TITLE: ARZAMAS-16: ECONOMICS AND SECURITY in a CLOSED NUCLEAR CITY

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EXECUTIVE SUMMARY

Abstract: An American specialist on the Soviet and Russian military-industrial complex examines the economic, social and political tensions within one of the most important, closed nuclear cities in Russia. Based on an intensive examination of the city's daily newspaper, not heretofore available in the West, the author explores the implications of the current situation for prospective nuclear accidents or proliferation.

Much concern has been raised recently about the potential for insufficiently controlled nuclear materials to be stolen from one or more of Russia's closed nuclear cities. There is also concern that highly trained nuclear weapons scientists from these cities might emigrate to unstable Third World regions. Two incidents are cause for particular attention to this matter. First are Russian claims that 36 nuclear scientists tried to emigrate to North Korea in 1992, but were stopped at the border. Second is evidence that one fifth of an ounce of 99.75% pure plutonium-239 found in Germany in 1994 has a "fingerprint" indicating that it may have come from Arzamas-16, the flagship of Russia's closed nuclear cities. If proved correct, either of these incidents would indicate a link between the closed cities and nuclear proliferation.

This report contributes to the analysis of this situation by shedding light on current economic and social conditions in Arzamas-16. An exhaustive review of the city council newspaper in Arzamas-16, Gorodskoi Kur'er, indicates that the chaos of economic reform and the breakdown of centralized power in Russia appears to be threatening the safe handling and control of nuclear materials in the city. The new-found combination of low state salaries and work prestige, opportunities for quick economic gain through private activity in a climate where illegality is the norm, and a low state budget for upgrading the nuclear facilities is a recipe for potential disaster.

First, there are reports that--as elsewhere in Russia's military and security forces--soldiers guarding the city's tightly-controlled perimeter have deserted their posts. 20 such cases were

1Forthcoming in Post-Soviet Affairs.
reported in the year preceding March 1993. Again, as elsewhere in Russia’s military and
security forces, the presence of disgruntled soldiers may indicate the potential for corruption.

Second, the dismantling of nuclear warheads occurring in Arzamas-16 may not be
environmentally safe. At a roundtable discussion in November 1992, many senior researchers
and engineers in the city argued that while the probability of a nuclear explosion occurring
during dismantling was close to zero, the problem of radioactive dispersion due to an
accidental conventional explosion had not been sufficiently studied in advance. As of February
1994, there was still concern that the structures where dismantling is occurring would be
unable to contain the effects of a conventional explosion. This is particularly disturbing
because of a series of accidents that have occurred in the closed cities in recent years,
including a February 1994 fire in a ventilation system in one of the Arzamas-16 buildings
where radioisotope work takes place. This problem is aggravated by the fear that if workers
complain too loudly about the situation, the work will be taken away from the city and moved
elsewhere.

Third, the city is currently suffering from the lack of state financing for nuclear programs.
Salaries have plummeted, and (as is true throughout Russia’s defense complex) it has become
common for nuclear workers to receive their wages late. The nuclear physics institute in
Arzamas-16, VNIIEF, is in particularly hard circumstances at the moment, since it has been
unable to find much of a market for its civilian conversion projects. It therefore has great
hopes that cooperation with its American counterparts, particularly the Los Alamos Nuclear
Laboratory, can help it to survive. Growing U.S. congressional doubts about the advisability
of continued funding for Nunn-Lugar programs may put this relationship in jeopardy, leaving
the Arzamas-16 laboratory with no work and no funds.

Fourth, each of these problems is being aggravated by the privatization schemes undertaken by
the nuclear facilities in recent years. Throughout the past two years there has been great
conflict in the city over the question of who owns pieces of the nuclear installation’s property:
the city government, or the enterprises (until 1992, there was no city government in Arzamas-
16, and all affairs in the city were controlled by the Ministry of Atomic Energy through the
enterprises).
One of the highest priorities of the management of VNIIEF, in particular, has been to retain its workforce by encouraging the privatization of spin-off companies located on enterprise property. The city has complained that many of these privatizations occurred illegally, without following the practices demanded by the regional affiliate of the State Property Committee. To some extent, the conflict revolves around access to rent and other purely economic control issues. But many of these spin-offs apparently lack proper documentation and contracts. This means that classified information can potentially leak out through them. Furthermore, some of them apparently have contracts which give them eventual rights to ownership of the installation’s equipment and labs, after they have rented that equipment and space from the installation for 5 to 10 years.

