RUSSIA'S NUCLEAR WASTE LAW: A RESPONSE TO THE LEGACY OF ENVIRONMENTAL ABUSE IN THE FORMER SOVIET UNION

Kathleen M. Maloney-Dunn

I. INTRODUCTION

> I could also mention the problems of dumping detergents and radioactive wastes . . . . The salvation of our environment requires that we overcome our divisions and the pressure of temporary, local interests. Otherwise, the Soviet Union will poison the United States with its wastes and vice versa.
> —Andrei D. Sakharov, Progress, Coexistence, and Intellectual Freedom 49 *(1968)*

> No other great industrial civilization so systematically and so long poisoned its air, land, water and people. None so loudly proclaiming its efforts to improve public health and protect nature so degraded both. And no advanced society faced such a bleak political and economic reckoning with so few resources to invest toward recovery.
> —Murray Feshbach & Alfred Friendly, Jr., Ecocide in the U.S.S.R.: Health and Nature Under Siege 1 *(1992)*

This Comment analyzes the need for Russia's pending Nuclear Waste Law and assesses its chances of solving the environmental and security problems with which the Russian Federation must cope. The first section of the Comment provides an overview of the origins and controversial aspects of the Nuclear Waste Law. The second section documents the legal, industrial, and military factors which contributed to the development of the current nuclear contamination crisis. It begins with a brief history of Soviet environmental laws and explains the reasons for their ineffectiveness. These include a reliance on extensive, rather than intensive, methods of industrial production, economic incentives to pollute, weak enforcement and sanctions structures, and an almost complete lack of public input on, or oversight of, government activities or legal recourse for violations of environmental regulations. Next, an overview of Soviet radioactive contamination, stemming from industrial practices and the nuclear arms race, is provided to emphasize the dire need for new legal and institutional approaches, embodied in the Law on Environmental Protection and the Nuclear Waste Law.

The third section of this Comment highlights the importance and timeliness of the Nuclear Waste Law, which proposes to regulate all military activities, by discussing the security implications of the dissolution of the Soviet Union with regard to the storage of fissionable materials and the safe removal of massive

quantities of uranium and plutonium from weapons stockpiles. The Russian Federation and other members of the Commonwealth of Independent States face internal chaos due to the breakup of centralized structures and defense establishments. The Comment will describe efforts of foreign nations and international organizations to alleviate the risks of nuclear proliferation and a brain drain of former Soviet nuclear experts. Aid to prevent nuclear disasters, to improve safety at nuclear facilities, and to facilitate disarmament and waste reprocessing activities is critical. The prospect of a nuclear black market and uncontrolled exports of nuclear materials will be analyzed in light of economic hardships and ethnic conflicts in the CIS today.

The fourth section of the Comment provides an overview of the reorganization of the Russian Federation after the collapse of the Soviet Union. The structures and jurisdiction of environmental and other government agencies relating to nuclear waste and safety issues are reviewed within the context of the Russian Federation's transition to a market economy and the emergence of grassroots "greens" groups. After outlining the main features of the new laws enacted in Russia to protect natural resources and control pollution, this section will analyze the potential effectiveness of the Nuclear Waste Law, given its improvements upon related Soviet laws and policies and its unprecedented provisions for democratic public participation. Finally, possible problems with implementing the legislation will be explored and alternative approaches will be suggested in the Conclusion.

II. RUSSIA'S PROPOSED NUCLEAR WASTE LEGISLATION: A GENERAL OVERVIEW

The collapse of the Soviet Union exposed grave environmental problems in the ex-Soviet republics. The new republican constituencies of the Commonwealth of Independent States ("CIS")[1] have only begun to uncover and cope with the toxic residue the Cold War left behind. As formerly classified material is examined in Russia and in the other republics, the true extent of ecological destruction caused by 20th century Soviet military and industrial policies has been disclosed as deplorable in effect and staggering in scale.

The dangers posed by radioactive contamination are aggravated by the absence[2] of any legislation in force in Russia concerning nuclear waste, energy, or safety. Russia remains the only nuclear power without laws on these

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1. As of March 1993 eleven formerly Soviet states still belonged to the Commonwealth. *Yeltsin Suggests Regional Role*, N.Y. Times, Mar. 1, 1993, at A7 [hereinafter *Yelstin Suggests*].

2. As of this writing, September 15, 1993. [This article was going to publication when President Yeltsin abolished the Russian Parliament. The Nuclear Waste Law should serve as a prototype for the future Russian Parliament to enact.]

subjects.[3] As a result, the Russian Federation Supreme Soviet[4] is generating a number of laws to govern the development and regulation of nuclear activities and atomic energy.[5] This Comment demonstrates that one of these bills, "On State Policy for Handling Nuclear Waste,"[6] represents the most comprehensive and promising step to date in addressing the widespread radioactive contamination in the former Soviet Union ("FSU").[7] The Nuclear Waste Law is also important because it departs from Soviet-era style environmental laws and builds upon the innovative provisions of the 1992 Russian Law on Environmental Protection.[8]

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3. Alexander Shuvalov, *Russian Experts Look For Ways of Ensuring Ecological Safety*, Tass, May 25, 1993, *available in* LEXIS, Nexis Libr., CURRNT File; *Defense Ministry Ignoring Yeltsin's Nuke Control Order*, Agence France Presse, Apr. 28, 1993 (Russia is the only country in the world without legislation on the use of nuclear energy or radioactive waste disposal) [hereinafter *Defense Ministry Ignoring*]. *See also* Alexander Sidyachko, *Nuclear Burial Facility Near Moscow?* BizEkon News, Mar. 4, 1992 (outlining the problems facing the Russian nuclear industry due to the lack of a national law on radioactive waste burial). The Chairman of the Subcommittee on Nuclear Ecology describes the situation regarding radioactive waste disposal as "monstrous," and says that unless the problem is addressed, the country will be confronted with a "global disaster" in the near future. He stressed the lack of any "mechanism to control" the military-industrial activities and waste sites scattered all over the country. Alexander Putko, *There is No Concept of Dealing with Dangerous Nuclear Waste in the U.S.S.R.*, Nezavisimaya Gazeta, *translated in* Sov. Press Dig., Oct. 23, 1991, at 15.

4. The 252-person Supreme Soviet is the standing legislature whose members are elected from among the 1041 representatives of the Congress of People's Deputies. The full Congress, which meets only once or twice a year, was created during the reformist era of President Mikhail S. Gorbachev. Its current members were elected in March 1990 for a five-year term. Serge Schmemann, *Russia Lurches Toward New Era Amid Dissension*, N.Y. Times, Nov. 11, 1992. The Congress is responsible for setting broad policy guidelines, considering constitutional changes, and naming the Supreme Soviet. Serge Schmemann, *Power of Russian Parliament's Leader Becoming a Vexing Issue for Yeltsin*, N.Y. Times, Oct. 25, 1992, at A6.

5. K. Belyaninov, *Where is a Nuclear Dump to Be Located?*, Komsomolskaya Pravda, *in* Sov. Press Dig., Sept. 26, 1992, at 4.

6. Draft Law of the Russian Federation *On State Policy for Handling Nuclear Waste* (Kristen Suokko trans., 1992) [hereinafter *Nuclear Waste Law*] (on file with author).

7. Despite the draft law's recent set-backs and an Executive order attempting to bypass the Parliament's jurisdiction on atomic matters, the Congress of People's Deputies remains the highest legal authority in Russia under the existing Soviet-era Constitution. *Yeltsin Suggests*, *supra* note 1, at A7.

8. The law was passed by the Supreme Soviet in December 1991 and was signed by Russian Federation President Boris N. Yeltsin in February 1992. *RSFSR Law on Environmental Protection*, Rossiyskaya Gazeta, Mar. 3, 1992, at 3-6, *translated by* FBIS, JPRS-TEN-92-007, Apr. 15, 1992 [hereinafter *Law on Environmental Protection*]. RSFSR Law No. 2060-1, adopted Dec. 19, 1991, "On Protection of the Environment." This law represents the first attempt by the FSU to enact All-Union legislation on environmental protection and to institute legal reforms aiming at a

The Russian parliamentary committee for the environment approved the Nuclear Waste Law on September 17, 1992, after hearings on the sixth draft.[9] The second hearing on the legislation was held during the winter-spring 1993 session of the Supreme Soviet.[10] Although the Deputy Prime Minister signed the bill after this hearing, and the draft law was adopted on April 14, 1993 by the House of Nationalities of the Russian Supreme Soviet, thereby increasing chances that the law will finally be approved and enacted during the autumn 1993 session, Ministerial and Parliamentary conflicts threaten to stall or even sabotage the law's passage.[11]

The most controversial feature of the Nuclear Waste Law concerns its provisions on spent nuclear fuel.[12] The current political debate in Russia centers around the legal classification of spent nuclear fuel, i.e., whether it should be categorized as radioactive waste per se, or as a separate category of material available for reprocessing and use in atomic reactors.[13] According to the draft Law, the reprocessing of spent nuclear fuel, "one of the most dangerous stages of the nuclear fuel cycle, . . . " resulting in " . . . the formation of a significant quantity of high-level liquid wastes[,]" is to be limited and phased out.[14] However, an Executive decree of April 1993[15] calls for an expansion of

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market economy. All environmental acts within Russia, including laws on nuclear waste, must be consistent with the framework and principles of this fundamental law. Nicholas A. Robinson, *International Law in Ex-U.S.S.R.: Pollution Controls Developing*, Nat'l L.J., Apr. 13, 1992, at 27. Yeltsin was elected President by popular vote in June 1991. Douglas Stanglin, *Yeltsin at the Crossroads*, U.S. News & World Rep., June 22, 1992, at 46, 46-47. *See infra* notes 329-48 and accompanying text.

9. The Presidium of the Supreme Soviet approved this bill for consideration by the Supreme Soviet in its next session. *Session of the Presidium of the Russian Supreme Soviet Opens*, BBC Summary World Broadcasts, Sept. 9, 1992.

10. Telephone Interview with Kristen Suokko, Coordinator of CIS Programs, Natural Resources Defense Council (Jan. 28, 1993) [hereinafter NRDC].

11. *Law on Radioactive Waste*, CIS Envtl. Watch, Summer 1993, at 83 (Monterey Inst. Int'l Stud.); Telephone Interview with John M. Whiteley, Director of Toward a Safer Nuclear World Project, School of Soc. Ecology, U.C.-Irvine (May 5, 1993).

12. Article 2 defines spent nuclear fuel as "fuel elements from a nuclear reactor, the future use of which would be ineffective." *Nuclear Waste Law*, *supra* note 6, art 2.

13. Judith Perera, *Russian Government May Press Parliament to Accept Waste*, World Env't. Rep., Oct. 13, 1992, *available in* LEXIS, Nexis Libr., CURRNT File.

14. *Nuclear Waste Law*, *supra* note 6, art. 18

15. President Yeltsin recently issued a decree that the Russian Federation will fulfill the intergovernmental contracts entered into by the FSU concerning the delivery of nuclear fuel from Russia and the return of the spent fuel from nuclear power stations abroad for reprocessing. *Decree of the President of the Russian Federation*, No. 472, Moscow (April 21, 1993) [hereinafter *Decree*] (on file with author). The decree also orders the Russian Ministry of Atomic Energy [hereinafter Minatom] to conduct negotiations and submit to the Council of Ministers draft intergovernmental agreements on bilateral projects involving reciprocal obligations for spent fuel management. The same Ministry, in conjunction with other Federal Ministries, is commissioned to develop and approve procedures for receiving and reprocessing spent

reprocessing activities,[16] in direct contrast to the stated "general principles" of the Nuclear Waste Law.[17]

The 1992 Russian Law on Environmental Protection, already in force, virtually prohibits the importation of foreign radioactive waste products into Russia for either dumping or storage on its territory.[18] While the Law on Environmental Protection forbids the burial and storage of foreign nuclear wastes, it does not explicitly prohibit their reprocessing in Russia as long as the by-products, i.e., those with a lower radioactivity and a different half-life, are sent out of Russian territory.[19]

Although the Russian Republic of the U.S.S.R. previously provided reactor fuel and accepted nuclear waste and spent fuel from Soviet-built power stations in other Republics, Eastern Europe and Finland, the new Law on Environmental Protection has been interpreted as superseding Soviet agreements to accept radioactive waste from other nations. The Law's operation has precluded shipments of spent fuel and waste from other nations such as the Ukraine and Lithuania, where Soviet-built nuclear plants are located, into Russia.[20] As a

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nuclear fuel from foreign atomic stations. These Federal Committees and Ministries are also charged with managing the spent fuel and radioactive waste from reprocessing, placing priority on the return of solidified radioactive waste from reprocessing activities in Russia to the country of the nuclear fuel's origin. *Id.*

16. Minatom and the Russian Ministry of Foreign Economic Relations are obliged by the decree to "conduct negotiations on drawing foreign investment for development of plants for reprocessing of spent nuclear fuel." *Decree*, *supra* note 15, art. 7. In exchange for reprocessing services, regions where the plants are located are to receive 25% of the hard currency generated from reprocessing, to be spent on "radiation monitoring, improvement of environmental conditions, and socio-economic development programs . . . ." *Id.* at art. 5. Environmental activists maintain that this inducement is designed to persuade communities that improved living and economic conditions in their localities are linked to the continued operation of nuclear plants, while official funds earmarked for environmental remediation are already being diverted to upgrade nuclear weapons facilities. George Lobsenz, *Russia Revs Up Reprocessing Capacity*, Energy Daily, June 8, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

17. *Nuclear Waste Law*, *supra* note 6, art. 18 ("preventing the unregulated accumulation of radioactive waste into the environment"; limiting and phasing out reprocessing; and aiming "toward the lowest possible generation of radioactive waste").

18. *Law on Environmental Protection*, *supra* note 8, art. 50(3).

19. *Press Conference on the State of the Environment in RF and the Health of the RF Population*, Off'l Kremlin Int'l News Broadcast, *in* Fed. News Service, Oct. 7, 1992, at 48 [hereinafter *Press Conference*].

20. The Law on Environmental Protection states that if regulations in international treaties on environmental protection concluded by Russia conflict with the provisions in this law, the treaty regulations apply. *Law on Environmental Protection*, *supra* note 8, art. 93. However, no mention was made of the supremacy of commercial contracts between Russia and the other republics or foreign nations. The implementation of the Law has caused tension between Russia and other states. *See infra* notes 218-235, 328 and accompanying text.

result, nuclear waste dumps are cropping up in Kazakhstan[21] and other republican states due to the absence of adequate, official burial facilities in those territories,[22] a problem which has been exacerbated by the Russian refusal to accept radioactive waste from other countries.[23]

The Nuclear Waste Law strengthens the prohibitions placed on the importation of nuclear waste by the Law on Environmental Protection because it also bans the burial of foreign radioactive waste in Russia.[24] Nevertheless, one of the issues delaying the passage of the Nuclear Waste Law is whether its provisions on spent nuclear fuel undermine or contradict the Law on Environmental Protection. Hard-liners within the Ministry of Atomic Power and Industry ("MAPI," now called "Minatom")[25] and the Russian Parliament argue that spent nuclear fuel should not be treated as radioactive waste, but rather as material that could be reprocessed to produce atomic energy.[26] In contrast, environmentalists maintain that the reprocessing of spent nuclear fuel should be phased out because it promotes a continued reliance on nuclear power.[27] They also contend reprocessing poses an even greater long-term nuclear waste disposal problem, which they claim the Law on Environmental Protection implicitly

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21. Eight million tons of nuclear debris, generating a radioactive count equal to over half the fallout from Chernobyl, are scattered throughout Kazakhstan in 529 waste dumps. *Kazakhstan Littered with Radioactive Waste*, Agence France Presse, Apr. 5, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

22. Kazakhstan, where Soviet nuclear testing took place, has only one official burial facility, which is reportedly unreliable. O. Stefashin, *Kazakhstan: Spontaneous Radioactive Dumps Begin to Appear*, Novecon, Aug. 11, 1992.

23. Nuclear waste that Russia used to take for disposal or reprocessing is now accumulating "dangerously" in Eastern Europe and the ex-Soviet nuclear republics. Thomas Halverson, *Ticking Time Bombs: East Bloc Reactors*, Bull. Atom. Sci., July-Aug. 1993, at 43, 48; Yeltsin's April *Decree*, *supra* note 15, may reverse this trend.

24. *Nuclear Waste Law*, *supra* note 6, art. 6; *Russia Might Reject Radioactive Dumping From Abroad*, BBC Summary World Broadcasts, Sept. 19, 1992.

25. This former Soviet super-ministry is responsible for defense and civilian activities, including all phases of the nuclear fuel cycle. *Gosatomnadzor*, on the other hand, plays a role similar to the U.S. Nuclear Regulatory Commission ("NRC"), and is attempting to switch from a supervisory to a licensing role. William C. Potter, *The Effects of Chernobyl on Soviet Decision-making for Nuclear Safety*, 41 Impact Sci. on Soc'y 257, 261 (1991). *See infra* note 189.

26. Minatom wants the Nuclear Waste Law to allow the import and reprocessing of spent nuclear fuel. The Ministers are trying to persuade the Parliament's Ecology Committee to amend the legislation by stressing that reprocessing is a profitable "multi-million dollar business." *Russia: Nuke Ministry Wants to Reprocess Spent Fuel*, Greenwire, Mar. 16, 1993, *available in* LEXIS, Nexis Libr., OMNI File.

27. In response to Minatom's request that the Law on Environmental Protection be changed to permit Russia to keep and treat nuclear waste rather than sending it back to its source, parliamentarians have expressed sympathy with the "economic needs" of the waste treatment plants facing financial collapse. *Russia Could Become Nuclear Wastebasket*, Agence France Presse, Mar. 3, 1993.

attempts to limit by banning imports of radioactive waste products for storage, burial, or disposal.[28] However, President Yeltsin's April 1993 decree[29] may effectively usurp the Parliament's jurisdiction over these nuclear fuel and waste issues. The decree appears to attempt to reverse the Law on Environmental Protection's application to date by confirming Russia's commitment to provide nuclear fuel to power stations abroad and to receive the spent fuel from these same nuclear power plants for reprocessing in the Russian Federation.[30] Such an Executive preemption of legislative authority raises questions of constitutional separation of powers in Russia.[31]

The emerging conflict between the executive and legislative branches illustrates the constitutional disarray in Russia today and the tenuous status of the rule of law, the separation of powers, and democracy in the FSU. In addition to the complications the Nuclear Waste Law entails in terms of international agreements and Russian relations with other CIS states, its adversarial passage through the Supreme Soviet highlights the struggles over democratic trends and constitutional reform in the Russian Federation. The ongoing battles among different branches of government in Russia makes it difficult to predict even the jurisdictional framework within which the nuclear waste problem will be resolved, especially given executive overrides and proposals for a new Russian Constitution and early Parliamentary elections in the Fall of 1993.[32]

Despite the political and constitutional complications confronting the Nuclear Waste Law, its enactment is urgently needed given the magnitude and gravity of the environmental problems related to radioactivity in Russia. An estimated 1.6 billion metric tons of toxic wastes are buried on Russian soil.[33] Nuclear dumping in rivers flowing out of industrial regions throughout the U.S.S.R. contaminated the seas north of the ex-Soviet empire, threatening Scandinavia, Canada, the United States, China, Japan, and Western Europe with

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28. *Law on Environmental Protection*, *supra* note 8, art. 50(3).

29. *Decree*, *supra* note 15.

30. *Decree*, *supra* note 15 and accompanying text.

31. Minatom sought the Executive decree when it became apparent that the Ministry was losing the spent fuel debate in Parliament, thereby attempting to preempt the legislature's power over these substantive issues. Telephone Interview with John M. Whiteley, Director of Toward a Safer Nuclear World Project, School of Soc. Ecology, U.C.-Irvine (July 10, 1993).

32. Yeltsin has threatened to call parliamentary elections this Fall, while the Parliament — whose term does not expire until 1995 — warns that its dissolution exceeds the President's constitutional powers and opposes early elections. A conference convened in June 1993 to draft a new Russian Constitution failed to produce a consensus and intensified power struggles between executive and legislative branches. Celestine Bohlen, *In A Standoff, Yeltsin Threatens Opponents With An Early Election*, N.Y. Times, Aug. 13, 1993, at A3.

33. *Pollution, Economics Lead to Worsening Public Health in Russia, Officials Say*, BNA Int'l Env't. Daily, Nov. 2, 1992.

radioactive pollution.[34] A vast portion of the planet's territory[35] has been severely, and in some cases, irreversibly, poisoned. The first-ever official Russian national reports on the environment and public health document pollution levels exceeding ten-fold the maximum permissible levels of toxic substances in nearly all the major industrial centers in Russia.[36]

Cleanup costs for the radioactive dumps scattered throughout the FSU may exceed hundreds of billions of dollars.[37] In Lithuania alone, the past five decades of Soviet military occupation inflicted environmental damage that will cost the Baltic Government $150 billion just to clean up.[38]

Since the breakup of the U.S.S.R., the Russian Federation and Parliament have initiated plans to clean up contaminated regions. These plans give priority to irradiated waste that continues to be generated by nuclear power plants and military reactors throughout the FSU.[39] While estimates vary, it appears that

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34. Murray Feshbach, *Ecology's Eastern Front*, U.S. News & World Rep., July 20, 1992, at 43.

35. The territory (8,649,489 square miles) of the FSU covered about one-sixth of the earth's surface. Charles E. Ziegler, Environmental Policy in the U.S.S.R. 13, 25 (1987). Sixteen percent of the FSU's land mass, where one-fifth of the population lives, is in a "severe ecological condition." Murray Feshbach & Alfred Friendly, Jr., Ecocide in the U.S.S.R.: Health and Nature Under Siege 9 (1992).

36. *Press Conference*, *supra* note 19, at 38, 48. Eighty-four cities, with a total population of over 50 million, registered air pollution levels ten times higher than required limits. Nearly three-fourths of the Russian people breathe dirty air. Over 20% of all drinking water and 10% of the foodstuffs in the Russian Federation do not meet existing safety standards. *Id.* at 38.

37. One Russian official estimates the irradiated mess will cost "trillions" to clean up. Claire Shipman, *Former Soviet Union Pays Consequences of Nuclear Use*, CNN transcript #277-1, Feb. 15, 1993, *available in* LEXIS, Nexis Libr., OMNI File; *See also infra* notes 39, 41, 146 and accompanying text. The United States, the nuclear nemesis of the FSU, faces similar remediation costs. The U.S. Department of Energy's ("DOE") 1990 Five-Year Plan called for spending over $30 billion on environmental restoration and waste management activities at nuclear weapons sites alone. U.S. Congress, Office of Technology Assessment ("OTA"), *Complex Cleanup: The Environmental Legacy of Nuclear Weapons Production (Summary)*, OTA-O-484, at 6 (Washington D.C.: U.S. Gov't Printing Office, Feb. 1991). The DOE's estimate has tripled since then. Douglas Pasternak, *A $200 Billion Scandal*, U.S. News & World Rep., Dec. 14, 1992, at 34. Recent estimates are over $300 billion. George Perkovich & William Potter, *Cleaning Up Russia's Future*, Wash. Post, Jan. 5, 1992.

38. John Budris, *Is This What the 15 People at the TV Tower Died For?*, N.Y. Times Mag., Aug. 2, 1992, at 44.

39. Recently, Minatom submitted a draft state program on the handling of radioactive waste and spent nuclear materials to the Parliament. Minatom and 13 other government agencies prepared the plan, which provides for appropriate disposal of radioactive substances stockpiled before 1990 and is expected to cost 200 billion rubles in mid-1992 prices. Leonid Veksler, *Radioactive Waste Disposal to Cost 200 Billion Rubles*, BizEkon News, May 16, 1993. The program will pay for defense-related nuclear waste projects via a special government fund. *Id.*

Russia's storage capacity for nuclear waste, from low-level radioactive water to high-level spent fuel rods, will last only a few more years.[40] In fact, nuclear reactor waste from Russian submarines is either being dumped in the oceans or stored out in the open near naval ports for lack of land-based disposal sites.[41]

President Yeltsin commissioned an exhaustive map of radiation-contaminated regions in Russia in 1992,[42] and issued an order in June 1992 on verification of the safety of all nuclear objects in Russia,[43] reflecting the urgency with which citizens and the new government view these issues.[44] This urgency is also evidenced by the fact that the very first environmental legislation drafted by the Russian Supreme Soviet concerns radioactive waste.[45]

Despite pressure from abroad to enact legislation on nuclear safety first, the Russian Supreme Soviet decided the most pressing problem was the absence of state policy on radioactive waste.[46] The Supreme Soviet insisted on forming

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40. A department chief at the Russian Ministry of Ecology estimates a storage capacity of only two to three years. John-Thor Dahlburg, *A Nuclear Tainted Russia Hunts for Affordable Cure*, L.A. Times, Sept. 4, 1992, at A1.

