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Military Nuclear Waste and International Cooperation in Northwest Russia

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Sammendrag/Abstract
Disarmament and naval force reductions in the Russian Federation have created new security policy challenges. In northwest Russia, these challenges stem from the scores of nuclear-powered submarines that have been decommissioned and the large quantities of fissile material and radioactive waste that are generated as a result. The report discusses the activities of several international assistance programmes, examines some of their limitations, and indicates obstacles to their expansion, but it is not meant to be an evaluation of their effectiveness or efficiency.

The main objectives of this study are to; indicate some of the principal environmental and security policy implications of nuclear waste generated as a result of disarmament and naval force reductions in northwest Russia; describe relevant international cooperation programmes that are operating in the region and their ability to assist Russia in addressing these implications; examine obstacles to international cooperation. Chapter 2 outlines the main types of nuclear waste in northwest Russia and the implications of this material on different aspects of national security. Chapter 3 provides an overview of four international assistance programmes that seek to help Russia address problems associated with this material. It outlines the main objectives and relevant activities of each programme and discusses the interaction between them. Bilateral agreements between foreign donors and Russia have become an important feature of international nuclear cooperation. Chapter 4 examines some of the key issues covered by the agreements and the role they play in balancing the competing interests of donors and Russia. The chapter gives special emphasis to liability for nuclear damage. Donors often point to unsatisfactory framework conditions as being the principal obstacle to nuclear cooperation with Russia. There are other challenges as well, from domestic politics and divergent interests in the United States and Russia, to deteriorating East–West relations. These challenges are explored in Chapter 5. Finally, Chapter 6 presents the conclusions of the study and recommendations for further activities.

Stikkord/Key Words
nuclear safety, nuclear waste, AMEC, military environmental cooperation

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Preface

In preparing this report, we have had the pleasure of meeting a diverse group of individuals from several different countries in government and the armed forces, industry, academia and non-governmental organisations. We are grateful to all of them for generously sharing their time, experience, and viewss on the issues covered in this report.

We are especially grateful for the assistance of R. Douglas Brubaker, attorney and senior research fellow at the Fridtjof Nansen Institute, for his research on the issue of liability for nuclear damage. Section 4.3 of this report draws from a manuscript he is preparing for separate publication in an international legal journal as a more detailed, legal treatment of the subject.

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Steven G. Sawhill
Cambridge, 28 August 2001

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Lysaker, 28 August 2001

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Glossary

1997 Protocol	Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage, 29 September 1997
AEPS	Arctic Environmental Protection Strategy
AMAP	Arctic Monitoring and Assessment Programme
AMEC	Arctic Military Environmental Cooperation
Atomflot	Murmansk Shipping Company's icebreaker repair facility
Bq	*becquerel*—the SI unit for expressing radioactivity. 1 Bq = one disintegration per second. The older unit *curie* (Ci) is equal to 37×10^9 Bq. Large amounts are usually expressed as tera-becquerels (Tbq); 1 TBq = 1×10^{12} Bq.
CEG	Contact Expert Group on International Nuclear Waste Projects in the Russian Federation (organised under the auspices of the IAEA)
CTR	Cooperative Threat Reduction programme (Nunn–Lugar programme)
CTR Umbrella Agreement	US–Russia Agreement Concerning the Safe and Secure Transportation, Storage and Destruction of Weapons and the Prevention of Weapons Proliferation, 17 June 1992
Duma	The lower house of the Russian parliament
EBRD	European Bank for Reconstruction and Development
EBRD Agreement	EBRD–Russia Agreement relating to Nuclear Safety Account Projects in the Russian Federation, 9 June 1995
EC	European Community
EC Memorandum	EC–Russia Memorandum of Understanding on the Implementation of the Technical Assistance Programmes in the Field of Nuclear Safety, 27 February 1995
EU	European Union
exempt waste	Waste that displays radioactive activity levels at or below clearance levels (annual dose to members of the public of less than 0.01 millisieverts) and may be safely disposed of without specifically considering its radioactive properties. [One millisievert is the avearge yearly dose from natural radiation, and is used as the yearly dose limit for all radioactivity of anthropogenic origin to which the general public may be exposed.]

general purpose submarine	submarines of the SSGN and SSN classes, also referred to as non-strategic submarines
Gosatomnadzor	Russian Federal Radiation Safety Authority
Goskomekologiia	Russian State Committee for Environmental Protection
high-level waste	Waste that contains both short- and long-lived radionuclides in such large concentrations that a high degree of isolation is required to ensure safety. Such waste generates a significant amount of heat from radioactive decay; therefore, it normally demands both shielding and cooling. Activity levels in high-level waste are on the order of 50,000 to 500,000 TBq/m^3, corresponding to a heat generation rate of about 2 to 20 kW/m^3. High-level waste includes spent reactor fuel, if it is declared as waste.
IAEA	International Atomic Energy Agency
ICC *Nuklid*	Inter-branch Coordination Center Nuklid (an affiliate of Minatom)
intermediate-level waste	Waste having activity levels above clearance levels for exempted waste and thermal power below 2 kW/m^3. The distinction between low-level and intermediate-level waste is the added requirement of shielding for the latter. These categories are further subdivided into short- and long-lived waste, the boundary criterion being based on the activity content of long-lived alpha-emitting radionuclides.
Joint Protocol	Joint Protocol Relating to the Application of the Vienna Convention on Civil Liability for Nuclear Damage and the Paris Convention on Third Party Liability in the Field of Nuclear Energy, 21 September 1988
low-level waste	Waste having activity levels above clearance levels for exempted waste and thermal power below 2 kW/m^3. The distinction between low-level and intermediate-level waste is the added requirement of shielding for the latter. These categories are further subdivided into short- and long-lived waste, the boundary criterion being based on the activity content of long-lived alpha-emitting radionuclides.
Minatom	Russian Ministry of Atomic Energy
Minpriroda	Russian Ministry of Natural Resources
MNEPR	Multilateral Nuclear Environmental Programme in the Russian Federation
MPC&A	Material Protection, Control and Accounting programme
NATO	North Atlantic Treaty Organisation
NEFCO	Nordic Environmental Finance Corporation
NOK	Norwegian kroner. On 13 July 2001, US $1 = NOK 9.3330.
non-strategic submarine	submarines of the SSGN and SSN classes, also referred to as general purpose submarines
Norwegian–Russian	Norway–Russia Agreement on Environmental Co-operation in

Agreement	Connection with the Dismantling of Russian Nuclear Powered Submarines Withdrawn from the Navy's Service in the Northern Region, and the Enhancement of Nuclear and Radiation Safety, 26 May 1998
NSA	Nuclear Safety Account (administered by the EBRD)
Nuklid	Inter-branch Coordination Center Nuklid (or ICC Nuklid), an affiliate of Minatom
Nunn–Lugar programme	Cooperative Threat Reduction (CTR) programme
OECD	Organisation for Economic Co-operation and Development
Paris Convention	Convention on Third Party Liability in the Field of Nuclear Energy, 29 July 1960
PCB	polychlorinated biphenals
radwaste	radioactive waste
RUB	Russian rouble. On 13 July 2001, US $1.00 = RUB 29.2010.
SDR	special drawing rights. On 13 July 2001, SDR 1.00 = US $1.24859.
SLBM	submarine-launched ballistic missile
SNF	spent nuclear fuel
SSBN	ballistic missile-firing submarine, nuclear powered
SSGN	cruise missile-firing submarine, nuclear powered
SSN	fleet (attack) submarine, nuclear powered
START I	US–USSR Treaty on the Reduction and Limitation of Strategic Offensive Arms, 31 July 1991
START II	US–Russia Treaty on the Further Reduction and Limitation of Strategic Offensive Arms, 3 January 1993
Storting	Norwegian parliament
strategic submarine	ballistic missile-firing submarine (SSBN)
TACIS	Technical Assistance to the Commonwealth of Independent States (administered by the EU)
TBq	tera-becquerel (1 TBq = 1×10^{12} Bq)
VAT	value added tax
Vienna Convention	Vienna Convention on Civil Liability for Nuclear Damage, 21 May 1963
weapons-grade material	generally defined as fissile material that contains uranium-235 or plutonium-239 which is more than 90% isotopically pure
weapons-usable material	generally defined as highly enriched uranium (> 20% ^{235}U) or plutonium of any isotopic concentration

Chapter 1
Introduction

Disarmament and naval force reductions in the Russian Federation have created new security policy challenges. In northwest Russia, these challenges stem from the scores of nuclear-powered submarines that have been decommissioned and the large quantities of fissile material and radioactive waste that are generated as a result. This report is an examination of the security implications of defence-related nuclear waste in northwest Russia, and of international efforts to address these implications. The report discusses the activities of several international assistance programmes, examines some of their limitations, and indicates obstacles to their expansion, but it is not meant to be an evaluation of their effectiveness or efficiency.

The main objectives of this study are to:

- indicate some of the principal environmental and security policy implications of nuclear waste generated as a result of disarmament and naval force reductions in northwest Russia;
- describe relevant international cooperation programmes that are operating in the region and their ability to assist Russia in addressing these implications;
- examine obstacles to international cooperation.

This introductory chapter provides a brief background to the problems, discusses the main questions the study seeks to answer, and provides a note on methodology employed in the study.

1.1 Background

In the early 1990s, the United States and the former Soviet Union took a decisive turn in their strategic relationship by setting in motion a process to reduce their nuclear arsenals. In 1991, the two superpowers withdrew their tactical nuclear weapons from forward deployment, 'detargeted' their strategic missiles, and signed the START treaty. In January 1993, Presidents Clinton and Yeltsin signed the START II treaty, agreeing to even deeper cuts in their strategic nuclear forces. The Russian government also began laying up many of its warships, including nearly two-thirds of its nuclear-powered submarine fleet, as part of its drastic cutback in military expenditures. As a result, Russia now has vast amounts of nuclear material and radioactive waste for disposal.

Both countries faced similar challenges in dismantling their nuclear stockpiles in a safe, secure and expedient manner. Unlike the US, however, Russia lacks a comprehensive, 'cradle to grave' system for decommissioning its nuclear-powered submarines and warships. Between 1959 and 1991, for example, the Soviet Union simply disposed of its high, intermediate and low level radioactive waste in the Arctic Ocean and the seas adjacent to the Far East. Although Russia suspended ocean dumping in 1993, it has not substantially expanded its capacity to manage nuclear waste, and the influx of material stemming from its fleet reductions has overwhelmed its existing capacity. Given its weak economy and unstable social and political systems, Russia currently lacks the capacity to create an adequate system on its own within a reasonable timeframe.

The situation has given rise to concern over the potential threat this material poses to people, the environment, property and economic activity. There is also concern that poorly

secured material is vulnerable to terrorism and susceptible to diversion to those seeking nuclear weapons.

1.2 Issues

The first phase of the study is an outline of the types, quantities and characteristics of defence-related nuclear waste in northwest Russia that has arisen from disarmament and force reductions. This forms the beginning point of the problem definition, followed by a discussion of how this material does or may effect national security. What threat does it pose to human health and the environment? How could it affect important economic activities and interests in the region?

Several states have created programmes to ameliorate nuclear safety and security threats in Russia. The second phase of the study is a survey of four assistance programmes currently active in northwest Russia that are relevant to defence-related nuclear waste. The main objective of this phase is to describe the objectives, priorities and activities of relevant programmes, and to indicate the relationships between them. Which aspects of the problem do they address? Which aspects are under-represented or omitted? In what ways do the programmes complement each other?

Although foreign assistance programmes are making important contributions, they have also experienced difficulties, and still face some challenges. This is to be expected in an area as sensitive as defence applications of nuclear energy, especially when it involves former adversaries. The final phase of the study, then, is an examination of the relationships between the participating states, their perceptions of cooperation, and remaining obstacles to cooperation. How have they established a suitably defined, stable and predictable foundation for cooperation? How have they reconciled different priorities and interests? What differences or obstacles remain, and what are the prospects for resolution?

1.3 Methodology

This study is based on open-source information collected through document analysis, participation in international seminars, and through personal interviews. There is a burgeoning amount of official documentation on topics covered in this study. This material includes international conventions, bilateral agreements, multilateral declarations, domestic legislation, government and parliamentary reports, and issue papers. Official documents have been a key source of insight into the political objectives, priorities, actions and interests of the participating governments. We have also consulted studies and working papers by intergovernmental organisations, such as the IAEA, NATO and the OECD, as well as papers by technical, legal and other security specialists that are relevant to issues covered in this report.

Personal interviews formed another key source of information for this study. Interviews were conducted in Norway, Russia and the United States, and involved several different types of interviewees. First, we conducted interviews with senior government officials at the policy and coordinating levels. These individuals typically had responsibility for negotiating agreements, setting programme objectives, approving project proposals, coordinating programme implementation, and authorising project expenditures. Most of these individuals were career civil servants or military officers, though some were political appointees. These interviews provided unique insights into the different priorities, policies and perceptions of the participating governments. They also revealed the differences that exist within individual governments.

Second, we conducted interviews with technical, legal and other security specialists. These individuals came from a variety of institutions, including government ministries, agencies, military services, and laboratories; intergovernmental organisations such as the IAEA and the OECD; and nongovernmental sources, such as independent research foundations and environmental nongovernmental organisations. The government representatives were usually directly involved in one or more of the cooperation programmes discussed in this study. They were able to provide factual information on specific issues (e.g., the relative sensitivity of different types of nuclear material from a proliferation standpoint) and on specific projects, as well as valuable perceptions into the challenges of international cooperation. Individuals from intergovernmental organisations were helpful in providing substantive knowledge in certain specialised fields, such as nuclear law. Nongovernmental sources were helpful in obtaining alternative views, perceptions and assessments. The Center for Policy Studies in Russia (the PIR Center) was particularly useful, in that it has published several reports on Russian perspectives towards nuclear cooperation with the West, and it benefits from access to Russian officials that we did not have.

We also interviewed several western commercial contractors involved in nuclear projects with Russia to obtain a better appreciation of industry interests and concerns. Most projects are carried out by commercial contractors; obtaining their insights into the process was essential.

Finally, we supplemented our document analysis and interviews by participating in several international seminars and workshops. These included the conference 'Nuclear Risks, Environmental and Development Cooperation in the North of Europe' (Apatity, Russia, June 1999), and a meeting of the Intergovernmental Working Group on Nuclear Waste Problems in Russia (Washington DC, March 2000). The latter was particularly useful, in that it included legislators and other political-level participants from Russia and the United States.

1.4 Structure of the report

Chapter 2 outlines the main types of nuclear waste in northwest Russia and the implications of this material on different aspects of national security. Chapter 3 provides an overview of four international assistance programmes that seek to help Russia address problems associated with this material. It outlines the main objectives and relevant activities of each programme and discusses the interaction between them. Bilateral agreements between foreign donors and Russia have become an important feature of international nuclear cooperation. Chapter 4 examines some of the key issues covered by the agreements and the role they play in balancing the competing interests of donors and Russia. The chapter gives special emphasis to liability for nuclear damage. Donors often point to unsatisfactory framework conditions as being the principal obstacle to nuclear cooperation with Russia. There are other challenges as well, from domestic politics and divergent interests in the United States and Russia, to deteriorating East–West relations. These challenges are explored in Chapter 5. Finally, Chapter 6 presents the conclusions of the study and recommendations for further activities.

Chapter 2
Nuclear Waste and International Security

2.1 Introduction

In the broadest scope, the three themes of this study are nuclear material, security and international cooperation. Specifically, it examines the relationships between international cooperation in the areas of nuclear arms reduction and nuclear safety currently taking place in the northwest region of Russia, how cooperation in the one area affects cooperation in the other, and how both areas contribute to national security goals of the principal participants—Norway, Russia and the United States. Here, *national security* is meant in its broadest of contexts, and includes:

- *environmental* security, which focuses on the well-being of the natural environment and the health, safety and stability of human populations;
- *economic* security, which is concerned with the stability and well-being of economic and business activities; and
- *military* security (the traditional definition of national security).

Peaceful applications of nuclear energy represent both benefits and risks to society. Whether these benefits exceed the costs and the potential risks, or vice-versa, however, is a matter of considerable public debate. Military applications of nuclear energy represent a different type of resource and risk. On the one hand, nuclear weapons played a key role in the strategic balance between competing political-military blocs during the era of the Cold War. For most people, however, they are seen as fundamentally destabilising, and great efforts are being taken to reduce and ultimately eliminate nuclear weapons and their means of delivery. This process is generally welcomed for its contribution to improving global security and stability. Yet the process also represents challenges that can adversely affect the national security interests of both nuclear weapons states and their neighbours: the challenges of disposing of large volumes of surplus fissile material and radioactive wastes both safely and securely. Nuclear disarmament and nuclear waste are intricately intertwined; the challenge is to ensure that in reducing one threat, it is not simply replaced with another.

The geographic focus of this study is northwest Russia, that is to say, Norway's *nærområde* (neighbouring areas), a key deployment area for nuclear-powered submarines and surface naval combatants of the Russian Northern Fleet. In this region, the principal concerns with respect to military nuclear material revolve around reducing the threats posed by strategic and tactical nuclear weapons and by radioactive wastes generated by nuclear-powered naval vessels. The topical focus is radioactive waste associated with the so-called 'back-end stage' of the life cycle for nuclear materials—i.e., during decommissioning. Primary emphasis is placed on naval nuclear propulsion, especially irradiated (spent) nuclear fuel. This focus reflects both the fact that military nuclear materials are not manufactured in the study's geographic region of focus,[1] and that the principal issues of international

[1] Nuclear fuel for Russian naval vessels powered with pressurized water reactors is produced in Elektrostal outside Moscow, while fuel for liquid metal-cooled reactors was produced in Ust-Kamenogorsk, Kazakhstan. O. Bukharin and J. Handler, 'Russian Nuclear-powered Submarine Decommissioning,' *Science and Global Security* 5 (1995): 245-271.

cooperation deal with the elimination and disposition of nuclear weapons and nuclear-powered submarines.

This chapter provides a brief summary of the types and quantities of military nuclear waste in northwest Russia and the threats this waste represents to environmental, economic and military security.

2.2 Military nuclear waste in northwest Russia

The most important applications of nuclear energy in defence programmes have been in developing nuclear explosives and in operating nuclear-propelled naval vessels. Each application generates a variety of radioactive wastes in its respective life cycle. At the front end of this cycle is initial production. The essential materials in nuclear explosives (uranium and plutonium) and in nuclear fuel (uranium) are manufactured through different processes from naturally occurring uranium ore. Uranium mining, milling and refining generates large volumes of mill tailings, which contain radioactive decay products. Chemical separation processes used in uranium enrichment and plutonium production have further generated hundreds of thousands of cubic meters of highly radioactive and hazardous chemical waste. This waste, located *outside* northwest Russia, contains almost 99 percent of all the radioactivity present in by-products and waste generated by the production of nuclear explosives and nuclear fuel.

At the opposite, or 'back-end stage' of the life cycle are the operations connected with removing military nuclear materials from service. With respect to nuclear weapons, some weapons have been removed from service as a result of arms reduction agreements and unilateral decisions taken by the nuclear weapons states in the aftermath of the Cold War. This has resulted in surplus weapons-grade fissile material[2] that must now be disposed of safely and securely.

With respect to naval nuclear propulsion, the back-end stage includes operations connected with refuelling operating reactors and decommissioning the reactors of vessels removed from service. Normal refuelling involves the removal and disposition of spent fuel and coolant. Spent fuel may either be disposed of as high-level radioactive waste[3] or reprocessed into new fuel; additional high-level wastes are generated in the case of reprocessing. Normal decommissioning involves defueling the reactor, removing coolant, and disposing of radioactive components, including the reactor compartment. Thus in addition to spent fuel, the decommissioning process generates a large quantity of contaminated or activated material from the reactor plant, reactor compartment and adjacent ship sections in the form of solid and liquid radioactive waste. Decommissioning damaged reactor cores poses special problems that must be dealt with on a case-specific basis.

According to Russia's Ministry of Atomic Energy (Minatom), the Russian Federation has accumulated about 600 million cubic meters of radioactive waste, with an activity of about 74 $\times 10^{18}$ Bq (or 74 million TBq).[4] More than 90 percent of this quantity is related to military

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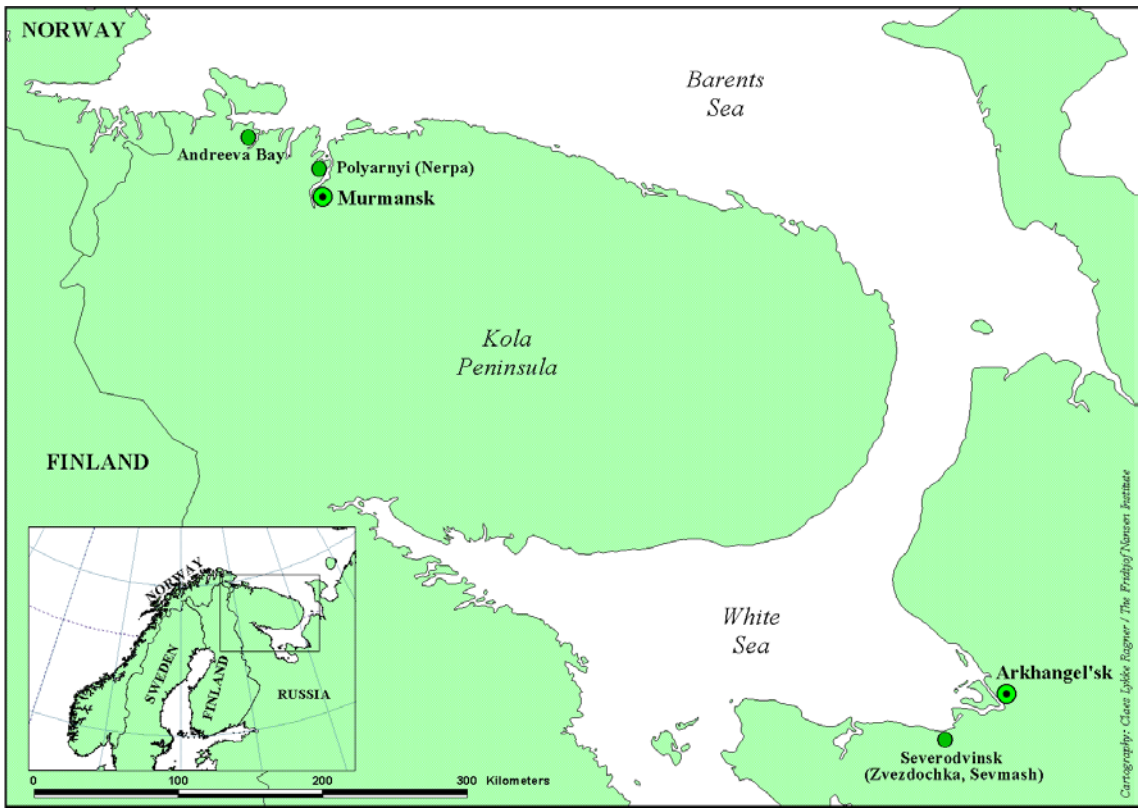
[2] *Weapons-grade* fissile material is generally defined as uranium-235 or plutonium-239 which is more than 90% isotopically pure. *Weapons-usable* fissile material is generally defined as highly enriched uranium (> 20% ^{235}U) or plutonium of any isotopic concentration.

[3] This study follows the waste classification system established by the International Atomic Energy Agency (IAEA), which classifies radioactive waste in three categories: exempt waste, low-level and intermediate-level waste, and high-level waste (technical definitions may be found in the glossary). There are variations to these categories, but the general IAEA classification scheme is sufficient for the purposes of this study.

[4] N. N. Yegorov, 'Plenary Address,' *International Co-operation on Nuclear Waste Management in the Russian Federation* (Vienna: International Atomic Energy Agency, 1995), 16. The *becquerel* (Bq) is the SI unit for

production of weapons-grade materials, and is located at the enterprises of Minatom throughout Russia. In addition to this waste, Russia stores about 8,500 tonnes of spent nuclear fuel with an activity of about 150 million TBq. Only a small fraction of this waste and fuel is associated with the construction, operation and disposition of Russian nuclear-powered submarines and surface combatants.



Map of Northwest Russia

Waste from Russia's nuclear-powered naval vessels

In 1958, the Soviet Union commissioned its first nuclear-powered naval vessel, the Project 627 (*November*) class submarine, *K-3*. A total of 254 nuclear-powered submarines and surface ships have entered service in the Soviet/Russian navy: 91 ballistic missile submarines (SSBN), 60 cruise missile submarines (SSGN), 93 fleet submarines (SSN), five mini-submarines, four *Kirov* class battle cruisers, and one *Kapusta* class communications ship.[5] The Soviet Union also built seven nuclear-powered icebreakers and the ice-strengthened, nuclear-powered cargo ship, *Sevmorput'*; these vessels are civilian rather than military, therefore they will not be discussed further.

expressing radioactivity; 1 Bq = 1 disintegration per second. The older unit *curie* (Ci) is equal to 37×10^9 Bq. Large quantities are usually expressed in *tera-becquerels* (TBq); 1 TBq = 1×10^{12} Bq.

[5] NATO, Cross-border Environmental Problems Emanating from Defence-related Installations and Activities, vol. 4, Environmental Risk Assessment for Two Defence-related Problems, report no. 227 (Brussels: North Atlantic Treaty Organization, 1998), I-8 and I-9; R. Sharpe, ed., Jane's Fighting Ships 1991-92, 94th ed. (Surrey: Jane's Information Group, 1991), 604 and 647.

Today, only about a quarter of these vessels—about 61 nuclear submarines and 4 surface combatants—are believed to be in active service.[6] The remainder have either been retired or placed in reserve after having reached the end of their normal service life, or in the case of some of the SSBNs, after having been withdrawn in accordance with arms reduction agreements. Although in press statements the Russian navy recently claimed to have as many as 76 nuclear submarines still in operation (26 strategic and 50 general purpose), it has also announced that the fleet will be further reduced in the near future, to be maintained at a level of about 32 nuclear submarines (12 strategic and 20 general purpose).[7] The term *strategic* submarine is synonymous with SSBN; the terms *non-strategic* and *general purpose* submarine refer collectively to SSGNs and SSNs, and are used interchangeably. Table 2.1 sets out an estimated status of Russia's nuclear-powered naval vessels.

Table 2.1 – Status of nuclear-powered naval vessels in the Russian navy

	Northern Fleet	Pacific Fleet	Total	Source
In service	39	26	65	Den Norske Atlanterhavskomité, pp. 32-34
Reserve/inactive	36	19	55	
Retired	72	48	120	Watson et al., pp. 15-16
Scrapped/struck [a]	13	1	14	Nilson, Kudrik and Nikitin, chap. 2.
Total	160	94	254	NATO, vol. 4, pp. I-8 and I-9

Note: a. Includes vessels sunk either as the result of a marine casualty or as a means of disposal.

Precise information on the number and status of Russian submarines withdrawn from service, the characteristics of their reactors, the number of fuel assemblies they contain, and other related details is considered classified national security information and has not been released by the Russian authorities. Minatom has provided less detailed information to the Contact Expert Group (CEG), a group of interested countries organised under the auspices of the IAEA to facilitate international cooperation on radioactive waste management in Russia. This information permits a general assessment of the current situation with respect to nuclear waste management arising from naval vessels retired from service. According to an April 2000 letter to the CEG by the Inter-branch Coordination Centre Nuklid (an affiliate of Minatom), about 120 submarines have been withdrawn from the Russian navy.[8] Of these, about 60 percent are located in northwest Russia and 40 percent in the Russian Far East. About 80 percent of the submarines still have their fuel on board. Due to corrosion and leakage of the ballast tanks, about 30 percent have low reserve buoyancy and are at risk of sinking should they be towed from their current location. This information is summarised in Table 2.2.

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[6] Den Norske Atlanterhavskomité, *Nordisk Sikkerhet: Militærbalansen 1999–2000* [Nordic Security: The Military Balance 1999–2000] (Oslo: Den Norske Atlanterhavskomité, 2000), 32-34.

[7] '32 Nuclear Subs to Remain in Service,' *Nuclear Chronicle from Russia*, 25 May 2000 (Oslo: Bellona).

