

NIS NUCLEAR SMUGGLING SINCE 1995: A LULL IN SIGNIFICANT CASES?

by Emily S. Ewell¹

Emily S. Ewell is a Senior Research Associate at the Center for Nonproliferation Studies, Monterey Institute of International Studies.

Between 1992 and 1994, there were at least seven unambiguous cases of diversion and recovery of weapons-usable nuclear material that appeared to be linked to the former Soviet Union. The Western nonproliferation community has referred to these as “significant cases” because they provided unequivocal evidence that it was possible for highly enriched uranium (HEU) and plutonium, the essential ingredients of nuclear weapons, to be stolen and traded on the black market. The first significant case involved the diversion of 1.5 kilograms (kg) of 90-percent-enriched HEU in 1992 from the Luch Scientific Production Association, a Russian nuclear research facility located outside Moscow in the town of Podolsk. The last case involved the recovery of 2.72 kg of 87.7-percent-enriched HEU in Prague, Czech Republic in December 1994. In all of these cases, the perpetrators were brought to trial and convicted. (See Figure 1 for a brief summary of all seven cases.) But more than three years have elapsed since that last case.

Between January 1995 and December 1997, dozens of cases of radioactive isotope smuggling, dozens of cases involving the smuggling of low-enriched uranium (LEU) and natural uranium, and approximately 15 cases of dual-use nuclear material smuggling were reported.² However, there has not been a single confirmed case involving even minute quantities of weapon-grade material that received coverage in the open source literature. Why?

This report will not attempt to answer that question definitively; instead it will present six possible explanations, both positive and negative, for this apparent lull in significant nuclear smuggling cases. The report will draw upon examples from “non-significant” cases—cases that definitely occurred but did not involve weapons-usable material—in order to gain some insight into possible significant nuclear smuggling cases that may have gone undetected. It would be easy to point to the recent lull in activity as evidence that nuclear smuggling is no longer a serious threat. And one certainly should not dismiss this more positive interpretation; however, the evidence provided by these cases appears to suggest that this would be a naïve conclusion.

OPTIMISTIC INTERPRETATIONS FOR THE LULL

There are two optimistic interpretations for this lack of significant cases, both of which assume that the quantity and seriousness of nuclear smuggling incidents, in fact, has declined. The first is that international assistance to secure nuclear materials in the newly independent states (NIS) has made a significant impact in the last three years. The second is that increased awareness of the seriousness of nuclear smuggling issues, among both policymakers and the general public in the NIS, has helped provide a positive deterrent to nuclear theft and diversion.

Figure 1: Overview of Cases Involving Weapons-Usable Nuclear Material

CASE NAME & DATE OF DIVERSION	MATERIAL DIVERTED	ORIGIN OF MATERIAL	RECOVERY OF MATERIAL	COURT RULINGS
Podolsk 5/92-9/92	1.5 kg of 90% HEU	Luch Scientific Productio Association Podolsk	10/9/92; Russian police operation intercepted the smuggler, Mr. Leoni Smirnov, in the Podolsk train station.	3/11/93; Smirnov received three years probation for stealing and storing radioactive material
Andreeva Guba 7/29/93	1.8 kg of 36% HEU	Naval base storage facility, Andreeva Guba	7/29/93; Russian security force arrested the thieves, Popov an Antonov, before they could smuggle the material out of Russia.	11/2/95; Antonov was sentenced to four years in prison, Popov to five years in prison.
Tengen Unknown	6.15 g of Pu-239	Unconfirmed; possibly Arzamas-16	5/10/94; Police in suspect Adolf Jaeckle's apartment for another reason, stumbled upon the cache.	11/23/95; Jaeckle was sentenced to two-and-a-half years in prison for illegal possession of fissile material.
Landshut Unknown	800 mg of 87.7% HEU	Unconfirmed; likely Obninsk	6/13/94; Undercover German police acted as potential customers in sting operation.	Two of the principal brokers, Gustav Illich and Vaclav Havlik, received 19 and 13 months in prison respectively.
Sevmorput 11/27/93	4.5 kg of 20% HEU	Naval Shipyard, Sevmorput	6/94; The brother of a suspect asked a co-worker for help finding customer. The co-worker notified authorities.	The two main thieves, Aleksei Tikhomirov and Oleg Baranov were sentenced to three-and-a-half years in prison.
Munich Unknown	560 g MO fuel; 363 g of Pu-239	Unconfirmed; likely Obninsk	8/10/94; Undercover German police acted as potential customers in sting operation.	4/24/97; The three primary brokers, Justiniano Torres, Julio Oroz, and Javier Bengoechea, were sentenced to four years, 10 months; three years; and three years, nine months, respectively.
Prague Unknown	2.7 kg of 87.7% HEU	Unconfirmed; likely Obninsk	12/14/94; Anonymous tip to police giving the material's location (a parked car).	10/97; Four players in this complicated case were given sentences ranging from three to nine years.