Labor conflict is another result of this privatization. There is resentment over the high salaries that middle-level managers can obtain through joint work at both the installation and their spin-offs, salaries that workers without access to the spin-offs are denied. As elsewhere in Russia’s defense complex, there is also resentment about the fact that the spin-offs, because they are located inside shops and divisions of the mother enterprise, are getting artificially cheap access to energy and other raw materials from the installation, at a time when worker wages are suffering because of the installation’s budget crisis. In the newspaper, workers have publicly excoriated enterprise managers for following unfair and corrupt policies.

While spin-off privatization may be a source for profit by middle managers, labor conflict can be dangerous in installations where nuclear materials are handled daily. When combined with apparent holes in the control of those materials, and with apparently inadequate safety precautions, this breakdown in discipline could be disastrous.

It is not clear that more money could solve these problems, but it is clear that the absence of money is exacerbating them. The Russian budget is currently tight enough that significant new funds are unlikely to be forthcoming domestically. In this case, the U.S. and other Western governments have a strong security interest in doing what they can to support the safe and stable restructuring of Arzamas-16 and the other closed nuclear cities.
During 1994, much alarm was raised in Europe and the United States by evidence that nuclear materials which may have come from one or more of Russia's closed nuclear cities had been stolen and smuggled to Germany. Through testing at the Los Alamos National Laboratory in New Mexico, most of the smuggled material was proven to be a plutonium/uranium mixture called Mox. This product's composition is too low-grade to have been produced in a reactor for military weapons, but is consistent with the civilian nuclear power output of the Mayak reactor in Chelyabinsk-65, one of Russia's nuclear cities (Broad in *The New York Times*, August 17, 1994; *International Herald Tribune*, August 20-21, 1994). One case, however, does not seem to fit this pattern. In May 1994, German police seized one-fifth of an ounce of bomb-grade, 99.75 percent pure plutonium-239 (Atkinson in *International Herald Tribune*, August 29, 1994). At first, German authorities said that its manufacturing "fingerprint" indicated that it came either from Chelyabinsk-65, or from Tomsk-7 or Krasnoyarsk-26, two of the other ten nuclear cities (*Associated Press*, July 17, 1994; Yasmann, 1994b). A month later, a representative of the European Union's nuclear control agency, Euratom, announced that this material could have come from Arzamas-16, the flagship city of Russia's closed nuclear complex (de Waal in *The Moscow Times*, August 25, 1994).

Throughout August and September 1994, the Russian press was filled with angry denials from officials that any plutonium or weapons-grade uranium was missing from stockpiles. Many of these reports accused German officials of rumor-mongering to gain votes in the upcoming national elections. Others accused the West of whipping up hysteria in an effort to take control of Russia's wealth in nuclear materials (Solov'yev in *Segodnya*, September 6, 1994). The director of the Avangard plant in Arzamas-16, responsible for the dismantling of nuclear warheads under START treaty provisions, affirmed in a September 1994 interview that "every gram" of the warhead material is carefully watched and reliably contained (Kuz'mich in *Krasnaya Zvyezda*, September 14, 1994). Yet, a few months earlier, representatives from the nuclear physics institute in the same city complained that "the institute has received practically no money for improving the technical means of guarding [materials] in recent years" (*Gorodskoy kur'yer*, June 11, 1994).

No definitive public statement has been made by any of the involved actors about the provenance of the seized substances. Yet there are confirmed reports throughout the Russian
press that major thefts of non-weapons-grade uranium-238 have been attempted both in Chelyabinsk-65 (*Associated Press*, July 8, 1994; Yasmann, 1994a), and in Arzamas-16 (Borodin in *Gorodskoy kur'yer*, April 21, 1994; Lein in *The Moscow Tribune*, August 25, 1994). Thus, it is possible that Russia's closed nuclear cities may not be fully "closed" to the exit of dangerous nuclear materials.

Nor may they be closed to an exodus of highly trained nuclear scientists, tempted to emigrate to any of several unstable Third World countries that express interest in developing their own nuclear bombs. While Russian authorities claim to have stopped 36 nuclear scientists at the border in 1992 as they attempted to emigrate to North Korea, and cite this as an example of the effectiveness of their controls (Mostovshchikov in *Izvestiya*, December 22, 1992), it is not clear that these controls can work indefinitely. The fact that the scientists tried to leave is disturbing enough, but there is further evidence of high-level motivation to ignore the dangers of nuclear proliferation, if not to foster it. Thus, the Russian Minister of Atomic Energy, Viktor Mikhailov, who has jurisdiction over the closed nuclear cities, contradicted the Russian Foreign Ministry in June 1994, arguing that sanctions against North Korea were unnecessary and that the International Atomic Energy Agency was placing "excessive demands" on North Korea (Foye, 1994a).² Feelings of solidarity with North Korea thus appear still to be strong among some members of the community of Russian scientists who aided the development of Pyongyang's civilian nuclear program in the Soviet era.