[8] ICC Nuklid, 'Response to questions of the SWG/CEG prepared by ICC Nuclide on the instructions of RF Minatom,' dated 25 April 2000, excerpted in C. Watson et al., 'Additional Working Papers Prepared for the CEG Strategy Working Group,' submitted to the 10th meeting of the Contact Expert Group, Helsinki, 23-25 May 2000, draft 6 (Vienna: International Atomic Energy Agency, CEG Executive Secretary, 2000), 15-16. These are reported by Nuklid as '120 general purpose submarines,' but when compared with information from other sources, it would seem that this number must include ballistic missile submarines as well; cf., NATO, vol. 4, I-14 and I-15.

Table 2.2 – Status of submarines withdrawn from service in the Russian Navy

	Northern Region	Far East Region	Total
Total withdrawn from service	72	48	120
with nuclear fuel	67	29	96
without nuclear fuel	5	19	25
with low reserve buoyancy	22	14	36

Source: ICC Nuklid, excerpted in Watson et al., pp. 15-16.

Using the concept of a 'theoretical submarine' introduced by Nuklid, we can estimate that each of these retired submarines yield an average of 455 spent nuclear fuel assemblies.[9] As most Russian submarines have two reactors, this estimate corresponds closely to the 200–250 fuel assemblies per reactor assumed in a NATO study on the management of defence-related radioactive waste.[10] Draining and flushing the reactor circuits generates about 250 m^3 of liquid radioactive waste per submarine.[11] After the reactor is defuelled, drained and flushed, the reactor compartment is cut from the hull, sealed, and stored either temporarily afloat or indefinitely at a repository ashore. The reactor compartment represents 95 percent of the solid radioactive waste generated by each submarine. The remaining 5 percent, an average of about 125 m^3 per submarine, is miscellaneous solid radioactive waste that needs to be managed separately ashore.[12]

Until the early 1990s, liquid and solid radioactive wastes generated by the Soviet navy were disposed at sea.[13] Naval facilities were equipped with only short term storage facilities, and a fleet of special vessels, such as the *Ural*, *Vala* and *Belianka* class special tankers, were operated for collecting and disposing of radioactive wastes in the Barents, Kara and White Seas, and in the seas adjacent to the Russian Far East.[14] Although Russia abstained from the 1993 amendments to the London Convention prohibiting the at-sea disposal of low-level radioactive waste, it suspended marine disposal activities in 1993 and has voluntarily complied with the 1993 amendments.[15] Following this change in its waste management practices, the Russian navy has been accumulating radioactive wastes in both floating and shore-based storage facilities that are now either at or near the limit of their capacity. Accor-

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[9] A 'theoretical submarine' is said to yield 65 canisters of spent nuclear fuel, each canister containing seven or fewer fuel assemblies of about 10 kg uranium oxide (UO_2). ICC Nuklid, excerpted in Watson et al., 16.

[10] NATO, Cross-border Environmental Problems Emanating from Defence-related Installations and Activities, vol. 3, Management of Defence-related Radioactive Waste, report no. 226 (Brussels: North Atlantic Treaty Organization, 1998), 27. This is an order of magnitude less, however, than an estimate in vol. 4 (p. I-37) of this same study, which assumes that the reactor plant of Russia's second-generation submarines is similar to the reactor used in the nuclear-powered cargo vessel Sevmorput', which has 493 fuel assemblies of 7 kg UO_2.

[11] Watson et al., 30.

[12] Watson et al., 30. On occasion, some of the miscellaneous solid waste has been stored and sealed inside the reactor compartment, but this process exposes workers to a higher radiation dose.

[13] A. V. Yablokov et al., *Facts and Problems Related to Radioactive Waste Disposal in Seas Adjacent to the Territory of the Russian Federation* (Moscow: Small World Publishers, 1993). This report is commonly referred to as the 'Yablokov report,' or in Russia, as the 'White Book.'

[14] T. Nilsen, I. Kudrik and A. Nikitin, *The Russian Northern Fleet: Sources of Radioactive Contamination*, Report no. 2 (Oslo: Bellona, 1996), chap. 3; Sharpe, *Janes Fighting Ships 1991–92*, 654.

[15] O. S. Stokke, 'Nuclear Dumping in Arctic Seas: Russian Implementation of the London Convention,' in *The Implementation and Effectiveness of International Environmental Commitments: Theory and Practice*, ed. D. G. Victor, K. Raustiala and E. G. Skolnikoff (Cambridge: MIT Press, 1998).

ding to the CEG Strategy Working Group, facilities in northwest Russia have accumulated an estimated 13,500 m^3 of liquid radioactive waste and about 10,200 m^3 of solid waste.[16] This material is mainly low- and intermediate-level waste. Substantial discrepancies in the data published by Russian authorities, however, make it difficult to provide a reliable estimate of radioactivity. For example, some 17,000 m^3 of liquid radioactive waste held at naval bases and shipyards was stated to have an activity level of 27.4 TBq in a report by Minatom representatives, but only 4.6 TBq in a report published jointly by the All-Russian Scientific Research Institute of Chemical Technology and the Kurchatov Institute.[17]

Russia normally sends spent naval nuclear fuel to the Mayak Production Association in the southern Urals for reprocessing, where plutonium is extracted and where uranium-235 is recovered and recycled into new fuel. Some types of spent naval fuel, however, are either uneconomical or unsuitable for reprocessing at Mayak: e.g., fuel with a low level of uranium-235 enrichment (assumed to be older fuel), fuel elements which are clad in certain zirconium alloys, fuel used in liquid metal-cooled reactors, and damaged fuel. Based on information from Nuklid, an estimated 28,000 such spent fuel assemblies have been accumulated by the Northern Fleet and are currently held at naval bases and in floating storage in northwest Russia.[18] This includes about 22,750 assemblies at Andreeva Bay in tank stores and in ageing casks, about 900 assemblies at Gremikha in ageing casks and in canisters located in channels in a special store, 639 unreprocessable assemblies stored aboard the service vessel *Lepse*, and about 3,900 damaged and unreprocessable assemblies aboard the service vessel *Lotta*.

Table 2.3 summarises the various estimates above regarding the amount of spent naval nuclear fuel and radioactive waste that are currently held in northwest Russia. In addition to the 72 submarines that are officially listed by Nuklid as retired, the table includes an estimated 49 submarines in the region believed to be either in reserve, inactive, or planned to be withdrawn from service to meet the Russian navy's announced force reductions. It assumes that each submarine yields 455 spent fuel assemblies, 250 m^3 of liquid radioactive waste, and 125 m^3 of miscellaneous solid radioactive waste. The quantity of solid waste listed in the table, however, does not include the submarine reactor compartment itself. As previously described, the reactor compartment is cut from the submarine's hull during the dismantling process and is stored separately as a discrete unit of solid radioactive waste. Each submarine yields one reactor section, therefore, 128 reactor compartments will need to be stored as a result of dismantling the submarines listed in Table 2.3.

Table 2.3 – Spent nuclear fuel and radioactive waste in northwest Russia

	Spent nuclear fuel assemblies	Liquid radwaste m^3	Solid radwaste m^3
In interim storage ashore and afloat	28,000	13,500	10,200
In 7 floating reactor sections	1,600	1,750	875
In 67 retired submarines with fuel	30,500	16,750	8,375
In 5 retired submarines without fuel	0	1,250	625
In 49 reserve and other submarines	22,300	12,250	6,125
Total	82,400	45,500	26,200

Source: Watson et al.

[16] Watson et al., 13.

[17] See Watson et al., 27-28.

[18] ICC Nuklid, excerpted in Watson et al., 17.

2.3 What kind of a threat does it represent?

Environmental security—the threat to humans and the biosphere

Radioactivity is accompanied by the emission of ionising radiation, which can damage living cells in plants and animals, including humans. The principal human health concern is that chronic exposure to radionuclides will lead to an increased risk of cancer or genetic damage. Acute exposure to high doses—usually the result of being in the near vicinity of a serious accident—can kill cells, which can cause radiation sickness and possibly death.

Because of its unique ecology, the Arctic terrestrial ecosystem is more vulnerable to radioactive contamination than temperate regions. Efficient uptake of radionuclides by Arctic plants and their transport to grazing animals such as caribou and reindeer leads to Arctic inhabitants receiving higher radiation doses than people in other regions of the world. Arctic and sub-Arctic residents have, on average, a five-fold higher exposure to radionuclides than populations in temperate regions, and individuals with a diet high in local terrestrial and freshwater foodstuffs can have exposures up to 50 times higher.[19] In Fennoscandia and northwest Russia, the population receive their major radiation dose via terrestrial and freshwater pathways from global fallout released by past atmospheric nuclear weapons tests (ceased in 1980) and regional fallout from the 1986 Chernobyl' accident. In general, human exposure to radionuclides in the Arctic has declined since the cessation of atmospheric nuclear weapons tests.

The European Arctic is unique for the high concentration of radioactive sources located in the region, including nuclear-powered ships, nuclear weapons, spent nuclear fuel and radioactive waste storage sites on land, radioactive wastes disposed of at sea, and sunken nuclear submarines. These sources have contaminated local areas and are of considerable concern among northern residents. However, the Arctic Monitoring and Assessment Programme (AMAP) concluded that contamination from these regional sources remains mainly localised and is currently only of 'negligible radiological significance' in relation to public health risks in the Arctic.[20]

Despite this conclusion, however, the AMAP assessment report warns that the large concentration of radioactive sources located in northwest Russia presents a serious potential risk of contamination to the Arctic environment and its inhabitants:

> The overall conclusion of this assessment is that the greatest threats to human health and the environment posed by human and industrial activities in the Arctic are associated with the potential for accidents in the civilian and military nuclear sectors. Of most concern are the consequences of potential accidents in nuclear power plant reactors, during the handling and storage of nuclear weapons, in the decommissioning of nuclear submarines and in the disposal of spent nuclear fuel from vessels.[21]

Particular attention has been given to the potential for accidents from retired submarines that have not yet been defuelled. Among various conceivable accident scenarios, a NATO study concluded that only two give rise to real concern.[22] The first is a core heat-up event, caused by a coolant leak or loss of coolant circulation to the reactor. Because the activity of a reactor core decreases with time, the possibility of a core heat-up event also decreases. One to

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[19] AMAP, *AMAP Assessment Report* (Oslo: Arctic Monitoring and Assessment Programme, 1998), 609-611.

[20] Ibid., 609.

[21] Ibid., 609.

[22] NATO, *Cross-border Environmental Problems Emanating from Defence-related Installations and Activities*, Summary final report, report no. 223 (Brussels: North Atlantic Treaty Organization, 1998), 25.

three years after the reactor has been shut down, the production of decay-heat is too low to melt the fuel, making core heat-up accidents impossible, even with a complete loss of coolant. The second, and greater concern is that of a criticality event, caused by accidents or irregular procedures during fuelling or defueling. Because the reactor vessel and the submarine hull are open to the atmosphere during these operations, a rapid criticality event will lead to a release of radionuclides into the surrounding environment. A criticality incident involving a submarine reactor would release on the order of 100 TBq of strontium-90 and several hundred TBq of cesium-137 (an estimated 70,000 TBq of cesium-137 were released during the 1986 Chernobyl' disaster).

The risk of cross-border radioactive contamination from a criticality incident while defueling a Russian nuclear submarine was judged to be low. For a hypothetical accident occurring in Ara Bay on the Kola Peninsula (76 km from Norway), a plausible worst-case calculation for northern Norway shows that even with winds heading directly towards Kirkenes, short-term radiation doses there would be below one year of natural background radiation.[23] As experience shows, however, local-area consequences can be severe. In 1985, for example, a criticality incident occurred while a *Victor I* class submarine was being refuelled at the Chazhma Bay naval yard near Vladivostok. The accident killed ten people involved in the refuelling operation, and it contaminated an area six kilometres wide.[24]

Leaving the reactor fuel in a decommissioned nuclear submarine for a long period of time does not constitute good practice. Defuelling completely eliminates the possibility of core criticality. It also reduces the radionuclide inventory aboard the submarine by 90 to 99 percent; the remaining radioactivity is imbedded in the reactor materials and may only be released by corrosion, which is a very slow process. Furthermore, defuelling reduces supervision requirements as well as public anxiety over a situation generally perceived to be hazardous.[25]

Economic security—the threat to economic activity

When the 1986 Chernobyl' disaster swathed Fennoscandia's pastures with radioactive fallout, it was quickly evident that certain aspects of the agriculture sector would be adversely affected, especially domestic reindeer and other grazing animals. In the first year after the accident, more than 73,000 reindeer in Sweden, or 78 percent of the 1986 production, were condemned as unfit for human consumption due to excessive radiocesium levels.[26] In Norway, 85 percent of the reindeer production for 1986 would have been condemned if the government had not intervened by raising the allowable radiocesium action levels by a factor of 10; nevertheless, 560 tonnes of reindeer meat (25 percent of the total production) valued at NOK 20 million were condemned.[27] While mitigation efforts were able to reduce the radiocesium uptake of reindeer and other grazing animals to below the limits set by national health

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[23] NATO, Summary, 23, 27.

[24] Nilsen, Kudrik and Nikitin, 154.

[25] NATO, Summary, 24.

[26] B. Åhman and G. Åhman, 'Radiocesium in Swedish Reindeer after the Chernobyl Fallout: Seasonal Variations and Long-term Decline,' *Health Physics* 66 (1994): 504.

[27] Strand, L. I. Brynildsen, O. Harbitz and U. Tveten, 'Measures Introduced in Norway after the Chernobyl Accident: A Cost-benefit Analysis,' in S. Flitton and E. W. Katz (eds.), *Environmental Contamination Following a Major Nuclear Accident*, Report no. IAEA-SM-306 (Vienna: International Atomic Energy Agency, 1990), 196.

authorities, a decrease in consumption of some of the most affected foods did occur due at least in part to public fear over radioactivity.[28]

The Norwegian government understands the connection between the effects of Chernobyl' on the country's agriculture sector and, even more importantly, the potential effects of nuclear contamination in the Arctic on the seafood industry. Seafood products are Norway's third largest export commodity, following only oil and gas in their importance to the national economy. In 1998, seafood made up 8.7 percent of Norway's total exports by value, at NOK 26.5 billion.[29] Although the results from joint Norwegian–Russian radiological surveys have shown that there is no significant contamination of the Kara or Barents Seas,[30] there is still cause for concern: if consumers perceive that fish from the Barents Sea are contaminated by radioactivity, despite scientific evidence to the contrary, it could have serious economic implications for Norway.

Per Tresselt, then Norway's ambassador to Russia, explained in a contribution to the Russian international affairs journal the importance of maintaining consumer confidence in the quality and purity of fish caught in the Barents Sea:

> The slightest rumour of unsatisfactory quality or of radioactive contamination of the fish can have serious consequences at a time when environmental considerations play a growing role in the mind of the consumer. Public opinion is more and more prone to react emotionally to information from the mass media about issues generating anxiety, especially where risks tied to the nuclear issue are involved. The consumer's reaction, where the acceptance of a product is concerned, can be severe and long-lasting.[31]

One need only look to the United Kingdom and Belgium to confirm the economic impact that can result from a loss of consumer confidence. In 1996, the EU and more than 30 countries banned British beef due to concern over BSE, or 'mad cow disease.' Before the ban, British beef exports were valued at £520 million (NOK 5.1 billion) per year. Although the EU lifted its export ban in August 1999, exports are at only two percent of their former level.[32] The effects of a food contamination incident, whether real or perceived, are not limited to economic losses—they can have swift political ramifications as well. A dioxin contamination scare in Belgium last year cost the Belgian food industry some 1.5 billion euros (NOK 12 billion) and precipitated the devastating defeat of Prime Minister Jean-Luc Dehaene's centre-left coalition government.

It thus comes as no surprise that a principal foreign policy objective of Norway has been to assist the Russian Federation in improving its nuclear waste management practices so that it will not have cause to resume its former practices of disposing radioactive wastes into the Arctic. As then Foreign Minister Bjørn Tore Godal stated when presenting the government's

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[28] Strand, Radioactive Fallout in Norway from the Chernobyl Accident: Studies on the Behaviour of Radio-caesiums in the Environment and Possible Health Impacts, report no. 2 (Østerås: Statens strålevern, 1994), 44-46.

[29] Statistics Norway, *Statistisk Årbok 1999* (Oslo: Statistisk sentralbyrå, 1999), table 297.

[30] Radionuclide levels in the Barents Sea are less than in many other marine areas, such as the Irish, Baltic and North Seas. AMAP, *Arctic Pollution Issues: A State of the Arctic Environment Report* (Oslo: Arctic Monitoring and Assessment Programme, 1997), 126.

[31] Tresselt, 'Sosedi po Severu' [Neighbors in the North], *Mezhdunarodnaia Zhizn'*, no. 5 (1997): 37.

[32] US Foreign Agricultural Service, 'U.K./EU Agricultural Issues' (London: US Foreign Agricultural Service, 1999).

action plan for nuclear safety to the Storting, 'For Norway, ensuring that the northern seas continue to be among the cleanest in the world is an immutable goal.'[33]

Military security—the threat of nuclear proliferation

The proliferation of nuclear weapons to irresponsible regimes and groups represents a serious threat to global security. Paradoxically, the threat of nuclear proliferation has increased since the end of the Cold War: as the strength of Russia's social, economic and political systems has declined, the motive and opportunity to steal nuclear material have increased.

Under the Soviet regime, military guards and the state security forces maintained a constant surveillance over nuclear materials and the people who worked with them. At the same time, nuclear scientists and workers had little reason to steal nuclear materials, because they enjoyed high social status, high wages and special benefits. Submarine crews and their counterparts in the Strategic Rocket Forces likewise comprised the elite of the Soviet military. Today, however, the country's ongoing economic crisis has severely undermined the foundations of its nuclear safeguards system. Budget cuts have reduced the security staff, security system maintenance has been deferred, and nuclear workers and military personnel have gone months without receiving their wages.[34] These circumstances increase the vulnerability of Russia's nuclear materials to theft and diversion: poorer security makes them easier to acquire, and socio-economic hardship increases the temptation to steal or divert nuclear material to those who would pay handsomely for it.

A mere eight kilograms of highly enriched uranium (generally taken to mean greater than 20 percent uranium-235) or plutonium is said to be sufficient to manufacture a nuclear weapon.[35] Russia is believed to have produced more than 1200 tonnes of highly enriched uranium and 150 tonnes of plutonium. More than half of this material is thought to currently reside in assembled nuclear weapons; the remainder is in the form of metals, oxides, solutions and scrap, as well as in some types of nuclear reactor fuel, including naval reactor fuel. Uranium fuel for use in naval propulsion is presumed to have a high degree of uranium-235 enrichment, approaching 90 percent in modern vessels.[36] The excess reactivity provided by highly enriched fuel is necessary for the reactor to respond quickly to the changing power demands of a naval vessel. It also prolongs the intervals between refuelling, thereby increasing a vessel's operational availability. Whereas assembled weapons are closely accounted for, heavily guarded and difficult to transport, weapons-usable material in other forms, including naval reactor fuel, is stored under considerably less security, making it particularly vulnerable to diversion.

The principal concern is the theft, diversion or sale of weapons-usable fissile material. There have already been several attempts to divert highly enriched uranium in the form of submarine fuel from northwest Russia.[37] In July 1993, two naval servicemen, a sailor and a guard, stole 1.8 kg of uranium enriched to 36 percent from the Northern Fleet's fuel storage

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[33] B. T. Godal, 'Statement to the Storting on Nuclear Safety Issues,' *UD Informasjon*, no. 20 (29 October 1996): 24.

[34] M. V. McClary, K. B. Sheely and J. E. Doyle, 'Status Report from the Russia/NIS Nuclear Materials Security Task Force, US Department of Energy,' in *Partnership for Nuclear Security: United States/ Former Soviet Union Program of Cooperation on Nuclear Material Protection, Control and Accounting* (Washington, DC: US Department of Energy, Office of Arms Control and Nonproliferation, 1997), 1.

[35] McClary, Sheely and Doyle, 2.

[36] NATO, vol. 3, 21-24.

[37] *See* J. C. Moltz, 'Russian Nuclear Submarine Dismantlement and the Naval Fuel Cycle.' *The Nonproliferation Review* 7 (1, 2000): 76.

facility at Andreeva Bay in Murmansk *oblast'*. During the guard's watch, the pair broke the padlock on the door to the storage area, took two fuel rods, and used a hacksaw to remove the fuel elements. They were apprehended by Russian security forces before they could smuggle the material out of the country. In a second incident, in November 1993, two naval officers stole 4.5 kg of uranium enriched to 28 percent from a fuel storage bunker at the Sevmorput' naval shipyard in Murmansk. The officers broke the lock to the bunker, removed the fuel elements from three fuel rods, and stored them in a bag in their garage. Seven months later, the two were apprehended and the material recovered after a third officer informed authorities about their inquiries into potential buyers for the material.[38] There are more recent cases as well. In July 2001, Georgian authorities recovered 1.7 kg of what they believe may be highly enriched uranium stolen from a Russian submarine base near Murmansk.[39]

The incidents described above involved fresh naval reactor fuel rather than spent fuel. Irradiating nuclear fuel makes it less attractive to a would-be proliferator, as some type of chemical processing would be necessary to separate unburned uranium-235 from the fission products created during irradiation. The greater the degree of irradiation, or 'burn-up,' the more extensive reprocessing is required, and thus the less attractive the fuel is from a proliferation standpoint. Nevertheless, spent fuel still retains a large percentage of unused uranium that can be extracted by chemical means and reused. Depending upon its initial enrichment level and its particular burn-up rate, spent fuel can provide fissile material of sufficient quality to build a nuclear weapon. Russian reticence to discuss fuel enrichment levels and burn-up rates, however, makes it difficult to assess the proliferation threat posed by spent naval nuclear fuel in northwest Russia.[40]

World-wide, there have been more than 370 confirmed incidents of illicit trafficking in nuclear material and other radioactive sources since 1993.[41] The annual rate of incidence appears to be increasing: the Russian State Customs Committee claims that it detected about 100 attempts in 1999 to import or export radioactive isotopes or nuclear materials illegally, as compared to five in 1995.[42]

Related to nuclear nonproliferation is the issue of preventing nuclear terrorism. The IAEA's advisory guidelines on the physical protection of nuclear materials recognise the need to prevent the malevolent dispersal of radioactive substances.[43] Therefore, even if spent fuel is not easily converted to weapons-usable material, it can still be used by terrorists to manufacture a so-called 'dirty bomb,' where conventional explosives are used to spread high-level

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[38] E. Ewell, T. Dalton and G. Webb (eds.), *Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapons, Fissile Material, and Export Controls*, no. 5 (Monterey: Monterey Institute of International Studies and Carnegie Endowment for International Peace, 1998), 106-108; Nilsen, Kudrik and Nikitin, 36.

[39] A. Gentleman and E. MacAskill, 'Weapons-grade Uranium Seized,' *The Guardian* (London), 25 July 2001. In another case, also in July 2001, French authorities recovered 5 grams of uranium enriched to 85% uranium-235; the material can only have originated in a nuclear weapons facility, most likely from one of the former Soviet republics. A. Palmer, 'The Blackest Market of All,' *Sunday Telegraph* (London), 29 July 2001. Such incidents may have had far-reaching implications; *see* S. Parrish and T. Robinson, 'Efforts to Strengthen Export Controls and Combat Illicit Trafficking and Brain Drain,' *The Nonproliferation Review* 7 (1, 2000): 112-24.

[40] In response to a question about spent fuel burn-up rates posed by Paul Moskowitz of the Brookhaven National Laboratory at a meeting of the Intergovernmental Working Group on Nuclear Waste Problems in Russia (Washington, DC, 1–2 March 2000), Vitalii Lystsov of the Kurchatov Institute responded that such information could not be released.

[41] G. Anzelon, IAEA, personal communication with Sawhill, 13 June 2001.

[42] Parrish and Robinson, 119.

[43] IAEA, *The Physical Protection of Nuclear Material and Nuclear Facilities*, INFCIR/225/Rev.4 (Vienna: International Atomic Energy Agency, 1999).

radioactive material over a large area.[44] Because spent naval fuel in Russia is not provided the more stringent security and accountability measures afforded nuclear weapons and even fresh fuel, this material could become an easy target for theft, diversion or sabotage.

Submarines may also become targets of terrorism.[45] In September 1998, for example, a Russian sailor frustrated with deteriorating conditions in the navy killed eight servicemen and then barricaded himself in the torpedo room of his *Akula*-class attack submarine. He held the vessel hostage at its base on the Kola Peninsula for 24 hours, threatening to destroy it together with its weapons and two nuclear reactors, before he died in an explosion that he apparently set. Still other threats include the theft or diversion of a poorly guarded, decommissioned submarine, the possible sale of decommissioned submarines to other countries, and the possibility that Russia may return a decommissioned submarine to active service.[46]

2.4 Security and cooperation

International security has become a complex function of interrelated factors, including not just military factors, but economic, social and ecological aspects as well. Arthur H. Westing, among others, has suggested that security is defined as both the prevention of armed conflict and the fulfillment of basic human needs and amenities; environmental, economic and social factors play an important role in satisfying both requirements.[47] Although the concept of comprehensive security does not yet have a widely accepted definition among scholars,[48] it has entered into the political lexicon in several political quarters. The Nordic states were early proponents, and much work in this vein has been done at the International Peace Research Institute in Oslo. The concepts also appeared in Soviet declaratory diplomacy in the 1980s; Gorbachev's Murmansk speech in 1987 represented one of its regional manifestations.[49] Environmental security was formally introduced as early as 1987 at the forty-second session of the United Nations General Assembly.[50] New security thinking may also be found in the United States. In 1992, the Clinton administration included economic and environmental factors in the revision of its national security doctrine, and created a post of deputy under secretary of defense for environmental security.[51]

The nuclear *problematique* in northwest Russia illustrates the confluence of environmental, economic and military aspects of security. As this chapter has indicated, force reductions in the Russian navy have led to an accumulation of fissile material and radioactive

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[44] US Department of Defense, Office of Environmental Security, *Program Plan and Proposed Obligations for the Arctic Military Environmental Cooperation Program FY 1999* (Washington, DC: US Department of Defense, Office of Environmental Security, 1999), 9.

[45] Moltz, 'Naval Fuel Cycle,' 76.

[46] J. C. Moltz, 'Closing the NPT Loophole on Exports of Naval Propulsion Reactors,' *The Nonproliferation Review* 6 (1, 1998): 108-114.

[47] A. H. Westing, 'The environmental component of comprehensive security,' *Bulletin of Peace Proposals* 20 (2, 1989): 129-134.

[48] Indeed, scholars do not agree upon whether the concept itself is valid. *See* D. H. Deudney and R. A. Matthew (eds.), *Contested Ground: Security and Conflict in the New Environmental Politics* (Albany: State University of New York Press, 1999).

[49] D. Scrivener, Gorbachev's Murmansk Speech: Soviet Initiative and Western Responses (Oslo: Norwegian Atlantic Committee, 1989), 23.

[50] N. Schrijver, 'International Organization for Environmental Security,' *Bulletin of Peace Proposals* 20 (2, 1989): 115.

[51] Sherri Goodman, Deputy Under Secretary for Environmental Security, US Department of Defense, interview with Sawhill, December 1996.

waste, most of which is managed in an unsafe and insecure manner. At present, radioactive contamination from these sources is mainly localised. Of greater concern is the potential for more widespread contamination of the Arctic environment and its inhabitants from accidents during the handling and storage of nuclear weapons, in the decommissioning of nuclear submarines, or in the disposal of spent fuel from vessels. Accidents also pose a serious threat to regional economic activity, even where there is not a significant release of radioactivity. Recent incidents around the world have demonstrated that even the perception of food contamination can have serious economic consequences. Because the economy of northern Norway is so heavily dependent upon its Barents Sea fisheries, maintaining consumer confidence in its seafood products is a principal national interest in Norway. Finally, nuclear proliferation and terrorism pose global threats to security. In northwest Russia, weapons-usable fissile material is vulnerable to theft, diversion or sale; indeed, there have already been several attempts to divert highly enriched uranium in the form of submarine fuel from the region.

Comprehensive security not only adds new aspects to the definition of national security, it also changes the strategy for achieving it from one of opposition to one of cooperation. This is a logical conclusion, given the transnational character of economics and the environment, and the linkage between the two. A cooperative approach is especially relevant to the security challenges posed by defence-related nuclear waste. Because the potential effects extend beyond Russia's national borders and the challenges defy unilateral solutions, international cooperation emerges as the only viable strategy. East–West cooperation in the defence nuclear sector is a relatively recent development, given the adversarial nature of their former relationship and the extreme sensitivities surrounding military applications of nuclear energy. Nevertheless, several western states are working cooperatively with Russia to help it address its waste management problems. The next chapter examines four foreign assistance programmes that are relevant to defence-related nuclear waste in northwest Russia.

