ports can be closed when necessary to the vital interests of the state. The potentially disastrous environmental or terrorist consequences of an accident or incident involving plutonium would certainly qualify as a "vital interest" of a coastal nation.

The Japanese government has considered the possible necessity of emergency port calls, but has not designated any special ports for such use, nor has it consulted with any nation other than the United States regarding this matter.[177]

The Basel Convention on the Transport of Hazardous Waste

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal,[178] to which Japan is a party, imposes requirements on parties (1) to reduce the movement of hazardous wastes to a minimum and to conduct the movements that do occur in such a way that human health and the environment are protected, (2) to provide information about transboundary movement of hazardous wastes and "to state clearly . . . the effects of the proposed movement on human health and the environment," and (3) to cooperate with other parties and organizations.[179] The Basel Convention thus reinforces the duty to consult and warn discussed earlier.[180]

The Convention authorizes states whose waters hazardous wastes are passing through[181] to refuse to permit such passage,[182] but Japan has entered an understanding to the Convention apparently rejecting this provision.[183] It is unclear what effect this understanding has on the provisions of the Convention that provide that transboundary movement of hazardous wastes without due notification or consent, or which does not conform in a material way with documents, is illegal traffic, thus triggering requirements to take back or dispose of the waste.[184]

The Liability Regime That Governs Injury to Others

Because plutonium is a deadly substance that could cause an environmental catastrophe if even a small amount were to escape into the atmosphere or ocean, the proposed Japanese shipments have created great concern. The risks of an accident, attack, sabotage, or hijacking and a resulting fire, seizure of the cargo, or sinking of the ship and cargo have raised questions of Japan's liability. The basic framework for the governing liability regime is given, for instance, in the 1982 Law of the Sea Convention, which says in Articles 192 and 194 that states have a duty to protect and preserve the marine environment, and in Article 235 that states shall be "liable in accordance with international law" if they fail to fulfill that international obligation.[185]

When states engage in ultrahazardous activity and harm results, they can be held

liable under a theory of strict liability. Liability may also be established for a breach of an international obligation such as due diligence. In either case, the state conducting the risk-creating activity must provide compensation for the resulting injuries. A review of some representative cases on state liability will set the stage for further analysis of these theories.

Cases on State Liability

The Trail Smelter Dispute. The United States claimed damages caused by the sulfur dioxide emissions of a smelter in British Columbia.[186] The case was submitted to an arbitral tribunal,[187] which based its decision on both United States and international law principles,[188] and imposed a detailed regime of controls over the emission of fumes from the smelter: "No State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties therein, when the case is of serious consequence and the injury is established by clear and convincing evidence."[189] The Trail Smelter case has been interpreted as imposing strict liability on nations that engage in pollution-causing activities with transnational effects.[190]

The Fukuryu Maru Fallout Exposure (1954). On March 1, 1954, the United States exploded a hydrogen bomb at the Pacific Testing Grounds in the Marshall Islands.[191] The U.S. Atomic Energy Commission notified mariners through normal channels of a warning zone surrounding the area,[192] but errors in calculating the magnitude of the explosion and in wind direction resulted in injuries to Americans, Japanese, and Marshallese outside the warning zone.[193] The Japanese fishing vessel *Fukuryu Maru* (*Lucky Dragon*) was located 14 miles outside the warning zone at the time of the blast[194] but received intensive exposure to radioactivity because of the miscalculation.[195] One of the 27-member crew died and the rest sustained serious sickness and injuries from their prolonged exposure to the radiation.[196]

The United States and Japan exchanged diplomatic notes and reached an agreement in 1955.[197] Although the United States defended these tests as lawful measures of security,[198] it tendered an *ex gratia* payment of $2 million to the Japanese government "for the purposes of compensation for the injuries or damages sustained . . . (and) in full settlement of any and all claims against the United States or its agents, national or juridical entities" caused by the test.[199]

After this incident, the United States did not cease its nuclear testing but did expand its warning zone.[200] The Japanese government protested this action and notified the United States of its belief that

> the United States Government has the responsibility of compensating for economic losses that may be caused by the establishment of a danger zone and for all losses and damage that may be inflicted on Japan and Japanese people as a result of the nuclear tests.[201]

The United States in its response stated that although it expected no economic losses

> if, after the test series has ended, any evidence is officially presented that substantial economic losses for Japan or Japanese nationals have been incurred as a result of establishment of the danger area and the tests, the United

> States is prepared . . . to give consideration to the question of compensation in light of such evidence.[202]

Although no claims were submitted,[203] the United States did document a willingness to consider compensation, apparently recognizing a strict liability regime in this situation.[204]

The United States has also recognized its obligation to the people of the Marshall Islands who were injured in this incident and have established a Nuclear Claims Tribunal with authority to compensate the victims of this tragedy.[205]

The Palomares Nuclear Bomb Accident. A U.S. bomber containing nuclear bombs crashed in the waters off the coast of Spain and the United States accepted responsibility to locate, remove, and dispose of the radioactive materials in Spanish waters and pay compensation for the injurious consequences of this act.[206] These actions were obviously undertaken in part for public relations and good neighborliness purposes in order to maintain U.S. bases in Spain, but they also implicitly recognize the absolute liability imposed on the United States in this type of situation.

The Crash of the Soviet Cosmos 954. On January 24, 1978, the Soviet nuclear-powered surveillance satellite Cosmos 954 lost its extraterrestrial orbit, entered Canadian air space, and spread its debris widely over western Canada.[207] The Canadian government instituted a massive search operation to isolate and remove the remains of the satellite.[208] Almost all the pieces were radioactive, with several containing lethal levels of radioactivity.[209] Canada conducted the operation with the assistance of the United States[210] but repeatedly called on the USSR to answer a series of questions it considered important to the processing of the satellite's debris.[211] The Soviets did offer limited assistance, albeit after the crash,[212] and eventually did answer the Canadian questions.[213]

The Canadian claim for damages illustrates several important principles. Canada based its claim jointly and separately on the 1972 Convention on International Liability for Damage Caused by Space Objects[214] and general principles of international law.[215] The Liability Convention places absolute liability on the launching country to pay compensation for damage caused by space objects that fall to Earth.[216] Canada, citing principles of international law, stated in its claim that there is "absolute liability for space activities, in particular activities involving the use of nuclear energy."[217] The claim notes that "[t]he principle of absolute liability applies to fields of activities having in common a high degree of risk."[218]

The Canadian claim did not assert a right for the payment of all the costs involved. Although the total cost of the operation was approximately $14 million (Canadian),[219] Canada asked for only about $6 million (Canadian) in compensation from the USSR.[220] This amount reflected the costs "reasonably related to the satellite debris and not including administrative and other types of expenses."[221] No physical, environmental, or property damage was asserted, nor was there evidence that any occurred.[222] This fortunate situation resulted from the speedy Canadian response and the remoteness of the areas involved.[223] The settlement agreement between Canada and the USSR, in the amount of $3 million (Canadian), mentions no liability.[224] It only states that the payment is "in full and final payment of all matters connected with the disintegration of the Soviet satellite 'Cosmos 954.' "[225]

The Corfu Channel Case.[226] The United Kingdom sought compensation for the death of 45 British officers and sailors and injuries to 42 others, as well as the serious damage

suffered by two destroyers, the *Saumarez* and the *Volage*, when they struck mines while passing through the North Corfu Strait between Albania and the Greek island of Corfu. The International Court of Justice found that Albania was liable for the damage, even though it had not laid the mine fields, because Albania was in a position to know what was happening in its waters and was under a duty to notify other states that might be endangered by the activity. The Court stated that international law obliges every state "not to allow knowingly its territory to be used for acts contrary to the rights of other States."[227] Liability in the Corfu Channel case was established because of a breach of this international obligation.