Source: Table II-B, "Highlights of Significant Fissile Material Smuggling Cases," *Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapon, Fissile Material, and Export Controls 5* (March 1998), p. 106; and "Czech Supreme Court Increases Sentences for Uranium Smugglers," CTK (Prague), April 28, 1998.

Impact of International Assistance

International assistance programs, and in particular U.S. assistance programs, have worked hard over the last three years to address the threat of nuclear material smuggling in the NIS. The largest such program is the U.S. Department of Energy's Material Protection Control and Accounting (MPC&A) Program, which grew out of the Nunn-Lugar Cooperative Threat Reduction program. The mission of this program is to "reduce the threat of nuclear proliferation and nuclear terrorism by rapidly improving the security of all weapons-usable nuclear material in forms other than nuclear weapons" in the NIS.³

The scope and pace of implementation of the MPC&A program increased dramatically in 1995, which corresponds roughly to the drop in significant nuclear smuggling cases. The number of NIS nuclear sites with agreements in place for MPC&A cooperation more than

doubled from 1994 to 1995, jumping from nine to 19 sites.⁴ The program continued to expand over the next three years, covering 53 sites in eight countries in 1998. In addition, the annual budget for the program increased from \$11 million in 1994 to \$137 million in 1998.⁵ Among those sites which received extensive MPC&A upgrades are the Luch Scientific Production Association and the Institute of Physics and Power Engineering in Obninsk—sites from which fissile materials are believed to have leaked (See Figure 1). As a result, there has been a tangible improvement in physical security at many of these sites. At some sites, physical protection literally increased from a rusty padlock on an old gate to a sophisticated system of detectors, video monitors, vaults, and alarms. New equipment now allows nuclear facilities to move their material accounting systems from hand-written ledgers to computerized networks.⁶ Other countries that have made contributions to securing and accounting for nuclear material include Japan, Germany, Sweden, and

the United Kingdom.

Another initiative that is aimed at the prevention of nuclear smuggling is the U.S. Department of Defense-Federal Bureau of Investigation Counterproliferation Program. This relatively new program, which only began to make significant progress in 1997, is designed to provide counterproliferation training and equipment to law enforcement and border guard officials, supplying information to and raising awareness among a key group of previously neglected NIS officials. It focuses primarily on the "southern tier" countries of Central Asia and the Caucasus—a region that was virtually ignored by U.S. nonproliferation programs in the early 1990s.

Thus, it is conceivable that these programs have made it significantly more difficult to physically divert, illegally transport, and sell nuclear materials.

Increased Awareness in the NIS

Awareness has increased among policymakers, nuclear scientists, and the general public in the NIS regarding the need to prevent nuclear smuggling through better MPC&A at nuclear facilities, as well as through more effective law enforcement, customs controls, and border controls. The increased salience of the issue is due in part to such factors as the April 1996 Nuclear Safety Summit in Moscow, at which Russia admitted officially for the first time that nuclear smuggling was a problem requiring serious attention. Periodic meetings of the U.S.-Russia Joint Commission on Economic and Technical Cooperation keep attention focused on these issues.⁷ Lastly, periodic conferences, workshops, and training seminars on MPC&A issues, as well as regular interactions between U.S. scientists and contractors with their counterparts at NIS nuclear facilities, have helped to sensitize scientists and other employees at NIS nuclear facilities to the dangers of nuclear smuggling.