Chapter 3
Cooperative Programmes

3.1 Introduction

Russia lacks a comprehensive, 'cradle to grave' system for decommissioning its nuclear-powered submarines and warships, and lacks the capacity to create one in the foreseeable future. Other states are increasingly concerned about the consequences of the rapidly accumulating number of retired submarines, fissile material and radioactive waste. Several foreign assistance programmes have been created to help ameliorate the actual and potential threats posed by this material:[52]

- the US Cooperative Threat Reduction programme
- the US Material Protection, Control and Accounting programme
- the Norwegian Plan of Action for Nuclear Safety
- the Arctic Military Environmental Cooperation programme

This chapter introduces the four programmes listed above with specific reference to their activities in the area of defence-related nuclear waste.

3.2 Cooperative Threat Reduction programme

The Cooperative Threat Reduction programme, or CTR, was created by the US Congress in 1991 to assist the nuclear successor states of the Soviet Union in safeguarding and reducing their nuclear weapons stockpiles. The programme also helps to transport, store and safeguard weapons in connection with their destruction, and establish verifiable safeguards against the proliferation of those weapons. The programme is often referred to as the Nunn–Lugar programme after its principal congressional sponsors, senators Sam Nunn and Richard Lugar. Since 1991, Congress has appropriated almost $4 billion through annual defence spending bills to carry out the CTR programme's weapons dismantlement and denuclearisation activities in Russia, Belarus, Kazakhstan and Ukraine.[53]

The CTR programme's chief focus is eliminating strategic weapons and their launching systems: i.e., intercontinental ballistic missiles, heavy bombers and ballistic missile-firing submarines. A principal objective within this focus is to ensure that Russia can meet its arms reduction obligations under the START I treaty.[54] Under the treaty, the US and Russia must reduce to 1600 deployed ballistic missiles and heavy bombers, and 6000 warheads on those missiles and bombers; launchers associated with the missiles must also be eliminated. With respect to Russia's submarine-launched ballistic missiles (SLBMs), this meant eliminating about 564 missile tubes (equivalent to about 31 ballistic missile-firing submarines) by 5

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[52] Other assistance programmes were created to improve nuclear safety in the *civil* nuclear sector. Prominent examples include the EU's TACIS programme and the EBRD's Nuclear Safety Account, together with several bilateral programmes.

[53] A budget and legislative history for the CTR programme is located in Appendix I to this report.

[54] US Department of State, 'Treaty between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms,' with annexes, protocols and memorandum of understanding, 31 July 1991, *Treaties and Other International Acts Series* [START I treaty].

December 2001. Under the START II treaty, the US and Russia must further reduce their deployed ballistic missiles, heavy bombers, and associated launch systems by 31 December 2007.[55]

Technically speaking, Russia can comply with the provisions of the START treaties simply by removing the missile compartment from the submarine hull and cutting the missile tubes in half.[56] Although requirements from the perspective of treaty compliance seem simple enough, practically speaking, it is a major engineering operation that cannot be undertaken without due regard for the disposition of the remainder of the submarine. Reactor safety, fissile material security, and hazardous and radioactive materials management are only a few of the issues that must be taken into consideration. Realistically, eliminating the missile launch tubes must be considered as but one step in a comprehensive process to dismantle the entire submarine.

The rate at which a submarine can be scrapped is largely dictated by how quickly the reactor fuel can be removed. The defuelling process is in turn governed by the availability of facilities for managing irradiated nuclear fuel and radioactive wastes, where 'management' refers to all administrative and operational activities involved in their handling, pre-treatment, treatment, conditioning, transport, storage and disposal.[57]

In 1995, Russian officials reported that they could unload only four submarine reactor cores annually.[58] With the typical Russian submarine having two reactors, this meant a rate of only two submarines a year—clearly insufficient to dismantle 31 SSBNs within the START I deadline, and woefully inadequate to handle within a reasonable time frame the scores of non-strategic submarines that Russia was retiring *en masse*. One of the chief obstacles to increasing this rate was Russia's lack of capacity to manage spent fuel and radioactive waste. Reporting on an opinion issued by the Contact Expert Group in 1997, the CEG chairman summarised the situation as follows:

> The Russian facilities for handling this fuel and associated radioactive waste on such a scale were characterized as '*either not available or inadequate*' by the experts, the capacities for treating it '*severely limited*,' for storing it '*virtually non-existent*' and the possibilities of transporting it '*restricted and are becoming even more so*.'[59]

Chronic budget shortfalls at Russia's shipyards were also an obstacle. Early CTR assistance consisted mainly of providing heavy industrial equipment, such as cutting tools, cranes and other items needed for removing the missile tubes and scrapping submarine hulls, but did not actually pay the shipyards for carrying out the work—this was the Russian government's responsibility. Without sufficient and regular payments from Moscow,

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[55] US Department of State, 'Treaty between the United States of America and the Russian Federation on the Further Reduction and Limitation of Strategic Offensive Arms,' 3 January 1993, as amended by the Protocol of 26 September 1997, *Treaties and Other International Acts Series* [START II treaty].

[56] The agreed process for eliminating SLBM launchers is contained in Section IV of the Conversion or Elimination Protocol to the START I treaty.

[57] IAEA, Safety Glossary: Terminology Used in Nuclear, Radiation, Radioactive Waste and Transport Safety (Vienna: International Atomic Energy Agency, 2000), 143.

[58] I. I. Melnitchenko, 'State Committee for Defence Branches of Industry of the Russian Federation,' in *International Co-operation on Nuclear Waste Management in the Russian Federation* (Vienna: International Atomic Energy Agency, 1995), 85.

[59] C. Newstead and B. Semenov, 'Report from the Contact Expert Group (CEG) for International Radwaste Projects in the Russian Federation (under the auspices of the IAEA),' submitted to the 6th meeting of the Barents Euro-Arctic Council, Bodø, 3–5 March 1999 (Vienna: CEG Secretariat, International Atomic Energy Agency, 1999), 4; emphasis in the original.

however, the shipyards were unable to pay their workers, operate and maintain their equipment, or even maintain basic electricity and water services at their facilities.[60]

Russia's waste management infrastructure and budgetary allocations were clearly insufficient to the task: despite the CTR aid, they managed to dismantle only five SSBNs between 1995 and 1998. The backlog in the decommissioning process threatened Russia's ability to implement its arms reduction commitments. Because the delays struck at the very heart of US strategic security objectives, CTR shifted from providing equipment and technology, to signing direct contracts with Russian shipyards to dismantle strategic submarines. Under this scheme, the US would provide funds on a so-called 'deliverables' basis, meaning that the yards were paid for work upon completion. The first contract, signed with the Zvezdochka shipyard in March 1997, proved successful, and additional contracts followed. CTR plans to dismantle 36 SSBNs on this direct contract basis. Taking into account the five SSBNs previously dismantled, this brings the total number of vessels to be dismantled to 41, which should be completed by the end of 2007 (see Table 3.1).

In addition to relieving the shipyards' payment problems, CTR provided some $50 million for infrastructure improvements at the three shipyards designated under the START treaty for SSBN dismantlement: Nerpa and Zvezdochka in northwest Russia, and Zvezda in the Pacific. Infrastructure improvements include building shore-based facilities for defuelling reactor cores, installing equipment for processing low-level radioactive waste, and repairing two *Malina* class service vessels. The improvements have increased the yards' capacity to dismantle submarines. Nerpa can now dismantle two to three submarines per year; an additional shipway will increase its capacity to four to six per year. After the shore-based off-loading facilities are completed, Zvezdochka will be able to dismantle six submarines per year and Zvezda eight.[61]

CTR officials acknowledge that there may be a need to upgrade additional facilities in northwestern Russia if submarines cannot be moved safely to Nerpa, Zvezdochka or Sevmash.[62] One example is Gremikha, a remote submarine base along the northern coast of the Kola Peninsula. Twelve submarines located there cannot be towed but must be defuelled on site. Of the twelve, only six will fit into Gremikha's dry-dock, which needs to be renovated before it can be used. *Malina* class service ships can be used to defuel the remaining six submarines; an additional service ship may be repaired and re-certified in order to facilitate this work. Infrastructure improvements at Gremikha will cost an estimated $20 million.

The disposition of irradiated fuel remains a major obstacle to progress. A serious backlog of spent fuel was piling up at the shipyards: Russia could afford to reprocess spent fuel from only one submarine per year, and lacked suitable storage, either in the region or outside, at which to hold the fuel in the interim. Because this was having a harmful effect on submarine dismantlement, the CTR programme contracted with the Mayak Chemical Combine to reprocess spent fuel from six (and possibly up to 15) SSBNs. The highly controversial measure—which required a special legislative waiver given current US nonproliferation policy—was justified as essential to ensure the implementation of START I by 2001.[63] Plutonium and uranium recovered from reprocessing will be stored under enhanced security provided by the US Material Protection, Control and Accounting (MPC&A) programme

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[60] J. C. Moltz, 'Russian Nuclear Submarine Dismantlement and the Naval Fuel Cycle,' *The Nonproliferation Review* 7 (1): 78.

[61] Colonel Jim Reid, Defense Threat Reduction Agency, presentation at the Intergovernmental Working Group (IWG) Meeting on Nuclear Waste Problems in Russia, Washington, DC, 2 March 2000.

[62] Reid, IWG presentation, 2 March 2000.

[63] Reid, IWG presentation, 2 March 2000.

operating at Mayak. CTR officials have also pledged additional funds, if necessary, to ensure that the reprocessing wastes are vitrified.

For spent fuel from the remaining SSBNs, the CTR programme is purchasing about 100 of the 40-tonne storage casks that were developed under the aegis of the trilateral AMEC programme (see Section 3.3). The casks are intended to serve as a transport and interim storage container, and are capable of safely storing spent fuel for a period of up to 50 years. Pads for temporarily storing the spent fuel casks will be built at the shipyards. CTR is also supporting the development and eventual construction of a spent fuel storage facility at Mayak. Because of continued difficulties in getting the casks, storage pads, and storage facility on line fast enough, the problem of spent fuel management remains a significant obstacle to submarine dismantlement. As one CTR official remarked, spent fuel management has become the principal 'nemesis' of CTR's strategic submarine elimination programme.[64]

The CTR programme has made an important contribution to arms reduction throughout Russia, and to nuclear waste management in the Northern and Pacific Fleets. Table 3.1 lists CTR's accomplishments in eliminating submarine-launched ballistic missiles, SLBM launchers, and ballistic missile-firing submarines as of 15 February 2001, along with its cumulative elimination projections for 2004 and 2007. About two-thirds of the missiles, launchers and submarines eliminated are located in the Northern Fleet; the remaining third are located in the Pacific Fleet.

Table 3.1 – CTR accomplishments and projections (as of 15 February 2001)

	Original inventory baseline	Eliminated as of Feb. 2001	Eliminated as of 2004 (projection)	Eliminated as of 2007 (projection)
Submarine-launched ballistic missiles	936	184	503	661
SLBM launchers	728	308	480	612
Ballistic missile-firing submarines	48	18	32	41

Source: Defense Threat Reduction Agency

There are still gaps and shortcomings in this effort. The greatest restriction at present is the lack of suitable short-term, interim or repository storage for spent fuel and radioactive waste.[65] According to Minatom, spent fuel transported to Mayak must be reprocessed immediately upon removal from the rail car, as there is no place to put it.[66] Furthermore, the current effort is inadequate to cover all decommissioned submarines, as it only has the capacity to deal with ballistic missile submarines. Although the infrastructure developed through the CTR programme can be redirected towards dismantling general purpose submarines once the SSBNs are finished, it was created to handle a relatively small number of vessels and may not

[64] Moltz, 'Russian Nuclear Submarine Dismantlement and the Naval Fuel Cycle,' 79.

[65] Short-term buffer storage is designed to provide a safe environment while material awaits transport from one site to another. Interim storage is conceived as lasting 20 to 50 years. A repository is designed for final, permanent disposal.

[66] C. Watson et al., 'Additional Working Papers Prepared for the CEG Strategy Working Group,' submitted to the 10th meeting of the CEG, Helsinki, 23 May 2000, Draft 6 (Vienna: CEG Secretariat, International Atomic Energy Agency, 2000), 22.

be sufficient to handle the remainder in a safe or timely manner.[67] Other components will be missing entirely, such as containers for spent fuel and radioactive waste, because CTR is purchasing only enough to accommodate the SSBNs.

3.3 Material Protection, Control and Accounting programme

The US Department of Energy's Material Protection, Control and Accounting programme, or MPC&A, is a companion programme to CTR. Created in 1994, the MPC&A programme's central purpose is to prevent the proliferation of weapons-usable fissile material from the former Soviet Union.

The MPC&A programme supports nonproliferation objectives through two principal activities: consolidating fissile material in centralised locations, and safeguarding material at consolidated sites. Consolidation aims to simplify the problem of nuclear security by reducing the number of sites containing weapons-usable nuclear material. In addition to eliminating many sites as targets of proliferation-related theft, consolidation helps to efficiently concentrate security efforts on a fewer number of sites and to decrease the long-term operating costs of maintaining sufficient safeguards at the remaining facilities. Enhanced safeguards include a broad spectrum of measures to physically protect, control and account for fissile material. These measures are designed to protect material against both 'outsider' and 'insider' threats.[68]

In the naval sector, the MPC&A programme assisted the Russian navy in reducing the number of sites containing fresh naval reactor fuel from about 20 to two land-based sites: the Severomorsk naval facility near Murmansk ('Site 49') and Chazhma Bay in the Russian Far East ('Site 34').[69] The programme has also improved physical protection for fresh naval reactor fuel stored aboard several service ships used to refuel submarines: ships PM-63 and PM-12 in northwest Russia, and PM-74 in the Far East. A similar project was carried out aboard the civilian service ship *Imandra*, which is operated by the Murmansk Shipping Company and used for storing fresh nuclear fuel for the company's nuclear-powered icebreaker fleet.[70]

As with CTR, most of this work has focused on weapons components, warheads, and weapons-grade fissile materials. In the naval sector, the programme's focus has been on protecting fresh nuclear reactor fuel. As mentioned in chapter 2, there have already been several thefts of fresh naval nuclear fuel in Russia. Protecting spent nuclear fuel, however, has been a low priority. Spent fuel is less attractive than fresh fuel to a would-be proliferator for two reasons. First, the fission products in irradiated fuel emit high levels of gamma radiation and are thus potentially lethal to handle, whereas fresh fuel may be handled safely with a pair of gloves. Second, extracting useful amounts of highly-enriched uranium from spent fuel

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[67] US Department of Defense, Office of Environmental Security, *Program Plan and Report on Proposed Obligations for the Arctic Military Environmental Cooperation Program FY 1999* (Washington, DC: US Department of Defense, Office of Environmental Security, 1999).

[68] R. Gottemoeller, 'The Importance of Sustainability in Securing Nuclear Material in the FSU,' paper presented at the Global '99 International Conference on Future Nuclear Systems, Jackson Hole, Wyoming, 29 August–3 September 1999 (Washington, DC: US Department of Energy, Office of Nonproliferation and National Security, 1999).

[69] Gottemoeller, 2; but compare with Moltz, 'Russian Nuclear Submarine Dismantlement and the Naval Fuel Cycle,' 82.

[70] Moltz, 'Russian Nuclear Submarine Dismantlement and the Naval Fuel Cycle,' 80.

requires chemical reprocessing—a much more sophisticated and demanding process than using fresh fuel.

As J. Clay Moltz argues, irradiated fuel containing highly-enriched uranium is a proliferation threat.[71] It is believed that the reactor cores in many of Russia's submarines were retired before the fuel had been completely used, or 'burned.' It is easier to extract highly-enriched uranium from this low-irradiated fuel, making it a potential proliferation target. In older submarines, much of this fuel has lost its so-called 'self-protecting' radioactivity due to the normal process of decay, making it less dangerous to steal.

While the MPC&A programme has made significant progress in protecting fresh nuclear fuel, protection of spent fuel remains extremely weak. The US policy towards spent fuel has been two-sided. On the one hand, in a report to the US Congress, the US Department of Defense cited proliferation concerns as a key justification for helping Russia manage spent fuel from its strategic submarines. On the other hand, it has been reluctant to use this as an argument for addressing spent nuclear fuel from the general purpose submarines still waiting to be defuelled, even though it is the same type of fuel as that used by an SSBN.

In January 1999, US Secretary of Energy Bill Richardson met with representatives of the Russian navy and the Kurchatov Institute to consider expanding the current scope of the MPC&A programme with the Russian navy.[72] One issue under consideration is the feasibility of dismantling general purpose submarines and securing spent naval nuclear fuel that represents a proliferation threat. The issue is currently under examination by a joint US Department of Energy and Department of Defense task force.[73] Key issues of interest are:

- the level of uranium enrichment (the higher the level of enrichment, the greater the proliferation threat),
- the extent to which the fuel has been irradiated (the lower the burn-up rate, the greater the proliferation threat), and
- the age of the fuel (the older the fuel, the more likely it has lost its self-protecting capability and thus the easier it is to steal).

Although the Russian government submitted an official request for US assistance in dismantling its general purpose submarines, it is reluctant to answer the questions above, citing the classified nature of this information. This has delayed completion of the US task force study and, as a result, no decision has yet been taken by the US side as to whether to assist Russia in such an ambitious undertaking.

3.4 Arctic Military Environmental Cooperation programme

The Arctic Military Environmental Cooperation programme, or AMEC, is a multilateral framework for cooperation between Norway, Russia and the United States on reducing the deleterious effects of military operations on the Arctic environment. The initiative was launched by Norway in March 1995 with a series of meetings between the three states' defence ministries, and was formalised at Bergen in September 1996 when their defence

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[71] Ibid., 81.

[72] K. B. Sheely and M. A. Hayward, 'New Strategic Directions in the MPC&A Program,' paper presented at the 40th annual meeting of the Institute of Nuclear Material Management, Washington, DC, 27 July 1999 (Washington, DC: US Department of Energy, Office of Arms Control and Nonproliferation, 1999).

[73] Ibid.

ministers signed the non-binding Declaration on Arctic Military Environmental Cooperation.[74] Jørgen Kosmo, then Norwegian defence minister, justified military engagement in environmental cooperation as 'only logical,' not just because the military were major contributors to environmental problems, but also because they also possessed resources that few other institutions could muster for solving such problems.[75]

Formally, AMEC is more a forum for tripartite communication than for joint activity. Article I states that the Declaration 'establishes a framework for contacts and cooperation among the Parties on military environmental issues in the Arctic.' It conservatively defines cooperation in terms of ad-hoc meetings, workshops, seminars and conferences; exchanges of delegations; exchange of information on environmental monitoring and remediation plans and efforts; contamination surveys; and research and technology exchange. The Declaration articulates no specific cooperative objectives, nor does it provide any specific environmental focus or priorities. Its charter is wide enough to cover any ecological threat stemming from military activities in the Arctic; for example, radioactive contamination on the Kola Peninsula, PCBs at the Distant Early Warning sites in North America, and even tundra damage caused by military vehicles. With the exception of an oblique reference in the preamble to radioactive contamination as 'an issue,' the Declaration contains no further reference to nuclear matters, and it never mentions conducting joint remediation projects, nuclear or otherwise.

The Declaration's noncommittal language notwithstanding, AMEC was from the start undeniably focused on joint efforts to address military nuclear contamination threats in the Russian Arctic. At the signing ceremony, then US Secretary of Defense William Perry stated, 'We will work to handle and store radioactive materials safely, to dispose of toxic materials properly, and to exchange information on risk assessments and clean-up technologies and methods.'[76] Norway stated that this cooperation would be 'carried out through joint projects' to clean up radioactive and non-radioactive pollution.[77] Indeed, prior to signing the Declaration, the parties had already established a steering group to identify and prioritise potential military environmental projects in the Arctic region, and had already selected several nuclear safety projects for their collaboration.

AMEC's nuclear focus is revealed most clearly in a report to the US Congress in which the US Department of Defense outlines the programme's purpose as follows:

> The primary goal of the AMEC Program is to advance US national security interests through the environmentally safe, accountable reduction of Russian naval nuclear forces in Northwest Russia, constructive engagement between US, Norwegian and Russian military forces and the advancement of sustainable military use of the Arctic region.[78]

Despite the rather self-interested interpretation of AMEC's primary purpose, the report provides a more instructive view of the parties' objectives than does the Declaration: AMEC's

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[74] Declaration among the Department of Defense of the United States of America, the Royal Ministry of Defence of the Kingdom of Norway, and the Ministry of Defence of the Russian Federation, on Arctic Military Environmental Cooperation, 26 September 1996 (Oslo: Ministry of Foreign Affairs) [AMEC Declaration].

[75] USIS, 'Arctic Military Environmental Pact Signing: US, Russian, Norwegian Pledge to Fight Pollution,' official transcript of news conference, 26 September 1996 (US Information Service, 1996).

[76] Ibid.

[77] Royal Norwegian Ministry of Defence, 'Declaration on Arctic Military Environmental Cooperation between Russia, USA and Norway Signed Today in Bergen, Norway,' *Pressmelding*, no. 50 (Oslo: Ministry of Defence, 1996).

[78] US Department of Defense, Office of Environmental Security, *Program Plan and Report*, 6.

purpose is to reduce the adverse effects of military operations on the Arctic environment; it is focused primarily on managing nuclear fuel and radioactive waste from Russia's nuclear-powered submarines; and it is carried out through joint technical projects. At present, these projects focus on dismantling Russian nuclear-powered submarines, giving priority to ballistic missile submarines that are being removed from service in compliance with US–Russian arms reduction agreements. AMEC supports this process by assisting Russia in developing the infrastructure to safely handle and store spent nuclear fuel and radioactive waste from the submarines.

Institutionally, AMEC is a military forum,[79] with only the three states' defence ministries named as its formal parties, only environmental issues stemming from military activities included within its mandate, and only defence organisations of other states invited to participate in its activities. This exclusiveness has not prevented the parties from going outside of their respective defence ministries and involving representatives of agencies with relevant technical expertise, but other stakeholders and interests are effectively excluded from participation.

AMEC's formal organisational structure consists of the Parties, the Principles, a Steering Group, and technical expert working groups. The Parties are the defence ministries of Norway, Russia and the United States. They are responsible for overseeing the Declaration and making any amendments to it. The Principles are the parties' designated officials responsible for ensuring the Declaration's objectives are achieved by overseeing project development, obtaining funding to implement agreed activities, and monitoring projects during the execution phase to ensure project milestones are being achieved within budget constraints. The Principals are also responsible for approving and terminating annexes to the Declaration, as well as approving the participation of other states in AMEC activities.[80]

Under the Principles' guidance, a Steering Group coordinates programme implementation and supervises AMEC projects. The steering group is co-chaired by a senior representative from each member country, plus up to three special advisors. Their responsibilities include: identifying and prioritising work requirements; providing project task management; managing logistics and other programme support; overseeing national security aspects of AMEC projects; preparing and reviewing project proposals; and providing quality assurance and control oversight. The co-chairs receive administrative, technical and financial support from their respective national programme offices, and may also receive support and advice from ad hoc interagency advisory groups.[81]

Technical experts serve as special advisors to the Steering Group. Organised as trilateral working groups to review specific technical issues, they provide technical advice on projects and evaluate proposals for new projects. Each party maintains an internal project organisational structure to facilitate programme execution and project implementation. The programme offices provide the primary point of contact within each country for the administrative, technical, financial and contractual functions of executing the AMEC programme.[82]

Finally, a trilateral project team is established to implement each individual AMEC project. Project teams are supervised by a lead project officer from the country with primary

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[79] By *military*, we mean the parties' defence ministries and their subordinate organs, but not other ministries that have a quasi-defence role (e.g., Russia's Ministry of Atomic Energy and the US Department of Energy).

[80] US Department of Defense, Office of Environmental Security, *The Arctic Military Environmental Cooperation (AMEC) Program Management Manual* (Washington, DC: US Department of Defense, Office of Environmental Security, 1998), 4.

[81] Ibid., 5.

[82] Ibid., 5-6.

responsibility for the project, plus project officers from the other two parties. Other members include a principal investigator responsible for performing the technical work necessary to execute a given project, and a contracting officer to manage the financial aspects of project implementation.[83]

AMEC's nuclear projects

AMEC projects are grouped into seven project areas: the first five deal with spent nuclear fuel and radioactive waste management, the last two with non-radioactive waste problems. Within the areas concerned with nuclear material, there are presently eleven individual projects. These projects are listed in Table 3.2.

In project 1.1, the AMEC parties have developed a prototype container, or 'cask,' suitable for interim storage and transportation of spent nuclear fuel from Russian submarines and naval vessels. The 40-tonne cask will accommodate both damaged and undamaged nuclear fuel, and is patterned on the Russian TUK-18 transportation cask so that it will fit the Russian navy's existing support and transportation infrastructure. Associated with the cask is the design and construction of a concrete pad on which up to 50 casks may be temporarily stored. Although the casks are designed to store spent fuel for a minimum period of 50 years, the pads are intended for short-term buffer storage, i.e., until the fuel can be transported to the fuel reprocessing facility at Mayak, or sent to regional storage facilities for long-term interim storage.[84] Design and manufacture of the prototype container was completed in late 1999, though the cask's certification and acceptance has been complicated by disagreements between Minatom and Gosatomnadzor as to who should be the certifying agency. Serial production of about 100 casks is to be funded through the CTR programme to facilitate defuelling ballistic missile submarines. The storage pads were to have been ready in mid-2001, but progress on building them has been delayed due to difficulties in obtaining land use permits from regional authorities.[85]

Table 3.2 – Nuclear projects in the AMEC programme

Project no.	Project description
	Naval spent nuclear fuel management
1.1	Design and construct interim storage and transportation container
1.1–1	Design and construct temporary storage pad for SNF cask
	Naval liquid radioactive waste treatment
1.2	Design and construct mobile liquid radioactive waste processing facility
	Solid radioactive waste volume reduction
1.3–1	Assess technology for waste volume reduction
1.3–2	Manufacture a mobile pre-treatment facility
1.3–3	Manufacture a decontamination unit for metal wastes
	Solid radioactive waste storage
1.4–1	Assess surface coating technologies
1.4–2	Manufacture steel radioactive waste containers
1.4–3	Manufacture concrete radioactive waste containers
	Radiation monitoring, and personnel and environmental safety
1.5	Equipment transfer, training and exchange of monitoring strategies
1.5–1	Radiation control at facilities

Source: US Department of Defense, AMEC Program Office

[83] Ibid., 7.

[84] Watson et al.

[85] Reid, IWG presentation, 2 March 2000.

Project 1.2 aims to reduce the growing volume of low-level liquid radioactive waste by developing a mobile waste-processing facility. The objective is that it provides sufficient capacity to deal with submarines at a number of remote sites on the Kola Peninsula. A mobile facility is necessary because some submarines cannot safely be moved to the existing (fixed) treatment facility at the Murmansk Shipping Company's repair facility in Murmansk (*Atomflot*), or to the facility being built by CTR at the Zvezdochka shipyard in Severodvinsk.[86] A Russian contractor has been selected to build the first mobile unit.

Projects 1.3 and 1.4 are focused on solid radioactive waste stemming from submarine dismantlement. The first group deals with technologies to reduce the volume of the waste stream. A review of applicable off-the-shelf technologies (project 1.3-1) was completed in 1999. This has led to two sub-projects: a mobile solid waste pre-treatment facility (project 1.3-2) and a decontamination unit for metal wastes. Manufacture of the pre-treatment facility is in progress and is scheduled for completion in 2001. The second project group addresses the shortage of storage for solid radioactive waste. Under project 1.4-2, a contract was awarded to Zvezdochka shipyard to design, manufacture and license 100 re-usable steel containers for the transportation and interim storage of solid radioactive wastes; production is now underway, with delivery scheduled for late 2001. Design specifications for a single-use concrete container have been completed and approved, and production is scheduled to run through late 2002. The concrete containers are designed to provide a long-term (up to 300 years) storage package for solid wastes.[87]

The last of the nuclear-related projects, Project 1.5, seeks to enhance radiation monitoring and safety. While it is aimed at improving monitoring and safety procedures and techniques pertaining to submarine dismantlement activities, the project has broader applications in the Russian military as well. Components of this project include transferring monitoring equipment, training Russian military officers at US sites, and installing the Norwegian 'Picasso' reactor monitoring system at a test location in Russia.[88]

As a whole, these projects address some of Russia's most acute nuclear waste management problems and directly support the most urgent priorities as expressed by both the International Atomic Energy Agency and by senior Russian nuclear officials themselves. On the other hand, US participation in AMEC is linked to its CTR programme, which has had the effect of limiting AMEC activities to those which directly benefit strategic submarine dismantlement without adequately addressing similar problems stemming from general purpose submarines. The practical problems related to the linkage between AMEC and CTR is discussed in chapters 4 and 5.

