

NATIONAL AFFAIRS

Russia

The Dirtiness of the Cold War: Russia's Nuclear Waste in the Arctic

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Introduction

During the Cold War, the United States and the former Soviet Union amassed extensive nuclear arsenals in a race of intimidation. Rapid manufacture of nuclear weapons produced large amounts of radioactive waste, and both sides sought the easiest means for waste removal. Russia generally disposed of its nuclear waste by a convenient and expeditious method: dumping it into the Arctic Ocean. The Arctic Ocean is one of the world's most heavily fished seas,¹ and it is a particularly fragile ecosystem.² Countries in the region were rightfully outraged when the practice was discovered.

The present situation poses a great risk to the environment. The amount of waste awaiting disposal in Russia is thousands of times greater than the amount already deposited in the ocean, and Russia currently lacks both the funds and the facilities to dispose of the waste. The international political structure that evolved as the world was addressing nuclear waste dumped in the Arctic is insufficient to solve Russia's current problem. To improve the system, the nations involved must move beyond their immediate national interests to a practice of greater openness.

This article will describe the evolution of current perspectives on Russia's nuclear waste and consider how the world might improve its approach to the issue. The first section will describe the discovery of Russian practices of nuclear waste dumping, and the second will outline relevant international agreements in place at that time. A description of the international response to Russia's nuclear waste disposal problem will follow in the third section, and the final section will suggest potential improvements.

I. Russia's Nuclear Waste Dumping in the Arctic

The former Soviet Union's practice of dumping radioactive waste into the Arctic Ocean was first publicised in 1991 by activists in the Russian ecological movement *Towards a New Earth*.³ Greenpeace quickly picked up on these reports, and rumours regarding the alleged dump-

ing were soon rampant. Russia categorically denied any such behaviour as late as 1992.⁴ But at the Fifteenth Consultative Meeting of the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter in 1993, member States and Greenpeace asked the Russian government to report on its radioactive waste disposal practices. In response, the Russian government commissioned a report, and the final text, authored by 46 Russian experts, was submitted in April 1993.⁵ Dr Alexsi Yablokov, the top environmental advisor to Russian President Boris Yeltsin, led the group,⁶ and the report became known as the Yablokov Report.

This document revealed that the former Soviet Union had dumped six nuclear reactors containing fuel, a nuclear icebreaker shielding assembly containing fuel, and 10 nuclear reactors without fuel into the fjords of Novaya Zemlya and the Kara Sea.⁷ It also revealed that from 1959-1992, the former Soviet Union and Russia disposed of over 17,000 containers of liquid and solid radioactive waste into the Barents and Kara Seas of the Arctic Ocean.⁸ At the time of the disposal, the total radioactivity of the waste was estimated to be 8.5×10^{16} Bq,⁹ ten times greater than the amount the Chernobyl accident and Russian nuclear testing together deposited in the Arctic.¹⁰

The acknowledgement by Russia of its past dumping practices alarmed the international community. The sheer volume of the waste and the regularity with which the dumping was practiced demonstrated extreme disregard for the environment by the former Soviet Union and Russia, but the Yablokov Report documented further outrages. When barrels containing radioactive waste failed to sink into the ocean, sailors were instructed to shoot at them with machine guns, a practice that instantly provided a route for waste leakage from the barrels into the Arctic environment.¹¹ Also, the life-span of barrels used for radioactive waste storage was 10 to 30 years, much less than the length of time that many have now been at the bottom of the ocean, which raises more concerns regarding leaks.

II. Existing International Agreements The London Convention

Russia is a party to the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, the primary international instrument for the regulation of ocean dumping.¹² The London Convention,

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which came into effect in 1975, prohibits the disposal of high-level radioactive waste in the ocean, and limits low-level radioactive waste disposal according to the demands of the International Atomic Energy Agency (IAEA). The IAEA requires dumping to take place outside the continental shelf, in waters deeper than 4000 metres, and between the latitudes of 50°N and 50°S.¹³ Dumping of low-level waste must also receive prior approval from the IAEA.