41. Construction of proper waste storage facilities will take about five years and cost one billion rubles (1992 value), while waste reprocessing plants will cost six billion rubles. Adam Tanner, *Nuclear Waste Was Dumped At Sea By Soviet Navy*, Inter Press Service, Apr. 2, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

42. Dahlburg, *supra* note 40, at A1. Yeltsin's advisor, Alexei Yablokov, in interpreting the first annual report, "On the Condition of the Environment," stated the most serious problem facing Russia is radioactive contamination. One of the main reasons for such extensive nuclear pollution is that the military-industrial complex was not subject to any environmental or health supervision. Inspection teams could not even enter the premises. Lyubov Dunayeva, *White Books Reveal What Had Been a Deep, Dark Secret*, Rossiiskiye Vesti, Oct. 24, 1992, at 2, *translated in* XLIV Current Dig. Post-Sov. Press, Nov. 25, 1992, at 28.

43. Yeltsin's order assigned a State Committee to verify the safety of all nuclear objects by December 1992, but the Defense Ministry has allegedly been refusing civilian experts access to nuclear weapons and materials in violation of the order. *Defense Ministry Ignoring, supra* note 3.

44. The President of the Russian Parliament's Environment Committee recently stated, "Our greatest concern is pollution by radioactive waste. All levels of radioactive waste have insufficient storage. This is problem No. 1." Brad Knickerbocker, *Russia Faces Huge Environmental Challenges*, Christian Sci. Monitor, Apr. 20, 1993, at 6.

45. In 1990, the RSFSR Congress of People's Deputies passed a resolution directing the Supreme Soviet to submit a proposal by June 1991 on a state program for radioactive waste and spent nuclear fuel material. The resolution banned the construction of new nuclear power plants from January 1991 until the adoption of the program. *RSFSR Resolution on State Nuclear Waste Disposal Program*, Sov. Rossiya, June 28, 1990, *in* BBC Summary World Broadcasts, July 13, 1990, at A1 [hereinafter *RSFSR Resolution*].

46. Written Communication from U.S. experts on nuclear safety and regulation to Russian Presidential Advisor and Chair of Supreme Soviet Ecology Committee (Jan. 6, 1992) (on file with author); Telephone Interview with John M. Whiteley, Director of

such a policy before dealing with atomic energy or any other environmental crisis.[47] Previously, neither the FSU nor Russia had ever enacted any legislation on nuclear waste.[48] The CIS states have not yet concluded any agreement on an integrated policy on nuclear power or radioactive waste storage.[49]

However, the U.S.S.R. Supreme Soviet took the first step toward mitigating the accumulation of more radioactive wastes in the early 1990s as the magnitude of the problem became increasingly publicized. The Parliament adopted the Law on Environmental Protection prohibiting the importation of foreign radioactive waste.[50] Debate persists in Russia about whether this ban on the receipt and burial of nuclear waste on the republic's soil applies to all foreign states[51] and whether spent fuel is to be treated as radioactive waste.[52] Although the Law on Environmental Protection precludes the transport of spent nuclear fuel from Germany, the former Czechoslovakia, Hungary, Bulgaria, the Ukraine and other

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Toward a Safer Nuclear World Project, School of Soc. Ecology, U.C.-Irvine (Nov. 8, 1992); *See also* The Status of Nuclear Waste and Nuclear Safety Issues in Russia and the United States: Hearings on S. 102-703 Before the Subcomm. on Nuclear Reg. of the Senate Comm. on Env't. & Public Works, 102nd Cong., 2d Sess. 6, 17 (1992) [hereinafter Nuclear Hearings] (statement of Fyodor G. Gasparyan, People's Deputy of Russia, Chairman) ("In the Supreme Soviet right now we are working on the first concept of law [on] nuclear power . . . . We consider this legislation to have top priority"). *Id.*

47. "[I]n our Committee on Ecology, we give . . . radiation safety top priority right now . . . Russia and its great expanses are contaminated with nuclear waste. What happened in Chernobyl cannot compare to the amount of radiation waste which exists in other places . . . . [I]n the northern areas . . . there [are] about 1.2 billion curies. [W]e need to provide for the safety of atomic energy . . . through legislation on . . . radiation waste." Nuclear Hearings, *supra* note 46, at 9 (statement of Evgenii K. Nesterov, People's Deputy of Russia, Deputy Chairman, Subcommittee on Radiation Safety).

48. *See supra* note 3.

49. Valery Yaroslavtsev, *The Atom of Discord*, Rossiyskaya Gazeta, *in* Sov. Press Dig., Feb. 15, 1992, at 6.

50. *Law on Environmental Protection*, *supra* note 8, art. 50(3); Dahlburg, *supra* note 40, at A1. However, Russia, as successor state to the U.S.S.R., also inherited the FSU's obligations to reprocess and bury the radioactive waste from Soviet nuclear power plants constructed abroad. *Id.*

51. *Argument Over Russian Acceptance of Foreign Nuclear Waste*, Rossiyskaya Gazeta, Sept. 17, 1992, *in* BBC Summary World Broadcasts, Oct. 2, 1992, at A1; *Press Conference*, *supra* note 19, at 48.

52. Article 50 is unclear on this point, *Law on Environmental Protection*, *supra* note 18, and no bureaucratic or regulatory authority has been assigned to interpret the law. Mark Hibbs, *Ukraine Will Not Exclude PU Use Pending Decision on Compensation*, NuclearFuel, Feb. 1, 1993, at 9 [hereinafter *Ukraine*]. Minatom officials state they await legal clarification on whether the Nuclear Waste Law prohibits the export and import of spent fuel, since "there is no regulatory basis for making this decision." Mark Hibbs, *Spent Fuel Import Blockage Means RT-1 Plant is Reprocessing Less*, NuclearFuel, Jan. 4, 1993, at 4.

countries of the FSU to Russia,[53] President Yeltsin's April 1993 Decree may contravene such prohibitions.[54]

III. NUCLEAR AND ENVIRONMENTAL CHAOS IN THE FORMER SOVIET UNION

A. Historical Background of Soviet Environmental Legislation

Although the Soviet Constitution[55] of 1977 espoused environmental values as paramount,[56] and the U.S.S.R. had enacted or decreed more than 1000 laws on environmental protection by 1987,[57] the lack of enforcement mechanisms and widespread non-compliance throughout the country rendered these laws ineffective. In general, the drive to industrialize sacrificed the environment in the FSU.

Private ownership of natural resources and land was banned from the beginning of the Soviet experiment.[58] Until very recently, ecological laws in the FSU and in Russia were based on the principle of exclusive state ownership of all natural resources.[59] Although Lenin supported the passage of legislation

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53. Hibbs, *Ukraine*, *supra* note 52, at 9.

54. *Decree*, *supra* note 15.

55. There have been four Soviet Constitutions (1918, 1924, 1936, 1977) as well as the 1988 amendments to the 1977 Constitution, which modified 30% of its provisions, mostly revising the legislative system. Robert Sharlet, *Soviet Legal Reform in Historical Context*, 28 Colum. J. Transnat'l L. 1, 12 (1990). *See* Bohlen, *supra* note 32, at A3.

56. Article 11 of the 1977 Soviet Constitution states, the "land, its mineral wealth, the waters and the forests are the exclusive property of the state." Article 18 provides for the necessary steps to be taken in the U.S.S.R. to protect and make scientific, rational use of the land, mineral, and water and other resources "in the interests of the present and future generations." Article 67 specifies that citizens of the U.S.S.R. are obliged to protect nature and conserve its riches. KONST. SSSR [Constitution] (1977), *in* 1 William E. Butler, Collected Legislation of the Union of Soviet Socialist Republics and the Constituent Union Republics: Constitutions I-1: 7, 9, 20 (1988).

57. *Environmental Law and Policy in the U.S.S.R.*, 17 Envtl. L. Rep. (Envtl. L. Inst.) 10,068 (Mar. 1987) [hereinafter *Environmental Law and Policy*].

58. The first article of the 1918 Decree of the All-Russian Central Committee of the Soviets of Workers, Soldiers, and Peasant Deputies stated this principle and the 1918 Soviet Constitution declared all natural resources to be part of the national heritage. Elena Kirillova, *Environmental Law in the New Soviet Union*, BNA Int'l. Env't. Daily, Nov. 6, 1991.

59. Tatiana Zaharchenko, *The Environmental Movement and Ecological Law in the Soviet Union: The Process of Transformation*, 17 Ecology L.Q. 455, 465 (1990). As late as 1988, the Soviet Constitution asserted exclusive state ownership of land,

protecting nature,[60] Stalin promoted the conquest of nature as part of his drive to industrialize and hence, dismissed earlier environmental laws.[61] After World War II, little attention was paid to the environmental consequences of reconstruction. Khrushchev's policies of developing wilderness areas and taming rivers for industrial purposes ignored conservation or environmental protection interests.[62] Under Brezhnev, the massive exploitation and sale of natural resources, which the Soviet people were accustomed to viewing as infinite, financed and sustained profligate spending on inefficient government structures and military enterprises.[63]

Until Stalin's industrialization program, the laws on nature protection were fragmented, with separate regulations for discrete resources like land, water, and minerals.[64] In the late 1950s, the Soviet Government attempted to integrate these bodies of law and All-Union Republic laws were adopted. However, this trend was short-lived. By the early 1970s, the codification of separate branches of law according to respective resources was instituted at the All-Union level, and these codes, in turn, were replicated by individual republics.[65] Although a basic framework for conservation[66] was established in the FSU, most of the laws had

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minerals, water, and forests (art. 11); and the duties of local, state, and administrative agencies to control land use and the conservation of nature (art. 147). KONST. SSSR (1988). This concept of collective public ownership of natural resources began to shift in 1990, with the enactment of laws allowing some private ownership of property and land. *See U.S.S.R. Law on Ownership in the U.S.S.R.*, Vedomosti SSSR, Issue No. 11, Item 164 (1990); *Fundamentals of Legislation of the U.S.S.R. and Union Republics on Land*, Vedomosti SSSR, Issue No. 10, Item 129 (1990).

60. Lenin approved the first Soviet nature preserve (*zapovedniki*) in 1919. Ziegler, *supra* note 35, at 49. During the 1920s, the U.S.S.R. pioneered the establishment of ecologically protected areas. These unique zones and the holistic approach to nature were sacrificed when the five-year planning and Stalin's rapid industrialization models emerged. Barbara Jancar, Environmental Management in the Soviet Union and Yugoslavia 50-51 (1987).

61. Kirillova, *supra* note 58, at 10. Stalin introduced the first Five-Year Plan in 1928, launching a massive drive to industrialize without regard for the environment. Ziegler, *supra* note 35, at 24.

62. Kirillova, *supra* note 58, at 11.

63. *Id.*

64. Oleg S. Kolbasov, *The Concept of Ecological Law*, 4 Conn. J. Int'l L. 267, 267-68 (1989).

65. *Id.* at 268.

66. The Soviet philosophy of "conservation" entailed "conserving" natural resources by using them efficiently to support economic and social development. These efforts to incorporate environmental concerns into centralized industrial management plans were unsuccessful to a large extent because of the overlapping, fragmented, and competitive relationships among the ministries and state agencies ("departmentalism") responsible for implementing them. Terry Yosie, *Environmental Perestroika*, Envtl. Forum, 1988-1989, at 9, 10-11; Eric Green, *Ecology & Perestroika* 4 (Am. Comm. on U.S.-Sov. Rel. 1990) (sometimes as many as 26 separate ministries and committees were involved in designing and implementing

little impact because they were extremely vague and general and required further implementing legislation.[67]

"Legislation" was a very broad term, encompassing a plethora of all-Union, republic, regional, and local statutes as well as a wide array of administrative regulations, departmental directives, and decrees in the FSU. Sources of what the Soviets referred to as "ecological law" included *zakony* (statutes) and *podzakonnye akty* (subordinate acts), enacted by the Supreme Soviet of the U.S.S.R. and the analogous legislative bodies in each of the republics, and administrative rules called *normativnye akty* (normative acts).[68] *Zakony* could be broad and systematizing norms of a particular branch of law, in which case they would be called *osnova*[69] or "Fundamental Principles of Legislation."[70] They could also comprise more narrow "codes." Edicts of the Presidium of the Supreme Soviet or republican parliaments were also considered laws.

Most of the environmental laws, or the equivalent thereof, in the FSU originated from subordinate normative acts such as government decrees from the Council of Ministers of the Union and the republics.[71] However, Council of Ministers' resolutions and other laws did not usually spell out standards, planning procedures, penalties, or fines for enforcement purposes. Rather, standards, emission levels, and other environmental controls were negotiated at both national and local levels and involved a complex set of agencies and ministries.[72] One of the drawbacks of this system was that the resource exploiters and polluters were frequently the authorities setting the environmental standards and penalties for violations, as well as those reporting data on environmental abuses.[73]

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environmental regulations).

67. Environmental laws in the U.S.S.R. contained declaratory norms, referring to other legislation for specific provisions and regulations. Technical environmental standards were set on the administrative level by the same organizations that would be governed by, and expected to enforce, the requirements. Sanctions and fines were negligible. Criminal sanctions for violating environmental laws generally focused on individuals engaging in activities like illegal hunting. Rarely were such sanctions directed at state corporate enterprises, which treated fines for pollution as an operating cost. Alexandre Timoshenko, *Developments in Environmental Law in the Soviet Union*, 3-4 J. Envtl. L. & Litig. 131, 132-33 (1988-1989).

68. Frances Foster-Simons, *Toward A More Perfect Union? The "Restructuring" of Soviet Legislation*, 25 Stan. J. Int'l L. 331, 334 (1988-1989) (citing William E. Butler, *Soviet Law* 41 (2d ed. 1988)).

69. *Osnova* are fundamental laws passed at the national level and adopted in near-identical form by the union republics. They express principles that define legal norms, the objects which these norms govern, and the implementing relationships between norms. Jancar, *supra* note 60, at 53.

70. The Fundamental Principles and codes were comprehensive, yet ineffective, because they left emission, sanitation, construction, and other standards to be enumerated in subordinate or collateral legislation and decrees. William E. Butler, *Natural Resource Law*, *in* Soviet Law 250, 253-54 (1983).

71. Jancar, *supra* note 60, at 53-55.

72. *Id.*

73. Green, *supra* note 66, at 4. It is not surprising, then, that although in practice

Departmental normative acts issued by state agencies and ministries constituted additional sources of ecological law.[74]

Although ecological law was considered a separate branch of law, natural resources were also protected under the wider systems of constitutional, administrative, economic, and criminal law.[75] The Constitution of the U.S.S.R. legally formalized state ownership of all natural resources in 1977.[76] *Zakony*, next in the hierarchy of Soviet laws, consisted of legislative acts of the U.S.S.R. Supreme Soviet and Congress of People's Deputies.[77] Decrees, statutes, departmental rules, and standards issued by the U.S.S.R. Council of Ministers and the central governmental bodies also frequently concerned environmental protection.[78] Republic laws included: regional *zakony*; codes involving a single substantive area of law, such as forestry; statutes; and decrees, varied in terms of the degree to which the protection of nature was institutionalized.[79] Decisions made by local state bodies were relegated to the lowest place on the totem pole of legal sources. Finally, in contrast to English common-law, courts in the FSU did not make law. New laws and regulations could not be developed by the Soviet court system, but courts could interpret and enforce *zakony* and legislation in disputes.[80]

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environmental violations were frequent, the U.S.S.R. did not publish data on the incidence of such violations. William E. Butler, *Soviet Environmental Law As a Model for Other Countries*, 4 Conn. J. Int'l L. 279, 282 (1989).

74. Kolbasov, *supra* note 64, at 271.

75. Kolbasov, *supra* note 64, at 272-74. For example, the RSFSR Criminal Code contained provisions punishing the violation of rules on keeping, using, or carrying explosive and radioactive substances with a prison term of up to seven years. Vedomosti SSSR, Issue No. 40, Item No. 591, amended December 12, 1968; Vedomosti RSFSR Issue No. 51, Item No. 1732 (1968) *in* William E. Butler, Basic Documents on the Soviet Legal System 376 (1983).

76. Article 11 established exclusive State ownership of land, its minerals, water, forests and the basic means of production. 1 Butler, *supra* note 56, at I-1: 7. Article 67 provided that the citizens of the U.S.S.R. "shall be obliged to care for nature and to protect its wealth." 1 *Id.* at I-1: 20. One of the most striking provisions suggesting remedies for environmental wrongs is found in article 58, which gave citizens the right to file complaints against state officials and bodies, to appeal contraventions in court, and to be compensated for damages resulting from unlawful state and public activities. *The Citizens' Role in Nature Protection in the U.S.S.R.*, 11 Envtl. L. Rep. (Envtl. L. Inst.) 50051, 50052 (Jan.-Dec. 1981) [hereinafter *Citizens' Role in Nature Protection*].

77. *Zakony* were adopted by majority approval in the Supreme Soviet or in the Congress of People's Deputies. They are analogous to legislation passed by either branch of the U.S. Congress. Alternatively, they could be enacted by an All-Union referendum. Some of the All-Union laws protected natural resources. Zaharchenko, *supra* note 59, at 466.

78. *Id.*

79. *Id.* at 466-67.

80. The decisions of the supreme courts of the former Soviet Union created binding precedents for lower courts. *Id.* at 467.

To date, the successor states to the Soviet Union have suffered from the absence of All-Union or republic legislation on nuclear or hazardous waste.[81] Soviet law lagged considerably behind the United States and Europe regarding legislation on the transportation, storage, and disposal of radioactive waste.[82] This gap was further widened by the complication that each of the fifteen autonomous Soviet republics had its own constitution, environmental legislation, subordinate acts, and ministerial decisions. Rather than approaching environmental preservation in a holistic manner, these disparate acts regulated resources like land, water,[83] minerals, and forests separately.[84]

Most of the specific requirements applicable to radioactive waste were contained in public health and sanitary standards established by the U.S.S.R. State Committee on Standards ("GOST") and were based on the 1969 U.S.S.R. Fundamental Principles of Legislation on Public Health, under which prevention of environmental pollution was an enumerated duty of all state agencies,

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81. Hazardous waste regulations were general requirements found in separate legislative acts, like those protecting water or the atmosphere. The only specialized rules were articulated in the 1985 Sanitary Rules on the Procedure for the Accumulation, Transporting, Rendering Harmless, and Burial of Toxic Industrial Wastes. However, these rules were violated frequently, with industrial wastes stored in temporary installations or simply transported to city dumps. M.M. Brinchuk, *Legal Problems of Hazardous Industrial Wastes in the U.S.S.R.*, 4 Conn. J. Int'l. L. 353, 356, 358 (1989).

82. Robert Starr & Jonathan Hay, *Environment Law of the Tundra*, Petroleum Economist, Nov. 1991, at 23.

83. An example of Soviet republic-based legislation is the Water Code of the RSFSR, adopted in June, 1972, and amended in 1980. It included only general provisions, such as articles 91 and 94 protecting water from pollution, obstruction, and depletion, and article 97 on the Prevention of Water Pollution by Fertilizers and Toxic Chemicals. Article 110 established criminal and administrative liability for violations like pollution, and article 113 specified that compensation for losses caused as a result of violations of the water code were to be paid according to the amounts and procedures set by the U.S.S.R. and RSFSR legislation. *Water Code of the RSFSR, in* 1 William E. Butler, Collected Legislation of the Union of Soviet Socialist Republics and the Constituent Union Republics: Union Republic Legislation III-4: 33, 35, 39-40 (1988). *Cf. Fundamental Principles of Legislation of the U.S.S.R. and Union Republics on Public Health, in* 2 William E. Butler, Collected Legislation of the Union of Soviet Socialist Republics and the Constituent Union Republics: Union of Soviet Socialist Republics II-5: 1-27 (1980).

84. Fundamental Principles of Legislation were enacted concerning land (1968, 1990), water (1970), minerals (1975), and forestry (1977), but there were no All-Union laws on environmental protection. Particular initiatives of Ministries and Republics were taken, but no standardized comprehensive law on the use of natural resources was ever adopted. Starr & Hay, *supra* note 82, at 23; Zaharchenko, *supra* note 59, at 465; *Congress of People's Deputies, Day Eleven*, Izvestia, June 10, 1989, *translated in* XLI Current Dig. Sov. Press, Aug. 30, 1989, at 19 [hereinafter *Congress of People's Deputies*].

enterprises, and organizations.[85] The importance of such epidemiological standards was emphasized by the 1972 U.S.S.R. Supreme Soviet decree "On Measures for the Further Improvement of Nature Conservation and the Rational Utilization of Natural Resources."[86] Pursuant to this decree, the U.S.S.R. Council of Ministers adopted the most comprehensive environmental decree of the 1970s, "On the Intensification of Nature Conservation and the Improved Utilization of Natural Resources," designed to promote more efficient utilization of natural resources and prevent further pollution.[87]

However, many of the laws designed to protect discrete natural resources and other environmental decrees continued to be vague and general. Although Soviet environmental laws were sophisticated and comprehensive on paper, they were rarely enforced in practice, and were more aspirational than legally binding.[88]

In July 1985 the Soviets enacted a decree "On Observance of the Requirements of Legislation on the Protection of Nature and the Rational Utilization of Natural Resources," which strengthened environmental protection by increasing the liabilities of state bodies, public organizations, and individuals that failed to comply with ecological standards and requirements.[89] This decree led to the enactment of stronger environmental laws by governmental agencies charged with implementing the directive. One such example was the Supreme Court of the U.S.S.R.'s creation of the 1986 Judicial Act, which sought to increase environmental claims in court.[90]

The Soviet Greens movement greatly expanded in the late 1980s, in part due to the 1987 passage of a law that, for the first time ever, allowed citizens to form associations for any purpose.[91] In the same year, economic law was liberalized with the adoption of "On State Enterprises (or Associations)," which stiffened

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85. Violation of the sanitary-hygienic or epidemiological rules or norms entailed disciplinary, administrative, or criminal liabilities. Article 21 prohibited the "use of operating objects which might cause harm to the health of the people through effluents, wastes, or refuse." *Fundamental Principles of Legislation of the U.S.S.R. and Union Republics on Public Health, in* 2 Butler, *supra* note 83, at II-5: 13. Article 28 established sanitary supervision over radioactive substances, among others. 2 *Id.* at II-5: 15.

86. This decree entrusted the Council of Ministers to take measures to intensify conservation efforts and to prevent the discharge of effluents and other polluting products. *Id.* at 5-7.

87. 2 Butler, *supra* note 83, at III-1: 1-2.

88. Ziegler, *supra* note 35, at 79, 81, 95; Green, *supra* note 66, at 4-6 (noting public's lack of legal protection from government violations of environmental regulations and subordination of environmental law to other concerns, especially economic performance).

89. *Environmental Law and Policy*, *supra* note 57, at 10069.

90. *Id.*

91. *U.S. Environmentalist Visitors to U.S.S.R. Find Greens Movement Gaining Strength There*, 12 Int'l Envtl. Rep. (BNA), at 236 (May 10, 1989); Vladimir Lupandin & Gennady Denisovsky, *The 'Greens' Coming to the Fore*, Moscow News, June 10-17, 1990, at 7. *See infra* notes 96, 97, 310-13, and accompanying text.

fines and penalties for pollution and "ecological offenses."[92]

In 1988 the U.S.S.R. Council of Ministers and the CPSU Central Committee issued the Decree "On the Radical Restructuring of Environmental Protection in the U.S.S.R."[93] This decree granted Soviet and republic state committees for environmental protection new powers to prohibit the construction or expansion of industrial facilities, to halt work by any enterprise violating environmental norms or legislation, and to initiate suits against enterprises, organizations, or citizens for the reimbursement of state-incurred losses from pollution or the "irrational use of natural resources."[94]

The creation of the State Committee on Environmental Protection, *Goskompriroda*, in January 1988 improved environmental oversight and implementation of control measures.[95] This development also improved public access to information and the freedom of the press, giving rise to the emergence of an independent environmental movement,[96] including antinuclear citizen groups spawned in the wake of Chernobyl.[97]

Throughout the 1980s, environmental legislation at the All-Union levels and in the republican domain was increasingly integrated into state planning and Five-

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92. Article 20 obligates enterprises to regenerate natural resources, protect the environment, and use waste-free technology. However, enterprises usually simply absorbed the cost of their illegal polluting activities. Enforcement was weak and environmental remediation almost non-existent. Vedomosti SSSR, Issue No. 26, Item No. 385 (1987) *in* Kolbasov, *supra* note 64, at 273.