The Nuclear Test Cases. In the 1960s, sentiment in opposition to nuclear weapons and atmospheric testing grew, and such testing became the subject of five multilateral treaties.[228] France and China refused to sign any of these treaties, however, and continued atmospheric testing of nuclear devices.[229] In 1973, both Australia and New Zealand brought actions against France in the International Court of Justice (ICJ) seeking a cessation and a declaration of illegality of French atmospheric testing at Moruroa in French Polynesia.[230] Australia and New Zealand both asserted that the tests were in violation of international law and their territorial rights of sovereignty.[231]

The ICJ, despite France's jurisdictional objections,[232] issued Orders of Interim Measures in June 1973,[233] calling for France to "avoid nuclear tests causing the deposit of radioactive fallout on the territories of Australia and New Zealand."[234] The Court did not, however, make a final decision on the applicants' claims, accepting France's statement that its atmospheric testing program was completed and that the dispute was thus moot.[235] It is nonetheless significant that the Court did issue interim orders against France, an action that it had taken only four times previously.[236] It can reasonably be assumed that the bringing of these suits and the Court's interim order were major influences in France's announcement that it would end its atmospheric program, and the ICJ noted specifically that unilateral declarations "may have the effect of creating legal obligations."[237]

The U.S. Attack on an Iranian Airliner. On July 3, 1988, the U.S. warship *Vincennes* mistakenly shot down an Iranian passenger plane over the Persian Gulf killing 290 persons, of whom 250 were Iranians. The United States asserted that it was not required to pay compensation under international law, but nonetheless offered on July 17, 1989, to pay $250,000 to each of the families of wage-earning victims and $100,000 to each of the families of the other victims.[238] Iran rejected this offer in 1990.[239] Iran had previously brought an action in the International Court of Justice seeking compensation from the United States for the victims and the destruction of the plane. In 1991, the United States contested the Court's jurisdiction, but "said in a letter to the court in 1989 that it was willing to participate in the case. This means that if the judges rule they have the right to decide the case Washington is likely to accept their decision."[240]

Summary. It seems clear from the cases and settlements discussed in this section that whenever a state engages without justification in activities that result in damaging consequences to other states, that state will be responsible in international law for the harm. Strict liability has been found by the International Court of Justice in the *Corfu Channel Case*,[241] by an Arbitral Tribunal in the *Trail Smelter* dispute,[242] and has been inferred from the *Fukuryu Maru* case. Liability has also been found by way of a treaty obligation in the Soviet satellite situation,[243] and through the acceptance of the nations causing the

harm in the 1954 nuclear test accident,[244] the Palomares incident,[245] and the Gulf airline incidents.[246]

Strict Liability Where Harm Occurs

The use of the strict liability doctrine has already been noted in connection with the *Trail Smelter* and *Corfu Channel* cases and the *Fukuryu Maru* (*Lucky Dragon*) and Russian satellite situations. In Anglo-American jurisprudence, the model for the strict liability doctrine is the 1868 case of *Rylands* v. *Fletcher*,[247] where the House of Lords held that a "person who for his own purposes brings on his land and collects and keeps there anything likely to do mischief if it escapes, must keep it in at his peril, and, if he does not do so, is *prima facie* answerable for all damages [that are] the natural consequences of its escape."[248] The Restatement of Torts, Second, has incorporated the *Rylands* holding and has gone on to state that "[t]he important thing about the activity is not that it is extremely dangerous in itself, but that it is abnormally so in relation to its surroundings."[249] The fact situations discussed earlier have adhered to these definitions. In the *Corfu Channel* case,[250] Albania was held responsible because the mine had been placed in waters under its control. In the *Fukuryu Maru* (*Lucky Dragon*) compensation situation, the United States was "in control" of the bomb that produced the radioactive fallout that drifted onto the vessel, and was thus responsible when the material "escaped" from its usual place and caused harm to the fishers.[251] Similarly, the Canadian government was responsible to ensure that the fumes "controlled" by the Trail Smelter were not allowed to "escape."[252] A strict liability requirement has been established in several recent international treaties,[253] and it is recognized as the appropriate regime for some but not all liability situations.[254]

Professor Goldie has described four regimes of liability,[255] each with a different level of liability depending on the utility of the activity and the relative purposes of the parties.[256] Although he was speaking specifically of liability for damages resulting from space activities, his concepts are easily transferred to harm from a nuclear accident on the high seas.[257] Goldie suggests, for example, that where

> an object which has been launched for purely nationalistic pre-emptive purposes injures an object which has been launched for shareable purposes, (*e.g.*, a communication satellite forming part of a world-wide system of peaceful telecommunications), then the greater utility of the latter should call for higher levels of responsibility on the part of the former, and a stricter liability upon the damaging and preemptive system than upon its victim. The liability in such a case should, it is submitted, be absolute.[258]

In the context of a nuclear accident on the high seas, this concept could be interpreted to mean that where a nation's shipping activities cause harm to another nation's environment, the greater universality of the latter should require that it be compensated by the former state.

Strict liability has been the standard that appears to be followed in international situations when the activity is ultrahazardous. One commentator has noted that "strict liability may result even though the activity does not involve a high degree of risk if the risk carries with it the possibility of such widespread harm that it becomes 'abnormally dangerous.' "[259] "A State is under a duty to notify any other State which may be threat-

ened by harm from the abnormally dangerous activities which the State permits to be conducted within its jurisdiction."[260]

Nuclear activity is a prime example of an ultrahazardous activity.