Dumping by Russia before 1975, when the Convention was not in force, does not violate international law, but all high-level radioactive waste dumped after this date is a direct violation. Ocean disposal of nuclear submarines is not itself counter to the London Convention, since it does not apply to military vessels that are entitled to sovereign immunity under international law.¹⁴ The Convention requires notification to the other parties of ocean dumping related to defence activities, however, and the former Soviet Union never once issued such notification.¹⁵ In addition, it did not receive prior approval for low-level radioactive waste disposal, and most dumping of waste was in water less than 300 metres deep, within the continental shelf, and north of the 50th latitude.¹⁶ Russia's radioactive waste disposal in the Arctic directly violates the London Convention.

Furthermore, the scope of the London Convention has expanded in recent years. Parties agreed to a temporary moratorium on the ocean disposal of radioactive waste in 1983 while the practice was under expert review.¹⁷ The review led to a complete ban on the dumping of radioactive waste into the sea in 1993. Russia has not accepted the ban, and it declares that it will have no alternative but to continue ocean dumping if other nations do not subsidise the construction of improved nuclear waste disposal facilities.¹⁸

Because the Convention itself does not contain provisions for liability and responsibility,¹⁹ the international community has little recourse for exacting compensation for violations by Russia. Even the 1996 Protocol to the London Convention contains few specifics on responsibility and liability for dumping.²⁰

To date, Russia has never been admonished or punished for its actions. In fact, Arctic nations and the USA have sought to cooperate with Russia and to provide aid to its nuclear waste disposal programme for a variety of reasons.

Efforts at Cooperation in the Arctic Community

Even before the release of the Yablokov Report, nations in the Arctic region were making efforts at cooperation. Finland first proposed a conference on environmental protection in 1989,²¹ and at the resulting ministerial conference in 1991 the circumpolar nations agreed to the Rovaniemi Declaration. It was adopted by Finland, Norway, Sweden, Russia, the USA, Canada, Denmark and Iceland, and established the Arctic Environmental Protection Strategy (AEPS).²²

Though Finland's original concern was protection of the Arctic environment, the AEPS also addresses the is-

suues of indigenous people, the role of science in the Arctic, and sustainable development.²³ The Rovaniemi process highlighted the differences in motivation among circumpolar nations for Arctic cooperation: Scandinavia's concern for the Arctic environment was used in this case as a means for other countries to further goals in additional areas. As described below, Russia's goals departed markedly from environmental interests.

The establishment of the Barents Euro-Arctic Region (BEAR) in 1993 was the next agreement framed to promote cooperation in the Arctic. It involves Denmark, Finland, Iceland, Norway, Sweden and Russia.²⁴ BEAR specifically recognises the need for cooperation in the remediation of Arctic nuclear pollution, and focuses to a great extent on nuclear safety. The agreement, initiated by Norway, revealed that the Euro-Arctic countries recognised the potential threat posed by the massive Russian nuclear arsenal nearby, both in terms of nuclear accidents and, as they were just learning in 1993, in terms of potential nuclear contamination.

III. Development of Current International Perspectives

Norway

Norway has a particular interest in preventing contamination of the Arctic environment because of its geographical location and its economy. First, it has a long coastline on the Arctic Ocean, so the ocean's waters directly affect Norway's terrestrial habitat. Next, fish from the Arctic make up 7 per cent of Norway's total exports,²⁵ so it must ensure not only that the fish are uncontaminated, but also that the buyers of the fish do not perceive a potential threat of contamination. Finally, pollution by Russia is of special concern to Norway because it shares its northeast border with Russia. For these reasons Norway has endeavoured to assist Russia in monitoring and preventing nuclear contamination and has tried to Russia in multilateral environmental treaties.