93. Vedomosti SSSR, Issue No. 6, Item No. 14 (1988), *in* Zaharchenko, *supra* note 59, at 468.

94. A new environmental protection fund was also established by this decree. Payments were legalized for the use of natural resources and for violations of environmental laws or standards, like the emission of pollutants. *Id.* at 468; *Environmental Protection Agency Set Up*, XL Current Dig. Sov. Press, Feb. 17, 1988, at 7.

95. Concurrent with the establishment of *Goskompriroda*, the environmental arm of the Procuracy, which is responsible for ensuring that all government agencies comply with the law and for prosecuting committees or individuals for non-compliance, was expanded. The Procuracy was empowered to close polluting projects, including nuclear ones, without application to a court, to impose higher fines, issue injunctions, and even imprison offenders. Kirillova, *supra* note 58, at 14. In 1989, an order granting the Attorney General similar new powers was instituted. Zaharchenko, *supra* note 59, at 471.

96. Hilary F. French, *Restoring the East European and Soviet Environments*, Ch. 6, World Watch State of the World 93 (1991).

97. Zaharchenko, *supra* note 59, at 460-63; Kirillova, *supra* note 58, at 10 (describing the linkages among *perestroika,* the environmental movement, and democratic and nationalist forces, especially in Russia, Ukraine, and Estonia). *See generally* Rowland T. Maddock, *Perestroika, Glasnost, and Environmental Regeneration in the Soviet Union*, 3 Int'l Envtl. Aff. 181 (1991) (evaluating the links between Chernobyl and the rise of environmental protest and political independence movements).

Year Plans. The Law on Environmental Protection, drafted in 1988, provided *Goskompriroda* with the authority to issue licenses to independent organizations to carry out environmental impact assessments.[98] By 1989, opportunities for public submissions on environmental decisions by government bodies existed and *Gosexpertisa* (under GOSPLAN or the Central Plan) began to take ecological issues into account in assessing major projects. Fines for pollution, resource user fees, and price reforms were some of the economic measures enacted to curb environmental exploitation. By the end of the 1980s, many of the state censorship restrictions on ecological data had been lifted for the first time.[99] Moreover, aggrieved persons at last were granted the right to challenge in court the administrative decisions of, and environmental breaches by, government committees.[100]

This newly-established right was strengthened by an October 1989 law passed by the Supreme Soviet on appeals procedures[101] and a special decree adopted by the Supreme Soviet in the same year, "About Urgent Measures for the Country's Ecological Recovery."[102] Other governmental actions which transformed environmental protection in the U.S.S.R. included the following:

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98. *Goskompriroda* was responsible for introducing environmental impact assessment ("EIA") in the U.S.S.R. The Ministry developed the methodology and mandated that EIAs be conducted for economic and other projects affecting natural resources. Y.L. Maximenko, *Environmental Impact Assessment in the U.S.S.R.*, 19 B.C. Envtl. Aff. L. Rev. 589, 589 (1992).

99. Maddock, *supra* note 97, at 184. This easing of restrictions on the publication of environmental data was significant because until 1989 Ministries enjoyed a virtual monopoly on such data. *Id.* at 184, 187.

100. This right was procured by 1988 and was important since it was difficult for citizens to determine which *individual* within the government made the decision or breached the law. Kirillova, *supra* note 58, at 13.

101. *On the Procedure of Appealing Unlawful Actions of State Administrative Bodies and Officials Infringing the Rights of Citizens*, Vedomosti SSSR, Issue No. 2, Item No. 21 (1988), *in* Zaharchenko, *supra* note 59, at 470-71. Until 1989, judicial review of administrative acts was not permitted and even with this new law, such judicial review is provided only for citizens who have suffered individual harm, not for administrative decisions generally. *Id.* at 473. As a rule, public interest litigation on environmental matters did not exist in the Soviet Union. Kirillova, *supra* note 58, at 13.

102. Vedomosti SSSR, Issue No. 25, Item No. 487 (1989), *in* Zaharchenko, *supra* note 59, at 457, 459. The decree set new goals for environmental quality and health standards, to be realized by 1995, and called for a revision of nuclear testing and nuclear power policies. It also called for the formulation of draft laws on nuclear energy and safety. Green, *supra* note 66, at 19.

the 1988-89 creation of the Environmental Fund;[103] the 1989 Leasing Law;[104] the 1990 Law on Property;[105] the Law on Ownership;[106] and the revised 1990 Law on Enterprises in the U.S.S.R.[107]

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103. *Environmental Fund Created*, Izvestia, Dec. 6, 1988, at 6, *translated in* XL Current Dig. Sov. Press, Jan. 9, 1989, at 30 (intended to work closely with *Goskompriroda* and supported by voluntary contributions from Soviet and foreign citizens and organizations).

104. Vedomosti SSSR Issue No. 25, Item No. 481 (1989); Issue No. 12, Item No. 325 (1991); *Fundamental Principles of Legislation of the U.S.S.R. and Union Republics on Lease*, Adopted by U.S.S.R. Supreme Soviet Nov. 23, 1989, amend. Mar 7, 1991, *in* 1 William E. Butler, Collected Legislation of Russia (1992). Article 3 permits leasing of land and natural resources. 1 *Id.* at III-3: 1. Article 18 states a lease enterprise "shall ensure effective use and regeneration of natural resources . . . [and is] obliged to protect the environment against pollution and other harmful effects." 1 *Id.* at III-3: 8-9. Formerly, such leasing by an individual or enterprise was treated as a crime. Zaharchenko, *supra* note 59, at 469.

105. The law allows individual private ownership and article 1, subparagraph 5, states, "the exercise of the right of ownership must not do damage to the environment . . . ." *The Law on Property in the U.S.S.R.*, Izvestia, Mar. 10, 1990, at 2, *translated in* XLII Current Dig. Sov. Press, Apr. 25, 1990, at 21. *See generally* Randy Bregman & Dorothy Lawrence, *New Developments in Soviet Property Law*, 28 Colum. J. Transnat'l L. 189 (1990).

106. U.S.S.R. Law on Ownership in the U.S.S.R., Vedomosti SSSR, Issue No. 11, Item No. 164 (1990), *in* Zaharchenko, *supra* note 59, at 456, 469. Article 20(1) of this law declared land, minerals, and natural resources to be the inalienable property of the people, but article 20(2) qualified this ownership by giving control and use of natural resources to the state for federal (all-Union) purposes, including defense. Philip Hanson, *Property Rights in the New Phase of Reforms*, 6 Soviet Economy 95, 103 (Apr.-Jun. 1990). In the corresponding 1990 Russian Law on Ownership in the RSFSR, article 3, subparagraph 2 specifies that property may be in private, State, municipal, or social association ownership; article 21 preserves the State's right of ownership of means of production in industry and the fuel and energy complex, among other enterprises. 1 Butler, *supra* note 104, at III-1,2: 14-15. However, in 1993, Russia announced plans to privatize all small and medium-size enterprises and most of those in the military-industrial sector. Defense plants are among the 5000 large enterprises slated for conversion to shareholder-owned operations. *Russian Selloff Target Set*, Wall St. J., Jan. 27, 1993, at A12.

107. This law was designed to govern all company activities in the U.S.S.R. Each enterprise must prepare an Environmental Impact Assessment and is subject to local control. Kirillova, *supra* note 58, at 19; *Law on Enterprises and Entrepreneurial Activity*, Vedomosti RSFSR, Issue No. 30, Item No. 418 (1990), was adopted by the RSFSR on Dec. 25, 1991. Article 18(1) states that the entrepreneur bears responsibility for pollution of the environment. *Id.* at art. 18(1). Enterprises "shall bear responsibility in accordance with RSFSR legislation," for violations including the sale of goods whose use causes harm to the health of the populace. *Id.* at arts. 18, 29(1)). Enterprises "shall be obliged to compensate damage caused by the irrational use of land and other natural resources, pollution of the environment . . . [and] violation of sanitary-hygienic norms . . . ." *Id.* at art. 29(2). Article 29(3) provides

Perestroika[108] accelerated the establishment and enforcement of environmental laws, both through *Goskompriroda* and other government bodies. By the end of the 1980s, environmental laws covered virtually every topic except nuclear waste management.[109] Finally, in June 1990 the RSFSR's Congress of People's Deputies passed a Resolution on Nuclear Waste,[110] signaling increasing concern with the environmental contamination resulting from nuclear activities.

Despite these developments in environmental law and government decrees, enforcement agencies continued to lack adequate staff, independence, and authority to sanction offenders. Furthermore, the Soviet court system was not equipped to punish violators of the environmental laws or to make major policy decisions.[111] Indeed, environmental law and lawyers have exerted very little influence over Soviet industrial practices or military policies to date.[112]

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that the activity of the enterprise may be suspended for a violation of the regime of natural use until rectified. 1 Butler, *supra* note 104, at V-1-3: 9-10, 15-16.

108. *Perestroika* refers to former President Gorbachev's program of economic restructuring and decentralization, designed to revive the Soviet economy and replace outdated modes of production with more efficient economic structures. Gorbachev also initiated concomitant political programs of *glasnost* (openness or self-examination) and *democratizasiya* (democratization) in the mid-1980s. A.F. Dowlah, Soviet Political Economy in Transition: From Lenin to Gorbachev 2 (1992). *See generally* V.K. Zabigailo, *Perestroika, Glasnost and Law Reform in the Soviet Union Today*, 12 Dalhousie L.J. 165 (1989-90).

109. Robinson, *supra* note 8, at 27. Neither was there an All-Union law on environmental protection. The U.S.S.R. was reported to lag thirty to forty years behind the U.S. and Europe in terms of regulating the transportation, storage and disposal of hazardous waste in general. Starr & Hay, *supra* note 82, at 23.

110. Resolution of the U.S.S.R. Supreme Soviet, Apr. 25, 1990, ordering a draft "Law on Use of Atomic Energy and Nuclear Safety" to be submitted for consideration by the autumn 1990 session of the U.S.S.R. Supreme Soviet. This law is designed, among other things, to deal with the consequences of the Chernobyl accident, radiation safety, and the burial of nuclear wastes. *Chernobyl: A New Cleanup Program is Set*, Izvestia, Apr. 27, 1990, at 2, *translated in* XLII Current Dig. Sov. Press, June 6, 1990, at 6.

111. The system generally lacked judicial recourse or administrative appeals procedures. Peter B. Maggs, *Marxism and Soviet Environmental Law*, 23 Colum. J. Transnat'l L. 353, 357 (1985). In contrast with the American system, litigation to enforce laws or settle disputes was not as prevalent in the FSU, which relied on administrative processes. Ziegler, *supra* note 35, at 100.

112. Nicholas A. Arena, *The Law in the U.S.S.R.*, Nat'l L.J., Aug. 19, 1991, at 11. The Soviet government operated on the basis of thousands of unpublished laws, which frequently contradicted and, in practice, preempted published laws, and led to popular mistrust of the law. *Id.* Public interest litigation in the FSU was virtually non-existent. Kirillova, *supra* note 58, at 13. Often, even top legal scholars of Soviet institutes could not penetrate the veil of secrecy surrounding the enactment or status of a given law. Foster-Simons, *supra* note 68, at 340-41.

B. Industrial Practices and Environmental Abuses

In spite of the multiple agencies charged with environmental compliance oversight, information on transgressions was withheld by industries and state economic bureaucracies obsessed with production goals.[113] Factory managers and bureaucrats in a maze of ministries effectively sidestepped responsibility for the violations of environmental codes and the resultant contamination of the FSU.

The system of centralized monopoly planning, wherein the same powers that made the laws and were charged with enforcing them frequently violated their own provisions, led to frequent phenomenal waste, corruption, and a lack of accountability to the public. Because even technical quantitative data on pollution were treated as state secrets[114] and the media censored reports of environmental destruction, public criticism of projects was hampered by the unavailability of information.[115] The lack of pluralist citizen groups[116] and the absence of an analogue to the U.S. Right-to-Know Act[117] hid incriminating

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113. "Guided by departmental interests, and sometimes by their own personal interests, officials frequently evade compliance with these laws. This does enormous damage to nature and society." Deputy S.K. Grossu, *Supreme Soviet Discusses the Environment*, Izvestia, July 3, 1985, *translated in* XXXVII Current Dig. Sov. Press, Aug. 7, 1985, at 5.

114. A law on state secrets was recently drafted, according to A. Prokopenko, Vice-Chairman of the Russian Committee on Archival Affairs. *Closed Archives: The More Things Change . . .* , Izvestia, Aug. 5, 1992, at 3, *translated in* XLIV Current Dig. Post-Sov. Press, Sept. 2, 1992, at 15. The Russian Federation is also discussing a law on closed [nuclear] cities, which are top-secret protected zones. *Closed Nuclear Cities Are Wary of Change*, XLIV Current Dig. Sov. Press, Aug. 26, 1992, at 12.

115. Little information was provided to the public during the formulation stage of a bill, even though article 114 of the 1977 Soviet Constitution provided for legislative proposals to be "submitted for nation-wide discussion." Even information about the status of any pending law was inaccessible. Once enacted, statutes were published on a very limited basis, if at all, and were largely unavailable for public consultation. In 1987, the Supreme Soviet enacted the "U.S.S.R. Law on the Nationwide Discussion of Important Questions of State Life," but the drafting and approval of legislation remained insulated from public participation. Foster-Simons, *supra* note 68, at 336-45. Even non-confidential but unpublished administrative documents were not accessible to citizens living in zones where "concentrations of harmful substances exceed[ed] all permissible norms." A.G. Tarnavskii, *Law and Voluntary Nature Conservation in the U.S.S.R.*, 4 Conn. J. Int'l L. 369, 374 (1989).

116. Ziegler, *supra* note 35, at 69-75; *Cf. Citizens' Role in Nature Protection*, *supra* note 76, at 50051-53; *Environmental Law and Policy*, *supra* note 57, at 10069 (on the All-Russia Society on Nature Protection and other political, not legal, proponents of environmental causes).

117. Congress enacted the Emergency Planning and Community Right-to-Know Act in October 1986 after the Bhopal disaster in India, stressing the individual's fundamental right to know about the quality of the surrounding environment. 42 U.S.C. §§ 11001—11050 (1986). *See especially* § 11044.

environmental data from public scrutiny. Ministries collected and kept basic compliance data on themselves, with no independent oversight or regulation.[118] Moreover, environmental laws, including subordinate acts, were, for the most part, unpublished at the All-Union and republic levels.[119] As *glasnost* took hold in the late 1980s, however, public discussion of, and opposition to, toxic enterprises became more effective, both in terms of preventive and remedial political action and the passage of new environmental legislation.[120]

Despite the stiff penalties Soviet criminal, civil, and administrative law generally imposed on polluters,[121] state enterprises routinely subsidized their output by passing pollution onto the commons.[122] Environmental degradation resulted from projects rushed to compensate for supply bottlenecks and to meet fixed output quotas.[123] Fulfillment of quotas, not observance of environmental standards, was rewarded with bonuses and promotions.[124] Producers relied on the vast size and wealth of natural resources of the U.S.S.R. in pursuing an inefficient "extensive" model of economic growth.[125] Conservation and pollution abatement were foreign to Soviet industries which had little or no incentive to cut expenses or the use of energy and other non-renewable resources.[126]

In the same vein, industrial wastes and polluting substances were simply diluted with clean air or water until the applicable environmental standards were met.[127] Such practices were rampant, even with the advent of joint foreign ventures in the U.S.S.R.

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118. Government control over all official data, which was largely classified, made it difficult to tell who, or which ministry or enterprise, was actually responsible for decisions or environmental transgressions. The state polluted and regulated the resources that it alone owned. *See* Green, *supra* note 66.

119. Starr & Hay, *supra* note 82, at 23; Arena, *supra* note 112, at 11.

120. *See generally* Maddock, *supra* note 97, at 182-84; Zaharchenko, *supra* note 59, at 459-65; Foster-Simons, *supra* note 68, at 344-51; Green, *supra* note 66, at 27-47.

121. *See generally* Kolbasov, *supra* note 64, at 272-74.

122. Nicholas A. Robinson, *Perestroika and Priroda: Environmental Protection in the U.S.S.R.*, 5 Pace Envtl. L. Rev. 351, 359-62 (1988).

123. Ziegler, *supra* note 35, at 33-34.

124. Peter M. Langrind, *An Overview of Environmental Law in the U.S.S.R.*, 11 N.Y.L. Sch. J. Int'l & Comp. L. 483, 487-88 (1990); Green, *supra* note 66, at 2-3.

125. "Extensive" methods of economic development rely on increasing the quantity of natural resources, energy, and other inputs to increase the value of the total output, whereas "intensive" methods focus on increases in efficiency to cut costs and add value to total output. Robinson, *supra* note 122, at 403.

126. Primary materials were provided either free-of-charge or below scarcity costs by the state, thus promoting wasteful use of natural resources. Ziegler, *supra* note 35, at 35.

127. Robinson, *supra* note 122, at 389-90.

> [B]oth Soviet industries and Western companies have long economized on operating expenses by dumping pollutants at night, by pumping liquid waste into underground cavities and by burying solid toxic waste illegally. Soviet and foreign surveys indicate that purifying equipment and automatic control systems designed to monitor technological processes are not operating at many enterprises: they have either been switched off to save money or are faulty.[128]

In the past, Soviet polluters who were caught faced steep fines or harsh penalties, but direct penalty costs were relatively low because fines were frequently paid by the state.[129] Swift public condemnation was orchestrated to achieve the deterrence the Soviet system so heavily relied upon.[130] Enterprises thus charged with an "ecological offense" temporarily absorbed the cost of the illegality, but environmental remediation was largely ignored or neglected. While the U.S. system relies on legal remedies, public involvement in the formation of environmental impact assessments,[131] citizen suits,[132] and injunctions, the Soviet system was based on planning, resource allocation, administrative control, and state supervision, all of which accomplished little in the way of environmental protection or cleanup.[133]

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128. Valentin Katasonov, *Response: Toxic Clouds Over Western Siberia*, Moscow News, May 7-14, 1989, *in* Nicholas A. Robinson, *Soviet Environmental Law: Emerging Business Constraints*, Practicing L. Inst. Comm'l L. & Practice Course Handbook Series 8 (July 17, 1989). *See* G.A. Nekrasova, *Legal Protection of Ground Waters in the U.S.S.R.* 4 Conn. J. Int'l. L. 361, 362 (1989) ("Pouring liquid industrial wastes into deep crevices and failing to bury containers with wastes of low and medium radioactivity deep enough also pose great dangers to ground waters. The deleterious effects of such activities may not be discovered for many years or even decades").

129. Furthermore, bonuses and promotions were awarded on the basis of fulfillment of output quotas, so that the financial and career indirect costs of environmental compliance were quite high. Finally, the special administrative units charged with enforcing the regulations had direct or indirect ties with the enterprises' planners and, therefore, concentrated on production rather than regulatory priorities. Leonore Shever Taga, Externalities in a Command Society, *in* Environmental Misuse in the Soviet Union 90-91 (Fred Singleton ed., 1976) [hereinafter Singleton].

130. *See* Ziegler, *supra* note 35, at 80-81, 97.

131. According to the National Environmental Policy Act ("NEPA"), 42 U.S.C. §§ 4321—4370(a) (1988). Environmental Impact Assessments ("EIA") are required by law. 42 U.S.C. § 4332 (1988). The Soviet equivalent of the EIA process was called "Ecological Expertise." Nicholas A. Robinson, *International Trends in Environmental Impact Assessment*, 19 B.C. Envtl. Aff. L. Rev. 591, 594 (1992).

132. Most U.S. environmental laws contain provisions that permit any citizen to sue the Environmental Protection Agency ("EPA") or other executive bodies to force compliance with the law. Patricia M. Wald, *The Role of the Judiciary in Environmental Protection*, 19 B.C. Envtl. Aff. L. Rev. 519, 525 (1992).

133. William E. Butler, *Law Reform in Soviet Environmental Law*, 5 Pace Envtl. L. Rev. 425, 426 (1988).

The publication of documents detailing environmental abuses in the CIS has accelerated the process of discovery and attempts at remediation. No longer can the vast size and tight secrecy of the Soviet empire mask such practices, including the widespread nuclear pollution sanctioned under the Soviets.

C. Decades of Radioactive Contamination

The grave environmental problems and pollution plaguing the FSU have been widely documented.[134] The most serious pollution, however, is radioactive,[135] which the drafters of the Nuclear Waste Law recognized as an urgent priority, leading Russia's Supreme Soviet to consider legislation on radioactive waste before dealing with any other nuclear or environmental issue.[136] "Poisoned air and dead rivers, dying land and sick people—such is the legacy left by thousands of shortsighted bureaucrats and managers after seventy-four years of Soviet communist rule."[137] The passage and implementation of the Nuclear Waste Law is necessary to address this legacy effectively.

The extent of nuclear damage inflicted on the territory and people of the U.S.S.R. was exposed only after the empire's disintegration. A recently-released radiation map indicates that over 130 underground "peaceful nuclear explosions" were conducted in the FSU for civilian purposes ranging from the creation of subterranean caverns, mining, and oil extraction to geophysical experiments.[138] Atomic bombs were also detonated above ground for dam construction and mining operations, resulting in the ongoing resettlement of Russians.[139] "Big chunks of the republic are so poisoned they will not be suitable for habitation for a very, very, long time."[140] For example, so much nuclear waste was deposited

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134. *Press Conference*, *supra* note 19; Ziegler, *supra* note 35; Singleton, *supra* note 129; Thomas B. Cochran & Robert S. Norris, *Soviet Nuclear Warhead Production*, Nuclear Weapons Databook 3d Rev. (NRDC, Feb. 14, 1991); Zaharchenko, *supra* note 59, at 456-59; Paul Hofheinz, *The New Soviet Threat: Pollution*, Fortune, July 27, 1992, at 110; Feshbach & Friendly, *supra* note 35; *Russia's Greens: The Poisoned Giant Wakes Up*, Economist, Nov. 4, 1989, at 23 [hereinafter *Russia's Greens*]; Green, *supra* note 66.

135. An independent analysis indicates that nuclear mismanagement left 15% of the FSU "ecologically unsafe," with over one million square miles contaminated with a total radioactivity 20-50 times greater than that released by Chernobyl. Mike Toner, *A Land of Nuclear Hot Spots?*, Atlanta J. & Const., Mar. 13, 1993, at A5.

136. *See supra* notes 46-48 and accompanying text.

137. Igor Reichlin, *How the Soviet Union Poisoned Its Own Wells*, Bus. Week, Aug. 3, 1992, at 8 (book review).

138. Douglas Stanglin, *Toxic Wasteland*, U.S. News & World Rep., Apr. 13, 1992, at 40, 42.

139. Steve Raymer, *Nuclear Pollution Plagues Former Soviet Union*, L.A. Times, Mar. 15, 1992, at A30.

140. *Id.* (quoting Alexei Yablokov, Yeltsin's top science advisor).

in Lake Karachai over the years that it must now be covered in concrete.[141]

Alexei Yablokov, Russia's State Advisor on Environment and Public Health, has drawn attention to the radioactive contamination resulting from mishaps and dumping in nuclear weapons-producing cities.[142] The Russian Government is unsure of the degree of radiation exposure suffered by those living near nuclear waste burial sites,[143] but one study suggests that around 3000 settlements and 2.3 million inhabitants of Russia have been contaminated by radioactive pollution.[144] Overall, close to 180 million ex-Soviet citizens live in "ecological disaster" zones[145] that may cost hundreds of billions of rubles to clean up.[146]

Public health problems have resulted from radiation exposure. Outbreaks of jaundice in newborns in the Altai region and in Kyshtym have been attributed to nuclear testing at Semipalatinsk and the dumping of plutonium and uranium from the Mayak weapons factory, respectively. Infants with such birth defects have been called "nuclear mutants."[147]

Research conducted in the arctic region reveals dangerously high

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141. Anne McIlroy, *World's Armed Forces are the Worst Polluters*, Gazette (Montreal), Mar. 18, 1992, at B7. The reservoir is being filled with hollow concrete blocks, rock, and soil to stem the dispersion of radionuclides such as cesium-137 and strontium-90. The lake should be filled by 1995, according to the plan. Cochran & Norris, *supra* note 134, at 21.