Until now, not much has been known about the situation on the ground in the closed nuclear cities of Russia, at least not in the unclassified literature. Very few Westerners have been granted access to the cities; those allowed in have been there primarily to attend scientific conferences, rather than to report on local conditions. There have been very few articles on the cities in the central or provincial Russian press. It has thus been difficult for outsiders to understand what life in those cities is really like, or the actual incentives and opportunities impinging on nuclear scientists living there.

We may now have a unique chance to fill in some of the gaps in our knowledge through a case study of life in Arzamas-16, the original, and still most prominent, of the nuclear cities. The author has exhaustively reviewed a fairly complete set of issues of the newspaper published by the city's Council of People's Deputies³ during the period, February 25, 1993 through June 11, 1994. The articles in this newspaper, *Gorodskoy Kur'yer* [*City Courier*], reveal in often poignant detail the social, economic, and safety problems facing the inhabitants of Arzamas-16.⁴ In the current economic crisis, residents face many of the same problems confronting Russians elsewhere, but their dilemmas are made more acute by both the closed
nature of their city, and the potential dangers associated with their work. Foreign researchers, who may still be unwelcome inside city walls, can thus use *Gorodskoy kuryer* to assess the international implications of local conditions and politics within Arzamas-16. In particular, I have found that the economic problems currently facing Russia's closed nuclear cities directly affect the probability of nuclear theft, brain drain, and accidental releases of radioactive materials into the environment. While the specific situations in the ten closed nuclear cities may differ from each other, their overall concerns are likely to be quite similar, given the similarity of their profiles. Hence, the contentious issues in Arzamas-16 probably reflect parallel dilemmas found elsewhere in Russia's nuclear weapons complex.

The overall problem may be stated simply: the chaos of economic reform and the breakdown of centralized power in Russia appears to be threatening the safe handling and control of nuclear materials in Arzamas-16 and in the other nine nuclear cities. The new-found combination of low state salaries and work prestige, opportunities for quick economic gain through private activity in a climate where illegality is the norm, and a low state budget for upgrading the nuclear facilities is a recipe for potential disaster. It is not clear that more money alone could solve these problems; it is clear that the absence of money is beginning to tear apart the fabric of discipline and morality that once held these closed cities together.

Before turning to an analysis of the problems of Arzamas-16, as reflected in its daily newspaper, one caveat needs to be recorded: *Gorodskoy Kuryer* is not a dispassionate or distant observer of events. Its editorial staff has taken some firm political positions. For example, the editors sided with the labor union in its complaints against the manager of the All-Russian Scientific Research Institute of Experimental Physics (VNIIEF), Arzamas-16's nuclear laboratory facility, in disputes over wages and benefits. The editors also favored an emphasis on the city's history as the site of an Orthodox Christian monastery, rather than its more recent historical role in Soviet defense. This distinction became important in a debate over how to rename the city. Some defense workers wanted to call it Kremlyov, the name it was secretly given by the USSR Supreme Soviet in 1954 to reflect its role as a “citadel” of state security. The newspaper instead urged citizens to insist that it be named Sarov after a Russian Orthodox monastery on the site which was closed in 1927. The newspaper won the point, since two-thirds of the city's population approved the City Council's decision to adopt the name, Sarov (*Gorodskoy kuryer*, March 3 and March 31, 1994). Notwithstanding these editorial biases, *Gorodskoy Kuryer* is for now the best window available on daily life and politics in Russia's closed nuclear cities.
CONTROL OVER POPULATION MOVEMENT

Russia's ten closed nuclear cities never appeared on any Soviet map. We now know that Arzamas-16 is located around 75 kilometers southwest of Arzamas, a city of approximately 111,000 inhabitants (near Nizhnyy Novgorod), that also specializes in defense-related production. The name, "Arzamas-16," is said to refer to the location's postal code. According to Andrey Sakharov, who was based there from 1950 through 1968, Arzamas-16 was built among the huts of impoverished peasants, who "could see nothing but a barbed-wire fence enclosing a vast expanse" (Sakharov, 1990, p. 113). Until recently, Arzamas-16's inhabitants faced severe restrictions on their ability to travel elsewhere in the Soviet Union and even to make domestic inter-city telephone calls (Sakharov, 1990, pp. 115, 119). They still may not write to foreigners without permission from the enterprise director (Borodin in Gorodskoy kur'yer, April 21, 1994).