Norway established with Russia the Joint Russian-Norwegian Expert Group on the Investigation of Radioactive Contamination of the Northern Seas in 1992,²⁶ and, after Russia's admission of nuclear waste dumping in the Arctic, their series of scientific exploratory cruises gained international attention. The International Arctic Seas Assessment Project (IASAP), launched in 1993 by the IAEA after the Yablokov Report, cooperated with this Russian-Norwegian group specifically to address the threat of radioactive contamination posed by Russian nuclear waste dumping.²⁷ The Arctic cruises found negligible radioactive contamination in the Kara Sea and detected only local areas of elevated radiation levels near the disposal sites.²⁸ The final IASAP Report, issued in 1996, concluded that remediation was not warranted based on the potential impact of radiation on human health.²⁹

Evidence obtained during the exploratory cruises did not alleviate Norway's concern, however. Reports released by the Arctic Monitoring and Assessment Programme, a working group of the AEPS, emphasised that the major risks from the dumped wastes are long-term; the contain-

ers will at some point corrode and release their radioactive contents into the sea.³⁰ Because of the long life of radionuclides, leaks that may occur hundreds of years in the future pose a significant health and environmental risk. These reports pointed out that the impacts of nuclear contamination on wildlife in the Arctic have not been assessed, so the waste may already have caused widespread ecological damage,³¹ even if humans have not yet been affected. The most disconcerting news was that not all waste that Soviet reports and data logs alluded to had been located or accounted for.³² Gaps in information represent a risk to the Arctic ecological system that cannot be quantified.

Norway has therefore continued to support assessment of the Arctic environment. It led a study by the North Atlantic Treaty Organisation (NATO) from 1993 to 1995 on the cross-border radioactive effects of defence-related activities. The report recommended the construction of a radioactive waste storage facility in Russia³³ and deemed the construction a national responsibility of Russia. A shift in the perception of responsibility was about to occur, as countries in Europe and North America gradually began to finance the clean-up of Russia's nuclear waste.

Russia's Request

Russia has been unwilling to accept the amendments to the London Convention that ban ocean dumping of radioactive waste. It says it is unable to handle its radioactive waste in an environmentally sound manner due to a lack of facilities for waste disposal, a lack of storage capacity and a lack of funds.³⁴ To some degree, it is true that Russia's economic difficulties have prevented it from properly addressing the problem.³⁵ Environmental programmes, specifically, remain woefully under-funded.³⁶ Russia has called for international aid to improve its waste disposal programme, and, in blatant disregard of the 'polluter-pays' principle, the world has responded.

In 1994, the USA, Russia and Norway began work to increase the capacity of a treatment plan for liquid radioactive waste.³⁷ The expansion was completed in 1999 at a cost of \$2 million, paid by the USA and Norway. Norway agreed to provide free technical assistance to Russia on nuclear waste issues in the 1998 Agreement on Environmental Cooperation,³⁸ Canada pledged \$10 million dollars under a programme established in 2000,³⁹ and the UK announced in 1999 that it will give Russia \$5 million for cleaning up waste in the Arctic.⁴⁰

American Support

The USA has been by far the largest outside financial supporter of Russia's nuclear waste disposal program. The breakup of the Soviet Union presented a great security risk to the USA because the former Soviet states possess the powerful nuclear arsenal developed during the Cold War.⁴¹ To address the risk, the USA has taken several steps, many of which resulted in the disbursement of financial aid to the Russian Federation. In 1991 the USA Congress established a means to secure and reduce the nuclear weapons of the Soviet Union successor states, the Nunn-Lugar Cooperative Threat Reduction (CTR) programme.⁴² It pro-

vides about \$400 million per year to this end, mostly to help dismantle weapons. Because the USA realised Russia could not decommission nuclear warheads without a functioning nuclear waste disposal system, CTR has funded such projects as the construction in Russia of a fissile material storage facility at Mayak, at a cost of \$99 million.⁴³ The aid the USA has provided to Russia for nuclear waste management under this programme is almost exclusively tied to the security interests of the USA.