142. Close to one of these cities, Tomsk-7, traces of radiation have been found in ducks, crayfish, and elk. John-Thor Dahlburg, *The Atom Sows Crop of Sadness*, L.A. Times, Sept. 2, 1992, at A1. In 1990, seven persons were hospitalized with radiation poisoning after eating wild game from the Tomsk area and 38 others registered radiation levels above the permitted maximum. Judith Perera, *Waste Tank Explosion Rocks Russian Tomsk Nuclear Site*, Nuclear Waste News, Apr. 8, 1993; Cochran & Norris, *supra* note 134, at 30 (describing lack of fencing around radioactively contaminated water areas and poor containment of nuclear waste burial sites). Nuclear waste is reportedly being buried in drums dropped by military helicopters into marshes near the plutonium separation plant. Michael Dobbs, *Blast at Siberian Plant Called "Worst Since Chernobyl,"* Wash. Post, Apr. 8, 1993, at A31. *See also* Viktor Tereshkin, *Breathe Deep: Radiation is Near*, Moscow News, Aug. 19, 1992, at 34.

143. Vasily Kononenko, *Reactor of the Nuclear-Powered Ship Lenin Was Thrown Into the Kara Sea*, Izvestia, Jan. 22, 1992, at 1.

144. *Environmental Facts*, CIS Envtl. Watch, Spring 1992, at 2 (Monterey Inst. Int'l Stud.).

145. Twenty percent of all Soviet citizens were estimated by Yablokov in 1989 to live in "ecological disaster zones," while 35-40% more reside in "ecologically unfavorable conditions." *Russia's Greens*, *supra* note 134, at 23.

146. *See supra* notes 37-39, 41 and accompanying text. In the Urals region alone, where the Mayak nuclear weapons plant discharged strontium and other radioactive materials in a series of disasters, the Russian Government will spend 25 billion rubles to clean up the area. Olivia Ward, *Warning Sounded on Siberian Arms Plant*, Toronto Star, Jan. 28, 1993, at A18. The FSU spent only about one percent of its gross national product on environmental protection in 1989. *Congress of People's Deputies*, *supra* note 84, at 19.

147. Dahlburg, *supra* note 142, at A1.

concentration levels of cesium and strontium in the aboriginal population and in local food and reindeer.[148] Seals have also been found to be dying of cancer linked to radioactive contamination near the Novaya Zemlya nuclear testing site.[149] The level of radionuclides in the blood of inhabitants of northern Russia is 100 times higher than that found in Moscow residents.[150]

In addition, post-Chernobyl casualty and contamination figures continue to rise as the Ukraine struggles to dispose of the hundreds of tons of radioactive wreckage—from beef to topsoil—that resulted from the 1986 nuclear disaster.[151] The health effects of the Chernobyl fallout have been measured in terms of a twenty-two-fold increase in thyroid gland tumors in Belarus over the past five years and a 450% increase in stomach and kidney illnesses in one of the affected regions of the Ukraine.[152]

The ex-Soviet Union must not only recover from past nuclear abuses, but its territories are also at risk for another Chernobyl-type disaster.[153] The CIS is endangered by the continued operation of fifteen Chernobyl-type nuclear reactors

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148. The total radiation level of the population living on the northern Chukot Peninsula is twice as high as the average figure for the Soviet population. Vladimir Lupandin & Yevdokia Gayer, *Chernobyl on the Chukotka Peninsula: Peoples of the North Pay For Nuclear Tests*, 34 Moscow News, Aug. 20, 1989, at 5.

149. Dahlburg, *supra* note 142, at A1.

150. Wilson Dizard, III, *The Rate of Deformities Among Newborns Attributable*, Inside NRC, June 29, 1992, at 13 (even though there are about 600 radioactively contaminated sites in Moscow itself). The life expectancy of indigenous peoples of the northern regions of Russia has fallen to about 40-45 years, as a result. This phenomenon has been linked to Novaya Zemlya nuclear tests, which released as many as 1000-3000 million curies of radioactivity. In contrast, Three Mile Island released only 15 curies, Chernobyl 50 million, and Chelyabinsk 1200 million. *Id. Cf.* Murray Feshbach, *The Toxic Archipelago*, Wash. Post, July 11, 1993, at C1 (Russian officials now citing 80 million curies released by Chernobyl).

151. Over 2.5 million acres of farmland in Ukraine and Belarus are still being farmed even though they remain contaminated. Hofheinz, *supra* note 134, at 110. The explosion contaminated 15,000 square miles, mostly in the Ukraine, Belarus, and Russia. Lida Poletz, *Seven Years After Chernobyl Ukraine Considers New Nuclear Plant Project*, UPI, Apr. 25, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

152. Dahlburg, *supra* note 142, at A1.

153. Nearly one-half of Russia's 26 nuclear reactors are considered unsafe. Knickerbocker, *supra* note 44, at 6. Experts have found that all of the 58 Soviet-built reactors in the region have "serious technical and operational flaws that require immediate modification or shutdown." Halverson, *supra* note 23, at 43, 44. Every type of nuclear installation in the FSU "has the potential for disaster, if not in a spectacular explosion like Chernobyl . . . then through seeping environmental contamination" caused by neglect. David Fairhall, *As An Empire Unravels, Simple Neglect Has Become the Greatest Nuclear Peril*, Guardian, Apr. 8, 1993, at 10, *available in* LEXIS, Nexis Libr., CURRNT File. *See also* Rudy Abramson, *Soviet-Built Nuclear Plants "Accidents Waiting to Happen,"* L.A. Times, Oct. 8, 1993; Christopher Flavin, *How Many Chernobyls?*, WorldWatch, Jan.-Feb. 1988, at 14.

still running in Russia, the Ukraine, and Lithuania. One of these high-risk reactors was briefly shut down in March 1992 after a leakage of radioactive iodine was discovered near St. Petersburg.[154] A small amount of radioactive water leaked out of the Kola nuclear power plant near the Finnish border in September 1992.[155] Such leakages are common, according to Yablokov, who recently warned, "every nuclear power station [in the country] is in no-good condition."[156] In spite of the public outcry after Chernobyl, and the safety hazards and waste problems the accident caused,[157] as late as 1988, twenty-six nuclear installations were scheduled for expansion or construction.[158] And in December 1992 Prime Minister Viktor Chernomyrdin signed into law a plan to build at least thirty new nuclear power plants, thus doubling the nation's energy capacity by 2010.[159]

D. Nuclear Legacy: Wastes From the Arms Race

The task of reprocessing nuclear waste from thousands of warheads to be dismantled under the Intermediate Nuclear Force ("INF")[160] and Strategic Arms

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154. In addition to these RBMK graphite reactor types, 10 old Soviet pressurized water reactors, VVER 440-230s, are still in operation, four of which are located in Bulgaria. Like the RBMKs, these models do not have heavy concrete containment structures to stop radiation leaks in the event of breakdown. Nor do they have redundant cooling systems, backup control cables, or adequate fire prevention systems. The Director of Nuclear Programs at the International Atomic Energy Agency [hereinafter IAEA] estimates that bringing these reactors into conformity with minimum safety standards would cost $10-15 billion and take five years. Eliot Marshall, *Western Leaders Disagree on Soviet Reactor Safety Plan*, Science, July 17, 1992, at 319. *Cf. EC: Ripa Di Meana Tells Press of Problems in Russian and Ukrainian Nuclear Sectors*, Agence Eur., Apr. 28, 1992 (European Commissioner for Environment estimates improving safety would cost $1.2 billion per plant).

155. *Radioactive Leak*, Wash. Post, Sept. 16, 1992, at A24.

156. Stanglin, *supra* note 138, at 44. Yablokov has also stated that Russia's nuclear power stations "are no less dangerous than nuclear weapons." Halverson, *supra* note 23, at 43.

157. The problem of disposing of 185 tons of nuclear fuel under the reactor remains unresolved. A. Stepovoi & S. Chugayev, *Deputies Assess the Chernobyl Tragedy*, Izvestia, Apr. 10, 1991, at 1-2, *translated in* XLIII Current Dig. Sov. Press, May 15, 1991, at 13.

158. From 1970-1988, nuclear capacity and output in the U.S.S.R. roughly doubled. M. Turnbull, Soviet Environmental Policies: The Most Critical Investment 92-93 (1991). Currently, 28 reactors at nine power plants generate almost 12% of Russia's electricity. Dahlburg, *supra* note 40, at 6.

159. The program calls for 100 billion rubles to be spent annually from 1993 through 1996, and 400 billion rubles per year from 2000 to 2010. Fred Hiatt, *Russia Plans to Build More Reactors*, Wash. Post, Jan. 13, 1993, at A15.

160. Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles, Dec. 8, 1987, U.S.-U.S.S.R., 27 I.L.M. 90 (1988). The INF Treaty

Reductions ("START")[161] Treaties compounds the bottleneck already existing due to the civilian sector's lack of storage and disposal facilities. Russian officials are soliciting U.S. assistance in designing storage space for the 500 metric tons of weapons-grade uranium and fifty metric tons of plutonium that will be released in the weapons dismantlement process.[162]

The military sector contributed to the radioactive contamination of the U.S.S.R. as much as, if not more than, the civilian sector.[163] In the defense establishment of the FSU, clandestine disposal of nuclear materials and military waste was common.[164] A recent Russian Government report reveals that the Soviets secretly and illegally dumped 2.5 million curies of radioactive material, including eighteen nuclear reactors and an atomic-powered icebreaker, into the seas, twice the combined amount that twelve other nuclear nations dumped before ocean disposal was banned in 1982.[165] Despite strict international treaty

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provides for the destruction of all intermediate nuclear weapons of the United States and FSU. The U.S. Department of Defense's On-Site Inspection Agency has been monitoring the destruction of over 1800 Soviet INF missiles and continues to conduct on-site inspections in Russia. Leo Cooper, Soviet Reforms and Beyond 57 (1991).

161. START I was signed in Moscow on July 31, 1991 by former Presidents Bush and Gorbachev, implementing 30-35% cuts in U.S. and Soviet strategic arsenals. It was ratified in the fall of 1992 by the Russian Supreme Soviet. Vladimir Potapov, *We Should Not Delude Ourselves*, Pravda, Nov. 26, 1992, at 7, *translated in* XLIV Current Dig. Post-Sov. Press, Jan. 23, 1993, at 19. Former President Bush and President Yeltsin signed START II on January, 3, 1993, mandating further reductions to about 3000-3500 warheads each by the year 2003. Thomas L. Friedman, *Beyond START II: A New Level of Instability*, N.Y. Times, Jan. 10, 1993, at A4.

162. *U.S. May Help Russia Build Storage Space for Nuclear Materials*, Aerospace Daily, July 23, 1992, at 185. In 1991, Congress passed the Soviet Nuclear Threat Reduction Act [hereinafter SNTRA of 1991], allocating $400 million of Department of Defense Funds for the transportation, storage, safeguarding, and destruction of Soviet nuclear and other weapons. 22 U.S.C. §§ 2551—2595(c) (1991). *See infra* notes 206, 261 and accompanying text.

163. Nuclear weapons-related wastes exceed civilian nuclear sector waste stockpiles by an "order of magnitude." Veksler, *supra* note 39.

164. A Russian Governmental Committee on Nuclear Waste Disposal at Sea was formed in 1992 to deal with radioactive cleanup and leaking submarines. A member of the Committee admitted that the Soviet practice of dumping radioactive waste at sea, which began in 1959, became a regular practice by 1960, and has been sustained by disinformation policies. *Russia Says Arctic Nuclear Dumping Started in 1946*, Reuters, Feb. 1, 1993. Yeltsin signed the Decree, "On the Creation of the Committee on Special-Purpose Underwater Works of the Government of the Russian Federation," ("KOPRON") on December 1, 1992. *Yeltsin Creates Committee to Retrieve Buried Nuclear Waste*, Tass, Dec. 1, 1992, *available in* LEXIS, Nexis Libr., TASS File.

165. *Coming Soon: Yeltsin's Last Chance*, U.S. News & World Rep., May 10, 1993, at 9. This report admits the practice continued even after the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter took effect in 1976. Although the U.S.S.R. signed the Convention, which prohibits signatory states from burying radioactive wastes at high latitudes and on the continental shelf, the Soviets continued to violate most of its provisions. The

obligations and Soviet laws prohibiting such practices, Ministerial edicts provided "military vessel immunity" for dumping activities.[166]

The Soviets also covered up the sinking of nuclear reactors in the Kara Sea and nuclear submarines near Novaya Zemlya, one of two nuclear test sites[167] in the Arctic. At least four of the five Soviet submarines lost at sea carried nuclear reactors or weapons. Currently, forty-three Soviet nuclear warheads and six reactors, which still contain uranium fuel, lie corroding at the bottom of the ocean.[168] Perhaps the most famous incident involving the Soviet nuclear fleet occurred in April 1989 when the *Komsomolets* submarine caught fire and sank in

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Russian Navy continues to dump nuclear waste in the seas since all temporary land-based storage facilities for radioactive materials are full and "radioactive materials are simply piling up at open-air sites." Reprocessing facilities will not be ready until 1997, at the earliest. Andrei Baiduzhy, *Safety: Another Ecological Secret is Revealed*, Nezavisimaya Gazeta, Apr. 3, 1993, at 1, *translated in* XLV Current Dig. Post-Sov. Press, May 5, 1993, at 21. Sixteen of these nuclear reactors, with fuel rods left in, were dumped in the shallow waters of the Kara Sea, which has been called the "maritime Chernobyl" and contains 17,000 cannisters of nuclear waste possibly corroding in its waters. Bruce Clark, *Greenpeace Ship Sails to Test Chernobyl of the Arctic*, The Times, Oct. 9, 1992. The Soviets sometimes shot at these cannisters to make them sink more rapidly, and breached the 1983 London Dumping Convention follow-up agreement banning even the disposal of low-level radioactive wastes into the oceans. Yet the FSU, even as late as 1989, declared it had never dumped any nuclear substances into the planet's waters. William J. Broad, *Russians Describe Extensive Dumping of Nuclear Waste*, N.Y. Times, Apr. 27, 1993, at A1, B8.

166. The government report, or "White Paper," also states that the Soviet Navy made unilateral dumping decisions which exceeded its authority. *Facts and Problems Related to the Dumping of Radioactive Waste in the Seas Surrounding the Territory of the Russian Federation*, Commissioned by the President of the Russian Federation, Decree No. 613, § II (Oct. 24, 1992) [hereinafter *Facts and Problems*] (on file with author).

167. This radioactive debris and the effects of 87 atmospheric, 3 underwater, and 42 underground nuclear tests conducted since 1955 may threaten fisheries and oceans from Scandinavia to Alaska. Fred Hiatt, *Russian Test Site Displays Pride, Perils of Superpower*, Wash. Post, Oct. 17, 1992, at A1. Plans are being formulated to turn the Novaya Zemlya testing range into a nuclear waste dump. Vasily Belousov, *Russia Looks For New Places to Bury Radioactive Wastes*, Tass, Sept. 23, 1992, *available in* LEXIS, Nexis Libr., TASS File; *Moscow Scientists Design Radioactive Dumping Facility*, Tass, Aug. 18, 1992, *available in* LEXIS, Nexis Libr., TASS File. If international standards for radioactive materials burial were applied, only one of Russia's 23 sea-dumping sites would qualify. *Yeltsin Receives Report on Undersea Nuclear Waste Sites*, BBC Summary World Broadcasts, Mar. 26, 1993.

168. *See* 1991 estimates of *Energiya*, a Soviet publication, *cited in* Wendy Wallace, *Komsomolets: A Disaster Waiting to Happen?*, CIS Envtl. Watch, Spring 1992, at 31 (Monterey Inst. Int'l Stud.). Another Soviet submarine containing fifteen strategic nuclear missiles sank following a fire on October 3, 1986 in the Atlantic Ocean about 1000 miles off North Carolina. *Four Sailors Died on Soviet Sub in '86, Paper Says*, Ariz. Daily Star, Jan. 22, 1993, at A10.

the rich fishing waters of the Barents Sea off the coast of Norway.[169]

Some nuclear ocean dumping was deliberate. Five sites in the Barents Sea and eight sites in the Kara Sea were used as radioactive waste dumps for thirty-two years.[170] Between 1959 and 1992, about 20,600 curies of liquid and 2.3 million curies of solid radioactive waste were dumped into the northern seas, and 12,300 curies of liquid and 6200 curies of solid nuclear waste were dumped in Pacific waters by the Soviet Union.[171] Nuclear waste storage and disposal problems are now even worse because of the submarines scheduled to be decommissioned under disarmament treaties.[172] Ocean dumping by Russia continues to date because of the lack of treatment schemes for spent fuel from the Northern and Pacific fleets and the absence of facilities for shipment and burial on land.[173] This "disposal of radioactive materials underwater" is a blatant violation of the 1992 Russian Law on Environmental Protection.[174]

The situation was no better on land in the FSU. A nuclear waste storage container explosion, at the secret plutonium production and reprocessing facilities of Chelyabinsk-65 (formerly -40, also known as "Mayak" or the "Kyshtym Complex") in the Urals region, spewed eighty tons of radioactive pollution into the air in 1957.[175] It will take decades to dispose of the 600 million curies of

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169. Saltwater has corroded the casings of two nuclear-armed torpedoes on board, but no technology yet exists to prevent leakage of radioactive materials from the submarine. *Officials Consider Fate of Sunken Nuclear Sub*, Ariz. Daily Star, Jan. 24, 1992, at C3. Radioactive cesium is reportedly leaking from the vessel, which lies 6000 feet underwater in an area subject to deep-sea storms and landslides that can travel up to 100 miles. Paul Raeburn, *U.S., Russia To Check Sub For Plutonium Leaks*, Ariz. Daily Star, Nov. 25, 1992, at A1, A3. In addition to the carcinogenic isotope cesium-137, the torpedoes contain 28 pounds of deadly plutonium (with a half-life of 24,000 years). James O. Jackson, *Nuclear Time Bombs*, Time, Dec. 7, 1992, at 44. The nuclear material in some of the sunken subs may amount to seven times that involved in the Chernobyl disaster. Walter Sullivan, *Soviet Nuclear Dumps Disclosed*, N.Y. Times, Nov. 24, 1992, at C9.

170. *Ship Reactor Disposal in Arctic Confirmed*, Nuclear News, Mar. 1993, at 79. Ten such secret dumps were also operated in the Sea of Japan and the Pacific waters until 1992. *Russian Navy Said to Dump Nuclear Waste in Sea*, Reuter Libr. Rep., Feb. 27, 1993.

171. *Russia Admits It Dumped Waste From Nuclear Reactors At Sea For 30 Years*, BNA Int'l Env't. Daily, Apr. 6, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

172. Judith Perera, *Investigation Reveals More Details of Soviet Sea Dumping*, Nuclear Waste News, Apr. 15, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

173. *Facts and Problems*, *supra* note 166, at §§ 4.1, 4.2 and Conclusion.

174. *Law on Environmental Protection*, *supra* note 8, art. 50(3).

175. An explosion at the Mayak complex sent a plume of two million curies of radioactivity into the air over the southern Urals on September 29, 1957. Steven Gutterman, *Tracking the Tragedies*, L.A. Times, Sept. 3, 1992, at A6. *Cf.* Jackson, *supra* note 169, at 45 (reporting recent estimates of 1.2 billion curies released into the environment). Soviet officials did not admit the occurrence of this nuclear accident (the so-called "Kyshtym Disaster") or the forced evacuation of over 10,000 people

highly radioactive liquid waste and 500,000 tons of solids presently awaiting treatment at the Mayak reprocessing plant.[176]

The Soviet epic-scale nuclear pollution of the arctic environment may even amount to criminal negligence with transnational consequences.[177] Judging from the reaction of the international community to the Chernobyl nuclear explosion, which led to the formation of new treaties,[178] global acceptance of such transboundary radioactive contamination is likely to be low. As the effects of Soviet nuclear waste dumping become clear to other nations, especially those bordering the arctic and Scandinavian regions, new international legal norms may evolve to respond to the contamination and allocate liability for damages.

The dumping of raw radioactive materials into Lake Karachai, starting in 1951, has made minimal exposure to the shoreline lethal.[179] Rapidly rising cancer rates have been reported among Siberian natives, especially infants, with

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until the spring of 1989. Cochran & Norris, *supra* note 134, at 21-25. *See generally* Zhores A. Medvedev, Nuclear Disaster in the Urals (1979).

176. Daniel Sneider, *Baker Focuses on Atomic Waste in Visit to Urals*, Christian Sci. Mon., Feb. 13, 1992, at 1. Some of the radioactive waste continues to be stored in containers like the ones that exploded in 1957, and if a major accident occurred today, it would be a catastrophe on the scale of 20 Chernobyls. Fred Hiatt, *Site of '57 Spill Still Hazard*, Wash. Post, Jan. 28, 1993, at A17. For the first time ever, the Mayak plant has started to reprocess more wastes than it produces. Evgeni Tkachenko, *Russian Factory Gets Rid of Nuclear Waste Products*, Tass, Jan. 5, 1993, *available in* LEXIS, Nexis Libr., TASS File. Radiation levels at the Mayak facility exceed nine billion curies. *Leverov Calls Mayak the World's Worst Contaminated Nuclear Site*, Nuclear Waste News, Feb. 25, 1993.

177. Former CIA Director Robert Gates articulated this view, based on a CIA assessment of the past 40 years of Soviet practices, at Senate Select Committee on Intelligence hearings on the arctic environment. *Editorial*, Gazette (Montreal), Aug. 24, 1992, at B2. However, a discussion of the emergence of peremptory norms, or *jus cogens*, from which no derogation is allowed by individual states within the international legal order, is beyond the scope of this article. In any event, radioactive pollution and nuclear accidents respect no boundaries and, therefore, these problems in the FSU are, or may become, transnational ones.

178. Convention of the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Mar. 22, 1989, 28 I.L.M. 649 (1989); Convention on Early Notification of a Nuclear Accident, Sept. 26, 1986, 25 I.L.M. 1370 (1986); and Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency, Sept. 26, 1986, 25 I.L.M. 1377 (1986).

179. Dr. Mira M. Kosenko, head of the clinical department of the Chelyabinsk Institute of Physics and Biology, claims that Lake Karachai is laden with 120 million curies of radioactivity — containing almost two and a half times as many long-lived isotopes as those released from Chernobyl — so that standing "on its bank, even for a half-minute, would be deadly." John-Thor Dahlburg, *Soviet Nuclear Bomb Drive Took a Vast Human Toll*, L.A. Times, Sept. 3, 1992, at A1. *Cf.* Hofheinz, *supra* note 134, at 110 (citing estimates that a lethal dose of radiation may result from standing on the shores of the Lake for less than an hour) *with* Carroll Bogert, *Get Out the Geiger Counters*, Newsweek, Nov. 2, 1992, at 64 (some scientists claim 10 minutes would be sufficiently deadly).

an eighteen-fold jump in cancer deaths in some sites.[180]

Years of dumping radioactive wastes into the Techa River, the sole source of drinking water near the Mayak facility,[181] and other Siberian rivers and lakes pose a danger to underground waters and the Arctic Ocean.[182] Up to 1.5 billion curies of plutonium have been stored or dumped in the region over the past few decades.[183] Nuclear waste discharges from the Mayak facility contaminated the soil and affected close to half a million residents in the Chelyabinsk, Sverdlovsk, and Tyumensk provinces.[184]

The pending Nuclear Waste Law is thus urgently needed. Russian warships continue to dump liquid radioactive waste in the sea in the Far East and the North.[185] The dumping of liquid and solid radioactive waste into rivers, oceans,

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180. Yereth Rosen, *Cancer Rates Skyrocket in Ex-Soviet Nuclear Sites*, Reuter Libr. Rep., Aug. 17, 1992.

181. Russian officials now acknowledge that, from 1948 to 1955, the plant dumped radioactive waste into the river, which served the drinking water and irrigation needs of around 124,000 people. The head of a government commission on the consequences of nuclear accidents reports that the plant's radioactive wastes are still stored in unsafe conditions. Although efforts are being made to improve waste management at Mayak, including the allocation of $20 million for nuclear waste reprocessing, they are insufficiently funded. Richard Boudreaux, *Urals Nuclear Disaster Contaminated 450,000*, L.A. Times, Jan. 30, 1993, at A6.

182. About 2.7 million curies were poured into the Techa, which was dammed to contain the radioactive waters. If the dams break, the Arctic ocean could be contaminated, which could be a global disaster. Alina Tugend, *Victims of Silence*, Orange County Register, June 6, 1993, at Close Up 1, 5.

183. Judy Dempsey, *Welcome to Chelyabinsk, Russia's Living Nightmare*, Fin. Times London, *in* Fin. Post (Toronto Ed.) June 3, 1992, at 43.