> A good example of the special importance in international law is the application of the doctrine of strict or absolute liability to operators or agencies responsible for the manufacture, transportation, or use of radioactive materials, activities that may result in injuries in the form of pollution by radiation.[261]

The legal systems in a number of countries, including the United States, Russia, and France, recognize strict liability for activities that are unusually dangerous.[262] Treaties establish strict liability in the areas of space exploration[263] and nuclear activity.[264] Examples of treaties on nuclear activity include the 1960 and 1963 treaties on third-party liability for nuclear damage and the 1962 Brussels Convention on the Liability of Operators of Nuclear Ships.[265] The activities for which these treaties establish liability are dangerous but not unlawful.[266]

The International Law Commission [ILC] of the United Nations has attempted to codify international legal principles related to the harmful effects of lawful acts in its "Draft Articles on International Liability for Injurious Consequences Arising Out of Acts not Prohibited by International Law."[267] "The specific context in which the topic is discussed has always been that of environmental hazard."[268] Here the ILC has adopted a standard of strict liability,[269] and one article "requires the state of origin to make reparation for appreciable harm."[270] "Basically," according to Oscar Schachter, "a State of origin would be obligated to compensate an affected State for appreciable harm caused by physical consequences of activities in the State of origin . . . . [T]he harm 'must in principle be fully compensated.' "[271]

Breach of the International Obligation of Due Diligence

Because of the limited number of decisions and settlements, some commentators state that it is still unsettled whether a standard of strict liability or due diligence should apply in environmental cases, including nuclear activity.[272] If harm occurred in a situation where strict liability did not apply, a decisionmaker would, at a minimum, require each nation to use due diligence to protect the citizens of other nations from harm[273] and to provide reparations for injuries caused by activities that create a foreseeable risk to others.[274] In the area of international environmental law, due diligence includes a duty to control sources of harm.[275] Cases citing this obligation include the *Trail Smelter Arbitration* and the *Corfu Channel* case,[276] and sources such as the Stockholm Declaration of 1972, which "affirms both the sovereign right of States to exploit their own resources 'pursuant to their own environmental policies,' and their responsibility 'to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.' "[277]

Conclusion

International law sources provide strong support for a theory of strict liability for an ultrahazardous activity such as transporting plutonium across the high seas from Europe

to Japan. Even if the transportation of plutonium is viewed as permissible under international law, under the strict liability theory, Japan would be liable for any harm that resulted from this activity.

Japan could also be held liable if a due diligence theory were used. It has been reported that the shipping cask would not withstand temperatures of a ship fire or the pressure of 10,000 meters below sea level for long periods of time.[278] If the cask were to fail, there could be a violation of the duty of due diligence to protect against foreseeable accidents.

Japan has acknowledged that the body conducting this transportation, the Power Reactor and Nuclear Fuel Development Corporation (PNC), would be responsible if an accident occurred.[279] Japanese law currently imposes a ceiling of six billion yen on liability for nuclear accidents,[280] but a Japanese spokesperson has said that "[i]f damages exceed the solvency of PNC, they will be paid by the government of Japan."[281]

Summary and Conclusion

Japan's plutonium shipment program is subject to the overriding duties of states to protect and preserve the marine environment and to avoid causing injury to other states. These twin duties form the basis for the concerns that have been raised about the voyage of the *Akatsuki Maru*. The secrecy surrounding the voyage and in particular the refusal to disclose the proposed route brings the Japanese government into conflict with the duty to inform and consult with countries along the route, because of the significant environmental harm that could occur in the case of an accident. This failure to consult and inform prevents affected countries from preparing for potential emergencies and coordinating with (or challenging) the Japanese government on the shipment.

The failure of Japan to prepare an adequate environmental impact assessment on the shipment also violates international law. Such an assessment should include the probable impact of the shipment on the environment, adverse environmental effects, an analysis of alternatives and a benefit-cost analysis, a balancing of short- and long-term concerns, and the expected commitment of resources. The preparation of an assessment must be an interdisciplinary effort and must permit public input into the process. The safety efforts undertaken by Japan and the two environmental impact assessments prepared by U.S. entities are altogether inadequate for reasons given in this article.

Japan apparently recognizes that the extremely hazardous nature of the cargo would preclude its passage through the territorial seas of other countries as being viewed as "innocent passage." Japan announced that the plutonium ship would not pass through territorial seas, and also indicated that the ship would avoid the EEZ of other nations, although its statement was ambiguous on that point and the vessel apparently did pass through the EEZ of several Pacific Island countries. A number of countries have asked Japan to avoid their EEZs.

It is also unclear whether this ship has the right of passage through international straits. Traffic separation schemes can certainly be imposed on the ship, and other precautions may also be appropriate. No nation would be required to allow the vessel to come into port in case of an emergency involving the cargo, and nations could also bar the ship from their territorial seas if an accident involving the cargo raised the possibility of pollution to the marine environment.

If any accident should occur involving the plutonium that causes harm to the marine environment or to humans, Japan would be held strictly liable to provide compensation for the harm that occurs without regard to fault or negligence. The strict liability regime is appropriate because this cargo is ultrahazardous.

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Notes

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2. David E. Sanger, "Japan's Plan to Ship Plutonium Has Big and Little Lands Roaring," *N.Y. Times,* Oct. 5, 1992, at A1, A6.

3. "Plutonium Ship to Pass West of Hawaii," *Honolulu Star-Bulletin,* Dec. 7, 1992, at 1, col. 1.

4. Sanger, supra note 2.

5. Id.

6. Nuclear Control Institute (Washington, D.C.), *Fact Sheet* 1 (May 22, 1992).

7. Id. at 4.

8. "Greenpeace Members Held in France's Plutonium Protest," Reuters News Service, Oct. 9, 1992.

9. Ruth Youngblood, "Japan Secrecy over Plutonium Shipment Sparks Outcry," United Press International, Sept. 27, 1992.

10. "Akatsuki-Maru Arrives Amidst Protest & Concern," *Nuke Info Tokyo,* Jan./Feb. 1993 (no. 33), at 2.

11. Alan E. Boyle, "Nuclear Energy and International Law: An Environmental Perspective," 60 *Brit. Y.B. Int'l L.* 258, 269 (1989).

12. United Nations Convention on the Law of the Sea, Dec. 10, 1982, UN Doc. A/CONF.62/122 (1982), 21 I.L.M. 1261 (1982) (hereafter cited as Law of the Sea Convention).

13. Id. art. 194(3)(b).

14. Id. art. 211(1).

15. Id. art. 211(6).

16. See infra notes 185–281 and accompanying text.

17. Frederic Kirgis, *Prior Consultation in International Law* 131 (1982). See also Principle 19 of the Rio Declaration on Environment and Development (adopted June 14, 1992, by the UN Conference on Environment and Development, reprinted in 31 I.L.M. 876, 879 (1992)): "States shall provide prior timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith."

18. Kirgis, supra note 17, at 360.

19. Id.

20. Id. at 361.

21. Id. at 360–361.

22. Id. at 363 (citing Fisheries Jurisdiction Cases (United Kingdom v. Iceland), 1974 I.C.J. 3, 28 and 175, 196).

23. See treaties cited in id. at 364 n.16.

24. Law of the Sea Convention, supra note 12, art. 87.

25. Kirgis, supra note 17, at 364.

26. Convention on Long-Range Transboundary Air Pollution, Nov. 13, 1979, art. 5, UN Doc. ECE/HLM.1/R.1 (1979), 18 I.L.M. 1442, 1444 (1979): "Consultations shall be held, upon request, at an early stage between, on the one hand, Contracting Parties which are actually affected by or exposed to a significant risk of long-range transboundary air pollution and, on the other hand, Contracting Parties within which and subject to whose jurisdiction a significant contribution to long-range transboundary air pollution originates, or could originate, in connexion with activities carried on or contemplated therein."