3.5 Norwegian Plan of Action for Nuclear Safety

In 1994, the Norwegian government presented a white paper to the Storting regarding the threats posed by nuclear activities in the former Soviet Union and Eastern Europe.[89] In

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[86] About 22 submarines in northwest Russia have a relatively low reserve of buoyancy; towing these vessels to a naval yard for defuelling is subject to a risk of their sinking. See Watson et al., 15-16.

[87] A. Griffith et al., 'Stabilization and Storage of Solid Radioactive Waste from the Russian Navy's Northern Fleet under the AMEC Program,' paper presented at the Waste Management 2000 Symposium, Tucson, 27 February–2 March 2000.

[88] US Department of Defense, *Program Plan and Report*, 17-18.

[89] Royal Norwegian Ministry of Foreign Affairs, Report No. 34 (1993–94) to the Storting on Nuclear Activities and Chemical Weapons Activities in Areas Adjacent to Our Northern Borders (Oslo: Ministry of Foreign Affairs, 1994).

response to concerns expressed in the white paper and the recommendations of a parliamentary committee,[90] the government drew up a Plan of Action for Nuclear Safety and initiated its implementation the following year.[91]

The Plan of Action's overarching purpose is defined as protecting human health, the environment and economic activity from radioactive contamination in Russia and other Eastern European states. It is evident that the Norwegian government's chief interest is in reducing contamination threats from sources located near its border with Russia, although the Norwegian Radiation Protection Authority (NRPA) reportedly takes the view that too much emphasis has been placed on geographical proximity.[92] Because the largest volume of nuclear material and radioactive waste in this region stems from Russia's Northern Fleet, defence-related nuclear cooperation with Russia is a central feature of the Plan of Action. The Plan approaches this cooperation primarily from the perspective of health and safety. However, it also articulates objectives in traditional areas of defence security, such as disarmament and nonproliferation.

Specific objectives include ensuring Russia does not resume the disposal at sea of radioactive material and facilitating Russia's accession to the 1993 Amendment to the London Convention, which prohibits marine disposal of such material. These objectives directly support Norway's national interest in maintaining a healthy, profitable fishing industry. To achieve its aims, the Plan outlines activities to increase Russia's ability to safely manage nuclear material and radioactive waste, and to facilitate the safe, expeditious dismantling of nuclear-powered vessels that have been retired from service.

Cooperation between Norway and Russia in areas covered by the Plan is governed principally by a bilateral agreement signed in May 1998, referred to in this report as the Norwegian–Russian Agreement.[93] The Agreement is discussed at greater length in chapter four. The Agreement established a joint commission to coordinate and control its implementation. The commission has met several times and has devoted most of its work to implementing projects specified in the Agreement.[94] Besides the joint commission itself, Norway's nuclear cooperation with Russia is managed within four principal networks. The first is at the political level between the Norwegian and Russian foreign ministries and Minatom. The second is between their environment ministries and is conducted chiefly through the joint Norwegian–Russian environmental commission.[95] The third is between the

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[90] Stortinget, Recommendation No. 189 (1993–94) from the Standing Committee on Foreign Affairs (Oslo: Stortinget, 1994).

[91] Royal Norwegian Ministry of Foreign Affairs, Plan of Action for the Implementation of Report No. 34 (1993–94) to the Storting on Nuclear Activities and Chemical Weapons in Areas Adjacent to Our Northern Borders (Oslo: Ministry of Foreign Affairs, 1995).

[92] G. Hønneland and A. Moe, *Evaluation of the Norwegian Plan of Action for Nuclear Safety: Priorities, Organisation, Implementation*, Evaluation report no. 7 (Oslo: Ministry of Foreign Affairs, 2000), 18. According to the NRPA, a major incident at a distant nuclear power station poses a greater threat to Norwegian health and safety than does radioactive waste near the border.

[93] Royal Norwegian Ministry of Foreign Affairs, 'Agreement between the Government of the Kingdom of Norway and the Government of the Russian Federation on Environmental Co-operation in Connection with the Dismantling of Russian Nuclear Powered Submarines Withdrawn from the Navy's Service in the Northern Region, and the Enhancement of Nuclear and Radiation Safety,' 26 May 1998, *Overenskomster med Fremmede Stater*, no. 7 (1998), 568-82 [Norwegian–Russian Agreement].

[94] Hønneland and Moe, Evaluation of the Norwegian Plan of Action, 27.

[95] The Russian environment ministry, *Minekologiia*, has been progressively downgraded since it was first created in 1988. In 1996, President Yel'tsin reduced its status to a state committee (*Goskomekologiia*); in 2000

NRPA and *Gosatomnadzor*, their respective nuclear regulatory authorities, and focuses principally on technical radiation safety and monitoring issues. The fourth is the defence-related nuclear cooperation that takes place under the auspices of the AMEC programme, where the defence ministries of Norway, Russia and the United States are the responsible parties.

In Norway, two ad hoc governmental bodies oversee implementation of the Plan of Action: the Committee of Deputy Ministers (the political level), and the Inter-ministerial Group of Senior Officials (career civil servants). The participants come from the ministries of foreign affairs, defence, environment, fisheries, health and social services, agriculture, and trade and industry, as well as the NRPA. The foreign ministry coordinates the overall work of the two bodies, and the NRPA provides relevant technical expertise.

As of January 2000, the Plan of Action contained 113 projects with total budgets of about NOK 536 million ($61 million), of which NOK 343 million ($39 million) had been spent.[96] The projects are divided into four priority areas: safety at nuclear facilities; management of nuclear material and radioactive waste; radioactive contamination in northern areas; and arms-related environmental and security hazards. The projects themselves may be further categorised by their type of activity: assessments, monitoring, option development (i.e., working out alternative solutions and conducting feasibility studies), construction of facilities and equipment, institution building, competence building, and miscellaneous activities.[97] Of the projects listed in the Plan, 13 are specified in the Norwegian–Russian Agreement,[98] the majority of which are in the defence sector (see Table 3.3). These 13 projects account for 54% of total budget allocations to the Plan of Action.

Defence-related projects in the Norwegian Plan of Action

Norway's flagship project has been the modernisation of a waste treatment facility in Murmansk (project 202). The project, which is often referred to as the Murmansk Initiative, involves upgrading and expanding an effluent treatment facility for low-level liquid radioactive waste. Technically it is a civilian sector project, as it is taking place at *Atomflot*, the repair facility for Russia's civilian nuclear icebreaker fleet operated by the Murmansk Shipping Company. Practically, however, it is defence-related, since the facility is also intended to process waste from the Russian Northern Fleet. The project expanded the facility's processing capacity from 1200 m^3 of waste per year to 5000 m^3 per year. Construction work is complete, though the facility is still not in operation due to delays in testing and licensing. The project was conceived in 1994 as a bilateral initiative; the US joined in 1995. American involvement is organised through the US Environmental Protection Agency. The total cost of the project was NOK 43 million ($5 million), of which the Norwegian share was NOK 17.5 million ($2 million).

President Putin abolished it altogether and transferred most of its duties to the Ministry of Natural Resources (*Minpriroda*), which is principally responsible for resource exploitation. Minpriroda now represents Russia on the joint Norwegian–Russian Environmental Commission.

[96] Hønneland and Moe, Evaluation of the Norwegian Plan of Action, 9.

[97] Hønneland and Moe, Evaluation of the Norwegian Plan of Action, 20.

[98] The Agreement initially specified ten projects; three more were added in 2000 by an exchange of notes.

Table 3.3 – Projects specified in the Norwegian–Russian Agreement and funded by the Norwegian Plan of Action for Nuclear Safety

Project number and description	Funding [a] (NOK)	Equivalent [a] (US $)
Defence-related spent nuclear fuel (SNF) projects		
211–Build ship for transport of naval spent nuclear fuel	3,300,000	376,000
212–Build four railway cars for transport of naval SNF	25,980,000	2,963,000
216–Empty/decommission naval SNF storage at Andreev Bay	6,430,000	733,000
217–Establish interim storage facility for naval SNF at Mayak	1,632,000	186,000
230–Develop transportable storage cask for naval SNF	5,345,000	610,000
232–Build pad for temporary storage of naval SNF casks	5,215,000	595,000
Defence-related radioactive waste projects		
213–Modernise liquid radwaste storage facility in Severodvinsk	36,689,000	4,185,000
214–Deliver mobile equipment for treating liquid radwaste	0	0
215–Build temporary storage for solid radwaste at Andreev Bay	75,200,000	8,578,000
226–Build system for treating solid radwaste from submarines	660,000	75,000
Civilian nuclear sector projects		
101–Enhance operational safety at the Kola nuclear power plant	84,757,000	9,668,000
202–Modernise liquid radwaste treatment facility in Murmansk [b]	17,500,000	1,996,000
203–Dismantle the floating technical base *Lepse*	25,000,000	2,852,000
229–Develop transportable storage cask for SNF [b]	4,134,000	472,000
Total	291,842,000	33,289,000

Source: Norwegian–Russian Agreement; Royal Norwegian Ministry of Foreign Affairs, *Annex to Plan of Action for Nuclear Safety Issues: List of Measures and Projects* (Oslo: Ministry of Foreign Affairs, 2000).

Notes: a. Funding allocations as of January 2000. US dollar equivalents calculated using the exchange rate of 1 January 2000 ($1 = NOK 8.767).
b. Although technically in the civilian sector, this project is also relevant to the defence sector. See discussion below.

In Norway, the principal rationale of the project is to contribute towards Russia's accession to the London Convention's amendment prohibiting the disposal of low-level radioactive waste at sea. In Russia, however, it is interesting to note that besides the increased waste processing capacity, another goal of the project is expressed as expanding Atomflot's commercial activities by selling waste processing services to the navy.[99]

Two additional projects relate to liquid radioactive waste. Project 214 involves developing a mobile waste treatment facility; this work is taking place as a trilateral venture within the AMEC framework as AMEC 1.2 (see discussion in section 3.4). Project 213 repaired and upgraded two storage tanks for liquid radioactive waste and its associated piping and control equipment. Located at the Zvezdochka shipyard in Severodvinsk, the tank facility holds 1000 m^3 of low-level liquid waste generated during submarine dismantlement prior to its treatment in an adjacent waste treatment facility being built under the auspices of the CTR programme. The tank facility project was started in May 1998 and completed in August 1999.

Two projects in the Plan focus on the transportation of naval spent nuclear fuel and radioactive waste. The first involved building specialised railway cars (Project 212). Russia

[99] Hønneland and Moe, Evaluation of the Norwegian Plan of Action, 34.

already had four railway cars for transporting spent fuel from rail terminals in Murmansk and Severodvinsk to the Mayak facility in the southern Urals. Additional cars were needed to handle the higher volume of shipments expected in connection with submarine decommissioning. Working as a subcontractor under Moss Maritime of Norway, the Tver' Railway Factory in central Russia built four new railway cars. The cars can accommodate both Russia's TUK-18 transport cask and the 40-tonne cask designed under AMEC.[100] Negotiations for the project began in September 1998; the wagons were delivered in March 2000.

Project 211 seeks to design and build a specialised ship for transporting spent fuel and radioactive waste from outlying naval bases to rail transfer terminals in Murmansk and Severodvinsk. A ship is needed because spent fuel is transported in containers that are too heavy to be transported by road, and some locations lack rail connections. Moss Maritime of Norway has been engaged to develop a concept level proposal. The firm is working with Minatom and *Morskoe Korablestroenie*, a consortium of Russian shipyards. The design calls for a ship that meets International Maritime Organization requirements for carrying unrestricted amounts of radioactive material (an INF-3 class vessel).[101] Additional features include a double hull and bottom for extra damage survivability, as well as moderate ice strengthening (Russian ice class LU4) to permit extended operations in the Barents, Kara and White seas.[102] Norway has allocated NOK 3.3 million ($375,000) for developing the design proposal. The actual cost to build the vessel will not be known until the parties have agreed on a specific design and solicited bids from shipyards.

Safe storage remains the greatest bottleneck in spent fuel management in Russia. Three projects involve developing a suitable container (or cask) for the transport and interim storage of spent fuel. Project 230 is the 40-tonne cask developed under the auspices of AMEC (AMEC 1.1), and Project 232 is its companion project to design and build a pad for the casks' temporary storage (AMEC 1.1–1). Project 229 is the Murmansk 80-tonne cask project, which is designing a similar (but larger) container for spent fuel from Russian nuclear submarines and icebreakers. Project 229 funds Norway's participation in this multilateral initiative that includes contributions from Finland, Sweden, the US, the UK, the EU, and the Nordic Environmental Finance Corporation. Work on the project has been suspended due to the lack of a legal framework providing certain legal protections for the other participating donors.

Project 216 seeks to elaborate alternatives for removing naval spent fuel stored at the Andreeva Bay storage facility and decommissioning the facility. Some 45,000 spent fuel assemblies are currently stored at this facility, which is located near the Norwegian border. Some of the fuel is stored in leaking storage pools; the rest is in ageing canisters stored in open fields, exposed to the weather. The first phase of the project involved constructing a ditch to prevent contaminated water from discharging to Litsa fjord. The second phase of the project—removing the fuel elements and decommissioning the facility—cannot take place before adequate interim storage is made available. The Murmansk 80-tonne cask (Project 229) will likely be one element to this strategy. The other is building a storage facility, either in the region or outside of it. Project 217 aims to support the development of such a facility. As part of this project, Kværner Maritime completed an evaluation of the uncompleted wet (pool) storage facility at the Mayak Chemical Combine in Cheliabinsk *oblast'* as one option for increasing storage capacity. The evaluation concluded that the design was flawed, and that

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[100] A train echelon of four cars will transport 12 casks containing a combined total of 588 fuel assemblies (equivalent to the fuel from 1.3 submarines). Watson et al., 18.

[101] IMO, Code for the Safe Carriage of Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes On Board Ships (INF Code), IMO-270E (London: International Maritime Organization, 1998).

[102] Bjørn Borgaas, Moss Maritime, interview with Sawhill, 29 September 2000.

a dry storage facility should be built instead. Russian authorities have indicated that they prefer to locate such a facility in northwest Russia rather than at Mayak. However, they have not yet selected a specific location, nor have they chosen a specific design. Financing needs to be identified as well. The cost is likely to be around $140 million for a facility capable of storing 50,000 spent fuel assemblies and that meets international safety standards.[103]

3.6 Interaction between cooperative programmes

No single, existing international assistance programme has demonstrated sufficient capacity to address the nuclear safety issues stemming from defence-related nuclear material in northwest Russia, or even to resolve the 'single' issue of scrapping Russia's decommissioned nuclear submarines—itself a complex process with many interdependent elements. Most assistance programmes have the capacity to tackle only a couple of elements at a time. If conducted in isolation from other activities, these limited measures can themselves be problematic, as a NATO environmental risk assessment warns:

> Focusing on a few high-risk aspects without systematically addressing the other aspects in the chain of interlinked tasks is of little use and may even be counterproductive as it could potentially shift the high risk somewhere else and maybe even make it higher.[104]

A comprehensive plan that encompasses each element in the chain is essential to the success of the overall effort. A collection of international assistance programmes could constitute such a comprehensive plan. The objective is to coordinate disparate international programmes with each other and with Russia's domestic programmes in a systematic manner, i.e., to achieve a level of synergy among the programmes.

Such a synergistic relationship has already developed between CTR, MPC&A, AMEC, the Norwegian Plan of Action for Nuclear Safety, and Russia's domestic nuclear safety programmes with respect to dismantling strategic submarines. Taken together, these programmes address many of these elements:

- removing, transporting, storing, safeguarding and destroying nuclear weapons;
- unloading, transporting, storing and reprocessing spent nuclear fuel;
- removing, storing, conditioning and disposing of radioactive waste; and
- scrapping the remainder of the submarine hull.

At the same time, critical gaps remain. The CEG Strategy Working Group has identified two areas of particularly high need.[105] The first is the remediation of spent fuel and radioactive waste stored at naval bases in northwest Russia. As described in chapter 2, some 28,000 fuel assemblies are stored in the open air in casks that do not meet current regulatory standards, in elderly floating stores, and in leaking storage tanks. The cost of this programme is expected to exceed $160 million. The second is to recover and provide safe interim storage of spent fuel from general purpose submarines retired from service. These submarines currently hold about

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[103] This estimate is based on a recent contract award to Foster Wheeler Environmental Corporation for building a dry storage facility for spent fuel from US nuclear submarines.

[104] NATO, Cross-border Environmental Problems Emanating from Defence-related Installations and Activities, vol. 4, Environmental Risk Assessment for Two Defence-related Problems, report no. 227 (Brussels: North Atlantic Treaty Organization, 1998), I-90.

[105] Watson et al., 10-11.

50,000 fuel assemblies, which may increase by another 75,000 in the next ten years. The two main bottlenecks in defuelling these submarines are a lack of equipment to effect the defuelling and a lack of interim storage for spent fuel. The cost of this programme is expected to exceed $220 million.

Over the past five years, Russian government spending in this area has been on the order of $5 million per year.[106] As this is clearly insufficient to undertake the necessary activities within a reasonable time frame, international assistance will be essential in addressing these needs. Yet there remains a problem in articulating a compelling argument for large-scale foreign assistance. The argument for eliminating the SSBNs was a very simple one to make and to understand: eliminating ballistic missile-firing submarines and their weapons substantially increases global security. General purpose submarines, on the other hand, are not perceived as a strategic threat in the same way as SSBNs, because they do no carry so-called 'strategic' weapons—even though they are capable of firing long- and medium-range cruise missiles fitted with nuclear warheads. Neither are they widely regarded as a particularly serious proliferation threat, even though they contain highly-enriched uranium fuel, and even though the submarines themselves could be sold abroad. As J. Clay Moltz argues, the potential sale of Russian submarines to foreign buyers poses several serious problems, not the least of which is providing states with a potent missile delivery system.[107] Furthermore, retired submarines waiting to be defuelled are not universally considered an especially dangerous environmental threat, at least in a transboundary context.[108]

It would be incorrect, however, to conclude that the lack of foreign assistance to address general purpose submarines is the result of a lack in donor interest: despite the problems mentioned above, there is interest. For example, at the sixth annual meeting of the Barents Euro-Arctic Council in March 1999, twelve states signed a Declaration of Principles to lay the foundation for creating a Multilateral Nuclear Environmental Programme in Russia (or MNEPR).[109] The initiative is explicitly focused on improving spent nuclear fuel and radioactive waste management in northwest Russia; implicitly, this includes material of defence-origin. A

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[106] Ibid.

[107] J. C. Moltz, 'Closing the NPT Loophole on Exports of Naval Propulsion Reactors,' *The Nonproliferation Review* 6 (1, 1998): 108-114.

[108] This is certainly a widely held position in the US, as made clear by Colonel Reid during his presentation at the IWG meeting, 2 March 2000. See also D. Layton et al., *Radionuclides in the Arctic Seas from the Former Soviet Union: Potential Health and Ecological Risks* (Arlington: US Department of Defense, Office of Naval Research, Arctic Nuclear Waste Assessment Program, 1997); and NATO, vol. 4.

[109] 'Declaration of Principles Regarding a Multilateral Nuclear Environmental Programme in the Russian Federation,' 5 March 1999, reprinted in *Nuclear Law Bulletin* 63 (1999): 95-96. The MNEPR Declaration of Principles was signed by the five Nordic states and Russia, plus France, Germany, Italy, The Netherlands, the UK and the US.

key obstacle to implementing this programme, however, has been the difficulty in establishing a mutually-acceptable legal framework with Russia governing how that assistance is to be provided (this topic is discussed at length in chapter 4). An agreement reached under the aegis of the MNEPR could provide the necessary framework to facilitate broad international participation. If coordinated with current efforts, the MNEPR could enhance the synergy already existing between CTR, MPC&A, AMEC, the Norwegian Plan of Action, and Russia's own domestic programmes, and could help to fill the gaps in them, especially by expanding the scope of current activities to include general purpose submarines.

Chapter 4
Frameworks for Cooperation

4.1 Introduction

A feature shared by the few multilateral nuclear assistance programs currently operating in Russia is that they have negotiated separate legal framework agreements. Donors have required Russia to sign the agreements as a prerequisite to providing assistance. The donors see them as essential to establishing a clearly defined, stable and predictable foundation for cooperation. Because Russia is not a full participant in the international legal framework surrounding nuclear energy and is seen as having an insufficiently developed domestic legal system, framework agreements help clarify the parties' obligations, especially where the application of international or domestic law is in doubt. In essence, framework agreements establish the rules of the game by reconciling the competing interests of donors and recipients through negotiated bargaining.

Framework agreements typically exempt assistance from taxes, duties and fees; indemnify donors of liability from nuclear accidents; and outline audit and examination procedures. Some agreements also address the issue of donor access to sites where assistance is used, and some give diplomatic immunity to the donor's project participants.

The issues of *access* and *audits and examinations* must balance transparency and secrecy. On the one hand, donors have a legitimate interest in ensuring aid is used for its intended purpose. Typically, this requires some appropriate level of transparency and accountability, including physical access to sites where aid is used and the opportunity to conduct financial audits and examinations. On the other hand, military applications of nuclear energy involve highly sensitive, national security information. This sensitivity continues to apply even when the military transfers its nuclear material to civilian control, such as when spent nuclear fuel from a decommissioned submarine is transferred from the navy to Minatom. Russia's interest in protecting national security information is understandable. The challenge is determining the type (and quantity) of information necessary to disclose to meet programme goals and ensure fiscal rectitude, versus what information must be withheld to protect legitimate national security interests.

Immunity of donor personnel has become increasingly important from the perspective of some donors, especially the United States, for protecting their nationals from what they view as a capricious, arbitrary legal justice system in Russia. Under Article IX of the CTR Umbrella Agreement, for example, US government employees in Russia carrying out activities under the Agreement are accorded privileges and immunities similar to those accorded administrative and technical staff under the 1961 Vienna Convention on Diplomatic Relations.[110] At one level, this is protection against harassment and corruption, such as police arresting foreigners as a means for petty extortion.[111] At another level, it is a reaction against disturbing legal cases, such as the espionage charges against Aleksandr Nikitin, a Russian environmental activist, and Edmond Pope, an American businessman. The latter case prompted the US government to issue an advisory to American firms seeking business in the Russian military industrial sector warning them about the increased risks of being accused of espionage.[112]

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[110] Vienna Convention on Diplomatic Relations, 18 April 1961, *United Nations Treaty Series*, vol. 500 (1964), no. 7310, p. 95.

[111] *Dagbladet*, 2 December 1999, 4

[112] *Aftenposten*, 7 November 2000, 8.

Customs duties, taxes and fees levied on foreign assistance are a major obstacle to progress in multilateral cooperation. Although enthusiasm for foreign assistance varies widely among the world's wealthier nations, donor governments absolutely chafe at the notion of paying fees on the aid they provide to others. Donors expect that their gifts be free and unencumbered, and that their assistance be used entirely, and solely, for its intended purpose—not for bolstering a recipient's weak treasury. Donors of technical assistance to Russia have encountered a variety of different fees. For example, foreign goods imported into Russia are normally subject to a customs tariff of 5 to 35 percent and an import value added tax (VAT) of 20 percent on the value of the imported material. Goods and services purchased from Russian subcontractors are subject to a 20 percent VAT. A variety of other miscellaneous federal, regional and local taxes and fees may also be levied, directly or indirectly, on foreign assistance.[113] Besides objecting to paying on grounds of principle, donors also point out that the fees significantly erode the amount of donor aid available to solve the problems for which the aid is given. Framework agreements are the principal mechanism through which donors have sought to obtain exemptions from an aid recipient's duties, taxes and fees.

Indemnification of *liability for nuclear damage* is perhaps the most intractable issue complicating nuclear safety assistance to Russia. Potential donors are concerned that should an accident occur at an installation where their aid was being used, they could be held liable for potentially enormous financial damages. Donors have insisted on agreements that assign liability for nuclear damage to the aid recipient as a prerequisite for providing nuclear safety assistance. In addition to protecting themselves, donor governments are also protecting their domestic companies with whom they contract to perform the actual work associated with their nuclear assistance programmes. The most experienced western firms demand very strong guarantees of liability protection before they will agree to participate. As the most complex issue addressed in framework agreements, liability is discussed at length in Section 4.3.

4.2 The framework agreements

There are very few legal framework agreements that govern nuclear safety cooperation with Russia. One of the first to be negotiated was with the United States in 1992 governing activities conducted under the Cooperative Threat Reduction programme (commonly referred to as the CTR Umbrella Agreement).[114] The US has three other bilateral agreements with Russia containing nuclear liability provisions.[115] Russia has also signed framework agreements with

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[113] US Department of Energy, Office of Arms Control and Nonproliferation, 'The Impact of the Russian Taxation System on the Material Protection, Control and Accounting (MPC&A) Program,' paper presented at the 40th annual meeting of the Institute of Nuclear Material Management, Washington, DC, 27 July 1999 (Washington, DC: US Department of Energy, Office of Arms Control and Nonproliferation, 1999).

[114] US Department of State, 'Agreement between the United States of America and the Russian Federation Concerning the Safe and Secure Transportation, Storage and Destruction of Weapons and the Prevention of Weapons Proliferation,' with Implementing Agreements, with annexes, 17 June 1992, as amended by the Protocol of 15–16 June 1999, *Treaty and Other International Acts Series* [CTR Umbrella Agreement].

[115] They are: the 1993 Agreement Concerning Operational Safety Enhancements, Risk Reduction Measures and Nuclear Safety Regulation for Civil Nuclear Facilities in the Russian Federation; the 1998 Agreement on the Nuclear Cities Initiative; and the 2000 Agreement Concerning the Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes and Related Cooperation. Reprinted in OECD, Nuclear Energy Agency, *Nuclear Safety Related Co-operation Agreements Concluded with the Federation of Russia and with Ukraine, Containing in Particular Liability Provisions*, 2nd rev. (Paris: OECD, Nuclear Energy Agency, 2001). As they incorporate the CTR Umbrella Agreement and contain generally similar provisions, they will not be discussed further here.

the European Union,[116] the European Bank for Reconstruction and Development (EBRD),[117] Norway,[118] Germany[119] and France.[120] The EU agreement governs assistance provided through its TACIS programme. The EBRD agreement governs assistance provided through the Nuclear Safety Account to improve the safety of the Kola, Novovoronezh and Leningrad nuclear power plants.[121] Of the above, only the US and Norwegian agreements apply to the defence nuclear sector.

Under the terms of the CTR Umbrella Agreement, US aid is exempt from any tax, duty, fee or restriction; the US and its contractors are held harmless for any damages (nuclear or otherwise) arising out of CTR activities; third party claims are the sole responsibility of the Russian state; US government employees involved in authorised activities have diplomatic immunity; and the US has rights to conduct periodic audits and examinations. The US interprets the tax exemption clause to include taxes and fees assessed at any level of government.[122] Initially, both US government personnel and contractors were accorded immunity, however, the 1999 Protocol to the Agreement narrowed immunities to US government personnel only. The audit and examination provision specifies that US representatives have the right to inspect 'any and all related records or documentation' during the period of the Agreement and three years afterwards. Initially, the examinations were to take place 'if possible' at the sites where American assistance was used. This vague formulation was amended by the 1999 Protocol, which states that 'taking into account established practice, procedures to implement such examinations are to be agreed upon by the parties' Executive Agents.'

The Norwegian–Russian Agreement contains similar, yet less extensive, provisions with respect to tax exemptions, nuclear liability, and the right to conduct audits and examinations, but does not provide privileges and immunities for Norwegian personnel. Equipment and materials imported into Russia as free technical assistance are exempted from taxes, customs duties and other fees. Although the Agreement says tax exemptions shall be granted on terms

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[116] Memorandum of Understanding between the Commission of the European Communities and the Russian Federation on the Implementation of the Technical Assistance Programmes in the Field of Nuclear Safety, with letters, 27 February 1995, in OECD, *Nuclear Safety Related Co-operation Agreements*, 21-35 [EC Memorandum].