184. *Russian Military Plant's Waste Irradiated 500,000 People*, Kyodo News Service, *in* Japan Econ. Newswire, June 7, 1992. Besides indiscriminate dumping of radioactive wastes into the Techa River and the 1957 explosion, the region has suffered from the dispersal of radioactive particles over a vast area during a drought in 1967 that exposed the radioactive silt lining a reservoir to powerful winds. *Chelyabinsk Trip Report*, Center for Citizens Initiatives, San Francisco, 1992.

185. This is blamed on a lack of on-shore storage and reprocessing facilities. Leyla Boulton, *Russian Crisis: Navy Admits to Dumping Nuclear Reactors At Sea*, Fin. Times, Mar. 24, 1993, at 2. Military experts say in the existing economic climate, there is no question of discontinuing the dumping into the Seas of Japan and Okhotsk. *Russian Tanks For Nuclear Submarine Waste Full*, BBC Summary World Broadcasts, June 29, 1993, at C3. Naval officials overseeing 93 obsolete submarines and 30,000 containers of highly radioactive waste piling up, with storage depots 100% full, say they will be forced to "get rid of" the wastes. Olivia Ward, *Russian Submarines Face Nuclear Nightmare*, Toronto Star, Aug. 1, 1993, at F2. The problem is so acute that the Russian Navy is seeking the adoption of a nuclear waste disposal program in the Supreme Soviet and simultaneously preparing to dump nuclear waste into the ocean for lack of any alternative. Even though the Law on Environmental Protection prohibits the dumping of liquid and solid radioactive wastes in the ocean, the Russian Navy ignored the ban until 1992. "The overflowing nuclear storage

and other water systems is prohibited by the Nuclear Waste Law.[186] Previous Soviet military and civilian policies must be replaced with environmentally-sound strategies for coping with lethal radioactive materials in Russia and the other former republics. The legislation is also essential in terms of coping with the continuing problems of nuclear waste generated by atomic power stations.

E. Nuclear Power Hazards

In addition to the enormous radioactive waste cleanup and disposal dilemmas facing the Russian Federation, the government must deal with safety hazards posed by its nuclear reactors. Russia's nuclear industry, including both military and civilian reactors, continues to fall below international safety standards.[187] The FSU contains forty-two nuclear power reactors, fifteen of which are the most dangerous Chernobyl-type RBMKs (graphite-moderated).[188] Even with the 1991 creation of a State Committee for the Supervision of Nuclear and Radiation Safety (*Gosatomnadzor* of Russia),[189] no routine shutdown procedures have been instituted and no personnel have been trained to deal with a Chernobyl-type disaster.[190] In 1991 operating problems led to 270 temporary shutdowns at nuclear facilities in the FSU, one of these caused by a fire at one of Chernobyl's

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facilities, 'breathing' radioactive heat, and the shut down reactors of nuclear-powered submarines are more fearsome than international sanctions." Viktor Litovkin, *93 Nuclear Subs Are Waiting for Destruction in Russia, But the State Has Not Money For That*, Izvestia, July 9, 1993, at 6, *available in* LEXIS, Nexis Libr., CDSP File. About 160 submarines are awaiting dismantling. Feshbach, *supra* note 150, at C1.

186. *Nuclear Waste Law*, *supra* note 6, art. 18.

187. The IAEA has found that 59% of the safety flaws of nuclear reactors in that region were of the highest possible safety significance and require "immediate corrective action." *Press Release: Greater than One-in-Four Chance of Nuclear Catastrophe Unless Oldest Soviet Plants Are Closed*, Greenpeace (Vienna) Feb. 11, 1992. *See generally* Halverson, *supra* note 23, at 44. Experts have recommended that one-third of all Soviet-built nuclear plants are too dangerous for continued operation, but officials in Eastern Europe and the FSU claim serious power shortages would result from their shutdown. William Drodziak, *Where is the West's $700 Million For Russian Nuclear Cleanup?*, Wash. Post, Apr. 8, 1993, at A32.

188. Halverson, *supra* note 23, at 44. These figures do not include research reactors in the FSU. Scott D. Monroe, *Problems of Nuclear Safety in the Former Soviet Union*, CIS Envtl. Watch, Spring 1992, at 9 (Monterey Inst. Int'l Stud.).

189. This State Committee [hereinafter *Gosatomnadzor*] was established by Presidential Decree No. 249 (Dec. 3, 1991). It is responsible for preparing national legislation and governing the control of nuclear energy and radioactive substances, for civilian and military purposes. It is also charged with developing safety standards and a licensing system. A Declaration of the agency specified that any individuals or entities involved in nuclear activities must obtain a license from *Gosatomnadzor*. *Russian Federation: State Committee for Nuclear and Radiological Safety*, Nuclear L. Bull., June 1992, at 59.

190. Monroe, *supra* note 188, at 10. *See* Potter, *supra* note 25, at 263, 267.

three reactors.[191] In Russia alone, there were 204 recorded "incidents," the level before "accidents" on the IAEA's scale of nuclear mishaps, at nuclear power plants in 1992.[192]

International pressure to close down these RBMK reactors is growing.[193] Concerns mounted after the leakage into the atmosphere of six times the permissible amount of radioactive gases and ten times that of radioactive iodine from a nuclear power plant near St. Petersburg in March 1992.[194] More recently, an explosion of tanks storing uranium and plutonium at Tomsk-7, the site selected by the Russian Government for storage of radioactive elements from nuclear weapons dismantlement, cast doubts on the safety of that waste facility.[195]

Concerns are also being raised about the hazards of the twenty-four first-generation VVER (water-pressurized or "PWR") reactors still operating in former Soviet territory.[196] Undisclosed fires, unplanned shutdowns, and unreported accidents have plagued these obsolete plants, many of which are operating beyond their expected lifetimes.[197] The December 1992 law commissioning the

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191. Fred Hiatt & Margaret Shapiro, *Russians Warn on A-Plants*, Wash. Post, Mar. 29, 1992, at A1. Plans to deal with the problem of burying nuclear waste are currently being drafted by the Ukrainian government since no reprocessing enterprises exist within the state. *Ukraine Confirms Chernobyl Will be Shut Down in 1993*, ITAR-Tass, *in* BBC Summary World Broadcasts, Nov. 3, 1992, at C1. Chernobyl continued to operate in 1993, even though there were two fires within 48 hours in two of the four reactors still in operation. *Second Fire Hits Chernobyl*, Wall St. J., Jan. 15, 1993, at A6.

192. Janet Guttsman, *Tomsk Blast Puts Russian Nuclear Sector in Doubt*, Reuter Libr. Rep., Apr. 9, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

193. At its summit meetings, the G-7 has pressured Russia to shut down these reactors. Jonathan Steele & Larry Elliott, *Nuclear Safety Given Greater Priority*, Guardian, July 10, 1993, at 10. However, since these graphite reactors were designed to produce plutonium for nuclear weapons and were later adapted for power generation, they are "dual-use" and not subject to IAEA's inspection and approval under the Nuclear Non-Proliferation Treaty ("NPT") of 1968. Jancar, *supra* note 60, at 325.

194. Following this incident and another at the Balakovskaya power plant in southern Russia, cutbacks in output were announced for the first time in March 1992 by the head of the Presidential Committee on Nuclear Safety, Sergei Adamchik. Monroe, *supra* note 188, at 11.

195. *Explosion at Tomsk Casts Long Shadow Over Russian Nuclear*, East Eur. Energy Rep., Apr. 15, 1993, *available in* LEXIS, Nexis Libr., CURRNT File. Nuclear waste sites, despite their hazardous conditions, are the lowest priority of both the Russian Government and foreign donors. *The Explosion at Tomsk*, Wash. Post, Apr. 8, 1993, at A20. Military sites like Tomsk cannot be inspected by the IAEA even when accidents occur. Nigel Hawkes, *Radioactive 'Graveyards' Alarm West*, Times, Apr. 8, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

196. Marshall, *supra* note 154, at 319; Halverson, *supra* note 23, at 46, 47.

197. International experts consider 25 of the 57 nuclear power plants in the FSU to be "very dangerous." John Omicinski, *West Doing Little for Russian Nuclear Safety*,

resumption of construction of, and a two-fold increase in, nuclear plants has also caused alarm, especially given the colossal amounts of radioactive waste already generated by the nuclear complex.[198] The task of cleaning up sites such as Lake Karachai, the main storage area for high-level waste near Chelyabinsk, the Yenisei River[199] near Krasnoyarsk, and many other irradiated watersheds and geological repositories poisoned by irresponsible high-level waste disposal remains to be undertaken.

The IAEA has identified over 1000 hazards at these plants in need of immediate correction, yet *Gosatomnadzor* holds insufficient authority to order the permanent shutdown of any nuclear facility.[200] This inter-agency bureaucratic tangle in the Russian government makes the adoption of uniform laws dealing with nuclear facility safety and waste disposal by the Russian and other republican parliaments especially urgent. Once the Nuclear Waste Law takes effect, its implementation may be aided by monetary pledges from the European Community ("EC") and the Group of 7 Industrialized Nations ("G-7"), which are earmarked for appropriate nuclear waste disposal and safety improvements at nuclear reactors in the ex-U.S.S.R.[201]

The magnitude of the above environmental and nuclear hazards demonstrates the need for immediate national attention and international assistance.[202] Russia and the other nuclear republican states now face the Herculean task of cleaning up the post-Soviet environment. The successor nations also need help in ensuring the safety of still-operating nuclear facilities, the effectiveness of controls on radioactive wastes and fissile materials—i.e., plutonium-239 and uranium-235—and the stability of the fragile non-proliferation regime.

Gannett News Service, Apr. 8, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

198. Hiatt, *supra* note 159, at A15; *see generally* Robert Alvarez & Arjun Makhijani, *Hidden Legacy of the Arms Race*, Tech. Rev., Aug.-Sept. 1988, at 42; Nicholas Lenssen, *Facing Up to Nuclear Waste*, WorldWatch, Mar.-Apr. 1992, at 10. *Cf.* Konrad B. Krauskopf, *Disposal of High-Level Nuclear Waste: Is it Possible?*, Science, Sept. 1990, at 1231.

199. The Yenisei has been as badly polluted as the soil surrounding Chernobyl due to the production of plutonium at the Krasnoyarsk nuclear weapons plant until the first week of October 1992. Officials plan to build a nuclear waste reprocessing plant nearby. Clark, *supra* note 165, at 16.

200. Monroe, *supra* note 188, at 17.

201. The G-7 includes the United States, Britain, Canada, France, Germany, Italy, and Japan, all of which agreed to break the above impasse by creating a multimillion dollar fund to improve the safety of nuclear reactors in Eastern Europe and the ex-Soviet Union. The European Bank for Reconstruction and Development will manage the fund. Marlise Simons, *Major Powers Back Fund For Soviet-Design Reactors*, N.Y. Times, Jan. 29, 1993, at A2.

202. A spokesman for Minatom has complained that foreign governments have delivered many promises but not much else in the nuclear arena, except for dozens of delegations and "unfriendly advice." Hiatt & Shapiro, *supra* note 191, at A1.

IV. SECURITY CONCERNS REGARDING THE EX-SOVIET WEAPONS COMPLEX

The Nuclear Waste Law's importance for international security stems in part from its regulation of all activity, including military, related to radioactive waste in Russia.[203] The Russian military intends to treat plutonium from dismantled warheads as spent fuel, rather than as nuclear waste. The question of whether reprocessing spent fuel is governed by the Nuclear Waste Law, and should be limited and phased out,[204] is pivotal in terms of proliferation prospects. Plutonium from warheads dismantled in Russia, if reprocessed instead of disposed of as waste, could be sold or stolen for use as nuclear warhead material.[205]

The FSU possesses approximately 700-1000 tons of plutonium and highly-enriched uranium ("HEU"),[206] both of which are under only nominal central authority through Minatom. Yet Russia and the other former republics "have virtually no duly constituted legislative and regulatory authority over nuclear-related enterprises and exports. For the moment, the Soviet civilian and military nuclear industries controlled by MAPI are essentially self-regulating."[207] Furthermore, President Yeltsin has acknowledged that a system of state monitoring of nuclear exports has not been set up and that legislation dealing with the regulation of exports from Russia, including "dual-purpose" materials that could be used to create nuclear and other weapons, is still in the proposal stage.[208]

A. Removal and Storage of Fissionable Materials

Ironically, the dissolution of the Soviet state and the lack of uniform nuclear regulations may pose even greater security challenges for the United States and its allies than the arms race of the last forty years. The tens of thousands of deployed missiles of the United States and the FSU continue to pose risks of an accidental or unauthorized launch.[209] Furthermore, the process of disarmament has become even more complicated with the emergence of independent ex-Soviet

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203. *Nuclear Waste Law*, *supra* note 6, art. 4.

204. As envisioned by *Nuclear Waste Law*, *supra* note 6, art. 18.

205. Jonathan Schell, *Plutonium and its Persistent, Pernicious Threat*, Newsday, Mar. 4, 1993, at 117, *available in* LEXIS, Nexis Libr., CURRNT File.

206. Christopher Paine & Thomas B. Cochran, *So Little Time, So Many Weapons, So Much To Do*, Bull. Atom. Sci., Jan.-Feb. 1992, at 15; *see supra* note 162 and accompanying text; *see infra* note 261 and accompanying text.

207. Paine & Cochran, *supra* note 206, at 15.

208. Statement by Yeltsin on January 29, 1992. *Arms Cuts: Is Yeltsin One-Upping Bush?*, Rossiyskaya Gazeta, Jan. 30, 1992, at 1-2, *translated in* XLIV Current Dig. Post-Sov. Press, Mar. 4, 1992, at 7.

209. *See generally* Reducing the Dangers of Accidental and Unauthorized Nuclear Launch and Terrorist Attack (Int'l Found. Survival & Dev. Human 1990).

republican nations, given the possible non-adherence of these successor nuclear states to international nuclear export and arms controls and to non-proliferation agreements. Many experts are concerned about the lack of safe facilities for disposal of nuclear waste from decommissioned weapons and about the Russian Parliamentary approval required for any nuclear plant decommissioning.[210]

Prior to the demise of the U.S.S.R., deep reductions of U.S. and Soviet long-range strategic nuclear weapons were envisioned by the START I Agreement.[211] Negotiations with the new CIS parties must continue to guarantee verifiability and reliability of the Treaty's terms. While the majority of ex-Soviet nuclear weapons are situated in Russia, several thousand long-range and mobile missiles are scattered throughout Ukraine, Belarus, and Kazakhstan.[212] In May 1992 the four nuclear CIS states and the United States signed the Lisbon Protocol to START I, which mandates the transfer of all nuclear weapons from Belarus, Kazakhstan, and the Ukraine to Russia within seven years.[213] Since then, START II has been signed, requiring a two-thirds reduction in U.S. and former Soviet strategic nuclear arsenals,[214] yet the details of fissionable materials storage and the safe removal of massive quantities of plutonium and uranium from nuclear warheads remain unresolved. Moreover, the viability of both START I and START II remains uncertain at this point.[215]

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210. Fiona Fleck, *Experts Warn of Looming Russian Nuclear Crisis*, Reuter Libr. Rep., July 22, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

211. Six thousand warheads are scheduled for retirement under START I. Robin Knight et al., *Easier Said Than Done: Beating Nuclear Swords into Ploughshares is the Next Challenge*, U.S. News & World Rep., Nov. 2, 1992, at 53. *See supra* note 161.

212. *A Persistently Nuclear Nightmare*, Economist, Apr. 3, 1993, at 52.

213. *Start Treaty Revived Between U.S., Ex-Soviet Nuclear Powers*, Agence France Presse, May 23, 1992. The signing of the START Protocol also officially made Belarus, Kazakhstan, and the Ukraine parties to the Treaty, and "confirms and consolidates" their non-nuclear status. *START Protocol Signed*, 3 U.S. Dept. State Dispatch 428 (1992).

214. Under START II, by 2003, another 15,000 warheads will be eliminated. John Lloyd, *Arms Treaty Is Hostage To Fortune*, Fin. Times, Jan. 4, 1993, at 11.

215. Ukraine is supposed to relinquish its 176 long-range nuclear missiles and 37 long-range bombers to Russia, according to START I. However, Ukrainian President Leonid Kravchuk is reluctant to turn over the weapons to Russia, Ukraine's former colonizer. Friedman, *supra* note 161, at E3. The schedules for weapons dismantlement set by START I and II cannot be implemented until the Ukraine, which inherited 1600 nuclear warheads from the FSU, ratifies both Treaties. Gwynne Dyer, *Nuclear Proliferation: Some Good News At Last*, Toronto Star, Aug. 1, 1993, at B7. Russia declared it would not ratify START II until Ukraine formally approves START I. Relations between the two states were further strained when Ukraine rescinded a prior commitment to pay 16% of the $80 billion foreign debt of the FSU. Stephen Mulvey & Julie Corwin, *A Tale of Two Countries*, U.S. News & World Rep., Jan. 18, 1993, at 52. Most recently, Ukraine asserted it intends to keep 46 ballistic missiles until 1995, pending review of the NPT, or even later, depending on its "national security needs." *Ukraine to Retain Nuclear Warheads Until at Least 1995*, Agence France

The U.S. Senate's ratification of START I was stalled by uncertainties about the intent of CIS states to comply with the Treaty's terms.[216] The Senate Foreign Relations Committee approved START I on the condition that the United States seek arrangements with Russia on the verification of nuclear warhead dismantlement and the safe disposal of fissile materials.[217] Although all tactical nuclear weapons were transferred to Russia by July 1992, strategic nuclear forces in Belarus, Kazakhastan, and the Ukraine are not scheduled to be turned over to Russia until the end of 1999 under the post-Start I Protocol signed by these states and the United States. While Belarus and the Ukraine declared their intention to become nuclear-weapons free within the seven-year START I reductions period, Kazakhstan has vacillated on this commitment.[218] The Ukraine, now the world's third largest nuclear power, has wavered as well, suggesting that the country may sign the NPT[219] as a "transition country" with nuclear weapons.[220] The Kiev-based Government is reluctant to relinquish its nuclear weapons to Russia unless it receives payments for the nuclear fuel as well as security guarantees.[221]

Presse, Aug. 2, 1993.

216. The U.S. Senate finally approved (93-6) START I on Oct. 2, 1992 after negotiations assured that Russia, Ukraine, Belarus, and Kazakhstan would assume the FSU's Treaty obligations. However, former President Bush said the United States would only "formally ratify" the Treaty after Russia, Ukraine, and Belarus approved the Treaty. *Senate Approves Nuclear Arms Treaty, Bill that Offers Aid to Ex-Soviet Republics*, Ariz. Daily Star, Oct. 2, 1992, at A5. The Conventional Forces Reduction Treaty ("CFE") has also been delayed due to the uncertainty generated by conflicts among the Soviet Union's successor states. *Stand & Deliver*, Economist, May 9, 1992, at 16.

217. *Nuclear Sulks*, Aviation Wk. & Space Tech., July 20, 1992, at 19.

218. Harold Feiveson et al., *Dismantling the Doomsday Machine*, Tech. Rev., May-June 1992, at 61. Kazakhstan, the only Muslim republic with intercontinental nuclear missiles, has been ambiguous about its commitment to join the NPT as a non-nuclear weapon state and, until recently, asserted its prerogative to resume nuclear testing. However, Kazakhstan ratified START I in July 1992 and Russia ratified it on November 4, 1992. *Ukraine Stalls Yeltsin's Quest For Nuclear Arms Cuts*, Ariz. Daily Star, November 8, 1992, at C1 [hereinafter *Ukraine Stalls*]. Belarus ratified START I and approved adherence to the NPT on February 4, 1993. *Belarus Approves First Arms-Limitation Pact*, N.Y. Times, Feb. 5, 1993, at A6 [hereinafter *Belarus Approves*].

219. Treaty on the Non-Proliferation of Nuclear Weapons, July 1, 1968, 729 U.N.T.S. 161, 7 I.L.M. 811 (1968).

220. Jane Perlez, *Ukraine May Ask Special Status in Atom Pact*, N.Y. Times, July 26, 1993, at A8. The Ukraine depends on its 14 nuclear power reactors for more than 25% of its electricity. William C. Potter, *The Future of Nuclear Power and Nuclear Safety in the Former Soviet Union*, Nuclear News, Mar. 1993, at 61. The Ukraine is also concerned about the environmental effects of the obligatory destruction of nuclear missile silos. *Ukraine Stalls*, *supra* note 218, at C1.

221. The Ukraine announced in 1992 that it will sell its 176 strategic missiles, slated for transfer and destruction under START, to the highest bidder. *Ukraine Stalls*, *supra* note 218, at C1. The Ukraine claims sole proprietary inheritance of the nuclear weapons on its soil. Perlez, *supra* note 220, at A8. The Ukrainian Government has not

The above developments suggest that the fall of the Central Soviet Government in December 1991 left a vacuum of authority in the nuclear arena which republican powers have rushed to exploit. Conflicts over nuclear arms and plants have compounded the problems of responsibility for weapons dismantlement and nuclear waste disposal and cleanup. Many of the internal CIS power struggles involve decisions pertaining to the control and transfer of nuclear weapons and waste between CIS states. Although the Minsk agreement on Strategic Forces declared that the Commonwealth states recognize the need for joint command of strategic forces and unified control of nuclear weapons, the effective operational and political control of the same remains disputed.[222] An example of such controversies is the Ukraine's expressed reservations about transferring its strategic nuclear weapons to Russia and its declared "administrative control" over soldiers operating nuclear missiles on Ukrainian territory.[223]

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yet ratified the NPT and is seeking some monetary reward for becoming the first nuclear state to disarm voluntarily. Prime Minister Kuchma stated that Russia, not Ukraine, benefitted from the removal of tactical nuclear weapons from Ukraine because it has been able to sell nuclear fuel to the United States. *Ukraine Balks at Transfer of Nuclear Arms*, Ariz. Daily Star, Nov. 6, 1992, at A12. President Kravchuk has insisted $1.5 billion is needed to cover disarmament costs and has sought Western security guarantees in exchange for surrendering the weapons to Russia, and many Ukrainian parliamentarians are concerned about Russian revanchist claims on the Crimean Peninsula. Chrystyna Lapychak, *Ukraine Gains U.S. Guarantee Needed For START Support*, Christian Sci. Mon., Jan. 12, 1993, World Section at 1. Ukraine rejected a U.S. offer of $175 million for relinquishing nuclear components mandated by START I. *Belarus Approves*, *supra* note 218, at A6. Nonetheless, the U.S. has "unfrozen" the $175 million to accelerate the Ukraine's unilateral dismantlement of the disputed strategic nuclear warheads, on condition that Ukraine ratify START I. Vladislav Drobkov, *Missiles Which Moscow Still Sees as its Own*, Pravda, at 3, *translated in* Russian Press Dig., July 31, 1993.

222. Article 3 of the Minsk Agreement of December 31, 1991. William Walker, *Nuclear Weapons and the Former Soviet Republics*, Int'l Aff., Apr. 1992, at 255, 264. *See Commonwealth of Independent States Declaration on Nuclear Arms*, Dec. 22, 1991, *reprinted in* Nuclear L. Bull., June 1992, at 102. Kazakhstan insists on its participation in arms control negotiations and was angered by its exclusion from the START II process. The bilateral signing of START II threatens the Treaty's success in Kazakhstan, which has not authorized Russia to act on its behalf and has sought security guarantees from the United States in the wake of START I because Kazakhstan is surrounded by nuclear Russia and China. Viktor Kiyanitsa, *Kazakhstan Is Prepared to Disarm and Asks to be Taken*, Moscow News, Jan. 20, 1993. At the same time, Russia is proposing that, rather than the current joint and unified control CIS system, all strategic forces be placed under Russian jurisdictional control immediately, instead of in 1994, as agreed to by the independent CIS states. Pavel Felgengauer, *The Army: CIS Problems Discussed At Summit Meeting in Bishkek Today*, Nezavismaya Gazeta, Oct. 8, 1992, at 1, *translated in* XLIV Current Dig. Post-Sov. Press, Nov. 4, 1992, at 27.

223. This assertion of "administrative control" over missile troops conflicts with the Minsk Agreement ensuring joint CIS command of all formerly Soviet nuclear

The military conflicts and uncertainties still plaguing the CIS have raised Western nations' awareness that the fragile democratic reform movement in Russia and in the other republics needs concrete political and financial support from the international community. Entrenched communist elites still threaten to capitalize on popular disillusionment with the painful transition to a market economy. In addition, ethnic strife, nationalist forces, and regional civil wars jeopardize efforts to de-militarize the FSU.