The USA furthered its commitment to Russian disarmament in 1996 when the defence ministers of Norway, Russia and the USA signed the Declaration on Arctic Military Environmental Cooperation (AMEC), an agreement intended to enhance communication on military-environmental interactions.⁴⁴ AMEC led to the 1998 Agreement on Environmental Cooperation, in which Norway pledged free technical assistance to Russia for the dismantling of nuclear submarines.⁴⁵ The agreement allows for financial involvement by a third party, presumably the USA. Such a format illustrates differentiated responsibility: a polluter (Russia) could not afford to deal with its waste, so the victim (Norway) initiated a response in cooperation with an interested party of sufficient resources (the USA).

In 1998 the USA linked AMEC with CTR, because the need for radioactive nuclear waste disposal was holding up the decommissioning of nuclear submarines under CTR, and CTR could provide legal protection for AMEC.⁴⁶ This linkage demonstrates how the interests of nuclear disarmament and non-proliferation provided motivation for the participation of the USA in AMEC, and the link suggests that the USA does not consider environmental aid to Russia an inherently worthwhile endeavour. This attitude was also evident in 1999, when the USA Environmental Protection Agency (EPA), the department whose primary responsibility is environmental protection, boasted that the furthering of arms control objectives by the completion of a Russian nuclear facility expansion was as important as Arctic environmental protection.⁴⁷ While the pursuance of security objectives by the USA is a worthy goal, connecting environmental aid to security subordinates environmental concerns to military aims.

Russia's Advantage

Just as the Soviet Union benefited from the dumping of its nuclear waste in the Arctic during the Cold War, Russia stands to benefit from international aid for its disposal programme. The Soviet Union saved money on the construction of expensive disposal facilities by throwing nuclear waste into the ocean, and it saved money on transportation since the Arctic Ocean was conveniently located close to the nuclear processing facilities of the Kola Peninsula. Avoiding the permitting process of the London Convention, required for ocean disposal of low-level radioactive waste, also saved them time, an important advantage in a race to accumulate nuclear weapons.

Russia, in an effort to receive additional aid, continues to play up the international threat posed by the large amount of waste it has awaiting disposal. Leaders emphasise that the Kola Peninsula is a serious radiation hazard for all of Northern Europe,⁴⁸ and they contend that, with-

out help, they have no option but to violate international environmental protection agreements and disarmament treaties in dealing with the material.⁴⁹ The amount of money Russia claims it needs to dispose of its nuclear waste stored just in the Northwest near the Arctic is \$1.5 billion.⁵⁰

As described above, countries with individual interests in environmental protection or security are willing to provide funds and technical expertise to assist Russia in nuclear waste disposal. Russia, however, has often refused to allow the inspection trips needed for other countries to authorise aid and it has refused to allow technical experts from Western countries to enter its military bases.⁵¹ The aim behind this refusal is to prevent other countries from observing Russia's current nuclear submarine technology.⁵² Norway had offered \$2 million to clean a bay in the Northwest contaminated with nuclear pollution, but for years Russia refused to let Norwegian personnel examine the area, delaying disbursement of funds.⁵³ Donating countries should rightfully expect to receive information regarding the use of their money as an assurance of the conditions under which it was donated. Russia, however, continues to deny this information.

In another act of defiance, Russia currently builds and operates nuclear-powered submarines.⁵⁴ Russian President Vladimir Putin views the Russian Navy, with its heavy reliance on nuclear-powered submarines, as a way of reclaiming superpower status for Russia.⁵⁵ The funds Russia spends on constructing and operating new nuclear submarines should be spent on the 126 nuclear submarines⁵⁶ awaiting disposal. Moreover, by maintaining its submarine fleet, Russia generates an additional 5000 tons of solid radioactive waste per year,⁵⁷ further compounding the problem. Russia's unwillingness to direct its Navy away from nuclear waste-generating activities reveals a lack of serious concern on its part for environmental protection.