[117] Agreement between the Government of the Russian Federation and the European Bank for Reconstruction and Development relating to Nuclear Safety Account Projects in the Russian Federation, with annexes, 9 June 1995, in OECD, *Nuclear Safety Related Co-operation Agreements*, 39-62 [EBRD Agreement].

[118] Royal Norwegian Ministry of Foreign Affairs, 'Agreement between the Government of the Kingdom of Norway and the Government of the Russian Federation on Environmental Co-operation in Connection with the Dismantling of Russian Nuclear Powered Submarines Withdrawn from the Navy's Service in the Northern Region, and the Enhancement of Nuclear and Radiation Safety,' 26 May 1998, *Overenskomster med Fremmede Stater*, no. 7 (1998), 568-82 [Norwegian–Russian Agreement].

[119] Agreement between the Government of the Russian Federation and the Government of the Federal Republic of Germany on Nuclear Liability in connection with Deliveries from the Federal Republic of Germany for Nuclear Installations in the Russian Federation, with annex, 8 June 1998, in OECD, *Nuclear Safety Related Co-operation Agreements*, 73-80.

[120] Agreement between the Government of the French Republic and the Government of the Russian Federation on Third Party Liability for Nuclear Damage Caused in connection with Deliveries from the French Republic for Nuclear Installations in the Russian Federation, with annex, 20 June 2000, in OECD, *Nuclear Safety Related Co-operation Agreements*, 95-109.

[121] EBRD, The Nuclear Safety Account: Central and Eastern Europe and the former Soviet Union (London: European Bank for Reconstruction and Development, 1996), 11.

[122] Carol Kessler, Senior Coordinator for Nuclear Safety, US Department of State, telephonic interview with Sawhill, 29 June 2000.

'not less favourable than those accorded to technical assistance provided free of charge by any third party,' it is unclear whether Norway could demand the same treatment as the US receives under its agreement. Audit and examination rights are somewhat narrower. Norway may conduct examinations to ensure its assistance is 'used in accordance with the Agreement,' but the Agreement does not specify what may be inspected, when it may be inspected, or where the inspections may take place. It would seem to Norway's advantage to strengthen audit and examination rights.

AMEC does not have its own framework agreement with Russia. AMEC has been able to move forward via linkages to the CTR Umbrella Agreement and the Norwegian–Russian framework agreement. Yet, this arrangement has not been entirely satisfactory. With respect to US participation, AMEC projects must directly support CTR objectives and fall within the very narrow programmatic guidelines set by the US Congress in legislation governing the Nunn–Lugar programme in order for them to be covered by the CTR Umbrella Agreement. A project that does not fall within these guidelines would not be linked to CTR, would not be entitled to the protections provided by the Umbrella Agreement, and would thus not enjoy US participation. In practice, this limits AMEC's scope to those activities involving ballistic missile submarines, which comprise only a third of the Russian submarine fleet.

Until recently, Norway was a limited partner in AMEC due to difficulties and delays in bringing AMEC projects under the terms of its bilateral agreements with Russia. Its 1995 Memorandum of Understanding[123] provided insufficient tax and liability protections. Russia continued to impose taxes and duties on nuclear safety assistance from Norway, and European firms eschewed involvement because they felt the Memorandum's liability provisions were inadequate. Although these shortcomings were largely resolved with the 1998 Norwegian–Russian Agreement,[124] the agreement initially covered only one AMEC-related project: the development of a mobile facility for treating low-level liquid radioactive waste (project 1.2) (see Table 4.1). Efforts to add the other AMEC projects were difficult and time-consuming. It was not until May 2000, after a long process involving the exchange of diplomatic notes, that three additional AMEC projects were brought under the terms of the agreement: the spent fuel cask and storage pad projects (projects 1.1 and 1.1-1), and the solid radioactive waste handling project (project 1.3). The solid waste storage project (1.4) is still not covered. Although the additions were a welcome improvement, they are considered only a temporary solution to improving Norwegian participation in AMEC, as the parties must engage in additional negotiating rounds before the remaining uncovered projects, or any new projects, can be added to the 1998 Agreement.[125]

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[123] Royal Norwegian Ministry of Foreign Affairs, 'Memorandum om Norsk–Russisk Samarbeid på Atomsikkerhetsområdet' [Memorandum on Norwegian–Russian Cooperation in the Area of Nuclear Safety], 4 October 1995, *Overenskomster med Fremmede Stater*, no. 9 (1995), 784-6.

[124] Norway continues to experience some difficulties. *See* K. Dragnes, 'Atomsamarbeid i Stampe' [Nuclear Cooperation at a Standstill], *Aftenposten*, 9 April, 2000, 7; cf. G. Hønneland and A. Moe, 'Mislykket Atomsamarbeid?' [Unsuccessful Nuclear Cooperation?], *Aftenposten*, 8 March 2001, 22.

[125] Ambassador Torbjørn Norendal, Special Advisor for Nuclear Issues, Royal Norwegian Ministry of Foreign Affairs, Oslo, interview with Brubaker and Sawhill, 29 June 2000; Kessler, interview, 29 June 2000.

Table 4.1 – Projects governed by the 1998 Norwegian–Russian Framework Agreement

Project	Initial or added project	Defence related	AMEC related
Build ship for transport of naval spent nuclear fuel (SNF)	initial	yes	no
Build four railway cars for transport of naval SNF	initial	yes	no
Empty/decommission naval SNF storage at Andreev Bay	initial	yes	no
Establish interim storage facility for naval SNF at Mayak	initial	yes	no
Build temporary storage for solid radwaste at Andreev Bay	initial	yes	no
Modernise liquid radwaste storage facility in Severodvinsk	initial	yes	no
Deliver a mobile facility for treating liquid radwaste	initial	yes	yes
Dismantle the floating technical base *Lepse*	initial	no	no
Modernise liquid radwaste treatment facility in Murmansk	initial	no [a]	no
Enhance operational safety at the Kola nuclear power plant	initial	no	no
Develop prototype transportable storage cask for naval SNF	added	yes	yes
Develop pad for temporary storage of SNF storage casks	added	yes	yes
Build system for treating solid radwaste from submarines	added	yes	yes

Note: Technically, this is a project in the civil nuclear sector, as it is taking place at *Atomflot*, the repair facility for Russia's civilian nuclear icebreaker fleet. Practically, however, it is defence-related, since the facility will also process waste from the Russian Northern Fleet.

Two additional agreements are presently under negotiation with Russia. The first, commonly referred to as the Trilateral Agreement, is between Norway, Russia and the United States, and is intended to provide liability and other legal coverage for AMEC and other trilateral cooperation in civil and military nuclear safety. The second is a broad, multilateral framework agreement to support an initiative called the Multilateral Nuclear Environmental Programme in the Russian Federation (or MNEPR); negotiations for this agreement began in May 1999 and involve 12 nations (see Section 4.4).

4.3 Liability for Nuclear Damage

Under international law, the law of responsibility of states is concerned generally with the incidence and consequences of both illegal and legal acts, and particularly with the payment of compensation for loss caused.[126] With respect to ultra-hazardous activities, international law presently lacks a principle of 'absolute' or strict liability for failure of states to control activities that create a serious or unusual risk of harm to others. However, objective responsibility provides some measure of protection.[127] Particular problems have been addressed through multilateral conventions, such as the conventions that established absolute liability with respect to damage caused by nuclear installations.

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[126] I. Brownlie, *Principles of Public International Law*, 4th ed. (Oxford: Clarendon Press, 1990), 433. See generally 432-76.

[127] Ibid., 433. The International Law Commission has worked on 'international liability for injurious consequences arising out of acts not prohibited by international law.'

Principles of civil nuclear liability law have been under development since the mid-1950s. These include the concepts of strict liability (i.e., liability without fault), channelling liability to the operator of a nuclear installation, limiting liability in amount and time, mandatory coverage for liability, and congruence between liability and coverage. Perhaps the clearest idea concerning liability for nuclear damage can be obtained from an estimation of the cost for compensation of damage from a nuclear catastrophe. In exceptional cases, damages may run as high as $100 billion.[128] Who is to stand responsible for compensation, and how will it be provided? So far, states themselves have largely been the guarantors. Where this fails, the uncompensated victims ultimately bear the costs. In the case of multilateral nuclear cooperation, foreign aid donors are afraid of exposing themselves to these risks, thus some type of protection from liability has become a prerequisite for their assistance.

The object of this section is to give an overview of developments concerning nuclear liability relevant to international nuclear cooperation with Russia. This section examines agreements concerned with both military and civilian uses of nuclear energy, because any drafts resulting from negotiations will likely be similar. It presents issues specifically relevant to Norway, and discusses some solutions to the problems identified.

The international liability regime for nuclear damage

Within the sphere of civil nuclear power and other peaceful uses of nuclear energy, international standards for financial protection against nuclear damage have been established by a constellation of liability instruments. They are: the 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy,[129] the 1963 Vienna Convention on Civil Liability for Nuclear Damage,[130] the 1963 Brussels Supplementary Convention,[131] the 1988 Joint Protocol Relating to the Application of the Vienna Convention and Paris Convention,[132] the 1997 Protocol to Amend the Vienna Convention,[133] and the 1997 Convention on Supplementary Compensation for Nuclear Damage.[134] Principles characterising the international liability regime for nuclear damage may be outlined generally as follows.[135] For clarity, the Vienna Convention is the focus.

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[128] M. Radetzki, 'Limitation of Third Party Nuclear Liability: Causes, Implications and Future Possibilities,' *Nuclear Law Bulletin* 63 (1999): 11. This estimate was calculated solely for the OECD area.

[129] Convention on Third Party Liability in the Field of Nuclear Energy, with annex, 29 July 1960, as amended by the additional protocol of 28 January 1964 and the protocol of 16 November 1982, *United Nations Treaty Series*, vol. 956 (1974), no. 13706, pp. 251 and 335, and vol. 1519 (1988), no. 13706, p. 329 [Paris Convention].

[130] Vienna Convention on Civil Liability for Nuclear Damage, 21 May 1963, *United Nations Treaty Series*, vol. 1063 (1977), no. 16197, p. 265 [Vienna Convention].

[131] Convention Supplementary to the Convention on Third Party Liability in the Field of Nuclear Energy, 31 January 1963, as amended by the additional protocol of 28 January 1964, *United Nations Treaty Series*, vol. 1041 (1977), no. 13706, p. 358 [Brussels Supplementary Convention].

[132] Joint Protocol Relating to the Application of the Vienna Convention on Civil Liability for Nuclear Damage and the Paris Convention on Third Party Liability in the Field of Nuclear Energy, 21 September 1988, *United Nations Treaty Series*, vol. 1672 (1992), no. 28907, p. 301 [Joint Protocol].

[133] Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage, with annex, 29 September 1997, *International Legal Materials*, vol. 36 (1997), p. 1462, not in force [1997 Protocol].

[134] Convention on Supplementary Compensation for Nuclear Damage, 29 September 1997, *International Legal Materials*, vol. 36 (1997), p. 1473, not in force [Convention on Supplementary Compensation].

[135] *See* P. Reyners, 'Modernisation of the Civil Liability Regime for Nuclear Damage: Amendment of the Vienna Convention and Adoption of the New Convention on Supplementary Compensation for Nuclear Damage,' *Advanced Training Seminar on Nuclear Law: Compendium, Tallinn, 24-8 August 1998* (Paris: OECD, Nuclear Energy Agency, 1998), 1-11.

- Liability is to provide financial protection against damage resulting from certain peaceful uses of nuclear energy.
- Liability for nuclear damage is channelled exclusively to the operators[136] of nuclear installations.[137]
- Liability of the operator is absolute. The operator is held liable irrespective of fault.
- Liability is in principle limited in amount, but there is not an unambiguous ceiling.[138]
- Liability is limited in time. Under the Vienna Convention compensation rights are extinguished if an action is not brought within ten years from the date of the nuclear incident.[139] Longer periods are allowable under the law of the installation state if the liability of the operator is covered by financial security. Shorter periods are also possible, but not less than three years under the Vienna Convention from the date the claimant knew or should have known of the damage and the operator liable.[140]
- The operator must maintain insurance or other financial security for an amount corresponding to its liability. If such security is insufficient, the installation state is obliged to make up the difference up to the limit of the operator's liability.
- Jurisdiction over actions lies exclusively with the courts of the contracting party in whose territory the nuclear incident occurred.
- Non-discrimination of victims on the grounds of nationality, domicile or residence is required.[141]

Following the Chernobyl incident, the IAEA and the OECD's Nuclear Energy Agency worked to consolidate these regimes. This led to the adoption of the Joint Protocol in 1988,

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[136] '*Operator*' in relation to a nuclear installation, means the person designated or recognised by the installation state as the operator of that installation, under Vienna Convention, Article I.

[137] '*Nuclear installation*' means (i) any nuclear reactor other than one with which a means of sea or air transport is equipped for use as a source of power, whether for propulsion thereof or for any other purposes, (ii) any factory using nuclear fuel for the production of nuclear material, or any factory for the reprocessing of nuclear material, including any factory for the reprocessing of irradiated nuclear fuel; and iii) any facility where nuclear material is stored, other than storage incidental to the carriage of such material; provided that the installation state may determine that several nuclear installations of one operator which are located at the same site shall be considered as a single nuclear installation; under Vienna Convention, Article I. The definition under (i) excludes reactors on nuclear-powered vessels, whether military or civilian.

[138] The Paris Convention limits maximum liability to 15 million Special Drawing Rights (SDR), about US $19 million. The installation state may provide for a greater or lesser amount (but not below SDR 5 million), taking into account availability of insurance coverage. The Brussels Supplementary Convention extends additional funding available under the Paris Convention up to SDR 300 million ($375 million) from contributions by the installation state and contracting parties. Different liability amounts are required under the national legislation of European countries. The 1997 Protocol sets the limit at SDR 300 million. The Convention on Supplementary Compensation defines additional amounts to be provided through contributions by parties on the basis of installed nuclear capacity and US rate of assessment.

[139] The Paris Convention is the same. Reyners, 6, notes that the Protocol requires 30 years for personal injury and 10 years for the other types of damage, due to the 'deferred damage' characteristic of ionising radiation.

[140] The period is two years under the Paris Convention.

[141] Reyners, 8, notes that the principle of non-discrimination was modified by an amendment to the Vienna Convention. It is now possible to refuse victims' requests for compensation where the compensation comes from public funds, above SDR 150 million ($187 million), or where the damage is suffered in the territory of a nuclear state which does not give reciprocal benefits to the installation state.

which essentially links the Vienna and Paris Conventions and their associated agreements, establishing one expanded liability regime.[142] Parties to the Joint Protocol are considered as parties to both conventions, and under a choice of law rules a determination is made as to which of the two should apply, to the exclusion of the other. However, the dual system is still in place, and the Joint Protocol may have actually increased the complexity of conventional relations between the different states. Further, a global and unified regime for civil nuclear liability may not be a realistic possibility any longer, though such an objective is logical, since the main civil nuclear powers are not parties to the conventions on civil nuclear liability.[143]

Liability for nuclear damage versus traditional liability in tort

With respect to liability for nuclear damage, most states deviate from traditional liability principles in tort, regardless as to whether they ratify and implement the international liability regime or rely upon a domestic regime. Traditional liability under tort is based on fault, any subject may be liable, liability is unlimited, and insurance is voluntary. In the nuclear liability regime, liability is strict, channelled to the operator and limited, and insurance or equivalent financial security is mandatory.[144] The reasons for this are as follows.

Strict liability strengthens the reparative function of the liability and the provision of compensation to victims, and imposes a burden on the operator. While channelling liability to one subject reduces the possibilities of damage reparation and the compensation of victims, it is balanced by the imposition of strict liability and compulsory insurance. Therefore, the adverse effect on reparation will usually be small. The channelling has important implications. Without channelling nuclear liability, the suppliers of goods and services would risk incurring liability for the potentially catastrophic harm caused by defects in products or services deliveries, and they would therefore have to insure. Consequently, nuclear damage would be doubly insured, thus raising costs.

Limiting liability would appear to lessen the reparative function of tort law. In practice, however, unlimited liability does not exist in tort law. The amount of liability is limited to the amount of coverage provided by existing liability insurance plus the net worth of the subject. These two together under tort law often prove severely inadequate for full compensation of catastrophic damage. Thus, a formal limitation of liability at a level above the sum total of liability insurance plus the net worth of the liability subject will have no impact on the compensation payments. The nuclear liability limitation, which is set at a level acceptable to insurers, is below this level, and therefore constrains the reparative function of the liability. In practice, this is balanced by the fact that states assume liability for nuclear damage above the liability limitation. Without the limitation, the nuclear operator risks bankruptcy should a severe accident occur.

Whether liability insurance is compulsory does not influence liability in tort. However, since liability insurance increases the capacity of the nuclear operator to fulfil its obligation, compulsory liability insurance promotes the reparative function of the liability. At the same time, it clearly limits the freedom of action of each nuclear operator. The duty to insure against liability or to provide equivalent financial security clearly imposes a burden on the nuclear power industry as a whole, as well as state parties to the nuclear liability conventions.

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[142] Ibid., 2.

[143] Ibid.

[144] *See* Radetzki, 10-11, regarding the nuclear power industry. The same arguments also apply to nuclear cooperation agreements between western states and Russia since the subject matter is nuclear damage.

Russia and the international liability regime

Russia is not a participant in the international nuclear liability regime. A number of events suggest, however, that Russia has at least a partial interest in becoming one.[145] Between 1995 and 1997, Russia enacted the law 'On the Use of Atomic Energy,'[146] signed the Vienna Convention, drafted a proposed law 'On Indemnification for Nuclear Damage and Nuclear Insurance' (the Russian Indemnity Draft),[147] and submitted to the Duma a bill to ratify the Vienna Convention. Since 1998, however, little seems to have occurred concerning ratification of the Vienna Convention.[148] One reason for the inactivity may be the need to address inconsistencies between the Russian Indemnity Draft and the Vienna Convention, possibly caused by inexperience with the global regime. Another reason may be that ratification has been dealt a lower priority due to shifting legislative priorities.[149] A third reason may be that Russia lacks the financial capacity to meet even the limited liability obligations of the Convention.[150] In practice, however, this would seem to present a minor problem, since extremely low liability amounts exist.[151]

Some of the former Soviet republics, such as the Ukraine, have ratified the Vienna Convention and other treaties governing nuclear liability.[152] Several western states and international organs are urging Russia to ratify the Convention as well.[153] One might ask why

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[145] Ibid.; M. Zhuchkov, et al., 'International Civil (Legal) Nuclear Liability Regime and Conceptual Features of the Russian Federation Nuclear Insurance System,' *International Seminar on Nuclear Damage Compensation and Nuclear Insurance: Compendium, Moscow, 15-17 April 1997* (Paris: OECD, Nuclear Safety Agency, 1997), 144-54 [*Moscow Seminar*].

[146] Federal Law on the Use of Atomic Energy of 20 October 1995, reproduced in *Supplement to Nuclear Law Bulletin* 57 (1996). Numerous legal instruments enacted under the statute regulate the use of nuclear energy. *See* OECD, Nuclear Energy Agency, *Overview of Nuclear Legislation in Central and Eastern Europe and in the NIS* (Paris: OECD, Nuclear Safety Agency, 2000), 1-9.

[147] A. Matveev, 'Conceptual Draft of the Federal Law, "On Indemnification for Nuclear Damage and Nuclear Insurance,"' *Moscow Seminar*, 139-43.

[148] Progression of these bills through the Duma is unclear, though several hearings have occurred. OECD, *Overview of Nuclear Legislation,* 8.

[149] O. Supataeva and E. Vassilieva, 'Nuclear Liability in the Russian Federation: The Problem of Indemnities,' *Reform of Civil Nuclear Liability, International Symposium*, *Budapest, 31 May–3 June 1999* (Paris: OECD, Nuclear Energy Agency, 1999), 365-9 [*Budapest Symposium*]. Generally the Constitution of the Russian Federation, the Civil Code and the Federal Law on the Use of Atomic Energy serve as a basis for drafting the appropriate law on civil liability. A. Gutsalov and A. Matveev, 'Current Status of the Russian Legislation on Civil Liability for Damage Caused by Radiation,' *Budapest Symposium*, 567-72.

[150] Russia cannot afford to ratify the Vienna Convention, according to Valentin Luntsevich, member of the Russian Duma and deputy chairman of the Intergovernmental Working Group (IWG) on Nuclear Waste Problems in Russia (address at the IWG meeting, Washington, DC, 1 March 2000).

[151] The minimum liability limit set by the Vienna Convention is $5 million (in terms of gold on 29 April 1963). N. Pelzer, 'Focus on the Future of Nuclear Liability Law, *Budapest Symposium*, 439, notes that 'the liability amounts made available on the basis of national legislation, even if those legislation [sic] implement the international liability convention, vary from country to country. There are extremely low liability amounts, and there are also high and very high amounts.' F. Suransky, 'Increased Liability Amounts under the 1997 Vienna Protocol and Elsewhere,' *Budapest Symposium*, 118, notes that 1963 Vienna limits are very low from today's point of view, with the lowest limits being Bulgaria and Lithuania at SDR 15 million ($19 million), the Slovak Republic at SDR 35 million ($44 million), and Ukraine at SDR 50 million ($62 million). The amount of compensation is not only inadequate for the potential risk, but is also not internationally harmonised.

[152] Reyners, 2.

[153] Among those encouraging Russia to ratify the Convention are the IAEA, Norway, the US and the UK. Fiona Wagstaff, OECD, Nuclear Energy Agency, Legal Affairs Section, telephonic interview with Brubaker, 16 March 2000; C. Allen, 'International Principles of Nuclear Liability: Western Group's Comments on the

western states are encouraging Russia to do so when several of the largest users of nuclear energy are themselves not parties, such as the United States,[154] and when they have obtained more favourable liability coverage in bilateral agreements with Russia, as discussed below. The answer lies partly in the fact that western states view international treaties as a key to confidence building and as an important contribution to international standards.[155] Some states consider it 'critical' to have commitments at a treaty level, with bilateral and multilateral agreements being necessary only in the interim. Ratification may also help to encourage important commercial involvement.

Both Norway and the United States believe that potential problems involving legal jurisdiction could be limited—some may say cynically—through Russia's accession to an international liability instrument.[156] In particular, Russia's ratification may help to preclude lawsuits in western states with progressive liability laws, such as occurred when Indian victims sued Union Carbide in US courts following the toxic chemical release at its plant in Bhopal, India in 1984. The US government is concerned about how a US court would approach the issue of jurisdiction if a nuclear incident occurred at a Russian site where US government assistance was involved. It is uncertain how the courts would interpret bilateral liability agreements. Because of Russia's questionable ability to cover substantial damages, a court may consider bilateral agreements that assign all liability to Russia as lacking good faith and thus accept jurisdiction. If Russia were a party to the Vienna Convention, however, there is a greater likelihood that US courts would not accept jurisdiction, respecting the treaty provisions that assign liability to the operator and reserve legal jurisdiction with Russia's courts.[157]

Nevertheless, Russia may find direct benefits in ratifying the Vienna Convention.[158] It is important, therefore, to know the extent to which it would be implemented under Russian domestic law. Although the Russian Indemnity Draft provides for full compensation by the Russian state for loss and damage caused by radiation, the following points appear to be inconsistent with the Vienna Convention:[159]

- Special rules governing transboundary damage may be contrary to the Vienna Convention, which requires that victims not be discriminated against on account of their nationality, domicile or residence.
- It is unclear whether the Vienna Convention is directly applicable in Russia, overriding any conflicting provisions of national law.

Draft Law on the Compensation of Nuclear Damage and Nuclear Insurance' *Moscow Seminar*, 160-2; A. Troy, 'Statement for the International Seminar on Nuclear Liability and Insurance Issues in Russia,' *Moscow Seminar*, 171; Carol Kessler, address at the Intergovernmental Working Group (IWG) meeting on Nuclear Waste Problems in Russia, Washington, DC, 1 March 2000; Norendal, interview, 29 June 2000.

[154] The US considers the current international liability regime inadequate, though it has signed (but not yet ratified) the 1997 Convention on Supplementary Compensation.

[155] Kessler, address at the IWG meeting, 1 March 2000.

[156] Norendal, interview, 29 June 2000; Kessler, interview, 29 June 2000.

[157] This is subject to recognition of the jurisdiction of foreign courts in certain cases, as well as the right of subrogation related to foreign operators, mentioned briefly below. The jurisdictional point is not clear, however, and US courts are noted for deciding tort and contract law cases equitably against parties who have relied upon an 'unfair bargaining position.'

[158] The Russian legal system is presently more unpredictable than those in western states, and most alternatives should probably be held open.

[159] From Allen, 163-6. The list is not exhaustive. Allen suggests it would be more efficient to make the necessary changes to the Russian Indemnity Draft before ratifying the Vienna Convention.

- If the Vienna Convention is directly applicable, it is unclear why the Indemnity Draft is limited to incidents within the territory of Russia, as distinct from all incidents where the Russian operator is liable.
- The relationship between provisions on transboundary damage and provisions on transportation cases is unclear. There is no reference by the Indemnity Draft to the assumption of liability required under a written contract. Where there is no written contract, there appear no provisions governing the operator's liability upon receipt of incoming nuclear material or prior to the release of outgoing material. A distinction is required.
- The extent of the operator's liability is unclear. A limitation of the operator's liability appears to relate only to transportation cases. Furthermore, the limitation appears to apply to the financial guarantee versus the operator's liability.
- If the operator's liability is limited, it is unclear whether the operator is liable in respect to each installation where several installations are involved, as required under the Vienna Convention.
- Due to indistinct formulations, it is not clear whether the operator is exclusively liable.
- No provision is made for the right of subrogation, which would be needed in cases where a foreign operator is liable, but compensation is paid by the Russian state.
- The Indemnity Draft has not claimed certain exemptions under the Vienna Convention regarding the scope of the operator's liability. Incidents arising from 'actions of a irresistible force' are not limited to incidents caused by grave, exceptional natural disasters and armed conflicts. Damage to the health of personnel is not expressly limited to cases where compensation is not already available from public health insurance, social security and occupational disease compensation. It needs to be clarified whether damage to the health of the operator's personnel would always be covered.[160]
- It is unclear whether the recognition of the jurisdiction and judgements of foreign courts in certain cases, both of which are important, would be sufficiently implemented elsewhere in the Russian legislation, or whether specific provision is required in the Indemnity Draft.
- Definitions differ, making it difficult to assess implementation of the Vienna Convention. For example, the term 'nuclear object' is used by the Indemnity Draft but not by the Convention. The term seems to include defence nuclear installations, yet nuclear damage arising from a military nuclear power source is excluded.
- The insurer's liability is to the insured party, who is the operator, and insurance payment should not be made payable to the 'person . . . suffering damage'. (This clause may seem to reflect confusion regarding the difference between liability and compensation.)
- It is unclear whether the phrase, 'property interest of insured parties connected with their liability' means 'nuclear object' implying the problems denoted above.

[160] Since the operator has recourse under the Russian Indemnity Draft in cases established under civil law, it is unclear whether these are limited to those under the Vienna Convention. Whether there exists contractual indemnity is partially dealt with in other provisions, and a complete exemption is given where the damage results from incidents caused intentionally. This may be broader than under the Vienna Convention.

- Cancellation by the insurer, on demand, is allowed under the Indemnity Draft, while under the Vienna Convention cancellation is permitted only upon two months notice, or through cancellation in the course of carriage.
- Payment of insurance within one month of the insured event is provided for under the Indemnity Draft. However, damage may not be ascertained until much later.

Nuclear insurance issues in Russia, though relevant, will not be dealt with extensively here. The Russian insurance industry is under development, though lacking capital.[161] Risks exceed the insurance pool capacity in Russia. One expert estimated an operator's liability limit to be 1.2 trillion roubles ($41 billion) for an incident at a nuclear facility, and 400 billion roubles ($14 billion) for a nuclear transport incident. According to this expert, however, 'pool capacity [of the Russian insurance market] may be 100 billion roubles [$3 billion] at best. Insurance pool capacity will directly affect the solution of the issue on risk liability reinsurance when risks exceed the capacity.'[162] This suggests that most of the liability of a nuclear operator in Russia needs to be covered by a state guarantee.[163] Due to all of the reasons discussed above, bilateral liability agreements will likely continue to be a central element of international cooperation. Multilateral liability agreements may also become prevalent.