Just as local officials are using nuclear arsenals as bargaining chips within the CIS, leaders in autonomous republics are lobbying to attract polluting projects to their regions for political and capital gains. Nuclear power plant projects, often subject to widespread and sometimes effective citizen opposition,[224] nevertheless tempt elected officials seeking to mitigate skyrocketing energy prices and the shortage of hard currency.[225] Closing existing, unsafe nuclear power plants which supply a large percentage of electricity in some regions, especially in the Ukraine, Lithuania, and parts of Russia, does not appeal to politicians who must cope with economic hardships and energy demands. Moreover, atomic energy still holds a privileged position in the centers of power and enjoys greater financial support for operations and development than other kinds of programs local politicians initiate.[226]

Russia and the Ukraine have engaged in bitter disputes over the fate of the strategic Black Sea fleet and other military assets.[227] For instance, Ukraine suspended tactical nuclear weapons transfers to Russia in March 1992.[228] The shipments resumed only after guarantees were issued that the warheads were actually being destroyed and Western protests were registered with President Kravchuk's government in Kiev.[229] In another instance, the Ukrainian authorities refused to sanction shipments of radioactive waste from the Paks

missiles. Howard Witt, *Breakup of Nuclear Superpower Creates New Threats*, Chi. Trib. *in* Ariz. Daily Star, Jan. 31, 1993, at C3. This reversal of previous policy has upset both Russia and the United States. Knight et al., *supra* note 211, at 53.

224. For example, local environmentalists in southern Russia pressured the Rostov Regional Council into suspending the completion of a two-year long nuclear power plant project. The project director, in response, signed a contract to build an atomic power station in Iran. Gennady Belotserkovsky, *Closing A Nuclear Power Plant Easy*, Rabochaya Tribuna, Jan. 22, 1993, *trans. in* Russian Press Dig., Jan. 22, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

225. Yeltsin's April 1993 Decree, for example, reflects this concern by earmarking 25% of hard currency resources from reprocessing activities in exchange for the provision of these (nuclear) "services" by localities. *Decree*, *supra* note 15, art. 5.

226. Minatom, for instance, has been offering benefits such as lower electricity rates, new housing, and more medical facilities to regional administrations that support nuclear power plants in their jurisdiction. Potter, *supra* note 220, at 61.

227. Perlez, *supra* note 220, at A8.

228. Maksim Yusin, *Ukrainian President's Decision Jeopardizes International Agreements*, Izvestia, Mar. 13, 1992, at 2, *translated in* XLIV Current Dig. Post-Sov. Press, Apr. 15, 1992, at 13.

229. Guy Chazan, *Ukraine Resumes Sending Nuclear Weapons to Russia*, UPI, Mar. 18, 1992.

atomic power station in Hungary, destined for Chelyabinsk, Russia, via the Ukraine.[230] The Krasnoyarsk Regional Administration in Russia also rejected shipments of Ukraine's VVER-1000 reactor wastes, traditionally stored in the secret town of Krasnoyarsk-26.[231] This government accused the Ukraine of breaching contractual agreements to supply fixed amounts of consumer commodities and food, objected to Ukraine's demand for hard currency payments for butter and sugar, and announced talks with the South Koreans, who are willing to pay $1,000,000 per ton for storage of their nuclear waste.[232] The Krasnoyarsk combine continues to withhold its supply of empty transport casks because the Ukraine has not sent sugar and other goods to the region.[233] With Krasnoyarsk refusing to accept radioactive waste for permanent storage from Ukraine's five nuclear reactors, due to the ban on such imports pursuant to Russia's Law on Environmental Protection, the Ukraine is facing a serious storage crisis.[234] Chelyabinsk-65, also in Russia, continues to temporarily store Ukrainian spent fuel on site for reprocessing, but Russia is now refusing to

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230. *Ukraine Blocks Transit of Nuclear Waste Train From Hungary to Russia*, BBC Summary World Broadcasts (Sept. 1, 1992); A. Kolesnikov, *Stray Atom-2*, Moscow News, Sept. 9, 1992. Russia's refusal to accept consignments of radioactive waste from foreign nuclear power stations under the Law on Environmental Protection led the Ukraine to deny passage of nuclear waste from Bulgaria and Hungary to Russia. *Ukraine to Stop Transporting Hungary's Nuclear Waste to Russia*, MTI Econews, May 6, 1993, *available in* LEXIS, Nexis Libr., CURRNT File. Finally, in June 1993 a Russian-Ukrainian Protocol was signed, assigning the nuclear energy departments of each state to draft a new agreement on prices the Ukraine must pay Russia for Ukrainian nuclear waste to be reprocessed in Russia. *Russia-Ukraine Economic Relation Improving*, BizEkon News, June 30, 1993, *available in* LEXIS, Nexis Libr., CURRNT File. A two-year agreement has been signed, but not published, permitting the transport of Ukraine's used fuel to Russia's Krasnoyarsk-26. Alexander Bolsunovsky, *Ukrainian Plutonium—Dangerous to Keep, Impossible to Return*, Moscow News, June 23, 1993, *available in* LEXIS, Nexis Libr., CURRNT File. Such agreements seem precarious, however, given dire economic conditions and new trade linkages between the republics.

231. Yaroslavtsev, *supra* note 49, at 6.

232. *Id.* at 6.

233. Anne MacLachlan, *Spent Fuel Storage Problems Threaten Operation of Ukrainian Power Reactors*, NuclearFuel, July 20, 1992, at 5.

234. Since the Law bans the storage of radioactive waste, but not its processing, Chelyabinsk-65 must return all waste formed through reprocessing Ukrainian used fuel to the Ukraine. Bolsunovsky, *supra* note 230. However, both Ukrainian construction of plants for the use of spent nuclear fuel and the return of plutonium from Russia to the Ukraine would be contrary to the NPT since the Ukraine is not a signatory to the Treaty and there would be no guarantee that the nuclear materials would not be used for military purposes. *Id.* Therefore, a conflict has arisen between Russia's *international* obligation as a signatory to the NPT not to export plutonium to a non-signatory state (i.e., Ukraine) without IAEA guarantees and its *domestic* obligation to abide by the Law on Environmental Protection. *Id.*

accept any more spent fuel from Ukraine for reprocessing.[235]

B. Nuclear Discord and Nuclear Entrepreneurs

The shortages of food and other basic consumer goods, the new and unfamiliar conditions of high inflation[236] and unemployment,[237] and the breakup of defense establishments have given rise to illicit sales of nuclear materials.[238] The sale of nuclear technology even for "peaceful" purposes to countries like Iran and Iraq poses new dangers, such as increased nuclear weapons proliferation, to the international community. Furthermore, the lack of an inventory system for weapons-grade materials in Russia[239] makes tracking sales difficult, if not impossible. The Nuclear Waste Law proposes to remedy this problem by establishing a centralized "State Registry" of radioactive wastes[240] and forbidding access to radioactive materials without the proper license issued under the law.[241]

Although the Soviet Union pledged to adhere to the Missile Technology Control Regime ("MTCR"), which prohibits the export of missiles and related components with payloads weighing more than 500 kilograms and with ranges of greater than 300 kilometers,[242] and to abide by the London Nuclear Suppliers

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235. The Ukraine used to obtain uranium from the U.S.S.R. and send its spent fuel back there for reprocessing. Ukrainian spent fuel storage containers are now filled to capacity. Poletz, *supra* note 151. The situation is complicated by Russia's Law on Environmental Protection, which forbids Russian enterprises from accepting any nuclear wastes or materials from any foreign state. The Ukraine has denied permission for the shipment of spent fuel from Bulgaria, Czechoslovakia, and Hungary destined for Russian reprocessing plants across Ukrainian territory because there is no guarantee that Russia will accept the waste once it reaches the border. MacLachlan, *supra* note 233, at 5.

236. Annual inflation reached 2000% in 1992. *Russian Retreat*, Ariz. Daily Star, Dec. 17, 1992, at A22. In January 1993 inflation was almost double the monthly rate registered at the end of 1992, and weekly rate increases and the use of indexation indicated conditions of hyperinflation (over 50% per month). *Russia's Road to Ruin*, Economist, Feb. 6, 1993, at 51. As of the end of May 1993 the ruble's value was 934 to the dollar, up from 128 a year ago. *Twilight Zone*, Economist, May 22, 1993, at 86, 87.

237. Official unemployment in 1992 doubled, from 484,600 in January to 981,600 by December. *Russia's Road to Ruin*, *supra* note 236, at 52.

238. John-Thor Dahlburg, *Ex-Soviets' 'Loose Nukes' Alarming*, L.A. Times, Dec. 28, 1992, at A3, A10, A11.

239. *How to Steal an Atom Bomb*, The Economist (Newspaper), June 5, 1993, at 15 [hereinafter *How to Steal*].

240. *Nuclear Waste Law*, *supra* note 6, art. 20. A Russian Scientific Commission For Radiation Safety started such a register after analyzing the law's provisions on this subject. Sergei Ovsienko, *Radioactive Belt Wrenches Russian Territory*, BizEkon News, Mar. 5, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

241. *Nuclear Waste Law*, *supra* note 6, art. 41, art. 21.

242. The MTCR was established in 1987. Lora Lumpe, Lisbeth Gronlund, & David

Group Guidelines[243] on nuclear exports, Russia has yet to establish an inventory of existing nuclear warheads.[244] Furthermore, the inspectorate that President Yeltsin charged with verifying nuclear materials has been excluded from nuclear military establishments by Minatom.[245] Confusion also persists about which governmental authority legally controls export policies,[246] making the monitoring or prevention of the smuggling of any of the approximately 27,000-30,000 nuclear warheads or devices stationed in the FSU particularly difficult.[247]

This regulatory chaos is particularly acute in the non-Russian republican states where there are fewer nuclear and export control experts.[248] A new comprehensive Russian law on atomic energy, such as the one drafted in 1990 (but never enacted) to supplement executive decrees on the export of nuclear materials, may be put on the agenda of the current Supreme Soviet and passed in 1993.[249] At any rate, stricter regulation of nuclear energy and materials is imperative given the proliferation risks posed by the U.S.S.R.-successor states.

Another dangerous trend involving the surplus of nuclear materials is the emergence of nuclear black marketeers. For example, the International Chetek Corporation ("CHETEK"), a private holding company, has been marketing the idea of conducting ecologically "clean" and totally "safe" underground nuclear blasts for commercial purposes.[250] In May 1991 CHETEK obtained exclusive rights to sell the nuclear services of the Soviet MAPI, now Minatom.[251] Victor

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C. Wright, *Third World Missiles Fall Short*, Bull. Atom. Sci., Mar. 1992, at 30, 35. The United States claimed in 1992 that the Russian sale of rocket technology to India violated the MTCR and ordered a two-year ban on the sale of sensitive space technology to the Indian or Russian space agencies. The sanctions were the first to be enacted against either country. Sanjoy Hazarika, *Despite U.S., Yeltsin Backs Rocket Deal With India*, N.Y. Times, Jan. 30, 1993, at A2.

243. The Russian Federation joined the 27 countries adhering to the Nuclear Suppliers Group and, on June 16, 1992, agreed to act in accordance with nuclear-related export guidelines. A special appeal was made to the new post-Soviet republics to accede to the NPT as non-nuclear weapon states, to adopt full-scope IAEA safeguards, and to adhere to effective nuclear export controls and guidelines. *Nuclear Suppliers Group: Memorandum of Understanding Implementing Guidelines For Transfers of Nuclear-Related Dual-Use Equipment, Material and Related Technology*, Apr. 3, 1992, 31 I.L.M. 1094, 1096.

244. Knight et al., *supra* note 211, at 54.

245. *How to Steal*, *supra* note 239, at 15; *Defense Ministry Ignoring*, *supra* note 3.

246. William C. Potter, *Exports and Experts: Proliferation Risks From the New Commonwealth*, Arms Control Today, Jan.-Feb. 1992, at 32, 34-35.

247. Knight et al., *supra* note 211, at 54.

248. Potter, *supra* note 246, at 35; Carla Anne Robbins, *The X Factor in the Proliferation Game*, U.S. News & World Rep., Mar. 16, 1992, at 44, 45.

249. *Deputy Minister on Nuclear Power Programme*, Rossiyskaya Gazeta, Jan. 16, 1993, *in* BBC Summary World Broadcasts, Jan. 29, 1993.

250. Potter, *supra* note 246, at 33; Robbins, *supra* note 248, at 44.

251. Robbins, *supra* note 248, at 44. CHETEK is also underwriting the work of the All-Union Research Institute of Experimental Physics (Arzamas-16), the principal Soviet nuclear weapons design center whose former nuclear scientists have been

Mikhailov, head of Minatom and a key promoter of CHETEK, has written to the United Nations, offering to annihilate chemical and nuclear weapons and wastes by detonating underground thermonuclear explosions for 130 million rubles per blast.[252]

At a 1992 conference in Norway, Mikhailov confirmed reports that Russian scientists were indeed planning on destroying nuclear and chemical waste via nuclear detonations, but refused to disclose where the project would be executed.[253] He also concluded a deal with Nuclear Fuel Services and Allied Signal in July 1992, whereby these two U.S. companies would convert uranium from dismantled Soviet warheads into commercial fuel for use in the United States and, eventually, in Russian power plants.[254]

In October 1992 the U.S. Department of Energy agreed to buy at least ten metric tons of HEU annually from dismantled Russian weapons over the next five years.[255] This unusual pact with the Russians was motivated less by the commercial resale of nuclear material for reactor fuel than by the United States' desire to keep the weapons material from "falling into the hands of unfriendly countries or terrorists."[256]

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recruited by CHETEK. Tariq Rauf, *Cleaning Up With a Bang*, Bull. Atom. Sci., Jan.-Feb. 1992, at 9.

252. Vladimir Orlov, *Russian Nuclear Business: Is the Threat Real?*, Moscow News, May 6, 1992.

253. *Russian Minister Confirms Controversial Plan to Dispose of Nuclear Waste*, Agence France Presse, May 19, 1992.

254. Thomas W. Lippman, *Russian Aims to Unload its Uranium in the U.S.*, Wash. Post, Aug. 5, 1992, at A4. To date, U.S. policy has been to keep weapons-related uranium programs separate from commercial nuclear power to limit illicit access to bomb-grade material. In contrast, this deal favors diluting bomb-grade uranium from Russia for U.S. civilian use. Thomas W. Lippman, *U.S. to Buy Reactor Uranium Material From Bombs*, Wash. Post, Sept. 1, 1992, at A1. Mikhailov's and CHETEK's plans raise issues of the rule of law and which branch of the Russian Government, if any, has the legal or political authority to conduct nuclear tests and dispose of, or sell, nuclear waste.

255. Russian uranium exports to the United States were frozen until a protocol to this agreement was signed, eliminating both the requirement that Russia notify the United States of all of its shipments of energy-grade uranium, including those to third countries, and the U.S. Department of Trade's prerogative to price Russia's uranium without consulting the Ministry of Nuclear Power Engineering. Dmitry Kadosov, *Russia May Resume Exports to the U.S.*, BizEkon News, Jan. 21, 1993.

256. Doyle McManus, *U.S. to Buy A-Bomb Fuel From Russia*, L.A. Times, Sept. 1, 1992, at A4. The United States has objected to Russian sales of uranium-enrichment technology to China, diesel submarines to Iran, and a rocket booster that could be used for a ballistic missile to India. Michael Gordon, *Russian Sales of Weapons Worrying U.S.*, N.Y. Times, *in* Ariz. Daily Star, Oct. 18, 1992, at A1. Prime Minister Victor Chernomyrdin signed executive order No. 2421-r, authorizing the Ministry of Nuclear Power and Engineering to sell up to 40 kilograms of plutonium-238 to the U.S. under a $50 million contract. Dmitry Kadosov, *Russian Government Approves Plutonium-238 Exports to U.S.*, BizEkon News, Jan. 15, 1993.

CHETEK and other private trading companies in the CIS are capitalizing on the shortage of cash and export controls by attempting to sell sensitive nuclear devices and materials abroad. Even more alarming is Minatom's grant to CHETEK of exclusive rights to the Ministry's thermonuclear "peaceful nuclear explosives" and test sites since CHETEK asserts that it is not bound by the current Russian nuclear testing moratorium.[257] Minatom's dependence on hard currency and financial infusions from CHETEK's stock revenues, thus, threatens to compromise the Ministry's regulation of nuclear exports.[258]

C. The Glut of Uranium and Plutonium: Prospects of Increased Proliferation

Nuclear bombs may be built out of fairly small amounts of HEU or weapons-grade plutonium.[259] Thus, the current convergence of a glut of nuclear materials, loopholes in export regimes, and insufficient IAEA controls in the global marketplace heralds increasing proliferation threats. If priority is not given to this issue, as the plutonium-239 and uranium-235 are removed from nuclear warheads in Russia and other nuclear CIS states, the danger of increased nuclear use, paradoxically, may be greater than at the height of the Cold War.[260]

Russia alone possesses twenty tons of plutonium from power reactors and more than 500 metric tons of HEU and 115 tons of plutonium from military stockpiles.[261] Estimates of the market value of stores of Russian uranium range from $1 billion[262] to $7 billion at commercial prices.[263] Thus, the Russians have sought to sell their reserves of uranium as reactor fuel for hard currency.[264]

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257. Rauf, *supra* note 251, at 9.

258. Potter, *supra* note 246, at 32-34.

259. *How to Steal, supra* note 239, at 15. The most difficult part of making a nuclear bomb is obtaining this HEU or plutonium. Stephen Budiansky, *The Nuclear Epidemic*, U.S. News & World Rep., Mar. 16, 1992, at 40, 42.

260. Joseph S. Nye, Jr., *New Approaches to Nuclear Proliferation Policy*, Science, May 29, 1992, at 1298; *How to Steal, supra* note 239, at 15.

261. Budiansky, *supra* note 259, at 44; *see supra* notes 162, 206 and accompanying text.

262. Budiansky, *supra* note 259, at 44 (market value if sold as reactor fuel).

263. John J. Fialka, *Uranium From Russian Nuclear Arms Could Slash Energy Costs, U.S. Says*, Wall St. J., July 17, 1992; *White House Hesitant to Pursue Verification Policy with Russia*, Aerospace Daily, July 17, 1992, at 101.

264. These supplies do not include the over 500 metric tons of uranium expected to come from the dismantlement of Russia's nuclear weapons. Fialka, *supra* note 263. As a result of Russian shipments of low-enriched, low-priced commercial-grade uranium to the United States in 1991 and early 1992, American uranium producers filed an anti-dumping suit to contest the Russian sales. On May 29, 1992, the U.S. Department of Commerce upheld a complaint filed by U.S. producers and the Oil, Chemical, and Atomic Workers Union, ruling that Russia sold uranium to the United States at less than one-half its true market value. Thomas W. Lippman, *Commerce*

Even though START I and its companion agreements do not require the destruction or dismantlement of nuclear warheads, some arms control experts favor dismantlement and international safeguards of the bomb-grade material over simply storing the components since they could easily be re-assembled for future weapons use.[265] If the United States and Russia decide to dismantle the warheads, world stocks of HEU and plutonium would increase by 1300 tons and 200 tons, respectively.[266]

Many experts are worried about the storage of these nuclear materials in their current form because they could be incorporated into new weapons.[267] The danger of low-enriched uranium and plutonium from spent reactor fuel and uranium-processing technology being distributed through the black market and exported to nuclear aspirants has led to suggestions that the material be submitted to international inspectors and safeguards.[268] There have been reports of private companies buying zirconium, beryllium, and graphite at discount prices from CIS state manufacturing firms and selling these materials abroad.[269]

One of the most serious threats to the non-proliferation regime is the emergence of private nuclear entrepreneurs.[270] These firms, including CHETEK, are seeking overseas markets for nuclear goods and services, with marginal government oversight. Sensitive nuclear facilities for "heavy water production, beryllium and zirconium metallurgy, hot cells for handling plutonium and even uranium enrichment facilities are located in and may still be operational in Central Asia."[271]

The Ukraine is looking for new purchasers of the uranium and heavy water from their ten VVER-1000 nuclear reactors because the domestic market has dried up.[272] Kazakhstan reportedly made a deal to sell four nuclear warheads to Iran, which were paid for, but not delivered, as of October 1992.[273] Nuclear experts

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Department Rules Ex-Soviets Guilty of Uranium "Dumping," Wash. Post, May 30, 1992, at A18.

265. Daniel Hirsch & Peter Tyler, *The Devil is in the Details: The Bush-Yeltsin Arms Cuts,* Nuclear Times, Spring 1992, at 3, 4.

266. Knight et al., *supra* note 211, at 54. Existing Russian factories could, perhaps, hold 1500-2500 dismantled warheads per year, but storage facilities for the extracted nuclear fuel are inadequate. *Id.*

267. Fleck, *supra* note 210 (outlining fears nuclear workers may sell secrets and materials to the highest bidder); *How to Steal, supra* note 239, at 15.

268. *How to Steal, supra* note 239, at 15; Richard L. Garwin, *Don't Neglect New Weapons Plant*, Bull. Atom. Sci., May 1992, at 17.

269. Potter, *supra* note 246, at 32.

270. *Arms Trade and Proliferation,* Hearing of Senate Subcomm. on Tech. and Nat'l Security of the Jt. Economic Comm., Fed. News Service, Mar. 13, 1992, *available in* LEXIS, Nexis Libr., CURRNT File.

271. *Id.*

272. Chrystia Freeland, *N-Waste Problems Mount for Ukraine*, Fin. Times, Feb. 12, 1992, at 2.

273. *Iran Is Purchasing Four Nuclear Warheads From Kazakhstan, Opposition Group Says*, Ariz Daily Star, Oct. 13, 1992, at A1 [hereinafter *Iran is Purchasing*].

are also concerned about Kazakhstan's fast breeder reactor, which may produce up to 440 pounds of plutonium annually, adding to stockpiles of weapons-grade materials under unclear supervision.[274] Furthermore, Russia sold two nuclear reactors and three submarines to Iran in September 1992 without any nonproliferation conditions or guarantees.[275]

German officials have investigated over 100 cases of illicit trade in radioactive substances in 1992 alone.[276] In January 1993 a man reportedly hoping to sell 220 pounds of uranium stolen from a Russian nuclear facility was apprehended in Lithuania.[277]

Despite Russia's professed commitment to nuclear non-proliferation and programs of pay raises and special incentive packages to keep nuclear scientists at home, it is unclear how long Russia or the other former republics can afford to employ nuclear experts or to compete with lucrative international contracts. About 700,000 people work in the previously-closed cities of the Soviet nuclear industry, and an estimated 2000 to 3000 of these workers are privy to sensitive secrets.[278]

The economic hardships in Russia and the other post-Soviet states make it very difficult to prioritize ecological concerns. Now that foreigners may own

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274. Bogert, *supra* note 179, at 64. A National Nuclear Center has been set up in Kazakhstan to study the environmental effects of nuclear testing, radioactive contamination, and safe methods for burying nuclear wastes. Gennady Kulagin, *National Nuclear Center Set Up in Kazakhstan*, Tass, Jan. 29, 1993, *available in* LEXIS, Nexis Libr., TASS File.

275. The U.S. State Department's former official for CIS Nonproliferation Affairs sought guarantees from Russia's Minatom that Russia will take back all the spent nuclear fuel from the Iranian reactors and agree not to supply them with technology for spent fuel reprocessing or uranium enrichment. However, given the lack of capacity at the Mayak reprocessing complex, recently reported to be the "most polluted place on earth," and the new Russian law prohibiting the import of foreign radioactive waste, such guarantees are unlikely. Mark Hibbs & Ann MacLachlan, *U.S. Wants Russia to Take Back Any Spent Fuel from Iran Deal*, NuclearFuel, Sept. 28, 1992, at 4. *See Iran is Purchasing*, *supra* note 273, at A1.

276. Craig R. Whitney, *Illicit Atom-Material Trade Worries Germans*, N.Y. Times, Oct. 20, 1992, at A7.

277. Witt, *supra* note 223, at C1.

278. *A Nice Red Afterglow*, Economist, Mar. 1, 1992, at 45. U.S. officials estimate 900,000 Soviets worked in the nuclear weapons industry; of these, about 2000 know how to design nuclear bombs and 3000-5000 are experienced in uranium enrichment or plutonium manufacture. Tom Post, *Selling Nuclear Missiles—And Minds*, Newsweek, Jan. 13, 1992, at 29. However, it is unknown how many closed or secret cities existed in the FSU — figures ranging from 10 to 87 have been cited — since they were not on any map or included in population or workforce censuses until 1992. Feshbach, *supra* note 150, at C1. Further complicating the situation, Yeltsin signed legislation in August 1992 closing 16 Russian regions and cities which produce radioactive materials and weapons. Richard Staar, *Russia's Network of Hidden Cities*, Wash. Times, June 3, 1993, at G3.