27. Daniel G. Partan, "The 'Duty to Inform' in International Environmental Law," 6 *Bos. U. Int'l L. J.* 43, 63 (1988) (citing World Commission on Environment and Development, Experts Group on Environmental Law, *Environmental Protection and Substantial Development* 98 (1987) (hereafter cited as Experts Group, *Report*)).

28. Id. (quoting from Experts Group, *Report*, supra note 27, at 98).

29. Corfu Channel (United Kingdom v. Albania), 1949 I.C.J. 4.

30. Kirgis, supra note 17, at 125.

31. Id. at 97.

32. Id. at 128.

33. *Restatement (Third) of Foreign Relations* 107 (1987).

34. Kirgis, supra note 17, at 130.

35. Id. at 170.

36. Id. at 169.

37. Lac Lanoux (France v. Spain), 53 *Am. J. Int'l L.* 156 (1959).

38. 42 U.S.C. § 4321 et seq.

39. Law of the Sea Convention, supra note 12, art. 192. See also Principle 17 of the Rio Declaration on Environment and Development, supra note 17: "Environmental impact assessments, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority."

40. Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, Nov. 25, 1986, 26 I.L.M. 38 (1987).

41. See Jon M. Van Dyke, "Environmental Impact Assessments," in *Cultural Values in the Age of Technology* 93, 94 (Effie Cameron, D. G. Malcolm, Jr., and Jeanne Skog, eds. 1991).

42. Statement of Toichi Sakata, Director of the Japanese Science and Technology Agency's Nuclear Fuel Division, to participants in the Asia-Pacific Forum on Sea Shipments of Japanese Plutonium, Tokyo (Oct. 6, 1992) (hereafter cited as Sakata Statement).

43. Id.

44. ECO Engineering, Inc. (1356 Cape St. Claire Road, Annapolis, Maryland 21401), "A Review of the Proposed Marine Transportation of Reprocessed Plutonium from Europe to Japan" 4 (March 30, 1992).

45. Answers provided by Prime Minister Kiichi Miyazawa to questions posed by Diet member Ms. Yuriko Hase (Sept. 22, 1992) (hereafter cited as Miyazawa Answers).

46. Citizens' Nuclear Information Center, "Plutonium Transport Casks Would Fail At Sea Depths" (Nov. 26, 1992) (press release). The tests were not conducted for longer than 20 minutes apparently because "the pressure dropped spontaneously due to water leakage from the pressurizing device." Id.

47. Sakata Statement, supra note 42.

48. Id.

49. Id.

50. Id.

51. Citizens' Nuclear Information Center (Tokyo), "'Environmental Impact Assessment' (?) Only for the Japanese" (Nov. 26, 1992) (press release).

52. Id.

53. Id.

54. Id.

55. U.S. Department of Energy, *Environmental Assessment of the Proposed New Agreement for Peaceful Nuclear Cooperation Between the United States and Japan and an Associated Subsequent Arrangement for the Return of Recovered Plutonium from Europe to Japan*, DOE/EA-00336 (1987).

56. "President Reagan has likewise declared his intention to seek to restore the reputation of the U.S. as a credible nuclear trading partner with countries whose nonproliferation credentials are unquestioned and Japan is one such country. The proposed new U.S.-Japan agreement has been

negotiated with this goal in mind, and its implementation is necessary if the United States is to reestablish itself as a dependable nuclear supplier to Japan. . . ." Id. at 1–8. "The proposed new Agreement for Cooperation thus affirms the U.S. intention to be a predictable nuclear trading partner." Id. at 1-9. "By affirming the U.S. intention to be a reliable nuclear trading partner, the new agreement helps ensure the continuation and growth of U.S. nuclear exports to Japan. The exports include enrichment services with an average annual value of approximately $250 million and component exports whose value is also substantial. The international market in enrichment services has become intensely competitive, and the U.S. share of that market has been declining. Japan is the best foreign customer of the United States for enrichment services, but is likely to remain so only if the U.S. can be relied upon to cooperate on a firm and predictable basis." Id. at 1-10.

57. Id. at 3-21.

58. Id. at 3-20. This figure is derived from a plutonium fire model developed by Lawrence Livermore Laboratory called "HOT SPOT" (M-161), prepared in April 1985.

59. Id. at 3-20 to 3-21 (citing International Commission on Radiological Protection, Recommendations (Adopted Jan. 17, 1977), ICRP Pub. 26, Annals of the ICRP 1(3)).

60. Id. at 3-21.

61. Id.

62. Id. at 3-11.

63. Id. at 3-22.

64. The report also says that the adverse environmental impacts caused by radiological doses to air and ground crews will be minimal. Id. at 3-15.

65. Id. at 4-1.

66. Id. at 4-3.

67. Id. at 4-5.

68. Id. at 4-15.

69. Id. at 4-17.

70. Id. at 4-18.

71. Id. at 4-15 to 4-18.

72. Id. at 4-18.

73. Id. at 4-8.

74. Id.

75. Id. at 4-10.

76. Id.

77. Id.

78. Id. at 4-15.

79. In the Murkowski Amendment, the U.S. Congress decreed that a cargo aircraft should never fly over U.S. airspace unless the Nuclear Regulatory Commission carried out plane crash tests to prove that the casks used for the transport could withstand a crash. Although the Sandia Laboratories have been working to develop a cask that could withstand a plane crash, this effort has thus far been unsuccessful. Tadeo Ishibashi, "Final Bill of the 20th Century: The Plutonium Transport" (Apr. 1990) (unpublished paper, on file with author).

80. Argonne National Laboratory, *Environmental Analysis of Sea Shipment of Plutonium from Europe to Japan,* ANL/IEP-88-50 (Sept. 1988).

81. Id. at 2-3.

82. Id. at 3-4.

83. Id. at 3.

84. Id.

85. ECO Engineering, supra note 44, at 11.

86. See, e.g., Jon M. Van Dyke, "Ocean Disposal of Nuclear Wastes," 12 *Marine Policy* 82 (1988); W. Jackson Davis and Jon M. Van Dyke, "Dumping of Decommissioned Nuclear Submarines at Sea: A Technical and Legal Analysis," 14 *Marine Policy* 467 (1990).

87. United States Navy, *Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Naval Submarine Reactor Plants* (1984).

88. Argonne National Laboratory, supra note 80, at 5.

89. Article 18 of the Law of the Sea Convention, supra note 12, defines passage as follows:

> 1. Passage means navigation through the territorial sea for the purpose of:
>   (a) traversing that sea without entering internal waters or calling at a roadstead or port facility outside internal waters; or
>   (b) proceeding to or from internal waters or a call at such a roadstead or port facility.
> 2. Passage shall be continuous and expeditious. However, passage includes stopping and anchoring, but only insofar as the same are incidental to ordinary navigation or are rendered necessary by *force majeure* or distress or for the purpose of rendering assistance to persons, ships or aircraft in danger or distress.

90. "Argentina Bans Passage of Plutonium Shipment," Reuters, Oct. 10, 1992.