The above events are receiving a great deal of coverage in the local press. Whereas five years ago, Russian papers frequently published articles about the mysterious and lucrative black market in nuclear materials, today they are more likely to run stories about the sophisticated technology and equipment being used to secure nuclear materials at the Kurchatov Institute in Moscow, the Institute of Physics and Power Engineering in Obninsk, or Russian naval sites.⁸

The current higher visibility of efforts to prevent and deter nuclear smuggling may increase the likelihood that

a potential smuggler would think twice before attempting to divert and sell nuclear materials.

PESSIMISTIC INTERPRETATIONS FOR THE LULL

Despite the optimism of the above points, there are at least four pessimistic interpretations for the apparent lull in significant nuclear smuggling cases over the past three years. These interpretations assume that smuggling, in fact, continues to occur undetected.

Lack of Information/Intelligence Sharing

As noted above, there has not been a single *confirmed* case involving the smuggling of weapons-usable material since the Prague case in December 1994. However, there have been a few *reported* cases, about which there is very little information and which have not been corroborated by independent sources. These potentially significant alleged cases include the seizure of 3.05 kg of weapons-usable uranium in St. Petersburg (Russia) in March 1994⁹; the loss of a fresh fuel assembly containing 145 g of Uranium-235 from Tomsk Polytechnical University (Russia) in late 1994 or early 1995¹⁰; the seizure of 6 kg of 20 percent HEU in Kiev (Ukraine) in March 1995¹¹; the theft of seven kg of HEU from a Pacific Fleet naval base at Sovetskaya Gavan (Russia) in January 1996¹²; and the possible theft of a small quantity of HEU from the Vekua Institute of Physics and Technology in Sukhumi (Georgia).¹³

The St. Petersburg and Kiev cases were reported briefly in the NIS press, but there was no subsequent coverage of the investigations or trials, if indeed any took place. These cases, as well as the Sovetskaya Gavan case, have been mentioned in analytical articles and reports in Western journals and gray literature, but without any detailed or clear information about the material itself, the perpetrators, the circumstances of the theft, the method of recovery, or any subsequent investigation or trial.¹⁴ In private conversations, NIS officials have offered limited information on the Kiev, Tomsk, and Sukhumi cases, but not enough to provide unambiguous evidence that these cases indeed involved the intentional diversion of weapons-usable nuclear material.¹⁵

These are just the cases that have been hinted at in press reports and by NIS officials. In addition, a Russian criminologist working on nuclear smuggling issues recently said that Russian law enforcement officials knew

of multiple diversions of fissile material from the closed nuclear cities, but that this information had not been released to the public.¹⁶ It is also worth noting that many NIS countries still have a state controlled press. The discovery by law enforcement officials of a major nuclear smuggling transit operation would be unlikely to make it into the newspapers in Uzbekistan, for example. Of those cases that have been reported in the press, an unusually high number appear to have taken place in the Baltics.¹⁷ This possibly misleading pattern may be explained, at least in part, to the fact that the press is more free and independent in this region.

Despite intelligence-sharing agreements that were made at the April 1996 Nuclear Safety Summit, there appears to be very little intelligence sharing on nuclear smuggling cases.¹⁸ If these cases are based in fact, then clearly there is evidence that NIS officials are aware of smuggling cases, but have not shared this information with their Western counterparts in any detail.

Smugglers Are Becoming More Sophisticated

It is conceivable that nuclear smugglers have become more savvy—have developed more streamlined communications with potential customers and are using less circuitous routes to bring their products to market. The “visible” market in nuclear materials is characterized by amateur criminals with no real buyers.¹⁹ More sophisticated smugglers likely would use sophisticated networks of insiders at nuclear facilities. These insiders likely would have a higher rank within the facilities than participants in the “visible” market, and certainly would include facility management. Such smugglers might be more likely to manipulate the system to their advantage, through customs fraud, for example. Indeed, Russian customs officials have stated in interviews with the press that the easiest way to smuggle nuclear materials would be to simply falsify the customs declaration.²⁰

Lastly, sophisticated smugglers would be more likely than their amateur colleagues to avoid detection. They might conceivably move their illicit nuclear materials south across the borders of the Central Asian and Caucasian countries, making use of existing narcotics trade routes and avoiding Europe altogether. According to one newspaper account, more than 200 tons of narcotics are moved illegally across the borders of Tajikistan each day. Only 10 percent of this amount is caught by the police, as drug couriers prefer to smuggle their goods along treacherous mountain passes that are virtually un-

guarded.²¹ While narcotics are primarily shipped from south to north, it is theoretically possible that these same smuggling routes could be reversed to ship HEU or plutonium from north to south.