International aid to Russia's nuclear waste disposal programme is, in a sense, freeing money for Russia to spend on its submarine fleet. Because its stockpiles of waste represent a risk to the world, Russia can use the nuclear material as a type of blackmail to obtain international monetary aid.⁵⁸ Aid that countries currently provide to Russia, in turn, serves as a disincentive for Russia to allocate national funds to the problem.⁵⁹

An Improved Approach to the Remaining Waste

Financial and technical cooperation provided by Western states undermines Russia's responsibility to clean up its nuclear waste.⁶⁰ Though Russia proclaims publicly that

the clean-up of its nuclear materials will cost billions of dollars, in 2000 Russia allocated only \$40 million to this task, which shows how little the waste concerns them.⁶¹ Meanwhile, waste generated by Russia's present nuclear submarine programme continues to grow.

The current international structure for disposing of nuclear waste in Russia is defective, because it was established out of individual political interests. Because of the immense risk posed to the earth by present mismanagement, a new approach should be taken to deal with Russian stockpiles of nuclear waste.

Technical Disposal Options

Scientists and engineers have proposed a wide variety of possibilities for the disposal of radioactive material. Some options, because they sound potentially dangerous, have been disregarded or outlawed, and the world community may miss opportunities by eliminating disposal choices before they are investigated, since the most cost-effective and environmentally safe alternative may yet need to be researched.

For example, the practice of sub-seabed disposal of nuclear waste was to be the subject of a \$100 million international study, but in 1986 the study was suddenly cancelled because the USA cut its funding in favour of land-based disposal.⁶² Sub-seabed nuclear waste disposal is the entombment of wastes beneath the ocean floor in the deep-sea clays at the centres of the continental plates.⁶³ These geological formations are geologically very stable and have thick layers of sediment that would bond with any radioactive

leaks to immobilise nuclides.⁶⁴ Also, the depth of the water column would isolate the waste from human communities.⁶⁵ Because the USA cancelled the study, however, most of the technology for sub-seabed disposal remains untested⁶⁶ and few nations consider it a viable alternative.

Other options for disposal of nuclear waste include disposal in glaciated areas, extraterrestrial disposal, and destruction by nuclear transmutation, a process in which long-lived radionuclides are transformed to shorter-lived nuclides.⁶⁷ The international community has generally pursued only deep geologic disposal of waste on land, and major political obstacles now block the implementation of the other options.⁶⁸ Countries with nuclear waste to dispose of should give some scientific consideration to other possibilities, as they may prove safe and inexpensive once their technology has been further developed.

Infrastructure

Russia inherited an unmanaged and corrupt nuclear waste disposal programme after the break-up of the former



Courtesy: World Resources 2000-2001

Soviet Union. Russia has attempted to improve the system by reorganising governmental groups involved in environmental regulation, but the reorganisation only resulted in confusion and a lack of coordination.⁶⁹

Russia further weakened administration for environmental protection recently by transferring the duties of the State Committee for Environmental Protection to the Natural Resources Ministry.⁷⁰ After the announcement of the transfer, the Ministry's director stated that his staff were underpaid and could not provide proper support for environmental assistance.⁷¹ Also, one role of the Natural Resources Ministry is to authorise the commercial use of natural resources,⁷² so its new responsibility to protect the environment is likely to result in a conflict of interest.

Money sent to Russia to improve nuclear waste disposal may be more effective if it is used for building governmental infrastructure rather than directly for the disposal of waste. Recently the European Union (EU) adopted the Action Plan for the Northern Dimension, in which nuclear safety in northwest Russia was designated a priority.⁷³ Under the Action Plan, the EU plans to assist Russia in closing unsafe nuclear reactors, assessing improvements needed for the decommissioning of nuclear submarines, and promoting the adoption of standard regulatory procedures to help Russia improve its environmental administration and infrastructure.⁷⁴ This assistance to Russian infrastructure is the first step in a promising direction.