91. "Greenpeace Members Held in France's Plutonium Protest," supra note 8.

92. "Indonesia Airs Concern over Japan's Plutonium Shipments," Kyodo News Service, Sept. 17, 1992.

93. "Philippines Prohibits Japanese Plutonium Ship from Passing," Xinhua News Agency, Nov. 11, 1992.

94. Teruaki Ueno, "200-Nautical-Mile Limit for Plutonium Ship," Reuters, Nov. 9, 1992.

95. See Joint USSR-US Statement with Attached Uniform Interpretation of Rules of International Law Governing Innocent Passage, Sept. 23, 1989, 28 I.L.M. 1444 (1989).

96. See China's Law on the Territorial Sea and the Contiguous Zone of 25 February 1992, art. 6, reprinted in *Law of the Sea Bull.*, Aug. 1992, at 24, 25 (from *International Affairs*, FBIS-CHI-92-040 (Feb. 28, 1992)): "To enter the territorial sea of the People's Republic of China, foreign military ships must obtain permission from the Government of the People's Republic of China." See generally Jin Zu Guang, "Conflicts between Foreign Ships' Innocent Passage and National Security of the Coastal States," in *International Navigation: Rocks and Shoals Ahead?* 111 (Jon M. Van Dyke, Lewis M. Alexander, and Joseph R. Morgan eds. 1988).

97. The Hague Convention on the Law of the Sea, League of Nations Doc. C.351(b) M.145(b), at 217 (1930).

98. See The David, 1933-1934 Ann. Dig. 137 (U.S.-Panama Claims Comm. 1933).

99. See, e.g., the Bulgarian Decree of 25 August 1935, art. 4, reprinted in *Laws and Regulations on the Regime of the High Seas* at 53, UN Doc. ST/LEG/SER.B/1 (1951). But cf. the Burmese Territorial Sea and Maritime Zones Law, 1977, art. 4, reprinted in *National Legislation and Treaties relating to the Law of the Sea* at 8, UN Doc. ST/LEG/SER.B/19 (1980); the Pakistan Territorial Waters and Maritime Zones Act, 1976, art. 123, reprinted in id. at 85; and the Yugoslavian Law of 22 May 1965, art. 6, reprinted in *National Legislation and Treaties relating to the Territorial Sea, the Contiguous Zone, the Continental Shelf, the High Seas, and to Fishing and Conservation of the Living Resources of the Sea* at 188, UN Doc. ST/LEG/SER.B/15 (1970). For legislation on the new Law of the Sea Convention, see *National Legislation and Treaties relating to the Law of the Sea*, supra, at 21.

100. Corfu Channel, 1949 I.C.J. 4; and see Japan v. Kulikov, 21 I.L.R. 105 (1954).

101. Hersch Lauterpacht proposed an even more restrictive definition before the ILC, arguing that a specific violation of coastal State laws was necessary, while Fitzmaurice took a wider view, arguing that simple prejudice of coastal security suffices, regardless of actions. See 2 *Yearbook of the International Law Commission* 272 (1936).

102. Convention on the Territorial Sea and Contiguous Zone, Apr. 29, 1958, art. 14(4), 15 U.S.T. 1606, 1610, T.I.A.S. No. 5639, 516 U.N.T.S. 205, 214.

103. Id. art. 14(5).

104. Id. art. 16(1).

105. Id. art. 16(3).

106. Law of the Sea Convention, supra note 12, art. 19.

107. Id. art. 221(1). "Maritime casualty" is defined as a collision of vessels, stranding, or other incident of navigation or other occurrence on board a vessel or external to it resulting in material damage or imminent threat of material damage to a vessel or cargo. Id. art. 221(2).

108. Id. art. 211(4).

109. Paragraphs 1 and 2 of Article 22 of the 1982 Law of the Sea Convention read as follows:

> 1. The coastal State may, where necessary having regard to safety of navigation, require foreign ships exercising the right of innocent passage through its territorial sea to use such sea lanes and traffic separation schemes as it may designate or prescribe for the regulation of the passage of ships.
> 2. In particular, tankers, nuclear-powered ships and ships carrying nuclear or other inherently dangerous or noxious substances or materials may be required to confine their passage to such sea lanes.

Article 23 recognizes that coastal nations may have reason to establish special restrictions governing ships that carry nuclear materials: "Foreign nuclear-powered ships and ships carrying nuclear or other inherently dangerous or noxious substances shall, when exercising the right of innocent passage through the territorial sea, carry documents and observe special precautionary measures established for such ships by international agreements." This language appears to require international agreement on restrictions and thus would not authorize an individual nation to impose unique restrictions, but it does recognize that coastal states do have legitimate interests in protecting their marine environment from the dangers presented by ultrahazardous cargo.

110. Youngblood, supra note 9.

111. "Lisbon Asks Tokyo to Keep Akatsuki Maru Away," Kyodo News Agency, Nov. 10, 1992.

112. Law of the Sea Convention, supra note 12, art. 57.

113. Id. art. 56(1)(b)(iii).

114. Id. arts. 279–299.

115. Id. art. 220(3).

116. Id. art. 220(4).

117. Id. art. 220(6).

118. Id. art. 220(7).

119. Sakata Statement, supra note 42.

120. Law of the Sea Convention, supra note 12, arts. 279–299.

121. See, e.g., Mark J, Valencia, "Japanese Plutonium Raises a Nuclear Scare at Sea," *International Herald Tribune,* July 14, 1992, at 4.

122. Law of the Sea Convention, supra note 12, art. 35(c), discussed infra at notes 133–138 and accompanying text.

123. Id. art. 44.

124. Note the right of non-suspendible innocent passage provided in Article 45 of the Law of the Sea Convention, supra note 12, applicable to the exceptions provided in Articles 38(1) and 45(1)(b), which provide for non-suspendible innocent passage through the island and mainland in the former case (e.g., Corfu Channel) and between a part of the high seas or an EEZ and the territorial sea of a foreign State in the latter (e.g., Straits of Tiran) and the right of normal innocent passage applicable to the exception provided in Article 36 (e.g., waters between the United States and Cuba).

125. Id. art. 38(2).

126. Id. art. 39(2)(a).

127. Id. art. 39(2)(b).

128. Id. art. 39(1).

129. Id. art. 38(3).

130. Id. art. 42(1)(b).

131. Id. art. 42(2).

132. Id. art. 42(3).

133. Michael A. Morris, *The Strait of Magellan* 76 (1989) (referring to the 1881 Boundary Treaty between Chile and Argentina, which is reprinted in the Morris volume at 205–207). A 1977 arbitration decision by a panel of the International Court of Justice concerning a dispute over the Beagle Channel held that "the 1881 treaty had given Chile exclusive control over the strait . . . , [and] that the waters of the strait were likewise Chilean since Chile controls both shores." Id. at 79.

134. Lewis M. Alexander, *Navigational Restrictions Within the New LOS Context: Geographical Implications for the United States* 143 (1986).