There have been a few incidents in the past three years that serve as good examples of more sophisticated methods of nuclear smuggling. One case involves the illegal export of the isotope Iridium-192 from Radioisotope Factory No. 45 at the Mayak Production Association to a company in the United Kingdom.²² While Iridium-192 is certainly not weapons-usable, and the United Kingdom is not a country of proliferation concern, the case is interesting for several reasons:

- 1) The iridium was exported under falsified customs documents that had been prepared by the factory staff. The scheme was discovered only because, on one occasion, the factory sent a shipment of the iridium to a customs post in St. Petersburg, instead of to the local Kyshtym Customs Post. The customs inspectors in St. Petersburg were more experienced than their colleagues in the Urals, and noticed that the radiation level of the shipment did not match the radiation level stated on the customs documentation.
- 2) According to the newspaper *Chelyabinskiy Rabochiy* (The Chelyabinsk Worker), the factory director, Mr. A. Kalinovsky, personally ordered his staff to falsify the customs documentation.
- 3) Mr. Kalinovsky’s scheme involved multiple exports over a period of at least two years.
- 4) Although a local court found Mr. Kalinovsky guilty, he was only sentenced to six years probation. When the prosecutor protested to a regional court asking for a harsher sentence, not only was his request denied, but Mr. Kalinovsky’s sentence was actually reduced to four years probation.

This case is a clear example of a sophisticated smuggling scheme in which nuclear materials were illegally and repeatedly exported from a major Russian nuclear center with the direct involvement of facility management. This case happened to involve non-sensitive isotopes. But would the Kyshtym customs inspectors have been any more likely to intercept the illegal shipments had they contained HEU as opposed to isotopes? There is nothing to suggest that it would have been any more difficult to export weapons-usable materials than it was to export iridium. In fact, because HEU has a lower radiation level than many radioactive isotopes, it is particularly difficult to detect.

Another interesting case involves the export of over 100 kilograms of LEU and other assorted radioactive materials from the Ulba Metallurgy Plant in Ust-Kamenogorsk, Kazakhstan. This case involves a group of “procurers” from Ust-Kamenogorsk, Kazakhstan, and a group of “marketing specialists” from Novosibirsk, Russia. According to newspaper accounts, the Ust-Kamenogorsk group was led by Mr. P. Zenovyev, a former Ulba employee-turned-metals trader. The Novosibirsk group was led by Mr. Krinitsyn, a Novosibirsk businessman originally from Ust-Kamenogorsk.²³

In a May 1997 article, *Kazakhstanskaya pravda* reported that Mr. Zenovyev used his contacts at Ulba to recruit a number of mid-level employees at the Ulba Metallurgy Plant and the Ust-Kamenogorsk Lead-Zinc Combine to divert LEU, thorium, tantalum, and other strategic and radioactive metals. His group sold these materials to Mr. Krinitsyn. Mr. Krinitsyn’s marketing network consisted of six individuals, one of whom was a former Customs agent who helped ship the material to customers abroad. According to one article, \$3.5 million worth of shipments crossed the Kazakstani-Russian border en route to Krinitsyn’s group. Shipments were sent via passenger bus and ordinary car.²⁴

Eventually, the two groups were apprehended by the collaborative efforts of Kazakstani and Russian security services. Kazakstani security services arrested a group of 18 individuals in Ust-Kamenogorsk, including Mr. Zenovyev, for the theft of 146 kg of LEU, 439 kg of thorium, 58 kg of thallium, 20 kg of indium, and an undisclosed amount of tantalum. A Kazakstani regional court sentenced the group, which included five women, in December 1996. Mr. Zenovyev received eight years in prison.²⁵