100% of formerly Soviet companies,[279] foreign investors are concerned about the risk of liability for previous polluting activities and of incurring all of the expenses for environmental restoration.[280] The newly independent republics, struggling to survive economically and to cope with escalating ethnic rivalries, have neither the time nor the resources to devote to environmental problems.[281] Thus, international assistance is needed, and even though the United States and Russia appear ready to exchange nuclear waste management technologies, concern over adequate protection for intellectual property rights and liability insurance for advanced technology continue to delay nuclear cleanup cooperation.[282]

Given the estimated 350,000 unemployed persons from the military-industrial sector and predictions that this figure will rise to 2.5 million persons,[283] political parties have drafted proposals to subsidize unprofitable state enterprises, including military industries, as an alternative to Russia's privatization plans. Many underemployed and poorly paid nuclear scientists[284] are also seeking foreign jobs or foreign investment in domestic projects, including cleanup of nuclear sites, leading to concern over a nuclear brain drain and the illicit sale of nuclear products abroad.[285] The brain drain of Russian nuclear experts to Libya, Israel, Brazil, India, Iraq, Pakistan, and even South Africa represents a serious problem given the newly-recognized right of emigration[286] and the approximately 100,000 scientists, engineers, and officials

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279. Since 1991, foreigners have been allowed to buy and own 100% of formerly Soviet companies. Sherry R. Sontag, *Deals Are Stalled in What Was Once the Soviet Union*, Nat'l L.J., Dec. 23, 1991, at 16.

280. Experts advise that contracts with Russian partners should be conditioned on the performance of an environmental assessment. *Foreign Investors Cautioned on Possible Environmental Liability*, 15 Int'l Envtl. Rep. (BNA), at 774 (Dec. 2, 1992).

281. Russia devotes less than 0.5% of its annual budget to environmental protection or cleanup. Knickerbocker, *supra* note 44, at 6.

282. *U.S.-Russian Nuclear Cleanup Underway Problems Remain*, Reuters, Apr. 19, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

283. Steve Erlanger, *Chaos Gives Russian Lobbyist Power*, N.Y. Times, Aug. 2, 1992, at 6. The military-industrial complex employed 10 million people. In Russia, one-half of all manufacturing was military-related. Most of the 1500 arms factories are expected to go out of business and Russian leaders are selling surplus weapons to China, India, Iran, and other hard currency customers. Bruce W. Nelan, *An Army Out of Work*, Time, Dec. 7, 1992, at 48, 49.

284. The average monthly salary of nuclear experts in the FSU is about six dollars. Leslie H. Gelb, *Denuke Russia*, N.Y. Times, Dec. 17, 1992, at A17 (figure by the end of 1992); Celestine Bohlen, *Scientists Upset Over Low Wages*, N.Y. Times, July 11, 1993 (citing $40 per month at one facility, but noting top nuclear researchers paid less than Moscow subway workers). Wages are arriving up to two months late. Fleck, *supra* note 210. Nuclear regulators and safety inspectors are paid even less than nuclear plant staff. Potter, *supra* note 220, at 67.

285. Feshbach, *supra* note 150, at C1.

286. Potter, *supra* note 246, at 34.

possessing nuclear knowledge and top-level security clearances in the FSU.[287]

For security reasons, the United States has offered legal and technical advice to establish export controls and computer packages that will enable leaders to account for their nuclear stockpiles.[288] The U.S. Congress appropriated $400 million under the SNTRA of 1991 to assist in employing arms scientists in nonmilitary work and in dismantling nuclear weapons on former Soviet territory.[289] In April 1992 three of the four nuclear republics (all except Kazakhstan) were certified as having met all of the bill's conditions for receiving aid.[290] The Charter of Friendship signed by former President Bush and President Yeltsin in June 1992 constitutes the implementing agreement for the $400 million allocated for fiscal year 1992.[291] An additional $400 million was appropriated by Congress for fiscal year 1993, expanding the aid program to include dealing with environmental damage linked to nuclear wastes.[292] However, none of the aid agreements were to be implemented before the spring of 1993,[293] and less than five percent of the $800 million Congress has appropriated

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287. NuclearFuel, Oct. 28, 1991, at 15, *cited in* Potter, *supra* note 246, at 34.

288. Robbins, *supra* note 248, at 51.

289. 22 U.S.C. §§ 2551—2595(c) (1991); *see especially* § 2551, sec. 221; *see supra* note 162.

290. Conditions include: (1) complying with all relevant arms control agreements; (2) facilitating U.S. verification of weapons dismantlement; (3) honoring human rights; (4) investing in disarmament; and (5) foregoing any military programs (including the reuse of nuclear or fissile materials) beyond legitimate defense needs. 22 U.S.C. § 2551, sec. 211(b) (1991).

291. The United States and Russia renewed their commitment to cooperate in increasing the effectiveness of international export control regimes, preventing the proliferation of weapons of mass destruction, and accelerating joint work on the conversion of military enterprises to civilian industries. *Russian Federation-United States: Charter for Partnership and Friendship*, July 1992, 31 I.L.M. 782. The $400 million appropriated for fiscal year 1992 from the Pentagon budget will enable the Russians to buy 10,000 safe containers for uranium and plutonium storage, 115 railroad cars for transporting nuclear weapons to dismantlement sites, and over 200 devices for rapid-response nuclear accident teams. Andrei Kozyrev & Viktor Mikhailov, *How We Will Destroy Nuclear Weapons*, Krasnaya Zvezda, Dec. 10, 1992, at 3, *translated in* XLIV Current Dig. Post-Sov. Press, Jan. 13, 1993, at 15.

292. Dunbar Lockwood, *Dribbling Aid to Russia*, Bull. Atom. Sci., July-Aug. 1993, at 39, 40.

293. For example, $25 million of the SNTRA of 1991 aid is earmarked for the purchase of special railroad cars and armored blankets designed for the safe transport of nuclear weapons, but the cars will not be ready until 1994. The $300 million bomb-proof warehouse near Tomsk that the United States promised the Russian government to help build to store nuclear weapons components is at least five years from completion. Storage facility designs are being studied under a $15 million U.S.-Russian deal. Knight et al., *supra* note 211, at 54. American aid in fiscal year 1994 will total close to $3 billion, with much of the $9.2 billion already pledged by the United States from 1991-93 still to be dispersed to the CIS states. Elaine Sciolino, *U.S. Will Draw Up A Strategy to Aid Ex-Soviet States*, N.Y. Times, Feb. 8, 1993, at

has been formally obligated through signed contracts.[294] At the April 1993 Vancouver summit, the U.S. proposed another $1.6 billion aid package, including funds for nuclear weapons dismantlement, and the G-7 pledged $43.5 billion to Russia in hopes of promoting nuclear cleanup.[295]

The United States has also committed funds supporting the transfer of military personnel and knowledge to the civilian sector.[296] Another U.S. aid proposal, originating from U.S. physicists who visited Tomsk-7 in June 1992, entails devoting $300 million to help the Russians build proper radioactive waste storage.[297]

To complement funds already committed through the SNTRA of 1991, the House and Senate approved the U.S. Freedom for Russia and Emerging Eurasian Democracies and Open Markets (FREEDOM) Support Act of 1992.[298] The Act authorizes the U.S. Department of Defense to appropriate funds for the continuation of disarmament assistance programs under the SNTRA of 1991.[299] Furthermore, the Act earmarks funds for other nonproliferation activities of the Department of Defense and the Department of Energy and approved the $12 billion U.S. contribution to the International Monetary Fund ("IMF") package of $24 billion[300] in aid to the FSU.[301]

International agencies have parallelled U.S. aid efforts. Heightened awareness of violations by signers of the NPT has led to IAEA plans to prevent parties from using their nuclear power plants for military purposes and to establish an international nuclear sales register to monitor global movements of nuclear

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A7.

294. Even less has actually been spent. Lockwood, *supra* note 292, at 39, 40.

295. *Aid When Boris Needs It Most; West Comes Through; Now To Monitor Results*, Buff. News, Apr. 16, 1993, at 2. Some of the U.S. money has been earmarked for helping Russia and the other nuclear CIS develop export and fissile material controls and to assess the environmental threat caused by nuclear waste dumping. Lockwood, *supra* note 292, at 40-41.

296. *Explosion at Tomsk*, East. Eur. Energy Rep., *in* Fin. Times, Apr. 15, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

297. The U.S. Administration negotiated with Minatom to construct a nuclear waste storage building designed to store 100,000 units of plutonium and HEU from nuclear warheads. The project is expected to take between six and eight years. Andrei Kolesnikov, *Discontent Over Nuclear Waste*, Moscow News, Oct. 7, 1992.

298. 22 U.S.C. §§ 5801—5874 (1992).

299. 22 U.S.C. § 2551, sec. 221 (1991).

300. In the spring of 1992, the United States, the E.C., and international lending institutions approved a $24 billion aid package to Russia, with at least $3 billion promised by the United States. *Editorial*, Ariz. Daily Star, Jan. 29, 1993, at A16. Less than one-half of the $24 billion had been disbursed as of April 1993. *Russia Seeks Targeted Action, Not Empty Promises of Financial Aid*, Agence France Presse, Apr. 14, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

301. Les Aspin (D-Wis.), former Chair, House Armed Services Committee, supported passage of the bill, stating, "[i]t is clearly in our interest to forestall chaos in a land with 30,000 nuclear weapons." William J. Eaton, *Russian Aid Bill Worth Billions Passed By House*, L.A. Times, Aug. 7, 1992, at A1.

materials.[302] The IAEA has encountered budget problems and has had to postpone or cancel some projects recently,[303] including research into safe methods of handling nuclear waste.[304] However, the IAEA and the United Nations Development Program recently launched a joint project to help curb nuclear smuggling and manage nuclear waste sites in the CIS states.[305]

Other countries are also offering Russia bilateral and multilateral assistance for nuclear arsenal dismantlement and the promotion of nuclear safety and monitoring.[306] The E.C. recently pledged $550 million of the $700 million recommended by the G-7 to address urgent nuclear safety problems through 1994, and sent the first-ever on-site international team to Russia and the Ukraine.[307] The Japanese government has launched a cooperative project with Russia to keep nuclear researchers employed in Russia, including the development of a fusion reactor and new methods of processing nuclear waste.[308] Unfortunately, inadequate intellectual property rights enforcement and insufficient liability insurance coverage in Russia for nuclear waste cleanup and management technologies are hindering current international cooperative efforts and remediation contracts.[309]

The sums of foreign money already committed to CIS nuclear safety and waste projects demonstrates the security and environmental concerns of other countries. The response of the international community to the dissolution of the Soviet Union also highlights the importance of the radioactive waste legislation awaiting passage in the Russian Supreme Soviet, without which implementation and distribution of the aid will continue to be hampered.

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302. *Ambassador Discusses Nonproliferation Issues*, Forum, Spring 1992, at 4, 5 (Monterey Inst. Int'l Stud.).

303. *Id.* at 4.

304. Russia assumed the former Soviet Union's membership in the IAEA in 1992. *Nuclear Agency Says It Must Postpone Projects*, Reuter Libr. Rep., Feb. 24, 1992, *available in* LEXIS, Nexis Libr., CURRNT File.

305. *IAEA*, Nucleonics Week, June 3, 1993, at 14.

306. *See generally* Halverson, *supra* note 23, at 44-48; Lockwood, *supra* note 292, at 41.

307. Neither Russia nor the Ukraine signed the Paris or Vienna Conventions regulating nuclear plant owners' and operators' liability, so the team agreed to go only after both states offered legal indemnification in case of an accident. Judith Perera, *E.C. Teams To Go On-Site to Russian Nuclear Plants*, Inter Press Service, July 15, 1993, *available in* LEXIS, Nexis Libr., CURRNT File. From 1991-1993, the E.C. promised almost $400 million to improve nuclear safety in Russia and the Ukraine, while member states committed an additional $118 million. *Id.*

308. *Japan, Russia To Join in Nuclear Power, Waste Disposal*, Yomiuri News Service, July 13, 1992. Japan has offered $100 million of a $1.8 billion loan and grant program for nuclear "rehabilitation." *G-7 To Tackle Russia's Nuclear Messes*, Eastern Eur. Energy Rep., May 14, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

309. *U.S.-Russia Nuclear Cleanup Underway, Problems Remain*, Reuters, Apr. 19, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

V. THE NUCLEAR WASTE LAW: TRANSFORMATION OF THE RUSSIAN FEDERATION'S APPROACH TO ENVIRONMENTAL AND NUCLEAR WASTE ISSUES

A. The Emergence of Grassroots "Greens" Groups

As a result of widespread contamination and the liberalized political atmosphere under Gorbachev, environmental groups proliferated in the late 1980s and early 1990s.[310] These organizations became a potent political force, frequently serving nationalist interests and ultimately contributing to the demise of communism in the FSU.[311] The Chernobyl accident also heightened public awareness of the dangers of nuclear power, testing, and weapons production.[312] Popular non-governmental groups have succeeded in preventing the siting of nuclear plants in the Ukraine, in shutting down the Semipalatinsk test site in Kazakhstan, and in opposing the dumping of radioactive wastes throughout Russia.[313] Citizen involvement in seeking redress for victims of Chernobyl and for other radioactive zones subject to decades of military-based environmental abuse has accelerated the formulation of new environmental laws in Russia and the other former republics.

Progress in this domain has been slow, but encouraging. Environmental law is gaining respect as a discipline in its own right and Russia is attempting to capitalize on the system of nationwide environmental protection that *Goskompriroda* tried to establish.

B. Institutional Reorganization and Reform: Russia's New Ministry of Ecology and Natural Resources

The reorganization of environmental bodies led to chaos and uncertainty of authority. Jurisdictional confusion resulting from changes in governmental structures has made passing legislation on nuclear waste even more complicated and difficult in the FSU.

In the spring of 1992, Russia consolidated its former environmental agency, the State Committee on Ecology, with the Ministries of Geology and Forests into a new Ministry of Ecology and Natural Resources. This new "super-

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310. Green, *supra* note 66, at 27-48; *see supra* notes 91, 96, 97 and accompanying text.

311. *See generally* Jack Redden, *The Soviet Price of All-Out Growth*, UPI, May 15, 1988 (Greens linked to nationalism of republics); Dick Thompson, *The Greening of the U.S.S.R.*, Time, Jan. 2, 1989, at 68.

312. Potter, *supra* note 25, at 258-259.

313. Nine partially-completed nuclear plant projects were either stopped or diverted to other purposes in 1989 due to public opposition. *Russia's Greens*, *supra* note 134, at 25.

Ministry" absorbed some of the best staff members from *Goskompriroda* and is working on instituting procedures for environmental impact assessments.[314] One of the problems to date, however, has been the lack of coordination between the Ministry and either the Russian Supreme Soviet's Ecology Committee or the Sector on Ecological Law of the Russian Academy of Sciences' Institute of State and Law.[315] The framework for the Russian Federation[316] and the draft Russian Constitution[317] proposed redefining jurisdiction over and protection of natural resources, but the version adopted in March 1992 failed to clarify not only the division of power among these federal bureaucracies, but also their relationship to new state and local authorities.[318]

The Supreme Soviet Committee on Ecology and the Rational Use of Natural Resources has criticized the ongoing failure of the Russian Federation Government to approve the Statute for the Ministry of Ecology and Natural Resources, which has led to the "virtual subordination" of environmental protection agencies to local executive structures.[319] A representative of the Paris-based World Association of Nuclear Operators summarized the political chaos characterizing the system: "From one week to another, the people you need to speak to have another name . . . . The competent people are in Moscow, but now every republic has to acquire this knowledge."[320] In addition, operators' and inspectors' salaries are inadequate or long overdue[321] and morale is worsening at

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314. Robinson, *supra* note 8, at 27. This Ministry for the Protection of the Environment and Natural Resources is an independent executive agency like the U.S. EPA. It is charged with setting standards and creating detailed environmental norms. "Expert ecological assessments" resemble U.S. NEPA-required EIAs. Robinson, *supra* note 122, at 418-19; *see supra* note 131.

315. Robinson, *supra* note 8, at 27.

316. The Russian Federation "Federal Treaty," lays out the jurisdiction between federal and state entities and if ratified, becomes part of the RF Constitution. *Federal Treaty*, Mar. 13, 1992, *available in* LEXIS, Nexis Libr., SOVLEGISLINE File. The "RF Security Act," No. 2646-I, also includes provisions for environmental protection. *RF Security Act*, Mar. 5, 1992, *available in* LEXIS, Nexis Libr., OMNI File.

317. Article 11 of the old (1977-78) Russian Constitution established the State's ownership of land and other natural resources and provided that "necessary measures shall be taken for the protection and scientifically well-founded rational use of land and minerals, water . . . ensuring the reproduction of natural wealth and the improvement of the human environment." *Constitution of RSFSR*, *in* 1 Butler, *supra* note 56, at I-1: 7.

318. There has been very little clarification on bureaucratic roles in adopting new natural resources codes. *See* Robinson *supra* note 8, at 27.

319. *Statement, Supreme Soviet of the Russian Federation Committee on Ecology and the Rational Use of Natural Resources*, at 2, adopted at a session of the Committee, (Sept. 17, 1992) [hereinafter *Statement*] (on file with author).

320. *A-Plants in Ex-Republics Feared As Disasters Waiting to Happen*, B. Globe, Mar. 28, 1992, at B6.

321. Half of 40,000 nuclear plant operators' salaries were recently paid six months

the nuclear facilities.[322]

Matters are further complicated by the enactment of a variety of laws which affect, either directly or indirectly, environmental rights and obligations in Russia. In 1991 the RSFRS enacted a Land Code[323] as well as a new law in April 1991 on the Sanitary-Epidemiological Well-Being of the Population.[324] In July 1991 the RSFSR adopted a new law of local self-government[325] followed by new laws of foreign investment. These innovations constitute important considerations for Western investors that seek to control their potential or actual pollution and waste liability. As a result, the Russian Federation, which wants to attract new foreign capital, has increasingly given priority to environmental and waste management issues.[326]

C. Russia's New Environmental Statute

About a year after the CIS was established in December 1991, an agreement formulating integrated environmental protection policies was concluded in February 1992.[327] The Declaration of Independence of the CIS states stressed

late. Dahlburg, *supra* note 40, at A1-6.

322. Scientists at the facilities have warned that conditions are "degrading." Fleck, *supra* note 210. Nuclear plant staff attitudes have been called "dangerously lax," with qualifications falling below regulations, and a random inspection test demonstrated that 75% of the staff at one nuclear weapons institute failed safety exams. Matthew Campbell, *Moscow in Danger of "Acute Nuclear Peril,"* Times Newspapers, May 9, 1993, *available in* LEXIS, Nexis Libr., CURRNT File.

323. *Land Code of the RSFSR, in* 1 Butler, *supra* note 104, at VII-1: 21. Adopted April 25, 1991, it establishes grounds for the termination of rights to ownership of land, including the use of land leading to the "deterioration of the ecological situation." *Id.* at art. 39(7). Sanctions include a warning for the "non-rational" use of land or its "spoiling," fines, and ultimately, the transfer of land to the soviet of people's deputies. *Id.* at art. 44. The protection of lands against degradation relies on a system of compensatory payments, *id.* at art. 100, and the law establishes that normative standards on chemical and radioactive substances must be complied with, *id.* at art. 102, including for siting, design, and construction. *Id.* at art. 103.

324. The Russian Parliament adopted this law before it was submitted to the U.S.S.R. Supreme Soviet in June 1991. It entitled citizens to receive information on the pollution levels in their food, water, air, and other elements, on who was responsible, and on how to sue government agencies, officials, and private persons for damaging public health. The law also imposed stiff fines and perhaps even prison terms on polluters. Feshbach & Friendly, *supra* note 35, at 202. This law and the Law on Environmental Protection are not being fully enforced because the Russian government has not submitted the required implementing acts. *Statement, supra* note 319, at 2.

325. Starr & Hay, *supra* note 82, at 23.

326. Robinson, *supra* note 8, at 27. However, the draft 1993 Russian budget does not designate any separate funds for environmental protection measures. *Statement, supra* note 319, at 2.

327. The CIS Agreement on Ecological Cooperation was signed by representatives

that existing laws of the U.S.S.R. would remain in force unless changed by new republican state legislation.[328] In this vein, the Russian Federation has begun to alter environmental laws and agencies within its territory, starting with the transformative Law on Environmental Protection.[329]

Provisions in the Law on Environmental Protection for local enforcement and empowerment[330] will lead to greater environmental accountability than in the past. Decentralized decision-making[331] may create incentives for enterprises to reach mandated levels. The new law even provides for "broad publicity and public input" in conducting "state environmental assessments" to determine the ecological safety of commercial and other activities.[332] This law also enables officials and citizens[333] to sue polluters for environmental offenses and to demand,[334] even compel,[335] closure of non-complying enterprises or termination of any environmentally harmful activities.[336] Local authorities[337] and judicial bodies[338] have, thus, been empowered to file lawsuits and hold hearings on disputes over environmental protection.[339] Injunctive relief may be sought in

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of Azerbaijan, Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, and Uzbekistan on Feb. 8, 1992. *Agreement on Cooperation in the Sphere of Ecology and Environmental Protection*, ITAR-Tass World Service, *in* BBC Summary World Broadcasts, Feb. 11, 1992, at C1 [hereinafter *Agreement on Cooperation*]. The parties agreed to undertake joint environmental protection programs, including those related to nuclear weapons dismantlement. D.J. Peterson, *Cooperation and Conflict over the Environment in the Post-Soviet Era*, CIS Envtl. Watch, Fall 1992, at 26, 27 (Monterey Inst. Int'l Stud.).

328. Russia reiterated this position in *Decree of the RSFSR Supreme Soviet*, Rossiyskaya Gazeta, Dec. 17, 1991, at 1, *in* William E. Butler, *On the Ratification of the Agreement on the Creation of the Commonwealth of Independent States, Collected Legislation of Russia* 17 (June 1992).

329. *Law on Environmental Protection*, *supra* note 8.

330. For example, the public "should be supplied with radiometric devices" to monitor ongoing radiation levels in the environment, according to art. 29(2), *id.* at 65.

331. This concern was first addressed in 1990, when the Program for Protecting the Environment was adopted. The Program increased the power of local and regional authorities to manage and regulate environmental protection. Local standards could legally be stricter than the centralized ones. *U.S.S.R. Publishes Program for Protecting Environment*, Sov. Bus. L. Rep., Dec. 1990.

332. *Law on Environmental Protection*, *supra* note 8, art. 35.

333. *Law on Environmental Protection*, *supra* note 8, art. 12.

334. *Id.*

335. Russian Federation state organs may restrict or suspend activities. *Id.* at art. 7. Increased citizens' rights also include the right to file suit and seek compensatory damages for adverse health effects stemming from environmental transgressions. *Id.* at art. 11. The law also provides for a licensing regime for government and private enterprises. *Id.* at arts. 8, 9.

336. *Id.* at art. 91.

337. *Id.* at art. 13.

338. *Id.* at arts. 78, 79.

339. Disputes involving citizens are to be resolved by court hearings or an

Russian tribunals and courts,[340] and plaintiffs may now sue for full compensatory damages,[341] in addition to the traditionally relied upon fines,[342] as the principal means of punishing violators.

According to the Russian Federation's Constitution and the Law on Environmental Protection, the Supreme Soviet possesses the exclusive right to determine the structure of administrative agencies in the field of environmental protection.[343] Public involvement, nonetheless, should enhance the legitimacy and authority of state bodies to guarantee public access to environmental information,[344] to grant permission to bury wastes, and even to require compliance by military facilities and operations with all of the environmental regulations and obligations set forth in the Law on Environmental Protection.[345]

The new environmental law, however, if strictly adhered to, would require the immediate closure of eighty percent of Russia's factories.[346] Yet many provisions of the law cannot be enforced without the adoption of implementing legislation, which the Russian Government has been very slow in submitting.[347] Moreover, the entire judicial system must be changed and a cadre of lawyers trained to effectively enforce the new environmental legal code.[348] In the FSU, individuals rarely brought claims to court. Finally, public interest litigation is now possible in Russia due to the innovative provisions of this law.

The Law on Environmental Protection was adopted one week before the

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arbitration tribunal. *Id.* at art. 78. Disputes between enterprises and organizations are to be resolved by regional commissions, or failing this, a commission created by the Russian Federation Supreme Soviet. *Id.* at art. 79.

340. *Id.* at art. 91.

341. *Id.* at art. 11; *id.* at arts. 86-90.

342. *Id.* at art. 84.

343. *Id.* at art. 5; *see also Statement*, *supra* note 319.

344. This is a major improvement over U.S.S.R. law, which had no Freedom of Information provisions. Kirillova, *supra* note 58, at 13.