135. Morris, supra note 133, at 102. Morris gives two reasons to support the "innocent passage" regime. First, Article 38 exempts from transit passage straits formed by islands of a state and its mainland, and the configuration of the Strait of Magellan contains such geography. Second, "[b]ecause of the 1984 closing line drawn across the eastern mouth of the Strait of Magellan, the Atlantic side of the strait is fronted by an Argentine territorial sea and EEZ." Id. at 103.

136. Id.

137. Id. at 103–104.

138. Id.

139. Michael Leifer, *Malacca, Singapore, and Indonesia* 52 (1978).

140. Alexander, supra note 134, at 126.

141. Leifer, supra note 139, at 55.

142. Id. at 56.

143. Id. at 53.

144. Id. at 34.

145. Id. at 63.

146. Id.

147. Id. at 69.

148. Id. at 72.

149. Id. at 73.

150. Id.

151. Id. at 67.

152. Id. at 91.

153. Id. at 93 (referring to a Joint Statement issued in November 1971).

154. Id. at 88.

155. Mariita Eager and Ian Stewart, "Freighter Heads for Nuclear Shipment," South China Morning Post Wire Service, Sept. 21, 1992.

156. "Malaysia to Prepare Contingency Plan," Agence France Presse, Nov. 10, 1992.

157. "Malaysia May Cite Security Laws to Block Japanese Plutonium Ship," UPI Business and Financial Wire, Sept. 24, 1992.

158. Article 46(b) of the Law of the Sea Convention, supra note 12, defines an "archipelago" as "a group of islands, including parts of islands, interconnecting waters and other natural features which are so closely interrelated that such islands, waters and other natural features form an intrinsic geographical, economic, and political entity, or which historically have been regarded as such." Article 46(a) defines an "archipelagic State" as "a State constituted wholly by one or more archipelagos and may include other islands."

159. Id. art. 48.

160. Id. art. 47.

161. Id. art. 49.

162. Id. art. 50, and see id. arts. 9, 10, and 11.

163. Id. art. 53; see generally *International Navigation,* supra note 96.

164. Law of the Sea Convention, supra note 12, art. 52.

165. Id. art. 53.

166. Leifer, supra note 139, at 79.

167. Id.

168. Id. at 80.

169. Id. at 91–92.

170. David L. Larson, "Innocent, Transit, and Archipelagic Sea Lanes Passage," 18 *Ocean Dev. & Int'l L.* 411, 427 (1987).

171. Leifer, supra note 139, at 148.

172. "Malaysia Reports Concerns over Plutonium Shipment," Kyodo News Service, Oct. 16, 1992, available in News Net.

173. Leah Makabenta, "South-East Asia: Fear of Japan's Plutonium Shipment," Interpress Service International News, Sept. 18, 1992, available on News Net.

174. Convention and Statute on the International Regime of Maritime Ports and Protocol of Signature, Dec. 9, 1923, 58 L.N.T.S. 55, 287 (entered into force July 26, 1926). Japan signed this agreement on September 30, 1926.

175. Id. art. 16.

176. See, e.g., Aramco v. Saudi Arabia, 27 I.L.R. 117 (1958). ("According to a great principle of public international law, the ports of every State must be open to foreign merchant vessels and can only be closed when the vital interests of the State so require.")

177. Sakata Statement, supra note 42.

178. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Mar. 22, 1989, UNEP Doc. IG.80/3 (1989), 28 I.L.M. 657 (1989) (hereafter cited as Basel Convention).

It is unclear whether the Basel Convention applies to radioactive waste. Article 1(3) excludes from the scope of the Convention "[w]astes which, as a result of being radioactive, are subject to other international control systems, including international instruments, applying specifically to radioactive materials." The body that might logically be considered to be such an "international control system" is the International Atomic Energy Authority (IAEA), which has not in fact instituted a code of practice and is not an international instrument. A good argument can therefore be made that radioactive wastes must be included under the Basel regime, under Article 1(b), as wastes that are hazardous by the domestic legislation of the Party of export, import, or transit, at least until the IAEA institutes binding control mechanisms. Basel Convention working groups have stated that nuclear waste can be interpreted to be included under the Convention.

179. Id. art. 4(2).

180. See supra notes 17–37 and accompanying text.

181. Article 2(12) of the Basel Convention, supra note 178, defines "transit State" as "any State, other than the State of export or import, through which a movement of hazardous wastes or other wastes is planned or takes place."

182. Id. art. 6(4).

183. "The Government of Japan understands that nothing in this Convention shall be deemed to require notice to or consent of any state for the mere passage of hazardous wastes on a vessel of a Party exercising its navigation rights under international law." Declaration of Japan, attached to the Final Act, Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, UNEP Doc. T/BSL/000, at 19 (1989).

184. Basel Convention, supra note 178, art. 9(1)–(5).

185. Law of the Sea Convention, supra note 12, arts. 192, 194, 235.

186. United States v. Canada, Arbitral Tribunal, Interim Decision (1938) and Final Decision (1941), 3 R. Int'l Arb. Awards 1905, 1938 (1941) (hereafter cited as Trail Smelter Arbitration).

187. In 1935 the United States and Canada signed a convention which provided for the establishment of an arbitral tribunal to decide questions concerning the nature and extent of damage and to provide appropriate remedies. The tribunal consisted of three members. One was chosen by each of the Parties and the third was selected by the countries jointly. See Interim Decision, 3 R. Int'l Arb. Awards at 1905.

188. Ved Nanda, "The Establishment of International Standards for Transnational Environmental Injury," 60 *Iowa L. Rev.* 1089, 1096 (1975).

189. Trail Smelter Arbitration, 3 R. Int'l Arb. Awards 1905, 1974–1978 (1941).

190. L. F. E. Goldie, "Liability for Damage and the Progressive Development of International Law," 11 *Int'l and Comp. L. Q.* 1189, 1226 (1965). See also M. J. L. Hardy, "International Protection against Nuclear Risks," 10 *Int'l and Comp. L. Q.* 739, 751 et. seq. (1961). Some authors suggest that because this was not a judicial decision the controversy as to whether the case stands for strict liability or merely invokes the "rudimentary principle of *sic utero tuo*," will "never be authoritatively resolved." J. Barros and D. M. Johnston, *The International Law of Pollution* 75 (1974).

191. See generally N. O. Hines, *Proving Grounds: An Account of the Radiobiological Studies in the Pacific 1946–1961*, at 171 (1962).

192. Myres McDougal and Norbert Schlei, "The Hydrogen Bomb Tests in Perspective: Lawful Measures for Security," 64 *Yale L. J.* 651 (1955).

193. Id. at 652.

194. Id.

195. Id.

196. Id.; Hines, supra note 191.

197. See Settlement of Japanese Claims for Personal and Property Damages Resulting from Nuclear Tests in the Marshall Islands in 1954, Jan. 4, 1955, 6 U.S.T. 1, T.I.A.S. No. 3160. See also Nanda, supra note 188, at 1098.

198. McDougal and Schlei, supra note 192, at 682–694.

199. Settlement of Japanese Claims for Personal and Property Damages Resulting from Nuclear Tests in the Marshall Islands in 1954, supra note 197.