The Russian security services observed two transactions by Mr. Krinitsyn’s gang before capturing Mr. Krinitsyn and his six colleagues in a sting operation. The two transactions included the sale of a small amount of “radioactive materials” to a Turkish citizen in the Russian city of Sochi, and another to a “Korean citizen” in Novosibirsk. The sting operation involved the sale of four kg of uranium for \$800,000. Subsequent searches of the suspects’ apartments revealed an additional 5.3 kg of uranium.²⁶

This case demonstrates that it is possible to establish complex insider networks within major nuclear facili-

ties. Although this case did not involve weapons-usable materials, it also demonstrates the ease with which nuclear material can be diverted and moved across internal NIS borders.

Materials Diverted before 1995

Weapons-usable material may have been diverted, but not exported, in the early 1990s. As noted earlier, the United States did not begin to make a significant effort to assist with MPC&A upgrades at NIS nuclear facilities until about 1995. It is conceivable that large quantities of weapons-grade or weapons-usable materials were diverted during the window of opportunity opened by the chaos resulting from the fall of the Soviet Union. Perhaps that material was not immediately exported, but set aside in various hiding places outside the boundaries of currently protected nuclear facilities. Would-be smugglers may be biding their time before making contact with serious potential buyers, or may be waiting until the climate is more permissive and the political attention on nuclear smuggling has diminished.

There were a number of cases reported between 1995 and 1997 that involved the discovery of nuclear material that had been diverted between 1990 and 1992. One such case involved the theft in 1992 of a 280 kg fuel assembly from the Ignalina nuclear power plant in Lithuania. The theft was discovered in 1993 during a routine inventory of nuclear fuel at the plant.²⁷ However, Lithuanian authorities recovered uranium fuel pellets and partially empty fuel rods that could be traced back to that same assembly on at least four separate instances in December 1994, March 1996, October 1996, and finally in June 1997, when one of the thieves, a former guard at Ignalina, turned himself in.²⁸ The former guard described how he and his cohorts had sold part of the material, and then buried the remaining material for sale at a future date.

Backlash against Western Intelligence Services’ Investigations

In the aftermath of the “Munich case,” a sting operation in which 363 grams of weapons-grade plutonium were smuggled from Moscow to Munich on a regular Lufthansa flight, there has been a noticeable backlash against intelligence services in general and sting operations in particular. There was a great deal of public outrage in Germany that an intelligence sting operation could involve the import of dangerous radioactive materials

on a passenger plane, thus endangering public health and safety. This led to a parliamentary investigation of the entire affair and a slew of accusations that there was not sufficient government oversight of the German intelligence service, the Bundesnachrichtendienst (BND).²⁹ As a result, the BND has been subjected to intense scrutiny over the last few years, with many of its officials called to testify before a special parliamentary commission regarding their knowledge of the Munich case. In addition, Russian officials made repeated accusations that Western intelligence operatives, in their zeal to set up sting operations, were creating an artificial market in illicit nuclear materials.³⁰

As a result, there may be a disincentive for Western intelligence services to actively pursue potential leads in this area. When they do come across information on cases, they may also be less inclined to publicize this fact. According to some sources, there have been instances when intelligence agents actually turned away nuclear material and refused to get involved in potential cases.³¹

NEED FOR FURTHER RESEARCH

Without doubt, progress has been made toward reducing the potential for nuclear smuggling. The NIS, the United States, and other countries should be proud of their accomplishments; at the same time, they should be wary of resting on their laurels. If one believes that there are individuals, sub-national groups, or nations that are interested in illegally obtaining weapons-usable materials, then one must acknowledge the possibility that attempts are being made to gain access to this material. Although the evidence presented in this report is not definitive, it provides “clues”—suggesting means and methods that might be used to smuggle weapons-usable materials. Each of these clues merits further research. Without such research, policymakers will assume that the threat has gone away and will allow those policies and programs that do exist to erode.