Public Disclosure and Information Exchange

Nina Yanovskaya, the woman in charge of decommissioning retired submarines for Russia's Northern and Pacific fleets, said in 1999, 'I realise everything that has happened is the fault of Russia. It's our doing. The old Cold War is responsible for the situation.'⁷⁵ More specifically, the internal and international secrecy of the former Soviet Union's nuclear programme is responsible. Russia continues its guarded behaviour today, even after the end of the Cold War, whereas the solution to its nuclear waste disposal programme lies in increased transparency, openness and knowledge-sharing.

Both Eastern and Western nations jealously guarded their defence-related information during the Cold War. The former Soviet Union also kept a tight control on information within its own government. It considered technical quantitative data regarding nuclear activities to be state secrets, and, by law, excluded the public from participating in decision-making.⁷⁶ It denied access to military bases to even its own civil inspectors.⁷⁷ The result was a lack of coordination and overall planning for nuclear waste disposal, and, without the input of a watchful public, a lack of ethical behaviour.

Russia's current secrecy serves to escape the scrutiny of the international community and interferes with offers of assistance from other nations. Because foreign experts are rarely allowed to enter disposal sites at Mayak or Andreeva Bay,⁷⁸ the technical advice they can provide to Russia is limited. The picture of the amount and location of waste disposed in the Arctic remains incomplete, since

Russia still maintains that much of the relevant data is classified information,⁷⁹ and the missing information makes an appropriate risk assessment impossible. Russia's secrecy also delays financial aid, as other nations refuse to disburse funds without any way of ensuring the proper use of the money.⁸⁰

Some environmental groups believe that all aid to Russia for nuclear waste disposal should be withheld until inspectors are allowed full access to military bases.⁸¹ Such confrontational, one-sided demands only increase hostility and insecurity – attitudes that fuelled the continuation of the Cold War and the current dilemma. Russia is already suspicious of the USA's offer of aid to its nuclear waste disposal programme.⁸²

Because the USA is currently dealing with the legacy of the Cold War, just as Russia is, a bilateral agreement encouraging a two-way exchange of information would benefit both sides. If the agreement were to require publication of data regarding nuclear waste disposal for international comment, several advantages would result. Inviting the involvement of civil society would ensure that waste disposal proceeds according to customary international law⁸³ and that Russia is held accountable for its past practices. Transparency mandated by the agreement would lessen the mutual suspicion that leads to arms stockpiling. Each side's plans and practices would be open to the scrutiny of technical experts, who could provide advice to improve the efficiency and safety of the respective programmes.⁸⁴ Also, public disclosure is one of the lowest-cost options for improving environmental programmes: the only cost is that of publication.

Conclusions

The former Soviet Union lacked an informed and honest management structure for nuclear waste disposal, and, due to the nation's secrecy and corruption, it disposed of its radioactive waste in a manner harmful to the fragile Arctic ecosystem. Russia has now discontinued the practice of ocean dumping of nuclear waste, but it must develop alternative treatment methods for its massive and growing quantity of radioactive waste awaiting disposal.

Because Russia contends it lacks the facilities and funds to handle its nuclear waste, the country requests aid from the international community. Countries in the Arctic region offer assistance out of environmental concern, and the USA, motivated by its security interests, provides large amounts of money to Russia via CTR. Giving money to Russia allows it to neglect its nuclear waste problems and to continue generating more nuclear waste.

Several options could potentially improve nuclear waste disposal in Russia. First, scientists and engineers should explore methods of disposal not currently in practice. Next, international aid should focus on reinforcing the environmental infrastructure of Russia, so it may effectively direct and regulate its own nuclear waste program. Finally, the sharing of knowledge between the USA and Russia would improve the safety and efficiency of nuclear waste management in both countries and encourage cooperation between the two. ➤

Notes:

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- ² Lakshman Guruswamy and Jason Aamodt, 'Nuclear Arms Control: The Environmental Dimension,' *Colorado Journal of International Environmental Law and Policy* 10(Summer 1999), 271–272.
- ³ *Id.*, 273.
- ⁴ Andree Kirchner, 'The Dumping of Radioactive Waste in the Arctic,' *European Environmental Law Review* (February 2000), 48.
- ⁵ Aleksy Yablokov *et al.*, *Facts and Problems Related to the Dumping of Radioactive Waste in the Seas Surrounding the Territory of the Russian Federation*. Commissioned by the President of the Russian Federation, 24 October 1992, Decree no. 613 (Greenpeace Russia trans., 1993), i.
- ⁶ Kristin Moody-O'Grady, 'Nuclear Waste Dumping in the Oceans: Has the Cold War Taught Us Anything?' *Natural Resources Journal* 35(Summer 1995), 697.
- ⁷ Yablokov, *supra* n. 5, 15–16.
- ⁸ *Id.*, 15–16.
- ⁹ International Atomic Energy Agency, *Radiological Assessment: Waste Disposal in the Arctic Seas*, 1997, <http://www.iaea.or.at/worldatom/inforesource/bulletin/bull391/specialreport.html>.
- ¹⁰ Thomas Nilsen and Nils Bohmer, *Sources to Radioactive Contamination in Russian Counties of Murmansk and Arkhangelsk*, 1994, <http://www.bellona.no/imaker?id=9845&sub=1>.
- ¹¹ 'Arctic Sea Dumping,' *Trade Environment Database* 4(2) (June 1995), <http://www.american.edu/TED/ARCTIC.HTM>.
- ¹² National Ocean Service International Programme Office, *The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, London, 1972, <http://international.nos.noaa.gov/con/ldc.html>.
- ¹³ Nilsen and Bohmer, *supra* n. 10.
- ¹⁴ Justin Mellor, 'Radioactive Waste and Russia's Northern Fleet: Sinking the Principles of International Environmental Law,' *Denver Journal of International Law and Policy* 28(Winter 1999), 59.
- ¹⁵ Yablokov, *supra* n. 5, 30.
- ¹⁶ Nilsen and Bohmer, *supra* n. 10.
- ¹⁷ James Waczewski, 'Legal, Political, and Scientific Response to Ocean Dumping and Sub-Seabed Disposal of Nuclear Waste,' *Journal of Transnational Law & Policy* 7 (Fall 1997), 106.
- ¹⁸ Robert G. Darst, 'Bribery and Blackmail in East-West Environmental Politics,' *Post-Soviet Affairs* 13(1) (1997), 68.
- ¹⁹ *Intergovernmental Conference on the Convention on the Dumping of Wastes at Sea: Final Documents*, 13 November 1972, 11 I.L.M. 1291.
- ²⁰ *1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, 1972 and Resolutions Adopted by the Special Meeting, 7 November 1996, 36 I.L.M. 1 (1997).
- ²¹ Kirchner, *supra* n. 4, 49.
- ²² Arctic Monitoring and Assessment Programme, *Arctic Pollution Issues: A State of the Arctic Environment Report*, 1997, <http://www.amap.no/assess/soaercn.htm#chapter8>.
- ²³ Mellor, *supra* n. 14, 69.
- ²⁴ *Id.*, 69.
- ²⁵ Steven G. Sawhill, 'Cleaning up the Arctic's Cold War Legacy: Nuclear Waste and Arctic Military Environmental Cooperation,' *Cooperation and Conflict* 35(1) (2000), 12.
- ²⁶ Kirchner, *supra* n. 4, 49.
- ²⁷ International Atomic Energy Agency, *supra* n. 9.
- ²⁸ *Id.*
- ²⁹ *Id.*
- ³⁰ Arctic Monitoring and Assessment Programme, *supra* n. 22.
- ³¹ Arctic Monitoring and Assessment Programme, *AMAP Report on Issues of Concern: Updated Information on Human Health, Persistent Organic Pollutants, Radioactivity, and Mercury in the Arctic*, September 2000, <http://www.amap.no/>.