200. Nanda, supra note 188, at 1098.

201. 4 M. Whiteman, *Digest of International Law* 585–586 (1965).

202. Id. at 587.

203. Nanda, supra note 188, at 1099.

204. Id. at 1098.

205. Compact of Free Association between the United States and the Federated States of Micronesia and the Republic of the Marshall Islands, Pub. L. No. 99-239, § 302(b), 99 Stat. 1770 (1986) (codified at 48 U.S.C. § 1681).

206. See Brian D. Smith, *State Responsibility and the Marine Environment* 77, 117 (1988) (citing Szuk, *The Bombs of Palomares* (1967) and du Pontavice, "Compensation for Transfrontier Pollution," in OECD, *Legal Aspects of Transfrontier Pollution* 409, 435 (1977)).

207. Claim against the Union of Soviet Socialist Republics for Damage Caused by Soviet Cosmos 954, Jan. 23, 1979, 18 I.L.M. 899, 902 (1979) (hereafter cited as Canadian Claim). The radioactive debris was distributed over portions of the Northwest Provinces, Alberta, and Saskatchewan.

208. Id. at 903–904.

209. Id. at 904.

210. See generally Peter P. C. Haanappel, "Some Observations on the Crash of Cosmos 954," 6 *J. Space L.* 147, 149 (1978); Eilene Galloway, "Nuclear Powered Satellites: The U.S.S.R. Cosmos 954 and the Canadian Claim," 12 *Akron L. Rev.* 401, 402 (1979); Paul G. Dembling, "Cosmos 954 and the Space Treaties," 6 *J. Space L.* 129 (1978).

211. Canadian Department of External Affairs Aide-Memoire of February 8, 1978, 18 I.L.M. 913 (1979).

212. Canadian Claim, supra note 207, at 903.

213. See id. and the Unofficial Translation of the Note of May 31, 1978, from the Embassy of the Union of Soviet Socialist Republics at Ottawa, 18 I.L.M. 927 (1979). It is interesting to note that the Soviets, after receiving information supplied to them by the Canadians about the satellite's debris, asserted that the situation at the time was "practically safe for population" and "[i]n similar conditions further search on the Soviet Union's territory would evidently be discontinued." Id. at 928.

214. Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762 (hereafter cited as Space Damage Treaty).

215. Canadian Claim, supra note 207, at 905.

216. Id.

217. Id. at 907.

218. Id.

219. The actual total was $13,970,143.66 (Canadian). Id. at 904.

220. The actual total was $6,041,174.70 (Canadian). Id.

221. Galloway, supra note 210, at 413.

222. Haanappel, supra note 210, at 148.

223. Aside from its assertion of absolute liability, the Canadian claim also discusses the duties of states in matters of transnational pollution. Canada stressed the failure of the government of the USSR to give prior notification of the possibility of the satellite's re-entry over Canadian territory and that government's failure to respond to questions concerning the satellite in a timely and complete manner. Canadian Claim, supra note 207, at 905. By these failures, the USSR failed to minimize the effect of the satellite's crash. Canada on the other hand carried out an expeditious survey and recovery operation that mitigated the resultant damages in accordance with international law. Id. at 905-906.

224. Protocol between the Government of Canada and the Government of the Union of Soviet Socialist Republics, done Apr. 2, 1981, 20 I.L.M. 689 (1981).

225. Id. See generally Stephen Gorove, "Cosmos 954: Issues of Law and Policy," 6 *J. Space L.* 137, 138 (1978). Cosmos 954 was not the first or the last nuclear-powered space object to fall to earth. Prior to Cosmos 954, three American space vehicles—two satellites and the Apollo 13 moon lander—fell into the Indian and Pacific Oceans respectively. *New York Times*, Feb. 8, 1983, at 19, col. 2. In addition, another Soviet nuclear-powered satellite, Cosmos 1402, fell into the Pacific Ocean in January 1983. *New York Times*, Jan. 25, 1983, at 20, cols. 1–2.

226. Corfu Channel (United Kingdom v. Albania), 1949 I.C.J. 4.

227. Id. at 22. Albania, however, has never paid the court-ordered compensation to the United Kingdom. Mark W. Janis, *An Introduction to International Law* 109 (1988).

228. Multilateral Treaty Banning Nuclear Weapons in the Atmosphere, in Outer Space and under Water (Moscow Test Ban Treaty), Oct. 10, 1963, 14 U.S.T. 1313, T.I.A.S. No. 5433, 480 U.N.T.S. 43, 2 I.L.M. 889 (1963); Treaty for Prohibition of Nuclear Weapons in Latin America (Treaty of Tlatelolco), Feb. 14, 1967, 22 U.S.T. 762, T.I.A.S. No. 7137, 634 U.N.T.S. 281; Multilateral Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (Outer Space Treaty), June 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205, 6 I.L.M. 386 (1967); Multilateral Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty), July 1, 1968, 21 U.S.T. 483, T.I.A.S. No. 6839, 729 U.N.T.S. 161, 7 I.L.M. 811 (1968); Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction in the Seabed and the Ocean Floor and in the Subsoil Thereof, Feb. 11, 1971, 23 U.S.T. 701, T.I.A.S. No. 7337, 10 I.L.M. 146 (1971).

229. Note, "The Nuclear Tests Cases: Judicial Silence v. Atomic Blasts," 16 *Harv. Int'l L.J.* 614, 614–615 (1975); see generally Jon M. Van Dyke, Kirk R. Smith, and Suliana Siwatibau, "Nuclear Activities and the Pacific Islanders," 9 *Energy* 733 (1984).

230. Nuclear Tests (Australia v. France), 1973 I.C.J. 99; Nuclear Tests (New Zealand v. France), 1973 I.C.J. 135. Fiji also sought to join as an intervenor in the proceedings, but its application was denied because of a lack of timeliness.

231. 1973 I.C.J. at 103; 1973 I.C.J. at 138. Under international law applicable to the high seas, Australia and New Zealand both asserted the right in common with all maritime states to have France not interfere with high seas freedoms by imposing danger zones and polluting the high seas with radioactive fallout. Both countries also asserted a right to be free of the effects of atmospheric fallout, especially the radioactive fallout, without their consent. See generally Dinesh Kholsa, "Nuclear Test Cases: Judicial Valour v. Judicial Discretion," 18 *Indian J. Int'l L.* 322 (1978).

232. 1973 I.C.J. at 104–105; 1973 I.C.J. at 141.

233. 1973 I.C.J. at 99; 1973 I.C.J. at 135.

234. 1973 I.C.J. at 106; 1973 I.C.J. at 142.

235. Nuclear Tests (Australia v. France), 1974 I.C.J. 253, 271; Nuclear Tests (New Zealand v. France), 1974 I.C.J. 457, 476.

236. The Sino-Belgian Treaty Case, 1927 P.C.I.J. (ser. A) No. 8, at 7; the Electricity Company of Sofia and Bulgaria, 1939 P.C.I.J. (ser. A/B) No. 79, at 194-200 (Interim Protection); the Anglo-Iranian Oil Co. Case, 1951 I.C.J. 89 (Interim Protection); and the Fisheries Jurisdiction Cases, 1972 I.C.J. 12.