Perhaps one reason for the dearth of new research on nuclear smuggling is that there have not been any new significant cases to energize the nonproliferation community. In light of this fact, it might be helpful to redefine the term “significant case.” In the past, “significant case” has been used to mean the smuggling of weapons-grade, or at least weapons-usable, nuclear materials. But careful analysis of cases involving LEU smuggling and the smuggling of dual-use nuclear metals such as zirco-

nium and beryllium might also prove extremely useful.

Unlike the seven “significant cases,” all of which involved very small amounts of material, some of the dual-use and LEU cases involved hundreds of kilograms of material. One might well ask, where is this material going? Who are the buyers? One reason a smuggler might sell these materials on the black market, as opposed to the legitimate market, is to avoid national export control regulations with their requirements for international safeguards. LEU is not weapons-usable, but it is much closer to weapons-usable material than natural uranium. The technological processes required to enrich natural uranium to two or three percent Uranium-235 are significantly more complicated than those required to increase the enrichment level from three percent to 90 percent. If only those cases involving HEU and plutonium are considered to be significant, the theft of 100 kg of LEU is given no more consideration than the theft of two capsules of Cesium-137 from an industrial source.

It is also worth noting that nuclear smuggling is not a problem that is exclusive to the NIS region. In March 1998, Italian police seized a 10-kg uranium fuel rod that appears to have been manufactured in the United States for use in a nuclear research reactor in Kinshasa, Zaire.³² Indeed, if nuclear facilities in other countries were subject to the type of scrutiny to which NIS nuclear facilities have been subject over the past seven years, equally serious security problems might well be found.

Unless there is intensive, critical analysis of all aspects of nuclear smuggling, including those cases that have been deemed “insignificant” in the past, we cannot be sure that we understand the complete picture. The potential consequences of nuclear smuggling are too serious to abandon the issue prematurely.

¹ This report was adapted from a presentation at the “Fissile Materials Workshop #5,” February 3-4, 1998, hosted by the Lawrence Livermore National Laboratory and the USAF Institute for National Security Studies. The author wishes to thank Dr. William Potter for encouraging her to prepare this presentation for the February workshop, and for drawing her attention to a number of substantive points made in this paper. For the purposes of this report, “NIS” is defined as all 15 of the newly independent states of the former Soviet Union: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

² These numbers are based upon an evaluation of the entries for the 24-

month period January 1995 to December 1997 in the NIS Nuclear Smuggling Database, Center for Nonproliferation Studies, Monterey Institute of International Studies, Monterey, CA.

³ U.S. Department of Energy, *MPC&A Program Strategic Plan*, January 1998, p. 8.

⁴ *Ibid.*

⁵ *Ibid.*, p. 15.

⁶ *Ibid.*, and personal observations by the author at nuclear research facilities in Georgia, Kazakhstan, Ukraine, and Uzbekistan in May 1996, February 1997, and June 1997.

⁷ Also known as the Gore-Chernomyrdin Commission (GCC). It is unclear what this commission will be called in the future, now that Sergei Kiriyenko has replaced Viktor Chernomyrdin as Prime Minister. A number of nuclear facilities were added to the MPC&A program at GCC meetings. See Gore-Chernomyrdin Commission website, "Energy Policy Committee: Statements and Agreements," (<http://www.eia.doe.gov/gorec/statea.html>).

⁸ See, for example, Alevtina Polyakova, "Kurchatovskiy Institut ishchet zashchitu," *Nezavisimaya gazeta*, August 15, 1997, p. 6; "Maksimalnyi rezultat s minimalnymi zatratami," *Atompressa* (14/251), April 1997, p. 4; Boris Konovalov, "Radiation in a 'Stone Sack': Moscow's First Line of Defense Against Nuclear Terrorism is in Obninsk," *Nezavisimaya gazeta*, December 5, 1996, p. 6; Vladimir Gundarov, "Utilizirovat atomokhody pridetsya v dolg," *Krasnaya zvezda*, March 13, 1998, p. 1.