Comparison of liability provisions in bilateral agreements with Russia

Liability provisions under the CTR Umbrella Agreement, the EBRD Agreement, and Russia's bilateral agreements with Norway, Germany and France are essentially carbon copies of one another. The indemnity agreement under the EC Memorandum, however, was initially considered deficient by western contractors, though subsequent changes appear to have made it comparable to the agreements above. This section compares the key liability provisions in these agreements.

The CTR Umbrella Agreement is concerned with the dismantling and transport of military nuclear material and equipment, and covers activities conducted by both military and civilian agencies. The pertinent liability provisions revolve around complete removal from liability for the United States for its CTR programme activities conducted in Russia. The US Department of Defense and the Russian Ministry of Atomic Energy are the parties responsible. The Agreement applies to all material, training or services provided under it or implementing agreements, and to all related activities and personnel. Unless written consent has been given by the US, Russia may not transfer title to and possession of any such material, training or services, other than to an officer, employee or agent of a party, and may not permit the use of material, training or services for purposes other than those for which it has been furnished.

Under the CTR Umbrella Agreement, Russia must hold harmless and bring no legal proceedings against the US government and US employees, contractors, and contractors' personnel, for damage to Russian property, or death or injury to Russian personnel, arising

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[161] Under the International Northern Sea Route Programme, the technically best bids in a moot round conducted for carriage of cargoes utilising nuclear ice-breakers came from the Moscow market. Edgar Gold, Oceans Institute of Canada, interview with Brubaker, 26 June 1997.

[162] N. Levant, 'Main Principles of Establishing a Russian Nuclear Insurance Pool,' *Moscow Seminar*, 181; see generally 177-81. See also A. Karpov and A. Karachevtsev, 'Some Principles of Approach to Nuclear Risk Insurance,' *Moscow Seminar*, 182-3; V. Gubanov, 'The Concept of the Development of Insurance Protection for Enterprises, Organisations and Employees of RF Minatom,' *Moscow Seminar*, 184-8; and M. Amelina, 'Role of Nuclear Insurance Broker in Nuclear Hazardous Facilities Insurance in the Russian Federation,' *Moscow Seminar*, 191-5. On 13 July 2001, US $1 = RUB 29.2010.

[163] See the proposal for extra coverage under the section, *Future developments—financial markets?*, infra.

out of activities covered by the Agreement.[164] Claims by third parties arising out of acts or omissions of US employees, US contractors or contractors' personnel performed as official duty are also the responsibility of Russia. The parties may provide compensation in accordance with their domestic laws, and the parties may consult as appropriate on claims and proceedings. Russian citizens or permanent residents of Russia are not covered. Despite termination of the Agreement or the implementing agreements, Russia's obligations with respect to liability continue to apply without respect to time, unless otherwise agreed.

The EBRD Agreement is similar to the CTR Umbrella Agreement, yet it is somewhat less extensive and has a different structure. Liability is addressed in one provision. It states that, with the exception of claims for damage arising from premeditated actions, Russia irrevocably guarantees full indemnity for the administrator of the EBRD, its employees, agents and subcontractors, both during and following the term of the agreement. The indemnity is from and against all actions, claims, losses, liabilities, expenses or damages in connection with a project or relevant grant agreement, inside or outside Russia. The exception for premeditated actions does not appear in the CTR Umbrella Agreement.

An *indemnity statement* is attached to the EBRD Agreement in which the Russian government states that the Agreement is binding and irrevocable and in favour of contractors, consultants and suppliers of equipment or services financed through grant funds from the Nuclear Safety Account. It addresses liability in much the same manner as the CTR Umbrella Agreement, noting, however, that it is needed as an interim measure pending Russia's adherence to the Vienna Convention, the Joint Protocol, or a similar internationally accepted regime for third-party nuclear liability. It may not be construed as acknowledging the jurisdiction of any court or forum outside Russia over third-party claims, except for Stockholm for arbitration, or as waiving the sovereign immunity of Russia with respect to third-party claims.

Attached to the indemnity statement is a *confirmation letter of indemnity* in favour of suppliers financed by the Nuclear Safety Account.[165] In the confirmation letter, the Russian government agrees to indemnify and to bring no claims against specified contractors, subcontractors, consultants, supplies and sub-suppliers of equipment or services and their personnel. These letters appear similar to the 'specific confirmation letters' used by the European Union to alleviate the initial problems it experienced with the EC Memorandum.[166]

The Norwegian–Russian Agreement in relevant parts substantially resembles provisions of Russia's indemnity statement attached to the EBRD Agreement. The only apparent difference is that the Norwegian–Russian Agreement states that the liability provisions shall not prevent indemnification by the parties for damage in accordance with their national laws. This however has a counterpart under the CTR Umbrella Agreement.

Russia's bilateral agreements with Germany and with France reflect the same contours as above, including 'model letters of confirmation' for suppliers of equipment and services.[167] The bilateral agreements that Russia is negotiating with the UK and with the Netherlands will probably contain similar provisions regarding nuclear liability, as will the MNEPR framework agreement.

Most contracting western companies require a letter of indemnity or other guarantee before carrying out work involving the nuclear energy industry in Russia and Eastern Europe.[168] The companies require the letters because they want additional coverage under civil

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[164] The CTR Umbrella Agreement permits legal actions involving contracts.

[165] See Appendix 2.

[166] B. Brands, 'Nuclear Indemnity Agreement between the EC and Russia,' *Moscow Seminar*, 175-6.

[167] Russia's agreements with Germany and France apply only to cooperation in the civil nuclear sector.

[168] Wagstaff, interview, 16 March 2000.

law to ensure a country's international obligations will be realised domestically.[169] Without sufficient assurances, many western firms have refused to participate in nuclear cooperation programmes with Russia, or have limited the extent of their participation. For example, European firms participating in TACIS projects considered the EC Memorandum's indemnity agreement insufficient and refused to release project reports, recommendations and assessments to Russian beneficiaries for fear of incurring liability.[170] They did not consider that the step from public law to a contractual obligation under civil law was assured. In response, the Commission provided contractors a 'comfort letter' guaranteeing that the EC would undertake to induce Russia by any legal or diplomatic means to meet its obligations under the EC Memorandum. The nuclear industry was unrelenting and maintained its embargo until they received specific confirmation letters in which Minatom confirmed for each contract that the same obligations Russia made under public law exist with regard to civil law contracts. These problems appear to have been resolved through the provision of 'specific confirmation letters' for each contract.[171]

Russian officials appear sceptical to providing letters of guarantee. They argue that although Russia has not ratified a liability convention, it has enacted relevant legal reforms and complies with the nuclear indemnity commitments it has made through bilateral agreements. In their view, letters of guarantee are unnecessary and problematic:

> Unfortunately, our western partners do not wish to notice such progress in the Russian legislation and are very insistent in requiring additional assurances from the Russian Federal Government. In so doing, they considerably complicate co-operation in the nuclear field. It is clear that the lack of a mechanism in Russia similar to that of the 1963 Vienna Convention complicates the court procedures for decision-making on nuclear indemnity issues but the practice of the assurances of the Russian Federal Government, which is being imposed, is unlikely to simplify them.[172]

Russia's ratification of an international liability instrument is unlikely to obviate western states' insistence on letters of indemnity. Several of the former Soviet republics, including the Ukraine, have ratified the Vienna Convention and other liability conventions, yet they are still required to provide letters of guarantee to ensure coverage acceptable to western companies.[173] Even with such letters, western companies have often confined their activities to those involving only a minor exposure to liability, demonstrating their continued concern over the fledging insurance markets covering nuclear incidents, the lack of capital for providing state compensation, and the rather capricious judicial systems in these states. In any event, the letters seem to be the trend internationally, and the relevant indemnity provisions may set a precedent.

Continuing role for intergovernmental liability agreements

Russia's ratification of the Vienna Convention may help international nuclear cooperation with Russia, at least with respect to cooperation in the civil nuclear sector. Some projects,

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[169] Ibid.

[170] Brands, 175-6. The indemnity agreement in the EC Memorandum requires a commitment from Russia not to make any claims with regard to damage resulting from TACIS programme activities and to hold harmless and indemnify all Community contractors in connection with third-party claims.

[171] 'Europe to Help Process Radioactive Waste,' BBC report, 9 February 2001, in *Russian Environmental Digest Files* 3 (6, 2001).

[172] A. Karasev, 'Nuclear Indemnity Regulations in the Russian Federation,' *Budapest Symposium*, 624.

[173] Wagstaff, interview, 16 March 2000.

however, may not benefit from Russia's participation in the international liability regime. Projects involving ship reactors would not be covered because the Vienna Convention excludes ship reactors from its definition of a 'nuclear installation.' The exclusion applies to both military and civilian vessels (e.g., Russia's nuclear-powered icebreakers and the cargo ship *Sevmorput'*).

Another problem is how nuclear material originating from the defence sector would be treated under the civil liability regime, because the regime is restricted to certain peaceful uses of nuclear energy. The restriction clearly excludes damage caused by incidents involving nuclear weapons and weapon components under military control. It may also exclude damage caused by incidents involving other nuclear material managed by and within military and defence programmes; for example, contamination from a storage facility for naval nuclear reactor fuel. However, 'peaceful uses' might arguably be interpreted as including nonproliferation, weapons elimination and disarmament measures; if so, the Vienna Convention may then apply.

It is unclear whether the Vienna Convention would apply to nuclear material transferred from military and defence programmes to civilian control.[174] This uncertainty applies to much of the nuclear material in northwest Russia, as responsibility for scrapping Russia's nuclear-powered submarines and warships was transferred from the navy to Minatom in 1998.[175] All of the nuclear projects within AMEC and most of the projects governed by the Norwegian–Russian Agreement fall within this category.

An additional complication is a lack of transparency even after defence-related material is transferred to civilian control. For example, the Russian government continues to protect the details of naval reactor fuel even after it is transferred to Minatom. This information includes, among other things, the fuel's age, its degree of uranium enrichment, and the extent to which it has been irradiated (the 'burn-up' rate). On the one hand, the details provide insights into Russian defence technology and operations—information the Russian government understandably wants to protect. On the other hand, certain details are essential for designing systems to safely handle, transport and store nuclear material. Western governments and commercial contractors are understandably reluctant to assume any liability in projects where critical details of the nuclear material in question are not disclosed. A balance between transparency and Russia's legitimate security interests has been difficult to achieve. Although progress is being achieved in this direction,[176] lack of transparency remains a substantial problem.[177]

In cases where the Vienna Convention would apply should Russia become a party, liability coverage may be insufficient if Russia were to adopt similar compensation limits as Bulgaria and Lithuania (c. $19 million). In cases where the Vienna Convention does not apply, where its application is in doubt, or where transparency is inadequate, donor governments will probably continue to require bilateral or multilateral liability agreements. In all

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[174] Increasing civilian control is one element of the strategy to achieve nonproliferation, arms reduction and disarmament objectives. *See* generally J. Lepingwell and N. Sokov, 'Strategic Offensive Arms Elimination and Weapons Protection, Control, and Accounting,' *The Nonproliferation Review* 7 (1, 2000): 64-75.

[175] Of some relevance is the Joint Convention on the Safety of Spent Fuel Management and on Safety of Radioactive Waste Management, 5 September 1997, in force 18 June 2001, reprinted as IAEA Information Circular 546 (Vienna: International Atomic Energy Agency, 1997). The convention covers the possibility of such transfers, but it does not address liability and Russia is not a party.

[176] J. Clay Moltz, Center for Nonproliferation Studies, Monterey Institute of International Studies, interview with Brubaker, 26 September 2000.

[177] Morten Mærli, Center for International Security and Cooperation, Stanford University, and Norwegian Institute of International Affairs, interview with Brubaker, 27 September 2000.

cases, western companies will probably continue to require letters of indemnity from Russia, just as they currently do from other Eastern European states that are parties to the Vienna Convention. Russia's scepticism about providing letters of indemnity has been noted. Though letters of indemnity now appear to be a common feature of bilateral liability agreements, Russia may contest their continued use in future negotiations. In sum, it is questionable whether Russia's participation in the Vienna Convention would significantly reduce bilateral negotiations between western donor states and Russia, especially with respect to defence-related nuclear cooperation. For Norway, this seems particularly relevant due to the security and cooperative issues addressed in chapter five.

Amidst these uncertainties, however, one certainty seems to exist: the bilateral liability agreements seem extraordinarily one-sided, essentially placing all liability on Russia. Although donors have understandable reasons for requiring such agreements, one may question how much capital Russia can raise to cover damage caused by a nuclear accident. This may in practice shift the risk to the victims of an accident, both in Russia and in bordering European states. The next section considers a proposal for raising the necessary financial security.

Future developments—financial markets?

A central problem regarding liability for nuclear damage involves the large amount of capital that may be necessary to cover the damage.[178] The insurance industry in the West is generally unwilling to insure third-party liability for nuclear damage in excess of a few hundred million dollars due to the small size of the nuclear-related market.[179] Because damages may exceed this amount, the top risk has in effect been transferred to either the states who have assumed liability, or, if this fails, to the potential uncompensated victims.

Some new ideas may help to complement the existing liability regime. One idea is to transfer the top nuclear risks to the international financial markets through new financial instruments.[180] This idea is under investigation in the US and in the OECD area. It may also be useful in Russia, despite its state ownership of nuclear installations and its precarious economic and political situation.[181]

Specifically, the idea envisions transferring the top risks to hedge funds, pension funds and other institutions that manage diversified capital portfolios on a large scale. These institutions handle capital on a larger scale than insurers and are better able to absorb the risks. The capital and surplus of insurers and re-insurers of property and casualty in the US has been assessed at $230 billion, while the US capital market is 60 to 80 times larger, representing a total value of $15 trillion to $20 trillion. The OECD area as a whole is about twice as large, although its exact extent has not been assessed. The size of the Russian capital market is unknown to the authors.

Using the calculation for the OECD area as an example, the principal question is how to keep $100 billion on standby to compensate damages from a potential nuclear disaster,

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[178] Radetzki, 11, notes a catastrophic event can be defined as a core meltdown followed by lethal radioactive releases, leading to several mortalities. The statistical probability of this happening within the OECD (where about 350 reactors are operating) was calculated to be one in 350 to 6000 years, with potential damage costs from less than $1 billion to more than tens of billions of dollars, reaching $100 billion in very exceptional cases (one in more than a million years).

[179] Ibid., 13-14.

[180] Ibid., 17-20.

[181] Russia may be moving in the direction of forming a state-owned company to operate its nuclear power plants (Gosatomnadzor official, interview with Jørgensen, 19 February 2001).

without government interference. This amount corresponds to more than 20% of the insurance industry's total capital at present; setting aside such an amount would place a substantial strain on the industry. On the capital market, such a security equates to approximately 0.3% of total assets—a considerably smaller proportion. The arrangements could include a nuclear catastrophe bond, with the principal to be forfeited as necessary for damage compensation if a nuclear catastrophe occurs with damages above $9 billion (the amount that insurance and risk pooling arrangements could probably provide). The bond issuer might be a group of insurers of nuclear operations, a pool of nuclear operators, or an intergovernmental institution set up for this purpose. The money raised by the catastrophe bond issue could be placed in government bonds, with the annual difference between interest paid and received charged to nuclear operators. With the capital invested in low-risk assets, the main risk carried by the bond holder would be the damage claims following a large nuclear disaster.

While the idea may be feasible in the civilian nuclear sector, it may not be applicable in the military nuclear sector, where states generally assume all liability under the law of state responsibility. Nevertheless, it would be helpful to ascertain whether western states take out commercial insurance to cover certain operators in the defence nuclear sector. Though perhaps untraditional, this seems not at all unfeasible. Following a reform of US government acquisition guidelines in 1994, the US military must use 'civilian' commercial components wherever practicable; 'the use of military specifications and standards is authorised as a last resort with an appropriate waiver.'[182] In a similar fashion, commercial insurance and instruments in the international financial markets may be able to provide some financial coverage for the military nuclear sector. Potential gains include a smaller burden on the state and greater certainty of coverage. Although it is uncertain whether commercial instruments could provide coverage, it seems pertinent to consider the possibility, as long as risk is ascertainable and national security interests can be maintained—the same factors that were considered before mandating the use of commercial parts in military hardware. The challenge is to think non-traditionally. Even if commercial markets are unable or unwilling to provide coverage for the defence sector, better liability coverage for civilian nuclear operators would reduce the overall burden currently borne by states, thus improving their ability to cover risks from the defence sector.

It may not be possible to transfer to Russia the financial concepts that are only just developing in the West. Nevertheless, it seems warranted to investigate anything that may ease the difficulties of covering risks in both western states and Russia. If this concept is even slightly feasible in Russia, then transferring the top risk to nuclear operators may internalise a cost that is at present externalised. It may also provide better financial security for both Russia and the West, strengthen incentives in Russia to undertake precautionary safety measures, and thereby promote efficiency and safety.

4.4 Negotiations for new agreements

Intergovernmental framework agreements will continue to be important to defence-related nuclear cooperation with Russia for some time. In the short term, new agreements are needed to resolve lingering problems with ongoing projects[183] and expand the limited scope of current

[182] A. Carter and W. Perry, *Preventive Defense: A New Security Strategy for America* (Washington, DC: Brookings Institution Press, 1999), 183-5.

[183] Taxes and fees, a lack of privileges and immunities, and inadequate audits of Norwegian assistance continue to be a problem with respect to Norwegian nuclear assistance. Dragnes, 7.

agreements so that other high priority projects can begin. In the longer term, new agreements are needed to expand the number of participating donor states.

Two separate sets of negotiations currently underway could lead to a more satisfactory foundation for defence-related nuclear cooperation with Russia. The first involves negotiations between Norway, Russia and the United States for a trilateral framework agreement. The intent is to reach an agreement that covers both AMEC and other trilateral cooperation initiatives, is broader in its scope than the CTR Umbrella Agreement (i.e., one that is not limited to strategic security), and is more flexible than the project-specific approach taken by the 1998 Norwegian–Russian agreement.

The second initiative was launched at the sixth annual meeting of the Barents Euro-Arctic Council in March 1999, when twelve states signed a Declaration of Principles to create a Multilateral Nuclear Environmental Programme in Russia (or MNEPR).[184] The initiative is explicitly focused on improving spent nuclear fuel and radioactive waste management; implicitly, this includes material of defence-origin. The Declaration calls on the signatories to conclude a legal framework 'as soon as possible' that includes the terms and conditions related to cooperation, including issues of liability, verification of financial allocations, and customs duties and tax exemptions in connection with financial and technical assistance.[185]

Negotiations for both agreements are troubled by incompatible positions held by the western governments on the one side, and by Russia on the other. The United States, a participant in both sets of negotiations, insists that the agreements must have at least the same level of protection as they currently have under the CTR Umbrella Agreement. Although Russia renewed these terms with the US in 1999 (with minor modifications), they have shown little willingness to extend them to either the MNEPR or trilateral framework agreements. Liability remains the most contentious issue for the various reasons discussed in Section 4.3, though there are still serious divisions between the parties over issues of taxes, immunity, access, and audits and examinations.

On the issue of taxes, for example, Russia argues that intergovernmental agreements are no longer necessary because Russia enacted a federal law on foreign assistance in May 1999.[186] The law exempts money, goods and services received as part of a certified foreign assistance program from specified taxes and fees. Western countries reject this formulation for several reasons. First, exemptions codified in a domestic law rather than an international agreement make it possible for Russia to change them unilaterally. Second, the law's exemptions cover only certain specified taxes and levies rather than providing a blanket exemption from all current (and future) taxes. New taxes not covered by the law could be enacted by Russia at any time, thus requiring new negotiations for tax exemptions. Finally, the law only applies to federal taxes—it does not provide relief from regional and local levies.

Russia objects to providing a blanket exemption from all federal, regional and local taxes. Legally, it is uncertain the Russian government could do so even if it wished, as some Russian officials argue that the federal government is constitutionally unable to exempt foreign assistance from taxes and fees levied by regional governments in areas over which the

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[184] Declaration of Principles Regarding a Multilateral Nuclear Environmental Programme in the Russian Federation, 5 March 1999, reprinted in *Nuclear Law Bulletin* 63 (1999): 95-96 [MNEPR Declaration of Principles]. The Declaration was signed by Denmark, Finland, France, Germany, Iceland, Italy, Norway, Russia, Sweden, the Netherlands, the UK and the US.

[185] Ibid., Principle 2.

[186] O Bezvozmezdnoi Pomoshchi (Sodeistvii) Rossiiskoi Federatsii [On Gratuitous Aid (Assistance) to the Russian Federation], Zakon no. 95-F3, 4 May 1999, *Vedomosti Federal'nogo Sobraniia*, no. 15 (21 May 1999).

regions have exclusive jurisdiction.[187] Some officials have voiced concern that western contractors will use exemptions in one area as a loophole to avoid tax obligations in another (unrelated) area, although it is difficult to see precisely how this could occur. The Russian point of view may be a result of a 'spill-over' of perceptions of domestic problems, especially its problems in collecting taxes and financing the public sector. Finally, in the eyes of Russians, the western position lacks respect for Russia's democratic legislative process, given that its 1999 law on foreign assistance was enacted after considerable debate between the president and parliament, including reverses in the Federal Council (the upper house of parliament) and a presidential veto.[188]

The question of diplomatic immunity for US personnel engaged in CTR projects was one of the two issues which nearly caused negotiations of the 1999 Protocol to the CTR Umbrella Agreement to strand. The US view, which pertains to all of its nuclear cooperation with Russia, is that immunity should be accorded to both its government personnel and its contractors working in Russia. This provision was included in the initial CTR Umbrella Agreement, but Russia succeeded in narrowing it in the 1999 Protocol. Nevertheless, the US continues to point out that immunity for non-government personnel is a crucial condition for successful implementation of CTR, AMEC and other nuclear cooperation programmes in which the US participates. The argument as put forward by a US State Department representative is as follows: without immunity, commercial contractors are unwilling to accept contracts to work in Russia because they do not trust the rule of law in Russia, and thus fear that if they become involved in an incident leading to criminal prosecution, they will not have a fair trial.[189] Russian officials voiced their strong disapproval of the US stance, referring to the common international practice of prosecuting criminal acts in the country in which they are committed. The immunity issue is clearly one where Russia is not ready to give way. The US may consider immunity to be a negotiable issue—after all, it acquiesced to Russian demands during negotiations of the 1999 Protocol to the CTR Umbrella Agreement. It seems unlikely, therefore, that immunity will be an absolute US condition in connection with either the trilateral or MNEPR framework agreements.

Access to sensitive facilities is not as severe a problem as might have been expected, according to Russian CTR participants.[190] Nevertheless, the question of access and the ability of donors to carry out full audits and examinations continues to arise in connection with specific projects.[191] Discussions at the Intergovernmental Working Group meeting in Washington indicate that western participants view this issue as more problematic for the AMEC cooperation than do their Russian counterparts. Russian participants seem to see it as mostly resolved, and maintain that solutions can be found on a case-by-case basis, for example, by removing sensitive objects from areas to be visited or by providing photographic evidence. Another idea deemed promising by both sides was that of having Russians entrusted

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[187] For an excellent discussion on the distribution of power between federal and regional levels under the 1993 Russian Constitution, *see* B. Risnes, 'Relations between Moscow and the Regions of Northwestern Russia: The Legal Aspect,' in *Centre–Periphery Relations in Russia*, ed. G. Hønneland and H. Blakkisrud (Aldershot: Ashgate, 2001), 35-60.

[188] PIR Center, 'Nunn–Lugar Faces Legal and Tax Problems: Is Russia Ready to Solve Them?' *PIR Arms Control Letters*, (May 1999).

[189] Kessler, address at the IWG meeting, 1 March 2000.

[190] Ye. P. Maslin, 'The CTR Program and Russia's National Security Interests," in *Cooperative Threat Reduction Program: How Efficient?*, ed. I. Safranchuk (Moscow: PIR Centre, 2000), 4.

[191] G. Hønneland and A. Moe, Evaluation of the Norwegian Plan of Action for Nuclear Safety: Priorities, Organisation, Implementation, Evaluation report no. 7 (Oslo: Ministry of Foreign Affairs, 2000).

by both parties—members of Parliament, for example—perform inspections on behalf of western project participants.[192]

The result of these deeply-entrenched positions is a negotiating deadlock for both the MNEPR and trilateral framework agreements. After a negotiating round on the MNEPR agreement held at Berlin in early April 2001, the EU commissioner for external affairs voiced profound disappointment with the discussions, characterising them as going 'backwards.'[193] It is clear that without a mutually-acceptable framework agreement, whether through a collective agreement such as the MNEPR proposal or through a collection of bilateral agreements, the potential for expanding the number of European donors will remain largely unrealised. Likewise, without a mutually-acceptable framework agreement among the three AMEC parties, AMEC will be unable to broaden its scope to non-strategic submarines in north-west Russia.

Legal issues are not the only considerations at work here: a broad range of security, political and economic issues affect the framework agreement negotiations between the parties. The next chapter examines some of the key challenges to cooperation.

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[192] Open discussion at the Intergovernmental Working Group (IWG) meeting on Nuclear Waste Problems in Russia, Washington, DC, 1 March 2000.

[193] D. Bakshian, 'EU Blasts Russia over Nuke Cleanup,' *Russian Environmental Digest* 3 (15, 2001).

Chapter 5
Challenges to Cooperation

5.1 Introduction

When talking with Norwegian and US officials about the main challenges to expanding nuclear cooperation with Russia, the lack of progress in obtaining satisfactory framework agreements is the problem they most frequently cite. As the previous chapter discussed, framework agreements have been a key to the success of international nuclear cooperation, and they will probably continue to be of the first importance for some time. There are also other challenges to cooperation, some of which relate to domestic politics within Russia and individual donor states, and others that involve relations between participants. This chapter explores three principal challenges to nuclear cooperation. The first is a counterproductive political linkage in the US between CTR and AMEC. The second involves divergent interests in Russia. The third challenge relates to the increasing friction in East–West relations that is straining cooperation.

5.2 Counterproductive political linkages

Early success within AMEC is largely the result of its linkage with CTR, a linkage that provided the immediate things needed to make the new programme work: money, political momentum, and a framework agreement. The Americans' linkage between AMEC and CTR, however, is not entirely a beneficial one. Because CTR is such a large programme in monetary terms (c. $400 million per annum), it comes under intense congressional scrutiny during the annual budget appropriations process. Over CTR's nine-year history, the US Congress has steadily narrowed the programme's scope through an ever-increasing array of legislative restrictions. As this section discusses, some of these restrictions are beginning to hinder AMEC's ability to address leading environmental problems because of the linkage between the two programmes.

The Congress has never been particularly amenable to using the CTR budget for funding activities not directly associated with strategic security. Their reticence has been demonstrated on many occasions, such as when they restricted fiscal year 1997 CTR funds from being used, amongst other things, for 'the provision of assistance to promote environmental restoration.'[194] The Congress repeated these restrictions in 1998 and 1999, and made them permanent in 2000.

When the Congress authorised a transfer of $5 million from CTR to AMEC in 1998, the funds continued to be governed by the use restrictions. Therefore, AMEC could not use the money for environmental restoration projects. Although the financial linkage to CTR was not continued the following year (AMEC funding was moved to another part of the defence department's budget), the Congress imposed a new restrictive linkage by stipulating:

> Activities under the Arctic Military Environmental Cooperation Program may not include any activities for purposes for which funds for Cooperative Threat Reduction programs have been denied or prohibited.[195]

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[194] National Defense Authorization Act 1997, 110 *US Statutes at Large* 2731, sec. 1503.

[195] National Defense Authorization Act 1999, 112 *US Statutes at Large* 1920, sec. 327.

Practically, this restriction has to date circumscribed US participation in only one, admittedly small (non-nuclear) project: AMEC 2.1, the development of technologies for the remediation of hazardous, non-radioactive waste sites on Arctic military bases. The ramifications of this restrictive linkage, however, are substantial.