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- ³⁸ Guruswamy and Aamodt, *supra* n. 2, 302.
- ³⁹ Andrei Krasnoshechekov, 'Canada to Help Russia with Nuclear Waste Processing,' *TASS*, 9 June 2000, *LEXIS-NEXIS Academic Universe*.
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- ⁴² Sawhill, *supra* n. 25, at 18. The programme, which is named for its principal sponsors, Senators Sam Nunn and Richard Lugar, is currently 40 per cent complete. Funding for its next phase must be approved by Congress. (Mansoor Ijaz and R. James Woolsey, 'How Secure is Pakistan's Plutonium?' *New York Times*, 28 November 2001, A27)
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- ⁴⁴ *Id.*, 7.
- ⁴⁵ Guruswamy and Aamodt, *supra* n. 2, 302.
- ⁴⁶ Sawhill, *supra* n. 25, 20.
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- ⁵⁰ Belousov, *supra* n. 48.
- ⁵¹ Mellor, *supra* n. 14, 56.
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- ⁵³ *Id.*
- ⁵⁴ Mellor, *supra* n. 14, 56.
- ⁵⁵ Coker, *supra* n. 1.
- ⁵⁶ 'Russia Concerned with Decommissioned Subs, Not Kursk Reactor,' *BBC Monitoring International Reports*, 24 August 2001, *Global NewsBank*.
- ⁵⁷ Mellor, *supra* n. 14, 58.
- ⁵⁸ Darst, *supra* n. 18, 69.
- ⁵⁹ *Id.*, 44.
- ⁶⁰ Mellor, *supra* n. 14, 69.
- ⁶¹ 'Disposal of Nuclear Subs, Rehabilitation of Radioactive Facilities Will Cost Russia \$1.5 Billion,' *News Bulletin*, 14 March 2001, *LEXIS-NEXIS Academic Universe*.
- ⁶² Waczewski, *supra* n. 17, 111.
- ⁶³ Christopher Meisenkothen, 'Subseabed Disposal of Nuclear Waste: An International Policy Perspective,' *Connecticut Journal of International Law* 14(Fall 1999), 631.
- ⁶⁴ Waczewski, *supra* n. 17, 110.
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- ⁶⁶ *Id.*, 111.
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- ⁷³ 'Action Plan for the Northern Dimension with External and Cross-Border Policies of the European Union 2000-2003,' The Council of the European Union, 13 June 2000, http://europa.eu.int/comm/external_relations/north_dim/.
- ⁷⁴ *Id.*
- ⁷⁵ Timothy W. Maier, 'Russian Armada Poisons the Seas,' *Insight on the News*, 5 July 1999, *LEXIS-NEXIS Academic Universe*. The comment was made by Yanovskaya at a seminar on nuclear waste held at the Center for Naval Analysis in Alexandria, VA, USA.
- ⁷⁶ Maloney-Dunn, *supra* n. 36, 385.
- ⁷⁷ Mellor, *supra* n. 14, 70.
- ⁷⁸ Kirchner, *supra* n. 4, 50.
- ⁷⁹ International Atomic Energy Agency, *supra* n. 9.
- ⁸⁰ 'Britain 'Putting Europe at Risk of Nuclear Blast', Russia Demands Promised Aid,' *The Daily Telegraph*, 26 June 2001, 11.
- ⁸¹ Debora MacKenzie, 'Treasure Case Dropped as Russia Signs Nuclear Deal,' *New Scientist*, 19 October 1996, *LEXIS-NEXIS Academic Universe*.
- ⁸² Sawhill, *supra* n. 25, 27.
- ⁸³ Customary international law is States' consistent application of an international legal rule. Customary international law prohibits such practices as genocide, the killing of soldiers who have surrendered, or actions by a State that harm another State's environment.
- ⁸⁴ Thomas Nilsen, 'Nuclear Waste Disposal in Russia,' 12 November 2001, personal e-mail.