⁹ Evgeniy Solomenko, "Tri Kilogramma Urana—V Rukavitse," *Izvestiya*, June 9, 1994, p. 2; Andrey Ishchenko, "Uranium Transported in Passenger Railcar and Stored in a Cool Place—Details about the Exposed Affair of the Misappropriation of Uranium-235," *Novaya Yezhednevnyaya Gazeta*, June 16, 1994; in FBIS-SOV-94-118 (20 June 1994), p. 41-42; and Dr. William Potter, "Before the Deluge? Assessing the Threat of Nuclear Leakage from the Post-Soviet States," *Arms Control Today* 25(October 1995), p. 11.

¹⁰ "Doslovno. Gosatomnadzor Rossii: Obnaruzheno Propazha 145 Gramm Urana S Obogashcheniyem 90 Protsetov," *Voprosy Bezopasnosti* 16 (October 27, 1997); in the NIS Nuclear Smuggling Database.

¹¹ Olga Musafirova, "Fresh Uranium Has Appeared in Kiev Stores," *Komsomolskaya Pravda*, April 4, 1995; in FBIS-SOV-95-064 (4 April 1995); and "Table II-B Highlights of Significant Smuggling Cases," in Monterey Institute of International Studies and the Carnegie Endowment for International Peace, *Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapons, Fissile Material, and Export Controls*, No. 5 (March 1998), p. 105.

¹² Rennselaer Lee, "Smuggling Update," *The Bulletin of the Atomic Scientists* 53, (May/June 1997), p. 55.

¹³ Dr. William Potter, "Less Well-Known Cases of Nuclear Terrorism and Nuclear Diversion in Russia," August 1997; in "Overviews," NIS Nuclear Profiles Database.

¹⁴ See, for example, Andreas Heinrich and Heiko Pleines, "Russia's Nuclear Flea Market Tempts Smugglers," *Transition* (November 17, 1995), pp. 9-11; Potter, "Before the Deluge: Assessing the Threat of Nuclear Leakage from the Post-Soviet States"; *Nuclear Nonproliferation: Status of U.S. Efforts to Improve Nuclear Materials Controls in the Newly Independent States*, General Accounting Office Report to Congressional Requesters, March 8, 1996; Statement of John Deutch, Director of the Central Intelligence Agency, before the Permanent Subcommittee on Investigations, Committee on Governmental Affairs, "The Threat of Nuclear Diversion," March 20, 1996; Lee, "Smuggling Update," p. 55; and Graham Allison, "Nuclear Dangers," *The Boston Globe*, October 19, 1997, p. C1.

¹⁵ Ukrainian, Russian and Georgian officials, interviews with NIS Nonproliferation Project staff, 1996 and 1997.

¹⁶ Informal seminar by Russian criminologist (name withheld upon request), Center for Nonproliferation Studies, Monterey Institute of International Studies, November 21, 1997.

¹⁷ According to the NIS Nuclear Smuggling Database, there were approximately 35 cases of radioactive or nuclear materials smuggling from the Baltic States of Estonia, Latvia, and Lithuania between January 1995 and December 1997.

¹⁸ Dr. William Potter, "Less Well-Known Cases of Nuclear Terrorism and Nuclear Diversion in Russia," August 1997; in "Overviews," NIS Nuclear

Profiles Database.

¹⁹ Rennselaer Lee has written and spoken about the "visible nuclear black market" as opposed to a possible, more sophisticated "shadow market" in a number of articles and presentations on nuclear smuggling. For example, see Lee, "Smuggling Update," pp. 52-56. The "visible market" would include the numerous smuggling incidents reported in the Monterey Institute's NIS Nuclear Smuggling Database involving primarily non-weapons-usable material.

²⁰ Interview with the head of the Urals Customs Division Nikolai Cherepanov, "Na Tamozhne Net Realnogo Kontrolya Radioaktivnykh Materialov," *Yadernyy Kontrol* (August/September 1997), pp. 29-30.

²¹ Grigoriy Sanin and Stepan Dvornikov, "Caravans Move to the North: Narcotics, Cotton, Uranium the Cause of a National Tragedy in Tajikistan," *Segodnya*, August 14, 1996; in FBIS-SOV-96-208-S (29 October 1996).