During their consideration of the Clinton administration's 2000 budget request, the Congress voiced concern that the CTR programme had strayed from its original focus and that its budget was being used as an omnibus funding mechanism for issues unrelated to reducing the nuclear threat to the United States.[196] The House and Senate conference committee stated jointly that 'the CTR program should remain focused on eliminating the threat posed by weapons of mass destruction and their delivery vehicles in the former Soviet Union.'[197] Although the Congress authorised the entire $475.5 million the Clinton administration had requested for CTR in the 2000 budget, they legislated a new, more sweeping, prohibition to ensure their wishes were carried out:

> No fiscal year 2000 Cooperative Threat Reduction funds may be obligated or expended for elimination of conventional weapons or the delivery vehicles primarily intended to deliver such weapons.[198]

The Congress repeated the prohibition and made it permanent in 2001.[199]

This raises an important question: what is a general purpose submarine? Is it a delivery vehicle primarily intended to deliver conventional weapons? According to the US Department of Defense, the answer to this question is *yes*.[200] Given this interpretation, CTR funds may not be used for dismantling general purpose submarines. Furthermore, because of the pre-existing legislative provision enjoining the use of AMEC funds in activities for which CTR funds have been denied or prohibited, it follows that the US may not use AMEC funds for this activity either.

One could correctly argue that American involvement in AMEC is already limited to ballistic missile submarines because the US is dependent upon the CTR Umbrella Agreement for its legal protections, which in turn is tied to the CTR Implementing Agreement concerning the elimination of strategic offensive arms. If the three AMEC parties are successful in negotiating a separate framework agreement (the trilateral framework agreement discussed in chapter four), then the US would no longer be dependent upon the CTR Umbrella Agreement for AMEC activities and would have a legal framework for multilateral cooperation encompassing activities beyond the scope of the CTR Implementing Agreement, including dismantling general purpose submarines. Nevertheless, if one categorises general purpose submarines as 'delivery vehicles primarily intended for the delivery of conventional weapons,' then the US would still be prevented from participating in AMEC projects directed at dismantling general purpose submarines because of the interaction between the 1999 and 2000 legislative restrictions outlined above.

Categorising general purpose submarines as conventional weapons systems does not withstand close scrutiny. Perhaps the term 'dual-purpose submarine' would be more accurate, as they are designed to deliver both conventional and nuclear weapons with equal ease. Certainly, some of these weapons are considered short-range, tactical weapons designed

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[196] US Congress, House of Representatives, Committee on Armed Services, *National Defense Authorization Act for Fiscal Year 2000*, 106th Cong., 1st sess., Report 106-162 on H.R. 1401 (1999), 412.

[197] US Congress, House of Representatives, *National Defense Authorization Act for Fiscal Year 2000*, 106th Cong., 1st sess., Report 106-301 on S. 1059 (1999), 814.

[198] National Defense Authorization Act 2000, 113 *US Statutes at Large* 512, sec. 1303.

[199] National Defense Authorization Act 2001, 114 *US Statutes at Large* 1654, sec. 1303.

[200] Captain Dieter Rudolph, US AMEC programme manager, interview with Sawhill, 8 May 2000.

solely for combat between ships and other submarines. But they can also deliver long-range cruise missiles. For example, the Russian SS-N-21 land-attack cruise missile is reported to have a range of 3,000 km, can carry a 200 kiloton nuclear warhead, and because its size is compatible with submarine torpedo tubes, can be fired by both SSGNs and SSNs.[201] Iceland, Greenland and much of the European continent are within a 3,000 km radius of Murmansk. For comparison, Russian SSBNs can deliver 16 to 20 ballistic missiles, each fitted with multiple warheads of 100 to 200 kilotons yield, at a range of 6,500 to 8,300 km.[202] Even though the SSBN can deliver more warheads at two to three times the range, the nuclear strike capability of the general purpose submarine remains formidable and cannot be dismissed. With such capability, the distinction between a general purpose submarine and a ballistic missile submarine would seem to be one of semantics.

The point here is that there are strong grounds for the US Department of Defense to change its current categorisation of a general purpose submarine. If it is changed, then the legislative prohibition would no longer apply, making it possible to use both CTR and AMEC funds for activities associated with general purpose submarines. Although the Clinton administration was considering whether to change the current categorisation, this task now falls to the Bush administration, and it is too early to tell what they will do.

The intentions of the Congress with respect to CTR are rather clear: it should focus on the strategic nuclear threat. This does not imply that there are not other legitimate, non-strategic issues that need to be addressed (e.g., environmental protection), it implies only that the Congress does not see CTR as the appropriate instrument through which to address them. It is not clear, however, that the Congress intended to restrict AMEC to a CTR support role; after all, AMEC was created to deal with the military's impact on the Arctic environment, a subject that ranges far from nuclear issues, let alone strategic nuclear arms issues. It is more likely that the implication of the restrictive linkage between AMEC and CTR was not taken into consideration. Whether the current US administration changes its categorisation of general purpose submarines or not, for AMEC's long term stability, a legislative remedy is necessary to cut the restrictive linkage between the two programmes.

A legislative remedy will not solve all of AMEC's problems. The administration must still convince the Congress to provide adequate funding. The actions and statements of the US Congress underline the high priority they place on reducing the strategic nuclear threat from the former Soviet Union, and their general ambivalence towards the environmental aspects of its nuclear legacy.[203] This does not bode well for obtaining a substantial US financial contribution towards defuelling the scores of general purpose submarines on the Kola Peninsula.

Fortunately, the American position has shown some signs of change. Last year, the Congress signalled a significant shift in attitudes and policy towards US engagement in environmental problems in northwest Russia by enacting a piece of legislation called the Cross-Border Cooperation and Environmental Safety in Northern Europe Act. In it, the Congress set out three key 'findings' related to nuclear safety:[204]

- that nuclear material and radioactive waste from Russia's submarines, icebreaker fleet, and nuclear power reactors have become significant environmental problems;

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[201] R. Sharpe (ed.), *Jane's Fighting Ships 1999-2000* (Surrey: Jane's Information Group, 1999), 561.

[202] Sharpe, 558-59.

[203] S. G. Sawhill, 'Cleaning-up the Arctic's Cold War Legacy: Nuclear Waste and Arctic Military Environmental Cooperation,' *Cooperation and Conflict* 35 (1): 16-18.

[204] Cross-Border Cooperation and Environmental Safety in Northern Europe Act 2000, 114 *US Statutes at Large* 639, sec. 2.

- that these environmental problems pose a threat to the safety and stability of Northern Europe and to countries of the Eurasian continent; and
- that working with the countries in the region to address these environmental problems is vital to the long-term national interests of the United States.

Based on these findings, the Congress declares in the Act that the US should demonstrate 'concrete support . . . for immediate efforts to assist in the clean up of nuclear waste in the region' and directed the government to obligate at least $4 million to this effort in fiscal year 2001.[205] The Act is significant, even though it upholds the viewpoint that Russia's nuclear waste does not constitute a direct environmental threat to United States itself, and even though $4 million is a small sum (less than one percent of the annual CTR budget). It is significant because the Congress acknowledges that US national interests are at stake, and because it legitimises engagement based on an environmental rationale.

A key proviso to American assistance, however, is that Europe must take the leading role. Congress has voiced general dissatisfaction with the EU over its lack of engagement in this area. As Representative Benjamin A. Gilman, chairman of the House Committee on Foreign Relations, remarked during congressional debate on the Cross-Border Cooperation bill:

> I have been concerned that the European Union, while acknowledging the extensive problems that exist today in its own backyard in Northern Europe, has yet to take action to provide the kind of substantial aid that will be needed if those problems are going to be properly addressed.[206]

An outgrowth of this sentiment, which has broad support within the Congress, is a provision in the Act that states the US expects the European Union and its member states to 'clearly take the lead in addressing the challenges posed in Northern Europe, in particular through appropriate yet substantial assistance.'[207] Drawing attention to the fact that the US is already engaged in these issues, the Act continues by stating that any additional US assistance is meant to supplement that of the EU, not replace it.

Politically, AMEC needs Europe to take a decisive role. European leadership would improve domestic political support in the United States for aid to deal with environmental problems abroad, and thus facilitate AMEC's expansion into non-strategic submarines. Until Europe becomes so engaged, the Cross-Border Cooperation Act indicates that the US is unlikely to provide additional nuclear assistance to Russia based solely on an environmental rationale (e.g., dismantling non-strategic submarines), even if the AMEC parties sign a trilateral framework agreement and the Congress removes the restrictive linkages between AMEC and CTR.

Some European states are interested in providing nuclear assistance to Russia. For example, in August 2000 the United Kingdom pledged £80 million ($120 million) towards dealing with Russia's decommissioned submarines.[208] Yet European participation, let alone leadership, is hardly possible without an adequate legal framework: the UK is unlikely to

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[205] Cross-Border Cooperation and Environmental Safety in Northern Europe Act 2000, secs. 2 and 4.

[206] US Congress, House of Representatives, Representative Gilman of New York speaking for the bill on Cross-Border Cooperation and Environmental Safety in Northern Europe, H.R. 4249, 106th Cong., 2nd sess., *Congressional Record*, (15 May 2000), vol. 146, 2984.

[207] Cross-Border Cooperation and Environmental Safety in Northern Europe Act 2000, sec. 2.

[208] C. Brown and G. Lean, 'UK Offers £80m to Clean Up Russian Nuclear Waste,' *The Independent* (London), 27 August 2000.

effect its offer of assistance, because it does not yet have a framework agreement with Russia. The MNEPR negotiations could provide such a framework. This makes the MNEPR a key to facilitating European participation, which is important for expanding US environmental assistance, which in turn is essential for expanding AMEC's activities into non-strategic submarines. Thus, we can see an intricate level of political synergy that is developing between the programmes.

5.3 Divergent Russian interests

It is important to bear in mind that the Russian Federation is less of a unitary actor in international affairs than was the Soviet Union. Since the dissolution of the Soviet Union in 1991, the Russian Federation has been characterised by a high level of internal conflict: between the executive and the legislature, between the federal centre and the regions, and between agencies within the executive bureaucracy. This situation has hampered Russia's ability to implement its stated political goals in many areas, and it has also affected project implementation within CTR and AMEC. Both CTR and AMEC involve a number of Russian decision makers and participating agencies in the political and bureaucratic spheres. Attitudes to programmes like CTR and AMEC, as well as the willingness to contribute to their progress, vary widely across the field of institutions and agencies involved, each of which has specific interests to defend. Moreover, these attitudes fluctuate over time.

Russian vs. western interests in cooperation

Russia's interests in cooperation are different than those of the United States, Norway, and other European nations. Several factors influence how CTR and AMEC are viewed by the Russians. First, the general state of Russia's relations with the West (discussed in Section 5.4) and, in particular, perceptions of the West's intentions in its dealings with Russia, influence the image of the programmes among decision makers, participants and the public at large. Second, the actual performance of the programmes, both in achieving their stated goals and in contributing to solving other problems of a social or economic nature, plays a crucial role. Third, for those directly affected by the programmes—institutions as well as individuals—the degree to which they benefit (or lose), economically or otherwise, is obviously very important.

In a study by the Centre for Policy Studies in Russia (the PIR Center) the robustness of the CTR programme is ascribed to the fact that the programme has been generally successful, despite some major shortcomings.[209] An attitude shared by most contributors to the report seems to be that CTR, although flawed in many ways, addresses problems which Russia simply cannot tackle on its own: eliminating weapons of mass destruction, preventing fissile materials proliferation, and fulfilling international obligations such as the START agreements. Some also emphasise the importance of indirect effects of CTR, such as providing work for employees in the defence industry. Thus, they conclude, it is absolutely vital that CTR be continued and developed further, however desirable it might have been to be able to do without it.

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[209] I. Safranchuk (ed.), *Cooperative Threat Reduction Program: How Efficient?* (Moscow: PIR Center, 2000). The Center for Policy Studies in Russia, founded in 1994, is a non-governmental research and public education organisation. Its main fields of research include international security, arms control and non-proliferation issues. See *www.pircenter.org* for further information on its activities, publications and funding.

Even though the overall conclusions are positive, the PIR Center report points out several perceived weaknesses of the CTR programme and its implementation, some linked to US policy and priorities, others originating in Russia. The most important of these are:

- Slow disbursement of funding, perceived gaps between declared assistance and actual spending;
- Too little money spent in Russia, dominance of US contractors;
- Too little emphasis on socially important issues such as defence conversion and housing projects;
- Linkages to unrelated foreign policy issues; and
- Bureaucratic infighting and unclear delimitation of responsibilities between Russian agencies.

The perceptions on CTR presented in the report generally correspond to those expressed in other Russian reports on this issue.[210]

The relative success of the CTR programme has a lot to do with the fact that it directly benefits agencies and sectors where scepticism towards cooperation with the West could be expected to be most widespread. Among the most prominent beneficiaries are the Ministry of Defence, the Ministry of Atomic Energy, and the defence industry. In fact, the strong support of Minatom and the defence ministry was crucial in winning broader backing for the programme and placating concerned parliamentarians when the first CTR agreement was concluded.[211]

The Russian Ministry of Defence has maintained a positive attitude to CTR throughout its existence, despite occasional disagreement over access to sensitive sites and information. The stance of Minatom, another major recipient of CTR assistance, seemed to undergo a change in the mid-1990s, when its attitude to CTR became markedly less enthusiastic. This coincided with an improvement in Minatom's financial situation, following bureaucratic changes whereby Minatom acquired control over the lucrative nuclear export market. Prior to this, Minatom was more dependent on CTR funding. In the new situation, western restrictions hampered Minatom's export opportunities, leading the agency to lose some of its interest in cooperating with the West and link its aspirations to markets in developing countries instead.[212]

The defence industry reportedly held a critical attitude towards CTR when the programme was first introduced, largely due to cold-war perceptions of the US as an enemy. However, defence industry leaders are able to appreciate the aid they receive through the programme, even if they retain a critical view towards the United States. Moreover, they understand that Russia cannot fulfil its obligations under START without outside help. The US interest in this is seen as natural and without any double standards.[213] During the tough negotiations of the 1999

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[210] See, for example, V. A. Orlov, 'Perspectives of Russian Decision-makers and Problems of Implementation,' in *Dismantling the Cold War: US and NIS Perspectives on the Nunn–Lugar Cooperative Threat Reduction Program*, ed. J. M. Shields and W. C. Potter (Cambridge: MIT Press, 1997), 85-102.

[211] Orlov, 86-87.

[212] A. A. Pikayev, 'The CTR Program and Russia: Is a New Start Possible? A Russian View,' in *Dismantling the Cold War: US and NIS Perspectives on the Nunn–Lugar Cooperative Threat Reduction Program*, ed. J. M. Shields and W. C. Potter (Cambridge: MIT Press, 1997), 123.

[213] I. Safranchuk, 'ESOA Program in Russia: Results and Problems of Implementation,' in *Cooperative Threat Reduction Program: How Efficient?*, ed. I. Safranchuk (Moscow: PIR Center, 2000), 28-29.

Protocol to the CTR Umbrella Agreement, numerous leaders of defence industry enterprises are said to have called the Ministry of Foreign Affairs, begging its officials to sign the protocol so as not to jeopardise contracts and workplaces.[214]

In the same manner that a direct stakeholder interest may increase the likelihood of an agency's support for international cooperation, an absence of interest may spell a threat to it. The stance of the Ministry of Foreign Affairs is illustrative. Since CTR belongs to the sphere of international relations, the foreign ministry performs a mediating and coordinating role between the parties, chief among which is leading Russia's delegations during any negotiations connected to the programme. However, the foreign ministry does not take part in programme implementation, nor can it be counted as an aid recipient. The foreign ministry's principal role is to protect Russian national interests, not to ensure the programme's survival. This is demonstrated by the ministry's tough stance during negotiations on the Protocol to the CTR Umbrella Agreement in 1999; American negotiators ultimately acceded to Russian demands to amend immunity provisions and customs procedures.[215] It has also been argued that the foreign ministry's status is enhanced when problems occur between the parties, whereas smooth cooperation may render its mediating and coordinating role less important.[216]

There is a tendency in Russia to view AMEC as an appendix to CTR, and several representatives of involved agencies and potential recipients have actually questioned the need for two programmes perceived to be very similar. In the Russian view, AMEC's principle strength, and the feature which sets it apart from CTR, is its explicit commitment to solving environmental problems. The main concern on the Russian side is the threat posed to human health, as well as to the immediate coastal and terrestrial environment. Although Norway and Russia would seem to have much in common where the perception of threats is concerned, this is not necessarily the case, at least with respect to the marine environment. For example, the concern over real or perceived contamination of fish is a dominating factor in the Norwegian emphasis on the environment, while there is little concern over this issue in Russia, despite the importance of marine fisheries to the regional economy. Apart from this, the recent developments in Chechnya have led to an increased awareness in Russia of the proliferation issue. Thus, nonproliferation stands forth as one area where Russian and US perceptions coincide to some extent.

As can be expected, different perceptions result in different priorities. A clear point in case is the order of submarine dismantlement. The Russian view is that the oldest submarines (most of which are general-purpose submarines) ought to be unloaded and dismantled first. It is argued that these submarines are a graver threat to the environment than the more recent generations, since many of them are in an advanced state of decay and may eventually sink. The US, being more concerned with the strategic threat posed by the SSBNs, argues that Russia's obligations under the START treaties must take precedence. American reluctance to deal with general-purpose submarines under CTR is frequently criticised by Russian participants, and this problem has been discussed repeatedly at the Intergovernmental and Interparliamentarian Working Group meetings.

Some critical voices also maintain that the priorities of AMEC (as well as other western initiatives) are wrong. In their view, the programmes place too much emphasis on issues such

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[214] I. Safranchuk, PIR Center, Moscow, interview with Jørgensen, 12 June 2000.

[215] US Department of State, Protocol to the Agreement between the United States of America and the Russian Federation concerning the Safe and Secure Transportation, Storage and Destruction of Weapons and the Prevention of Weapons Proliferation, 15–16 June 1999, *Treaties and Other International Acts Series*, arts. 3, 4 and 5.

[216] Safranchuk, interview, 12 June 2000.

as low-level liquid radioactive waste and ocean dumping at the expense of more acute problems, the foremost being the removal and storage of spent nuclear fuel. One Russian researcher ranged the various threats, with liquid waste as the lowest.[217] Lystsov pointed out that on-shore storage under unsatisfactory conditions is more of a threat than dumping the material at sea. There may be two aspects to this difference in perceptions. First are different interests. On-shore storage is more of a local Russian problem, whereas dumping the waste in the ocean commons makes it a regional or even global one. Second, there is a tendency in Russia, as compared to Western countries, to place more emphasis on scientific advice and less on public perceptions in development of policy. Many Russians, especially researchers and the decision-makers who act on the basis of their advice, are frustrated over what they see as emotional reactions from uneducated (western) masses. They feel western priorities are not always rational and that the Russian public takes a more sober view. This may explain why they do not worry so much about consumer perceptions vis-à-vis the Barents Sea fisheries. They believe it would take many times more dumped material to constitute the slightest threat, and are probably outraged at the idea of taking ignorant perceptions into account.

Since the AMEC cooperation is much smaller than CTR in terms of scope, ambitions and financing, it has attracted less of either positive or negative responses in Russia. AMEC has also existed for a much shorter period of time than has CTR, and difficulties in securing adequate (from a western point of view) legal arrangements for the programme has considerably hampered its implementation. Although the two western participants believe that the key to solving these problems are in Russia's hands, the slow implementation of projects, and, notably, the failure of Norway to disburse any funding to projects in Russia, are perceived as the major shortcomings of the programme.

The tug-of-war between the executive and the legislative branch

Throughout Boris Yeltsin's eight years in office, the conflict between the President and the Parliament (until 1993 the Supreme Soviet), symbolised by the physical attack on the White House in 1993, was a constant feature of Russian political life. Despite the fact that Yeltsin succeeded in tipping the political balance strongly in favour of the executive by introducing a political system frequently referred to as a 'super-presidency,' the Parliament remained at least partly in control of important policy areas like legislation and the state budget. While western countries were principally opposed to the weak role assigned to the legislature, they nevertheless had to rely on Yeltsin and the executive's ability to continue the process of reform, since the Parliament was largely a stronghold of forces opposed to reform (especially the Duma, or lower house).

With the December 1999 elections, the Duma came to be dominated to a greater degree by parties and formations supporting the President, and the level of conflict has diminished. However, the fact that the President is now to a greater extent 'in control' of the Parliament is not exactly a sign of developing democracy, and the commitment of President Vladimir Putin to democratic reform remains uncertain. The Parliament's ability to influence the progress of programmes such as CTR and AMEC is tied first and foremost to its legislative role, and to its competence to ratify international agreements like the START treaties and the London and Vienna conventions. Thus, the key to the solution of the most pressing unresolved issues of the AMEC cooperation—tax exemptions, liability and immunity—rests largely with the Parliament. During Yeltsin's presidency, the Parliament often blocked initiatives from the executive which were seen as desirable from a western point of view. Among those relevant

[217] Vitalii Lystsov, Kurchatov Institute, presentation at the meeting of the Intergovernmental Working Group on Nuclear Waste in Russia, Washington, DC, 1–2 March 2000.

for CTR and AMEC was the START II agreement, which was ratified by the new Parliament last year. The fact that the conflict level between executive and legislature has diminished does not, however, necessarily mean that it is more likely that the conventions will be ratified or the laws passed, both of which the western partners see as crucial to the progress of AMEC. While the Parliament has moved closer to the position of the executive, the opposite is also true: the executive's traditional commitment to reform now seems to pertain first and foremost to the area of economics.

Meanwhile, the western partners of the AMEC cooperation are increasing their efforts to involve Russian parliamentarians more directly in discussions of how to resolve outstanding issues. Under the auspices of the environmental non-governmental organisation Bellona, Russian Duma members have been invited to meet US and Norwegian officials, experts and political colleagues, in order to discuss Russian and western views of these problems. An interesting feature of these meetings has been the growing western concern over weak parliamentary control over the executive. This issue has moved higher on the agenda following revelations that western aid, notably transfers from the International Monetary Fund, has been diverted and ended up in foreign banks.

Centre–region relations

The relations between Moscow and the 89 federal units (or subjects) of the Russian Federation have been in more or less constant flux throughout the 1990s. The dominating process has been one of spontaneous, rather than planned, decentralisation, largely as a result of the centre's political weakness. Formally, relations between the centre and the regions are regulated by the Constitution, and, in most cases, by bilateral treaties. However, both the Constitution and the bilateral agreements tend to be fairly vague and general, particularly when it comes to issue areas over which the two levels exercise joint jurisdiction.[218] In practice, negotiations and power brokering play an important role, and a region's economic power (i.e., whether it is a net receiver or net contributor to the federal budget) determines to a large extent its clout vis-à-vis the federal authorities. According to Article 76 of the Constitution, regional laws may not contravene federal laws on issues within the federal government's exclusive jurisdiction or on issues within their joint jurisdiction. However, jurisdiction not explicitly designated to the federal level remains in the regions, and where there is a conflict here, regional law prevails. Risnes points out that the federal government has yet to implement a legislative framework in many areas of joint jurisdiction, and that in this vacuum, the regions are filling the legislative space.[219] The recent attempts on the part of President Putin to impose stricter central rule must be viewed against the backdrop of this chaotic situation.

CTR and AMEC have been affected by the centre-region struggle in various ways. The most frequently lamented problem is that of conflicting legislation, as well as divergent interpretations of laws. Projects have been exempted from taxes by federal authorities, yet are confronted with demands on the regional level that taxes be paid. Moreover, Russian legislation in general is notoriously complicated, and it is often nearly impossible for western decision makers and contractors to find out which regulations actually apply. In these circumstances, regional and local authorities have many opportunities to hamper or delay implementation of projects, if they wish to do so. There are several instances of regions trying

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[218] Article 72 of the Russian Constitution sets out areas of joint jurisdiction. *See* B. Risnes, 'Relations between Moscow and the Regions of Northwestern Russia: the Legal Aspect,' *Centre–Periphery Relations in Russia*, ed. G. Hønneland and H. Blakkisrud (Aldershot: Ashgate, 2001), 56-57.

[219] Risnes, 42-44, 54.

to capitalise on the CTR, MPC&A, and other international nuclear assistance programmes, usually by attempting to levy taxes on assistance.[220] In the cases where they do, the reason may be that they do not feel that the region gains (enough) from the project, or it may be an attempt to extract additional benefits.

On the other hand, western participants sometimes find it easier to deal with regional authorities, who are often closer to the problems the projects address. In such cases, the opposite problem may occur: i.e., the region is ready to cooperate but lacks the necessary decision making authority. Thus, although a recentralisation may facilitate cooperation in some cases, it may actually hamper it in others. Finally, western decision makers are generally favourably inclined to the idea of decentralisation as a matter of principle and thus make a point of involving regional and local authorities to the greatest extent possible. This is not always welcomed by their Russian colleagues, many of whom view strong central control as natural and, in the current context, as a safeguard against chaos. The ongoing attempts at recentralisation may reinforce this inherent contradiction between traditional Russian and western approaches.

Bureaucratic competition

In the Soviet Union, bureaucratic inter-relations were characterised by strong vertical ties between agencies on various levels within the same issue area, and correspondingly weak horizontal ties between agencies responsible for different areas. The various sectors of the economy were strictly separate, and cross-sector contacts went via the top. Thus, there were no traditions for cooperation and coordination between agencies and institutions belonging to different sectors. The shift to a new political and economic system following the demise of the Soviet Union highlighted the shortcomings of this mode of bureaucratic organisation. It also marked the beginning of a decade characterised by endless bureaucratic reorganisation and fierce competition between agencies—a development which further undercut their ability and inclination to cooperate across sectoral borders. Moreover, the reorganisations were not always undertaken in order to improve bureaucratic efficiency; President Yeltsin deliberately used the tactic of divide and rule to strengthen his own position. To make matters even worse, this all took place in a period of economic decline, when the agencies involved had to compete with one another for increasingly scarce resources.

Consequently, the climate for inter-agency cooperation has steadily deteriorated over the past decade. Today, any agency's influence strongly depends on its financial clout and vice versa, so each agency will strive to maximise both. This may not be unique to Russia, but the bureaucratic law of the jungle is no doubt particularly pronounced in that country.

This has created very serious problems for the implementation of both CTR and AMEC. Both programmes involve a large number of agencies, and the lack of coordination between them is rightly identified as a major impediment to successful implementation of projects. Participating agencies tend to lose sight of the programmes' overall objectives in their struggle to maximise their own share in the programmes.

Not surprisingly, this situation favours the traditionally strong agencies, such as the Ministry of Defence and Minatom. Alexander Pikayev, a researcher at the Russian Institute for World Economy and International Relations, has demonstrated how the agencies that enjoy the most funding from the Russian budget also tend to have more success with CTR disbursements (in relation to proposed funding), as well as with implementation of projects.[221]

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[220] N. Sokov, 'The Reality and Myths of Nuclear Regionalism in Russia,' *Program on New Approaches to Russian Security Policy Memo Series*, no. 133 (Washington, DC: Council on Foreign Relations, 2000), 3.

[221] Pikayev, 126-127.

Although he acknowledges the seriousness of the problem, Pikayev warns against western attempts to influence relations between Russian agencies, and, in particular, against a perceived tendency among US decision makers to label Russian agencies as 'good' or 'bad' and then promote the ones considered 'good.' As an illustration, he points to US lobbying for Gosatomnadzor at the expense of Minatom, which allegedly served to brand Gosatomnadzor as US-influenced, and forced it to keep a low profile and demonstrate its loyalty to the more influential agency. Pikayev's conclusion is that the US should first and foremost deal with the 'stable, traditional institutions'—in other words, Minatom and the Ministry of Defence.[222]

While agencies with a large stake in programmes and projects will generally be inclined to work for their successful implementation, the perception of having lost out may lead to attempts to block progress. One may speculate, for instance, on whether Gosatomnadzor's refusal to certify the 40-tonne cask may be a response to the agency's general lack of influence. This does not mean that Minatom and the defence ministry are pre-eminent in all issues. Indeed, they have less influence regarding the taxation issue since the federal tax service was elevated to a full ministry in early 1999. The new tax minister refused to reinstate a US–Russian agreement on tax exemptions for the US Material Protection, Control and Accounting (MPC&A) programme, and initiated efforts to collect taxes from Russian beneficiaries of the programme over the objections of Minatom.[223]

5.4 Deterioration in East–West relations

In 1992, when the CTR framework agreement was concluded, it immediately came under attack from Russian parliamentarians who claimed, among other things, that the agreement contradicted the constitution and violated Russian sovereignty.[224] However, the general climate of US–Russian relations was very favourable at the time, and this no doubt helped promote the agreement in Russia in the early stages of cooperation.[225]

Over the next few years, the Russian attitude to the West was to undergo profound changes. Economic decline, disappointment following inflated hopes of what western aid could accomplish, a growing irritation over what was perceived as western intervention in Russian affairs and a number of other factors eroded the initial enchantment with the West. After the elections in 1993, the Duma became a stronghold of communist and nationalist forces, and President Yeltsin and his team had to adjust their policy to the new circumstances at least to some degree. Throughout the 1990s, East–West relations experienced several crises, the most serious of which occurred in spring 1999 during the NATO bombing of Yugoslavia.