237. 1974 I.C.J. at 267; see Werner Levi, *Contemporary International Law: A Concise Introduction* 214 (1979); Mark W. Janis, *An Introduction to International Law* 13–14 (1988). It can be argued based on this case and other environmental principles that have become accepted in recent years that atmospheric testing of nuclear weapons is now a violation of customary international law because of the extensive pollution it causes. In recent years, only China has conducted any atmospheric tests.

238. Martin Fletcher, "Libya 'Must Pay for Lockerbie Bombing,'" *The Times* (London), Nov. 23, 1991, at 2, col. 1.

239. "Iran Says Its Courts Fit to Deal with U.S. Downing of Airliner," Reuter Library Report, Dec. 27, 1991.

240. "U.S. Contests World Court's Jurisdiction in Iran Airbus Case," Reuters Library, Mar. 5, 1991.

241. Corfu Channel (United Kingdom v. Albania), 1949 I.C.J. 4; see supra notes 226–227 and accompanying text.

242. Trail Smelter Arbitration, 3 R. Int'l Arb. Awards 1905, 1938 (1941); see supra notes 186–190 and accompanying text.

243. Space Damage Treaty, supra note 214; see supra notes 207–225 and accompanying text.

244. See supra notes 191–205 and accompanying text.

245. See supra note 206 and accompanying text.

246. See supra notes 238–240 and accompanying text.

247. Law Reports, 3 H.L. 330 (1868).

248. Id.

249. Restatement (Second) of Torts § 520 (1965).

250. Corfu Channel (United Kingdom v. Albania), 1949 I.C.J. 4; see supra notes 226–227 and accompanying text.

251. Hines, supra note 191, at 171.

252. See text accompanying notes 186–190, supra.

253. In addition to the 1972 Space Damage Treaty, supra note 214, the following treaties impose a strict liability obligation on contracting parties: the Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface, Oct. 7, 1952, 310 U.N.T.S. 181; the Convention on Third Party Liability in the Field of Nuclear Energy, July 29, 1960, reprinted in 55 *Am. J. Int'l L.* 1082 (1961); the Convention on the Liability of Operators of Nuclear Ships, May 25, 1962, reprinted in 57 *Am. J. Int'l L.* 268 (1963); the Convention on Civil Liability for Nuclear Damage, May 21, 1963, IAEA Doc. CN-12/46 (1963), 2 I.L.M. 727 (1963); the Convention on Civil Liability for Oil Pollution Damages, Nov. 29, 1969, reprinted in 64 *Am. J. Int'l L.* 481 (1970); and the Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Materials, Dec. 17, 1971, 11 I.L.M. 277 (1972). See generally John M. Kelson, "State Responsibility and the Abnormally Dangerous Activity," 13 *Harv. Int'l L. J.* 197 (1972).

254. See, e.g., Daniel B. Magraw, "Transboundary Harm: The International Law Convention's Study of 'International Liability'," 80 *Am. J. Int'l L.* 305, 327 (1988) and sources cited therein; and Smith, supra note 206, at 112-128 and sources cited therein.

255. Goldie, supra note 190, at 1223.

256. Four separate regimes of liability for injuries caused by space activities are proposed: "(i) When the harm occurs to people and property on the earth's surface absolute liability, subject to maximum amounts of damages payable, should be attached to the operator whose system caused the injury; (ii) When vehicles dependent upon air-breathing engines and aerodynamic lift are injured as a result of space activities of other States, doctrines drawn from analogies with 'presumed negligence' or the developing English doctrine of substantive *res ipsa loquitur* are appropriate; (iii) When one State's object in outer space inflicts harm upon another State's similar object in outer space, the equality of the actors with regard to risk, purpose, sources of knowledge of probable causes of accident, and of exposure to the unknown, calls for no higher obligation than that imposed by fault liability; (iv) But when the objects operating in outer space reflect different regimes and purposes, when, for example, an object which has been launched into outer space for purely nationalistic preemptive purposes injures an object which has been launched for shareable purposes (*e.g.*, a communications satellite forming part of a worldwide system of peaceful telecommunications), then the greater utility of the latter should call for higher levels of responsibility on the part of the former, and a stricter liability upon the damaging and preemptive system than upon its victim. The liability in such a case should, it is submitted, be absolute." Id.

257. "These general considerations are not restricted to questions of liability for injuries caused by space activities . . . they are also relevant to the negotiation and formulation of treaties governing the attribution of liability for transnational harm occasioned by the application of science and engineering to industry in the fields of activity indicated at the outset of this article." Id. at 1224. "(Such as) the peaceful uses of nuclear power." Id.

258. Id. at 1223.

259. Kelson, supra note 253, at 279–280.

260. Id. at 243 (citing the Corfu Channel case (United Kingdom v. Albania), 1949 I.C.J. 4).

261. Barros and Johnson, supra note 190, at 20.

262. Kelson, supra note 253, at 203–211.

263. Id. at 214–215.

264. Id. at 217.

265. Id. (citing conventions cited in note 253 supra).

266. Barros and Johnston, supra note 190, at 75.

267. Magraw, supra note 254, at 309.

268. Alan E. Boyle, "State Responsibility and International Liability for Injurious Consequences of Acts Not Prohibited by International Law: A Necessary Distinction?" 39 *Int'l & Comp. L.Q.* 1 (1989).

269. Boyle, supra note 11.

270. Oscar Schachter, *International Law in Theory and Practice* 364 (1991).

271. Id. at 378 (quoting from J. Barboza, Sixth Report on International Liability, UN Doc. 1/CN4/428, Annex to Report, art. 21). See also Boyle, supra note 268, at 6–9.

272. Boyle, supra note 268, at 18.

273. See, e.g., Alan E. Boyle, "Chernobyl and the Development of International Environmental Law" 5 (1989) (unpublished manuscript, on file with author), referring to Article 194 of the Law of the Sea Convention, supra note 12, requiring states to take "all measures necessary" to ensure protection of other states, and citing P. M. Dupuy, *La Responsibilite Internationale Des Etats Pour Les Dommages D'Origine Technologique et Industrielle* (1976).

274. See Boyle, supra note 273 (citing 1988 draft Article 10 of the International Law Commission's project on "Liability for Injurious Consequences of Acts Not Prohibited by International Law," UN Doc. A/CN.4/413).

275. Boyle, supra note 268, at 16: "The [International Law] Commission's view of strict liability is now that it should apply in all cases of appreciable environmental injury; in effect

responsibility for a failure of due diligence and causal liability for the fact of harm would in many cases co-exist."

276. Id.
277. Id. at 18.
278. Nuclear Control Institute, supra note 6, at 5.
279. Sakata Statement, supra note 42; Miyazawa Answers, supra note 45.
280. Interview with Tadao Ishibashi, in Tokyo (Oct. 4, 1992).
281. Sakata Statement, supra note 42.