²² This case has been reported on in two Russian regional newspapers: Viktor Riskin, "Mechenyye Izotopy," *Chelyabinskiy Rabochiy*, June 26, 1997, p. 2 and Dmitryy Zobkov and German Galkin, "Tamozhenny Post—Na Yadernom Obyekte," *Aktioner (Chelyabinsk)*, October 31, 1997, p. 1; both in the NIS Nuclear Smuggling Database.

²³ Gulnara Bekturova, "Ukrast Uran? Net Nichego Proshche," *Kazakhstanskaya Pravda*, May 14 1997, pp. 1, 3; in the NIS Nuclear Smuggling Database.

²⁴ *Ibid.*, and Maria Soloveva and Mikhail Kalinin, "Prestupniki Mogli Pogruzit V Samolet Dazhe Atomnyu Bombu," *Kommersant Daily*, December 3, 1996, p. 10; in the NIS Nuclear Smuggling Database.

²⁵ Vladimir Bogovitskiy, "V Ust-Kamenogorske Zavershilsya Sudebnyy Protseess Po Delu O Khishchenii Yadernogo Topliva I Redkikh Materialov," *Panorama*, February 21, 1997; in the NIS Nuclear Smuggling Database.

²⁶ Maria Soloveva and Mikhail Kalinin, "Prestupniki Mogli Pogruzit V Samolet Dazhe Atomnyu Bombu," *Kommersant Daily*, December 3, 1996, p. 10; in the NIS Nuclear Smuggling Database, Center for Nonproliferation Studies, Monterey Institute of International Studies, Monterey, CA.

²⁷ "Krast Uran Ne Nuzhno, On Togo Ne Stoit," *Segodnya*, March 10, 1993, p. 7 and Ashura Radzyavichyute, "Uran Byl Ukraden S Ignalinskoy AES," *Diena (Riga)*, June 13, 1997, pp. 1, 4; both in the NIS Nuclear Smuggling Database.

²⁸ "Confiscated U May Be Part Of A Lost Fuel Assembly," *Nuclear News*, February 1995, p. 63; Donatos Stravinkas, "V Vasiginase Naydena Chast Ukradennoi S Yadernym Toplivom," *Golos Lity*, March 14, 1996, p. 2; "Police Find Some of Nuclear Fuel Stolen From Ignalina," *Interfax (Moscow)*, October 31, 1996; and Ashura Radzyavichyute, "Uran Byl Ukraden S Ignalinskoy AES," *Diena (Riga)*, June 13, 1997, pp. 1, 4; all in the NIS Nuclear Smuggling Database.

²⁹ There are numerous abstracts on the German parliamentary investigation into the "Munich affair" in the NIS Nuclear Smuggling Database. For example, see "BND, LKA Withheld Transcript In Plutonium Scandal," ARD Television Network (Munich), March 7, 1996; in FBIS-WEU-96-047 (7 March 1996); Mark Hibbs, "Opposition Asserts Pu Sting Got Out of Control; Schmidbauer Lied," *Nucleonics Week*, April 27, 1995, pp. 5-6; and Mark Hibbs, "Schmidbauer, Agencies To Be Probed On Bonn Plutonium Sting Operations," *Nuclear Fuel*, April 25, 1995, pp. 2-3.

³⁰ For example, see Interview with Gennadiy Evstafiev, "Yadernaya mafia v Rossii. Pravda I Mify," *Vek*, September 22-28, 1995, pp. 4-10. In the interview, Evstafiev, a department head in the Foreign Intelligence Service, declared that the Munich affair occurred only due to "provocation." See also, "No Information About Leakage of Nuclear Materials," ITAR-TASS News Agency, December 22, 1995.

³¹ U.S. government official involved in the investigation of the Munich case, interview with CNS staff member, Bonn, Germany, April 1996.

³² "Uranium Bar Seized in N-Trafficking Gang Bust Made in US," broadcast on RAI "Uno" Television Network (Rome), March 20, 1998; in FBIS-WEU-98-079 (20 March 1998); and "More on Nuclear Ring; Uranium of US Origin," ANSA (Rome), March 20, 1998; in FBIS-WEU-98-079 (20 March 1998); both cited in NIS Nuclear Smuggling Database.