At present, the general attitude of the Russian government towards the West can be characterised as cool but pragmatic. Russia still sees the West as a potential partner, but at the same time Russian and western interests are considered naturally divergent on many central issues. While pragmatism seems to dominate in the executive, the view that the West is first and foremost out to damage Russia is not unusual in large segments of the population. Even

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[222] Pikayev, 127-128.

[223] US Department of Energy, Office of Arms Control and Nonproliferation, 'The Impact of the Russian Taxation System on the Material Protection, Control and Accounting (MPC&A) Program,' paper presented at the 40th annual meeting of the Institute of Nuclear Material Management, Washington, DC, 27 July 1999 (Washington, DC: US Department of Energy, Office of Arms Control and Nonproliferation, 1999).

[224] Orlov, 86.

[225] For example, Ye. P. Maslin, 'The CTR Program and Russia's National Security Interests,' in *Cooperative Threat Reduction Program: How Efficient?*, ed. I. Safranchuk (Moscow: PIR Center, 2000), 4.

among politicians there seems to be a widespread tendency to view East–West relations in everything from politics to business in terms of zero sum-games.

Overall, the CTR programme seems to have suffered less than might have been expected from the cooling in relations between Russia and the West. This appears to have been the case even during the middle of NATO's actions in Yugoslavia:

> Even on the background of war in Yugoslavia the [Russian] Government and the Ministry of Foreign Affairs refrain from any declarations about review of [Russia's] earlier stated position on foreign aid in general and the Nunn–Lugar assistance in particular. Hence, the current level of tensions in Russian–US relationship has no impact on cooperation in this area . . . . So far the program is under way and it faces the same problems as it faced before the Kosovo crisis.[226]

In a recent Russian evaluation of the CTR programme, carried out by the PIR Center, almost all contributors point to the significance of the fact that the programme was hardly affected even by the strain caused by the Kosovo crisis.[227] On the other hand, the contributors acknowledge that CTR implementation has been hampered to some extent by a critical attitude to US aid in the sensitive areas addressed by the programme.[228]

The deterioration in East–West relations affected AMEC more than CTR: Russia's contacts with the American and Norwegian AMEC Principals were suspended for around a year in the aftermath of the Kosovo crisis, although working-level contacts were maintained. This probably reflects AMEC's moderate importance to Russia in comparison with CTR. Although none of the projects were suspended as a direct result of political crises, general distrust and suspicion of ulterior motives may be part of the reason for the difficulty in extending the CTR framework agreement in June 1999, and also the reason why negotiations for the trilateral and MNEPR framework agreements remain unresolved.

Security concerns are often entangled with other issues in the Arctic. Even though the past decade has seen the number of weapons deployed in the Arctic decrease at the same time as the diversity of international cooperation in the region increased, many of the security concepts from the Cold War era are still in place today, and security issues still dominate international relations in the Arctic.[229] Indeed, the Arctic Ocean is strategically more important to Russia today than it was before the dissolution of the Soviet Union: the Russian navy has never been so restricted in terms of access to the world's oceans since the time of Catherine the Great.[230] Therefore, linkages between security issues and the environment may help to explain some of the difficulty western states are currently experiencing in organising and implementing nuclear cooperation programmes with Russia

Besides NATO's actions in Yugoslavia, other strains in east–west relations include Russia's strong objections to US plans to build a missile defence system,[231] to the Globus II radar in Vardø,[232] and to NATO expansion.[233] Russia has to date refused US overtures to amend

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[226] PIR Center, 'Nunn–Lugar Faces Legal and Tax Problems: Is Russia Ready to Solve Them?' *PIR Arms Control Letters*, (May 1999).

[227] I. Safranchuk (ed.), Cooperative Threat Reduction Program: How Efficient? (Moscow: PIR Center, 2000).

[228] Ibid., 52.

[229] W. Østreng, 'The NSR in the Context of Arctic Environmental Cooperation and National Security,' in W. Østreng (ed.), *National Security and International Environmental Cooperation in the Arctic: The Case of the Northern Sea Route* (Dordrecht: Kluwer Academic Publishers, 1999), 239-65.

[230] R. D. Brubaker and W. Østreng, 'The Northern Sea Route Regime: Exquisite Superpower Subterfuge?' *Ocean Development & International Law* 30 (1999): 304. See generally 301-311 and 323-324.

[231] 'Old Missile Defence Issue Haunts US and Russia,' *International Herald Tribune*, 26 April 2000, 1.

[232] I. Sellevåg, 'Vardø Exposed,' *Bulletin of Atomic Scientists* 56 (2000): 26-29; T. Postol, 'The Target is Russia,' *Bulletin of Atomic Scientists* 56 (2000): 30-35; 'Russians Challenge US over Radar in Norway,' *New*

the 1972 Treaty on the Limitation of Anti-Ballistic Missile Systems in order to allow them to build a missile defence system,[234] describing the treaty as 'the cornerstone of strategic stability in the world.'[235] Similarly, Russian officials have denounced the Globus II radar as a part of a future US missile defence system. They purport that the radar is intended to support the US system by monitoring Russia's ballistic missile tests with the objective of collecting detailed intelligence data on how to defeat Russia's long-range ballistic missiles. Although denied by Norwegian and US officials, to the Russians this may seem a plausible conclusion given that the radar was originally designed and used as part of the US ballistic missile testing programme.[236] Regardless of the radar's true purpose, the Norwegian defence attaché in Moscow noted that the controversy surrounding the radar clearly weakens cooperation between Norway and Russia in both security and other issue areas.[237]

It is difficult to state the degree to which disputes over NATO's actions and intentions, US missile defence plans, the Globus II radar or other regional security issues have affected current efforts to negotiate new framework agreements for multilateral nuclear cooperation. The Norwegian foreign ministry's special advisor for nuclear safety noted that in the Norwegian view, there is no linkage between Russian strategic and environmental policies, and that Norway would not accept such a linkage.[238] Yet Russian criticisms over these issues have taken place in connection with talks between the Norwegian and Russian foreign ministers on Norwegian, Russian and US nuclear cooperation, suggesting that in the Russian foreign ministry's mind, security is linked with nuclear cooperation. A prevalent attitude in Russia seems to be that West is disarming the country through the guise of nuclear safety cooperation at the same time that they are seeking to build strategic defence systems to neutralise Russia's remaining strategic deterrent.

Recent media reports have commented on the growing tension in Russian–Norwegian relations regarding the military, the environment and culture.[239] Although there may be a

York Times, 22 February 2000; 'Ny Russisk Kritikk av Radarstasjon' [New Russian Criticism of Radar Station], *Aftenposten*, 19 April 2001, 2; 'Vardø-radar Uroer Ivanov' [Vardø Radar Disturbs Ivanov], *Aftenposten*, 19 May 2000, 9.

[233] 'Ny Russisk Kritikk av Norge' [New Russian Criticism of Norway], *Aftenposten*, 20 February 2001, 3; 'Avvist i Moskva' [Opposed in Moscow], *Aftenposten*, 8 March 2001, 10. The lack of a normal relationship between Russia and NATO since the NATO action in Yugoslavia was mentioned in talks between the Norwegian Parliamentary Defence Committee, members of the Russian Duma, and Russian Minister of Defence Igor Sergeev. The Globus II radar was not mentioned, however.

[234] Treaty on the Limitation of Anti-Ballistic Missile Systems, 26 May 1972, *United Nations Treaty Series*, vol. 944 (1974), no. 13446, 13 [ABM Treaty].

[235] Igor Ivanov, Foreign Minister of Russia, 'Russia Challenges America to Get on with Disarmament,' *International Herald Tribune*, 25 April 2000, 6. 'Russia Switches Gears on Missile Defences,' *International Herald Tribune*, 23 February 2001, notes Russian officials are unhappy, yet ready for talks with the US on the NMD system.

[236] Sellevåg, 26-29; Postol, 30-35. Norwegian and US authorities initially claimed the radar's purpose was to monitor space debris. Now it is described as having a primary mission to collect data on deep-space satellites, with secondary missions of tracking near-earth satellites and collecting data on missile and aerodynamic targets.

[237] 'Samarbeidet med Russland er Svekket' [The Cooperation with Russia is Weakened], *Dagsavisen*, 7 August 2000, 14.

[238] Norendal, interview, 29 June 2000.

[239] *See*, for example, 'Mer Aggressive Russisk Holdning' [More Aggressive Russian Attitude], *Dagsavisen*, 31 July 2001, 5; 'Norsk Strålevern får ikke Utføre Radioaktivmåling ved Hevning av *Kursk*' [Norwegian Radiation Protection Authority Not Permitted to Measure Radioactive Releases during Raising of *Kursk*], Norwegian National Broadcasting, 9 August 2001; and 'Njet til Norsk Kultur Tokt' [No to Norwegian Cultural Expedition], *Aftenposten*, 16 July 2001, 15.

tactical component to Russian actions, there is also an emotional one, and it should not be underestimated. Both US and Russian security experts have commented on this and the effect that it is having on Norwegian–Russian environmental cooperation on the Kola Peninsula. Nikolai Sokov, a participant in the START I and II negotiations, noted Russian resentment, saying that 'the Norwegians do not understand Russian culture,' and 'no one likes the donor.'[240] Sokov also noted a more aggressive Russian attitude to US naval activities in the Russian Arctic.

Other variables may be responsible for hindering negotiations as well, such as a perceived imbalance in the costs versus the benefits of international cooperation. Russian recalcitrance in accepting donor demands may simply be that, in the Russian government's opinion, donors have not yet made an offer that they cannot refuse.

[240] Nikolai Sokov, Monterey Institute of International Studies, interview with Brubaker, 26 September 2000. Sokov felt so strongly about this that he expressed an interest in writing an article on the need to appreciate Russian culture in cooperative nuclear projects with Russia. Sokov worked at the Soviet and Russian Ministry of Foreign Affairs from 1987 to 1992.

Chapter 6
Conclusions

Beginning in the early 1990s, two parallel processes have decreased the strategic nuclear threat from Russia. First, Russia has reduced the number of its deployed nuclear weapons as a result of arms control agreements and unilateral decisions. Second, drastic cuts in defence spending have substantially reduced Russia's military and naval forces. Paradoxically, however, new threats to national security have emerged as a result. Near northwest Russia, for example, the threats stem from fissile material and radioactive waste accumulating in the region after the Russian navy retired nearly two-thirds of its nuclear-powered submarines *en masse* without first establishing an adequate waste management system. The situation poses a local health and environmental hazard as well as a potential threat to the regional economy due to the amount of material that is currently maintained in an unsafe, insecure manner. Furthermore, fissile material is vulnerable to theft and diversion, which could have serious consequences for international security. There have already been several attempts to divert highly enriched uranium in the form of submarine fuel. Other possible threats include nuclear terrorism and the proliferation of weapons systems by selling submarines abroad.

Dismantling retired submarines expediently would contribute to reducing many threats outlined in this report. Scrapping a submarine eliminates a launching system for nuclear weapons. This is the case whether it is a ballistic missile-firing submarine or not, since all submarine classes are capable of firing nuclear weapons. The principal difference between classes is the number of warheads they possess and the range at which they can deliver them. Removing the fuel from the submarine reactor is a prerequisite to scrapping the vessel. Defueling a submarine reduces the onboard radionuclide inventory by about 99%. Provided the fuel is placed into appropriate storage, defueling the submarine substantially reduces the potential hazard to the local environment, and it eliminates the management oversight requirements associated with a fuelled reactor. On the other hand, if adequate storage is not available ashore, then removing the fuel could increase local health and environmental hazards and make the fuel more vulnerable to theft or diversion.

In the wake of the 1986 Chernobyl' disaster, several international assistance programmes were established to improve the operational safety of Soviet-designed civil nuclear power plants in Russia and elsewhere. Foreign assistance in the defence nuclear sector, however, is extremely limited. At present, the overwhelming majority of assistance in this sector is provided by the United States to help Russia meet its strategic arms reduction commitments and to prevent the proliferation of weapons-usable fissile material. The US provides this assistance through its Cooperative Threat Reduction (CTR) programme and the Material Protection, Control and Accounting (MPC&A) programme. The programmes also address some aspects of nuclear waste where necessary to meet arms reduction objectives. In practice, this means dealing with reactor fuel and radioactive waste from ballistic missile-firing submarines (SSBNs), but not similar material from general-purpose submarines. The CTR programme, for example, is providing aid to eliminate 41 SSBNs and their associated missiles and missile launchers by 2007. As Russia has treaty obligations to the United States to eliminate some of its SSBNs, it is understandable that US assistance has begun here.

Two additional assistance programmes relevant to the defence nuclear sector are the Norwegian Plan of Action for Nuclear Safety and the trilateral Arctic Military Environmental Cooperation (AMEC) programme. The programmes address radioactive waste primarily from the perspective of nuclear safety rather than that of arms reduction and nonproliferation. In practice, however, AMEC is restricted by its ties to CTR, and activities under both AMEC and

the Norwegian Plan of Action are restricted by the limited amount of assistance that they make available.

International cooperation has led to some progress in submarine dismantlement and nuclear waste management. For example, as of February 2001, the CTR programme had helped Russia to dismantle 18 SSBNs and eliminate 138 submarine-launched ballistic missiles. The Norwegian Plan of Action and AMEC have contributed by providing essential pieces of the infrastructure for handling, storing and managing nuclear waste, such as developing a transportable storage cask for spent nuclear fuel, building special rail cars for transporting spent fuel, renovating a storage facility for liquid radioactive waste, and expanding the capacity of a treatment facility for liquid waste. Other efforts are ongoing. For example, Norway is working with Russia to design and build a ship for transporting spent fuel and radioactive waste from remote naval bases, and AMEC is designing a system for treating solid radioactive waste.

Nevertheless, no single programme has demonstrated sufficient capacity to address the nuclear safety and security issues stemming from defence-related nuclear material in northwest Russia, or even to resolve the 'single' issue of scrapping Russia's decommissioned nuclear submarines—itself a complex process with many interdependent elements. A comprehensive plan that encompasses each element in the chain is essential to the success of the overall effort. A collection of programmes could constitute such a comprehensive plan if they are coordinated and achieve a degree of synergy among them. Such a synergistic relationship has already developed between CTR, MPC&A, AMEC, the Norwegian Plan of Action, and Russia's national programmes with respect to dismantling SSBNs.

At present, international cooperation is ill suited and inadequate to dismantle general-purpose submarines. CTR is restricted from dealing with them, AMEC is constrained from doing so by counterproductive linkages to CTR, and none of the four programmes discussed in this report has sufficient resources. Although some of the infrastructure built to scrap SSBNs can be used to scrap general-purpose submarines, gaps remain, the most critical of which is the lack of interim storage for spent fuel and radioactive waste. Furthermore, someone must pay the Russian workers to carry out the dismantlement work.

The United States has been willing to spend billions of dollars to achieve its strategic security objectives. The US is unlikely to provide similar assistance for dismantling non-strategic submarines on purely environmental grounds, although recent legislation acknowledged US national interests are at stake and legitimised engagement based on an environmental rationale. The Congress has clearly indicated Europe must take the leading role and provide 'substantial assistance' before the US will consider additional, 'supplementary' aid.

Nonproliferation may provide a more compelling rationale for US engagement. The strength of this argument hinges principally on the characteristics of submarine fuel, including its initial level of uranium-235 enrichment, its age, and its burn-up rate. Other aspects of this rationale include preventing the sale of nuclear submarines abroad. There is some scepticism in the US as to whether spent fuel poses a significant proliferation risk. The US government is currently examining the issue, but Russian reticence to discuss the characteristics of its submarine reactor fuel makes it difficult to assess the proliferation risk.

Legal framework agreements play an important role in nuclear cooperation with Russia. They help to establish a clearly defined, predictable foundation for cooperation by clarifying the parties' obligations and reconciling competing interests through negotiated bargaining. Key issues of concern for donors include: exemptions from taxes, duties and fees; indemnification of liability for nuclear damage; audit and examination rights; donor access to sites where assistance is being used; and diplomatic immunity.

At present, only Norway and the US have agreements with Russia governing cooperation in the defence nuclear sector. AMEC does not have its own agreement, but activities have moved forward through linkages to the CTR Umbrella Agreement and the Norwegian–Russian agreement. This arrangement has not been entirely satisfactory. AMEC projects must directly support CTR objectives for the CTR Umbrella Agreement to apply; in practice, this limits AMEC's scope to activities involving SSBNs. Norwegian participation has suffered as well, since the Norwegian–Russian agreement initially covered only one AMEC project. As experience has shown, adding projects to the agreement can involve lengthy negotiations between the parties.

Liability for nuclear damage is one of the most contentious issues complicating foreign aid. Donors have insisted on agreements that assign liability to Russia as a prerequisite for providing assistance, ostensibly because Russia is not a participant in the international regime for nuclear liability. Russia is considering ratifying the Vienna Convention on Civil Liability for Nuclear Damage. Russia's accession would benefit cooperation in the civil nuclear sector, and may help some aspects of cooperation in the defence sector. Some projects, however, may not benefit. Projects involving ship reactors may not benefit because the Vienna Convention excludes ship reactors from its definition of a 'nuclear installation.' It is unclear whether the Convention would apply in situations involving nuclear material in the defence sector, or material transferred from defence programmes to civilian control. Where the Convention does apply, several aspects of Russia's draft law on nuclear indemnity appear to be inconsistent with the Convention, bringing into question the extent to which Russian domestic law would implement the Convention. Lack of transparency is also a problem, as donors and commercial contractors are reluctant to assume liability in projects where critical details of the nuclear material in question are not disclosed. A balance between transparency and Russia's legitimate security interests has been difficult to achieve.

Donor governments will probably continue to require liability agreements in cases where the Vienna Convention does not apply, where its application or implementation are in doubt, or where transparency is inadequate. Although donors have understandable reasons for requiring such agreements, placing all liability on Russia may provide a false sense of security. Does Russia have sufficient capital to cover damage caused by a nuclear accident? If not, then victims of an accident—both in Russia and in bordering European states—may go uncompensated. Ability to pay must follow responsibility to pay.

Framework agreements will continue to be most important for defence-related nuclear cooperation with Russia for some time. The parties need new agreements to resolve lingering problems with ongoing projects and expand the limited scope of current programmes. New agreements are also necessary to expand the number of donor states. Negotiations currently underway among the three AMEC parties and among the 12 states participating in the MNEPR initiative could lead to a more satisfactory foundation for defence-related nuclear cooperation with Russia. However, both sets of negotiations are troubled by incompatible positions held by donor governments on one side and by Russia on the other. Liability remains the most contentious issue, though there are still serious divisions over issues of taxes, immunity, access, and audits and examinations. Unless the parties are able to reach a mutually acceptable framework for cooperation, AMEC is unlikely to broaden its scope to general-purpose submarines, and the MNEPR is unlikely to realise its potential for facilitating European participation.

Western donors often cite Russia's unwillingness to agree to framework conditions as the principal obstacle to cooperation. This is not particularly useful as an explanation, as it appears to explain symptoms rather than underlying causes. Why is Russia unwilling to accept donor conditions for the MNEPR agreement, when it has agreed to similar conditions

with the EBRD, Norway and the United States? Why is Russia unwilling to extend the conditions contained in the CTR Umbrella Agreement to a trilateral agreement for AMEC?

Some evidence suggests that Russia does not fundamentally disagree with the international legal framework or irreconcilably oppose certain donor interests. Russia's case-by-case agreement, however, suggests other factors may be at work that dictate when—and under what circumstances—Russia is willing to accept foreign aid. Factors underlying these circumstances appear to include: the prevailing security and political relationships between Russia and potential donor states; the type and amount of assistance being offered; domestic priorities and political considerations (both in Russia and donor states); domestic power battles among different sectors of the Russian bureaucracy and between central and regional political authorities; linkages to national security; and nationalistic pride leading to reluctance to accept foreign handouts. Furthermore, there is also a degree of distrust regarding the objectives of its former cold war adversaries, a wariness that is illustrated by one Russian commentator's observation that 'free cheese is only found in a mousetrap.'

There is a need to clarify the relationships between political and legal factors affecting multilateral nuclear cooperation with Russia and to determine how these factors facilitate or impede cooperation. In particular, it would be timely to:

- determine how the political relationships between Russia and the principal donor states have changed since the first nuclear safety and security assistance programmes were negotiated in the early 1990s, and how these changes have affected cooperation;
- clarify the configuration of competing domestic political interests in Russia with respect to international cooperation in the civil and military nuclear sectors;
- ascertain the principal factors in Russia's evaluation of the benefits and costs of participating in multilateral nuclear cooperation;
- clarify the applicability of the international legal framework and Russian domestic legislation to the issues of particular relevance to international cooperation in the defence nuclear sector; and
- ascertain how, and to what degree, legal and political considerations are linked, and how this linkage affects international cooperation with Russia.

Disarmament and naval force reductions in Russia pose multifaceted challenges to international security. International cooperation is showing some signs of success, though gaps and shortcomings remain. Nevertheless, it is important to see these problems from a broader perspective and recognise that cooperation among former adversaries in an area as sensitive as defence applications of nuclear energy is itself a major achievement. The next step is to build on this achievement. Western states and multilateral institutions have indicated their interest in assisting Russia to improve nuclear safety and security. The amounts of assistance are considerable and could be even greater if proposed programmes are agreed upon and implemented. For this assistance to contribute fully and effectively to solving the problems at hand, the parties need to remove existing obstacles to cooperation by reaching equitable solutions that meet the security needs of all participants.

Appendix 1

Cooperative Threat Reduction Programme
Budget and Legislative History

Table 1 – CTR programme budget history (amounts in million US dollars)

Fiscal year	Requested	Authorized	Appropriated	Withdrawn or expired	Available for obligation
1992	$ 0.0	$ 400.0	$ 400.0		$ 400.0
1993	0.0	400.0	400.0	$ 330.0	170.0
1994	400.0	400.0	400.0		400.0
1995	400.0	400.0	400.0	38.0	362.0
1996	371.0	300.0	300.0		300.0
1997	327.9	364.9	327.9		327.9
1998	n.a.	382.2	382.2		382.2
1999	442.0	440.4	440.4		440.4
2000	475.5	475.5	460.5		460.5
2001	458.4	443.4	443.4		443.4
Total	$ 3,257.0	$ 4,006.4	$ 3,954.4	$ 368.0	$ 3,586.4

Guide to budget terminology used by the U.S. Government:

Requested refers to the amount that the president has asked the Congress to provide for a particular budget item.

Authorized refers to the maximum amount that the Congress has decided may be appropriated to a particular budget item.

Appropriated refers to the actual amount that the Congress allocates. This amount may be less than or equal to the authorized amount, but may not exceed it.

Withdrawn refers to a decision by the Congress to reduce an amount previously authorized or appropriated; i.e., it is a recission of budget authority.

Expired refers to an amount that may no longer be obligated, because the time limit within which it was required to be obligated has run out.

Available for obligation refers to the amount that is available for use for a particular budget item; it is equal to the amount appropriated, minus amounts withdrawn or expired.

Notified refers to a report transmitted to the Congress, in accordance with legislative requirements, that informs the Congress of the administration's intent to obligate a sum.

Obligated refers to an amount that is under contract for the delivery of goods or services.

Expended refers to the actual amount that is finally paid in payment for goods or services rendered.

Table 2 – CTR programme legislative history

Fiscal year	Legislation title	Legislative reference
1992	Soviet Nuclear Threat Reduction Act of 1991	Title II of Public Law 102-228, 105 Stat. 1693, 22 U.S.C. 2551 note
	Dire Emergency Supplemental Appropriations and Transfers for Relief from the Effects of Natural Disasters, for Other Urgent Needs, and for Incremental Costs of "Operation Desert Shield/Desert Storm" Act of 1992	Public Law 102-229, 105 Stat. 1708
1993	Former Soviet Union Demilitarization Act of 1992	Title XIV of Public Law 102-484, 106 Stat. 2563, 22 U.S.C. 5901
	FY93 Department of Defense Appropriations Act	Public Law 102-396, 106 Stat. 1876
1994	Cooperative Threat Reduction Act of 1993	Title XII of Public Law 103-160, 107 Stat. 1777, 22 U.S.C. 5951
	FY94 Department of Defense Appropriations Act	Public Law 103-139, 107 Stat. 1418
1995	FY95 National Defense Authorization Act	Public Law 103-337, 108 Stat. 2663
	FY95 Department of Defense Appropriations Act	Public Law 103-335, 108 Stat. 2599
1996	FY96 National Defense Authorization Act	Public Law 104-106, 110 Stat. 186
	FY96 Department of Defense Appropriations Act	Public Law 104-61, 109 Stat. 636
1997	FY97 National Defense Authorization Act	Public Law 104-201, 110 Stat. 2422
	FY97 Department of Defense Appropriations Act	Public Law 104-208, 110 Stat. 3009
1998	FY98 National Defense Authorization Act	Public Law 105-85, 111 Stat. 1629
	FY98 Department of Defense Appropriations Act	Public Law 105-56, 111 Stat. 1203
1999	FY99 Strom Thurmond National Defense Authorization Act	Public Law 105-261, 112 Stat. 1920
	FY99 Department of Defense Appropriations Act	Public Law 105-262, 112 Stat. 2279
2000	FY00 National Defense Authorization Act	Public Law 106-65, 113 Stat. 512
	FY00 Department of Defense Appropriations Act	Public Law 106-79, 113 Stat. 1212
2001	FY01 Floyd D. Spence National Defense Authorization Act	Public Law 106-398, 114 Stat. 1654
	FY01 Department of Defense Appropriations Act	Public Law 106-259, 114 Stat. 663

Appendix 2

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Form of Supplier's Confirmation Letter

[Supplier's Letterhead]

Ministry of Atomic Energy of the Russian Federation
Attention: Minister of Atomic Energy
[Address]

[Date]

Dear Mr Minister,

Re: Indemnity Statement in favour of Suppliers financed by the Nuclear Safety Account

We refer to the Indemnity Statement relating to the activities of the Nuclear Safety Account on the territory of the Russian Federation ("the Indemnity Statement") dated 9 June 1995, and attached as Annex 2 to the Agreement between the Government of the Russian Federation and the European Bank for Reconstruction and Development relating to Nuclear Safety Account Projects in the Russian Federation ("the NSA Agreement") dated 9 June 1995.

The Government of the Russian Federation has agreed pursuant to the terms of Article 2 of the Indemnity Statement to indemnify and bring no claims against contractors, sub-contractors, consultants, suppliers and sub-suppliers of equipment or services and their personnel, financed through grant funds from the Nuclear Safety Account, (therein referred to as "the Beneficiaries").

We hereby inform you that [*Supplier*] has entered into a [supply] [consultancy] contract with [*insert name of Recipient*] dated [*insert date*]. [The persons and entities identified in the attached list, are our sub-contractors, consultants and sub-suppliers.] [*Insert sentence only if applicable.*] Financing for said contract is being provided by the Nuclear Safety Account through a grant agreement between [*Recipient*] and the European Bank for Reconstruction and Development dated [9 June 1995].

We understand that, pursuant to the terms of the Indemnity Statement:

(a) [*Supplier*] [and the persons and entities identified in the attached list] are Beneficiaries for the purposes of said Indemnity Statement;

(b) The provisions of the Indemnity Statement, including the arbitration clause in Article 7 thereof, which are incorporated by reference into this letter-agreement, are binding on [*Supplier*] [and on each of the Beneficiaries] and the Government at the Russian Federation.

Please execute this document in the place indicated to confirm that the foregoing constitutes a binding agreement between us.

Yours faithfully,

[Authorised Representative of Supplier]

ACCEPTED AND AGREED
on behalf of
THE GOVERNMENT OF THE RUSSIAN FEDERATION:

By: _____
Minister of Atomic Energy

Date: _____

Attachment: List of Subcontractors

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