345. Environmental requirements, for the first time ever, are now fully applicable to the Russian military, including the obligation to "make compensation for damages caused to the environment or human health." *Law on Environmental Protection*, *supra* note 8, art. 55.

346. According to the main author of the law, Moscow State University Professor Vladislav Petrov. Stanglin, *supra* note 138, at 45. To comply with environmental legal norms in general, as they existed in 1991, 85% of all plants would have to shut down, according to another author. Maddock, *supra* note 97, at 185.

347. For example, Resolution No. 545, "On Approving the Procedure for Drawing Up and Approving Ecological Norms for the Emission and Discharge of Pollutants into the Environment and Limits for the Use of Natural Resources and for Dumping Waste," was not passed until August 1992. Brian L. Zimbler, *Legal Remedies Address a Catastrophic Situation: The Russian Law on the Protection of the Environment*, CIS Envtl. Watch, Fall 1992, at 41, 45 (Monterey Inst. Int'l Stud.).

348. Kirillova, *supra* note 58, at 13, 19. For example, polluting industries are now supposed to pay fines to the All-Russia State Ecological Fund, 90% of which are supposed to be used for local cleanup efforts, but there is currently no way to enforce such provisions of the law. Dahlburg, *supra* note 40, at 7.

disintegration of the U.S.S.R. and reflects the power struggle among national, regional, and local authorities at the time. As a result, the allocation of power and institutional rights remain unclear as to the disposal or reprocessing of wastes, as well as to the closure of facilities that fail to meet environmental standards. The Nuclear Waste Law attempts to clarify such rights and obligations so that cleanup of contaminated sites may be undertaken immediately upon passage of the legislation. Prevention of ongoing and future radioactive pollution may also hinge on adoption of the pending bill.

D. The Nuclear Waste Law: Transformation of Former Soviet Environmental Laws

The absence of legislation in the CIS to date on the issues of nuclear waste, safety, and exports has exacerbated the problem of regulating the military complex and the clash among feuding interest groups.[349] So far, CIS nations have not agreed on an integrated policy on either nuclear power or the handling and storage of radioactive waste.[350] The task of drafting sound legislation and of strengthening Russian institutions in these arenas is particularly difficult given the dire circumstances of the Russian economy. Environmental protection continues to be poorly funded. Perhaps the enactment of effective environmental legislation will increase the allocation of resources for its implementation and enforcement.

Russian legislators requested assistance from American groups in drafting a more effective body of environmental laws to redress the power imbalance between the regulators and the polluters, as well as to emphasize legal considerations in environmental matters.[351] American specialists rendered legal assistance to the Russian Parliament in drafting nuclear energy regulation and

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349. A new Russia-wide Commission on Radiation Protection has been established which should alleviate some of these problems. Dahlburg, *supra* note 40, at A1-6.

350. This is so despite a June 1990 resolution mandating this kind of agreement among the republics. *RSFSR Resolution, supra* note 45. However, the *Agreement on Cooperation, supra* note 327, includes some general provisions on radioactive wastes. Article 3 specifies that the high contracting parties "have decided that it is necessary to . . . set up and implement joint interstate programs and projects in the area of the use of natural resources and protection of the natural environment and ecological safety, including programs of safe destruction and neutralization of chemical and nuclear weapons, and of toxic and radioactive waste . . . ." The parties also agreed to set up an interstate ecological council and fund for implementing coordinated programs, "primarily for dealing with the purpose of the aftermath of ecological disasters." *Agreement on Cooperation, supra* note 327, art. 3. Implicit in this provision is a concern for nuclear disasters and waste problems. *Id.* at art 4.

351. Kristen Suokko, *Strengthening Nuclear Regulation in Russia*, NRDC report, (1992) (on file with author).

nuclear waste and safety laws pending before the Supreme Soviet.[352]

In December 1991 specialists from NRDC, the Nuclear Regulatory Commission, and UC-Irvine attended a Moscow workshop on the legal bases for the regulation of nuclear energy, held by the Committee on Ecology and the Rational Use of Natural Resources of the Supreme Soviet of the Russian Federation and President Yeltsin's State Advisor on Environment and Public Health, Alexei Yablokov.[353] However, the parliamentarians were much more interested in nuclear waste issues than in atomic energy safety.[354] People's Deputy Menshikov, Deputy Chairman of the Committee on Ecology and the Rational Use of Natural Resources, described a Russian Parliament's decree announcing that one of the highest priorities of the new legislature should be the establishment of a safe method for radioactive waste disposal.[355] People's Deputy Gasparyan, Chairman of the Subcommittee on Radiation Safety, stressed that the nuclear waste issue was to be legislatively addressed by the Subcommittee and the Ecology Committee as soon as possible.[356]

These hearings led to the drafting of legislation on what many Russians view as the biggest environmental problem in the FSU: nuclear waste and contamination. Although intense debates erupted among the Russians on whether the new law on nuclear energy would be promotional (emphasizing development) or regulatory (emphasizing safety), the Russian parliamentarians stressed that the People's Congress had decreed that no new power plants are to be built until a law dealing with nuclear contamination is passed.[357] They asserted that they were not interested in using the Kurchatov scientists' draft nuclear energy law, prepared by the U.S.S.R. Nuclear Society, in formulating legislation on this matter, especially since the Kurchatov staff's motivation in formulating nuclear legislation was to establish a framework for building new atomic power plants.[358] The parliamentarians were more concerned with drafting a nuclear waste law to cope with public health and environmental problems.[359]

The Russians were particularly interested in learning about how to establish an effective, independent regulatory agency/structure and an independent judiciary, as well as how to ensure public participation in the nuclear waste siting, licensing, and regulatory process.[360] As a result of their expressed interest in learning about the nuclear regulatory framework in the United States, an Agreement of Cooperation was signed by the participants on the final day of the workshop and the Americans extended an invitation for the Russians to visit

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352. Alina Tugend, *Collaborating on Environmental Safeguards*, Orange County Register, June 6, 1993, Close Up at 2.

353. Suokko, *supra* note 351, at 4.

354. *Id.* at 6.

355. *Id.* at 7.

356. *Id.*

357. *Id.* at 13.

358. *Id.* at 13-14.

359. *Id.* at 15.

360. *Id.* at 13-14.

Washington, D.C. in May 1992.[361]

A follow-up trip to Moscow by the CIS Programs Coordinator of NRDC revealed that, by Presidential decree,[362] state programs on nuclear energy and their implementation will be developed by a new Russian MAPI/Minatom. The old MAPI was dissolved by this same decree, which also ordered the Kurchatov Institute and the newly-created Ministry of Nuclear Energy to draft a new nuclear power law.[363] Consequently, the Supreme Soviet now holds sole responsibility for drafting legislation on nuclear waste and contamination issues, and has directed its energies primarily toward this goal.

The Subcommittee on Radiation Safety in the Committee on Ecology and the Rational Use of Natural Resources[364] in the Supreme Soviet submitted its first draft of the legislation on nuclear waste to NRDC for translation, distribution, and feedback. The principle drafters of this law accompanied the Russian delegation to Washington, D.C. for a ten-day working visit in May 1992.

During this visit, the Russians received specific comments and suggestions from a variety of sources on the Nuclear Waste Law. They also were invited by Senator Graham (D-Florida) to testify in a public hearing before the Nuclear Regulation Subcommittee of the U.S. Senate Committee on Environment and Public Works, and to observe first-hand the legislative process in the U.S. Congress. The May 6, 1992 Senate Hearing revealed the seriousness and scope of the nuclear waste problems shared by the United States and Russia.[365]

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361. *Id.* at app. E.

362. *Id.* at app. A.

363. *Id.*

364. To a great extent, this committee operates independently. Robinson, *supra* note 8, at 27.

365. Nuclear Hearings, *supra* note 46. Frank Murkowski, Senator from Alaska:

> '[A] billion curies' of radiation linger on the fringe of the arctic ecosystem. To put that in perspective, the accident at Three Mile Island released 15 curies. Radionuclides are collected and concentrated in arctic tundra and lichen, fish and marine mammals. Humans at the apex of the food chain, including the Inuit people of the United States . . . are potentially vulnerable.

Id. at 7-9. Nikolai N. Yegorov, Deputy Minister of Atomic Energy, Russian Federation:

> [T]he restoration of territories involved in various military programs . . . will cost 20 billion rubles. But chances are it will require more than that . . . in Russia, when atomic energy was just being developed in the 1950s, liquid radioactive waste . . . was disposed of as normal waste. Therefore, we had the pollution of the Techa River as well as the waters around Chelyabinsk.

Id. at 15. Dan Reicher, [former] Senior Attorney, NRDC:

Meetings of the delegation with representatives of the U.S. Nuclear Regulatory Committee, the Environmental Protection Agency, the Department of Energy, the National Academy of Sciences, and Illinois nuclear officials followed the Senate Hearing and were productive.[366] These same Russians involved in these working sessions in the United States represent agencies responsible for passing, implementing, and monitoring the effects of environmental laws on nuclear waste and safety in the FSU.

As a result of these exchanges and meetings, Parliamentarians Gasparyan and Nestorov invited the American experts to testify in an open hearing on September 17, 1992, in the Russian Parliament on the draft Nuclear Waste Law. This legislation has undergone six revisions. The most recent draft was subject to written commentaries and public assessment. It has been circulated for review within the government, affected ministries, and the relevant institutes of the Academy of Sciences. Under the new law, every state nuclear project must be approved by the Russian Parliament.[367]

> [In response to the problem of secrecy in U.S. and Russian weapons industries] . . . [t]here is frustration on the part of the members of the public and political leaders at both the Federal level and the local level about the lack of access to the decision making process for establishing nuclear waste storage and disposal sites. I think to the credit of the Russian delegation, one of the strong focuses of this new legislation is ensuring both a formal means for public and community involvement and encouraging informal access through the provision of extensive information.

Id. at 16. Alexander A. Matveev, Director of Science and Technology for the State Committee for the Supervision of Radiation Safety, *Gosatomnadzor:*

> The President, sharing the concern of the population about nuclear safety, has created a special committee on matters of nuclear safety, *Gosatomnadzor*, expanding this authority not only over civilian nuclear powerplants, but military as well and facilities involved in the nuclear fuel cycle . . . the supervisory personnel at these nuclear facilities make three to four times less than the industry workers at those facilities. Therefore, it is difficult to keep them employed.

Id. at 20. Lidia Popova, Director, Nuclear Program for the Socio-Ecological Union:

> We have acquired mountains of radioactive waste that nobody wants to take. Russia has the same problem as the State of Nevada. If our government is not able to work out an agreement with the population, be they Indians or simple people living in Russia, nothing will become of it. This problem cannot be solved by bribing the population by various social and monetary means . . . . I hope that in the process of the regulation of nuclear waste there will be articles concerned with the procedures for the involvement of citizens in the making and supervision of these decisions.

Id. at 21.

366. Suokko, *supra* note 351.

367. *Draft Law on Radioactive Waste Submitted for Discussion*, Tass, Sept. 17,

E. General and Specific Provisions of the Nuclear Waste Law

The overall objective of the law, as stated, is to ensure the safety of the population and the protection of the environment "through the safe isolation of radioactive wastes, which prevents them from entering the environment during collection, treatment, transportation, storage and burial."[368] The law covers high-, middle-, and low-level radioactive waste.[369] Atomic energy use issues are designated as separate from those pertaining to the "handling of radioactive wastes."[370] By defining the rights and obligations of governmental and administrative agencies as well as enterprises, organizations, and citizens in handling radioactive waste, the law seeks to guarantee legal protection and safety for personnel, populations, and the environment from the dangers of radioactive contamination. For the first time, protection from threats to property and health and compensation will be guaranteed to citizens of the Russian Federation in this domain.

One of the most striking aspects of the legislation is its attempt to depart from past Soviet practices of withholding information on nuclear-related sites and materials and excluding the public from participating in decisions on nuclear safety. In fact, the fundamental provisions call for the participation of public organizations and the population "in resolving safety questions during the handling of radioactive wastes by involving them in . . . conducting research on the issue, in selecting sites to store and bury radioactive wastes, and in organizing the monitoring system and results," and in conducting "environmental assessments of the plans of organizations handling radioactive wastes, siting,

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1992, *available in* LEXIS, Nexis Libr., TASS File.

368. *Nuclear Waste Law*, *supra* note 6, sec. 1, General Provisions.

369. Radioactive wastes, as defined by this law, include spent nuclear fuel which will not be reprocessed. *Id.* at art. 2. This definition leaves open the possibility for separate regulations, and maybe even an exemption, for nuclear wastes targeted for reprocessing on Russian soil. *See generally* Thomas B. Cochran & Robert S. Norris, *Russian/Soviet Nuclear Warhead Production*, Nuclear Weapons Databook, Working Papers NWD 93-1, NRDC, Sept. 8, 1993, at 63-64 (describing Russian classifications of different kinds of radioactive wastes).

370. Article 6 spells out the Principles of Government Administration in the Handling of Radioactive Waste and seeks to divide the "use of atomic energy and the handling of radioactive wastes." *Nuclear Waste Law*, *supra* note 6, art. 6. This provision has generated a heated controversy since the Russian Minatom favors the reprocessing of spent nuclear fuel for atomic energy and is pressuring the Supreme Soviet to consider the recently drafted law on atomic energy in conjunction with the draft law on radioactive waste. The parliamentarians who drafted the radioactive waste law and environmentalists are concerned, however, that if the two bills are considered in conjunction, the safety provisions of both would be diluted. The framers of the radioactive waste law want to pass their bill before the law on atomic energy to ensure compliance with its provisions. Telephone Interview with John M. Whiteley, Director of Toward a Safer Nuclear World Project, School of Soc. Ecology, UC-Irvine (Jan. 28, 1993).

inspection, and control."[371]

Protection against environmental contamination through safe handling of radioactive wastes is "guaranteed" by the legislation.[372] To achieve this objective, the law demarcates functions and responsibilities among different government administrative agencies and orders the creation of state structures, including the "State Agency on Radioactive Waste,"[373] to regulate the entire process of handling radioactive wastes, from their collection to burial.[374] Article 6 reiterates the above-mentioned Russian Federation's prohibition on the burial of radioactive waste from other countries on the territory of Russia.

Another new development, similar to American procedures in this realm, involves the provision for issuing licenses for handling radioactive waste. While Article 15 establishes that all radioactive wastes are the "exclusive property of the state," government bodies and private individuals are entitled to establish organizations for handling such wastes. The legal status of such organizations depends upon its license: user organizations with a license are permitted to store and bury nuclear wastes, whereas those without licenses are allowed only to conduct "collection, temporary storage, preparation, and transfer of nuclear waste to the organizations that handle nuclear waste."[375] All entities, however, "bear full responsibility for guaranteeing the safety of personnel, the local population and environment in accordance with the law."[376] In the event of an accident, user and handling organizations are required by the law to notify local and national civil defense and government supervisory agencies, according to Article 24.

Aside from being required to conduct radiation control and radioecological monitoring in radioactive waste zones, all organizations are charged with guaranteeing the permanent storage of information on the radiation situation.[377] All such information must be distributed to the public, nongovernmental agencies, the media, and state and local administrative and supervisory agencies upon request and "according to established procedure."[378] These requirements represent a significant departure from the old practice of either not collecting relevant nuclear and pollution data, or of classifying the information and sheltering it from public scrutiny. Citizen and nongovernmental access to

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371. *Nuclear Waste Law*, *supra* note 6, art. 3.

372. *Id.* at art. 5.

373. *Id.* at art. 14.

374. The Russian Government has established a special Commission to coordinate geological operations to ensure the safe burial of radioactive waste. Experts from the Russian Academy of Sciences, Minatom, and other enterprises are participating in the work of the Commission. These joint efforts represent an improvement over the previous approach of independent ministries and agencies working separately to bury such wastes. Veronika Romanenkova, *Russia Sets Up Commission for Burial of Radioactive Waste*, Tass, Oct. 12, 1992, *available in* LEXIS, Nexis Libr., TASS File.

375. *Nuclear Waste Law*, *supra* note 6, art. 21.

376. *Id.* at art. 23.

377. *Id.* at art. 26.

378. *Id.* at art. 27.

nuclear waste sites also constitutes a dramatic shift from the previously secretive state policy in this arena.

Under the new law, environmental assessments must be conducted prior to the siting of storage facilities and repositories.[379] Moreover, according to Article 32, those persons working for an established organization dealing with nuclear waste may not take part in conducting the environmental assessment, a departure from prior monopolistic state practices. Representatives of local administrative "organs" and "members of the public" of the territory of the proposed site should be included in conducting the assessment, according to this same Article. This provision seeks local democratic involvement through decentralized decision-making. For example, this goal is apparent in the law's mandate that the results of assessments be presented to the public via the mass media.[380]

Final approval of the selected sites and construction depends on the agreement of Russian state and constituent republic agencies, indicating a new concept of federalism within the Russian state. Oversight agencies of the state are granted the powers, among others, of refusing to issue, or revoking, licenses based on safety considerations or violations of environmental standards, of unimpeded access to the territory of the enterprise for inspection purposes, and of appealing to the administrative or court agencies to "bring violations of safety rules to justice."[381]

Section IX of the new legislation enumerates the rights of citizens and public organizations regarding decisions on nuclear safety.[382] As mentioned above, the right of citizens and public groups to make decisions and obtain "understandable"[383] information is unprecedented in Russia and the FSU. The bill even establishes legal criminal and administrative liability for officials who have concealed or withheld information about the violation of safety "standards, norms or regulations or about an accident."[384] Citizens are also afforded the right to monitor the level of safety of radioactive wastes[385] and to demand independent tests on their level of safety from the government of the Russian Federation.

Public hearings are identified by the law as the basic mechanism at the local level for selecting a site for burying radioactive waste and obtaining a license for putting a repository into operation. Such procedures resemble the U.S. EIA hearings required under the NEPA and seem designed to increase and ensure local citizen control over nuclear issues. Citizens are also granted the right to

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379. *Id.* at art. 30. This provision is analogous to U.S. legal requirements under NEPA, 42 U.S.C. § 4332 (1988); *see supra* note 131.

380. *Nuclear Waste Law*, *supra* note 6, art. 32.

381. *Id.* at art. 39.

382. *Id.* at arts. 45-48.

383. *Id.* at art. 46.

384. *Id.*

385. *Id.* at art. 47.

compensation for increased risk due to their proximity to such facilities.[386]

All of these citizen rights, although sometimes not clearly defined by the Nuclear Waste Law, represent extraordinary departures from past Soviet environmental laws and practices which excluded the public from any meaningful participation in the formation or enforcement of nuclear or environmental regulations.

Another innovation of this legislation lies in its detailed enumeration of the administrative, disciplinary, and criminal liability for violations of radioactive waste laws.[387] Working with radioactive wastes in any capacity without a license, attempting to coerce personnel at nuclear facilities, refusing to provide safety information about radioactive wastes, and violating inventory or transportation rules on nuclear materials are only some of the violations for which individuals, enterprises, and organizations can be held liable. Sanctions range from 500,000 ruble fines to imprisonment for up to ten years for certain violations.[388]

Finally, the legislation articulates a commitment to take measures consistent with international law and with a view toward international cooperation in this field.[389] Article 55 reiterates the Russian Federation's commitment to the Treaty on the Non-Proliferation of Nuclear Weapons and other international treaties and agreements on atomic energy. Article 56 emphasizes that the import and export of technologies for handling radioactive waste, materials and substances, equipment, and special services will be conducted in accordance with international law and legislation of the Russian Federation on the use of atomic energy.

VI. CONCLUSION

The Nuclear Waste Law is unprecedented and revolutionary. Its highly controversial prohibition on the importation of radioactive wastes into Russian territory and its provisions on spent nuclear fuel threaten the powerful atomic establishment in the FSU. The custodians of the nuclear civilian and military plants seem determined to avoid the drastic impact that the closure or conversion of these facilities would have on the economy and their own positions of power. Despite committee approval of, and parliamentary and popular support for, the

386. *Id.* at art. 49.

387. *Id.* at arts. 50-53. Previously, the only sanctions for the illegal "acquisition, possession, use, transfer, or disposal of radioactive materials including their theft" were enumerated in the 1988 Decree on Criminal Liability For Illegal Activities Involving Radioactive Materials, issued on March 3, 1988, and adopted by the Presidium of the U.S.S.R. Supreme Soviet. Violations of the Decree resulted in sanctions ranging from two to ten years in prison. *U.S.S.R. Regime of Radioactive Materials*, Nuclear L. Bull., June 1989, at 86.

388. *Nuclear Waste Law*, *supra* note 6, arts. 50-53.

389. *Id.* at arts. 54-58.

Nuclear Waste Law, its passage has been delayed by efforts of Minatom and other ministries to merge the Nuclear Waste Law with the newly-proposed Law on Atomic Energy. Such a merger would dilute the safety, public access, and other restrictive provisions of the Nuclear Waste Law. The hard-liners object to the eventual phasing-out of the reprocessing of spent nuclear fuel, even though reprocessing generates dangerous and large quantities of high-level liquid wastes, because this business is quite lucrative. Since Russia is paid in convertible currency for taking spent nuclear fuel from abroad and reprocessing it, and such payments represent a way to replenish dwindling state budgets, the government is reluctant to abandon Soviet agreements with other countries to receive the waste generated by foreign nuclear power stations.

One of the most controversial aspects of the bill is its innovative provision for public debate and approval of the siting and disposal of radioactive waste. Another is its ban on importation or burial of nuclear waste from other countries on Russian territory. Although these provisions further democratic and environmental objectives, Russian leaders fear the economic impact of these measures at a time when national priorities also include battling inflation, consumer discontent, unemployment, declining state revenues, crime, and increasing ethnic unrest. Nuclear and other plant closures precipitate secondary effects throughout the still highly-integrated industrial economy, so heavily reliant on military production and so driven by command-style management for decades.

The Russian Federation's plans to double the nation's nuclear capacity by 2010 thus signals the prospect of ever-increasing radioactive waste generation and nuclear safety problems. No domestic legislation on nuclear issues has yet been passed. Legal restrictions on the siting and construction of the power stations theoretically exist under the Law on Environmental Protection, but currently, there are no uniform and enforceable standards against which to measure the possible harmful radiation effects of such projects and the required implementing legislation has not yet been passed. Furthermore, the veil of secrecy traditionally surrounding all nuclear matters has made the subject of radioactive contamination close to taboo. Without epidemiological norms and environmental standards in place, proving that proposed nuclear facilities would be dangerous or illegal is virtually impossible for Russian citizens. The Nuclear Waste Law would strengthen the ability of local authorities and the public to control the environmental impact of such projects and to force state agencies and enterprises to provide for safe, sufficient radioactive waste disposal capacity before any given facility starts operating.

As Russia moves toward a privatized economy, environmental violations are bound to continue because pollution abatement equipment and other investments remain expensive. In fact, as the ruble declines in value and inflation soars, modern technology becomes even more expensive for Russians. Economic survival will supersede environmental remediation unless legal sanctions for violations are unyielding. The Nuclear Waste Law, in setting severe penalties, is a response to environmental abuse and neglect caused by irresponsible treatment of radioactive substances that continues to jeopardize not only the economy,

health, and safety of Russian citizens, but also the survival of Russia itself.

Multilateral aid to Russia and the other nuclear republics must be delivered to assist in the disarmament process and ensure non-proliferation of nuclear materials. The security of all nations is at stake. Resources from the military sector could be redirected toward investments in anti-pollution equipment for civilian production and nuclear site cleanup, but international intervention is necessary to help the Russian and other CIS states manage the radioactive legacy left by the Soviets. One of the justifications for the recent nuclear power program expansion was the lack of delivery of the promised aid from abroad to date. The resurgence of consolidated power in the nuclear ministries, still run by many of the same officials responsible for creating the radioactive quagmire in the first place, demonstrates the importance of a strong democratic approach to the problem. Democratic, decentralized decision-making on the siting and operation of nuclear waste and power facilities should make it more difficult and expensive to ignore the social and environmental costs of such activities.

Threats to dissolve the Parliament in late 1992 and throughout 1993 recall the many decades of authoritarian rule in Russia. President Yeltsin has reaffirmed his determination to call early parliamentary elections in the Fall of 1993 even though he can not do so constitutionally. The radical provisions for citizen participation and public access to information in the Law on Environmental Protection and the Nuclear Waste Law represent critical counterweights to this tendency to curtail any meaningful citizen involvement in policy-making, military-industrial development, and legal enforcement. The Soviet practice of deceiving the public and excluding them from such activities led to the current nuclear nightmare. The Russian Nuclear Waste Law provides an alternative, viable framework for the solution.