According to former Arzamas-16 resident Pavel Felgengauer, now a prominent Russian reporter on defense-related issues for the Moscow newspaper Segodnya, during the Gorbachev era residents could finally call other cities in the USSR as long as they used an operator, and relatives living outside the city finally received the right to visit family in the city once a year. While residents now reportedly have the right to travel in and out of the city freely, Felgengauer claimed in July 1992 that a list still existed of restaurants in Moscow that Arzamas-16 citizens were forbidden to visit (Felgengauer in Megapolis-Express, July 22, 1992), presumably because these establishments were known to be the gathering places of foreign spies. Moreover, travel abroad for Arzamas-16 residents continued to be regulated long after the collapse of the USSR. Reportedly, as of late 1992, the Ministry of Security maintained a list of nuclear scientists who were to be detained in any attempt to cross Russian borders until their supervisors could be notified to grant permission (Mostovshchikov in Izvestiya, December 22, 1992). While inhabitants of the city who were not occupying sensitive positions were permitted to go abroad (to get married, for example), this was only possible because "these people were not informed of state secrets," and were thus not considered to be security risks. Entrance by foreigners into Arzamas-16 was also tightly controlled. In the year preceding March 1993, according to the Chief of the Arzamas-16 City Department of the Ministry of Security, 80 visitors from abroad entered the city, but "around 20 delegations were refused entrance" (Borodin in Gorodskoy kur'yer, March 2, 1993). Reportedly, 45 days were needed for a foreigner to be cleared for entrance (Moscow Correspondent, 1993-94). Russians who were not themselves residents of the city were also required to obtain a permit to enter.
The city's residents apparently viewed this security regime as usefully limiting the incidence of crime and gang activity in Arzamas-16, since outsiders, both Russian and non-Russian, could not gain entry without being closely watched thereafter. Yet there was one aspect of the rules that seemed to disturb many residents. Children from the city who married or took jobs in parts of the USSR that are now in the “near-abroad,” particularly Ukraine and the Baltic countries, could visit their families in Arzamas-16 only by special permit. If family members from Arzamas-16 who were employed in sensitive positions tried to cross the borders of Russia to visit them in the near-abroad, they could be fired from their jobs (Borodin in Gorodskoy kur'yer, March 2, 1993). The break-up of the USSR has thus had an unusual impact on residents of this city: it left some of their immediate relatives stranded not merely outside their former country, but outside their family circles as well.

These strict regulations have allowed Russian authorities to claim that no scientists with uniquely sensitive nuclear knowledge have left to work for unstable regimes abroad. These same authorities also claim that no significant quantities of weapons-grade material have been smuggled abroad. Yet, while military contingents still man the barbed-wire fences surrounding Russia’s nuclear cities, there are conspicuous holes in these defenses. For example, the head of the municipal department of the Ministry of Security reported that soldiers, as elsewhere in Russia, were deserting their posts; 20 such cases were reported in the year preceding March 1993 (Borodin in Gorodskoy kur'yer, March 2, 1993). Thefts of uranium-238 indicate that insiders desperate for cash will wait to take advantage of any breaches in the security perimeter that might arise. Although residents of closed cities were known throughout Russia for their high level of moral rectitude and discipline (Felgengauer in Megapolis-Express, July 22, 1992), given the security regime under which they were educated, even they have not been immune to the breakdown of order and state authority in Russia. Apparently, moral rectitude and discipline have been compromised by a crumbling of the coercive and material incentives that had previous reinforced them.

CONTROL AND SAFETY AT NUCLEAR INSTALLATIONS

Safety at nuclear installations has become a major issue in Arzamas-16, exacerbated by funding shortages of recent years. Gorodskoy Kur'yer held a roundtable discussion in late 1992 among those in Arzamas-16 responsible for nuclear safety, to hear what their perspectives were on the issue. All of them—the Chief of the Sector for Reliability of Nuclear Charges, the chief of a research section, the deputy chief of a design section and another of a design group, the
Chief of the Laboratory on Longterm Elaborations, and the chief of a theoretical section—agreed that there were inadequate safeguards in place. Vasilyy Petrovich Zhogin, the deputy chief of a design section, claimed, "We, the specialists, knew very well [before START I was signed] that the technology and production for this [dismantling of nuclear charges] was not at all ready. The problem was not even posed to the specialists before the political decision was made" (Gorodskoy kur'yer, November 4, 1992). All of the participants agreed that while the probability of a nuclear explosion was close to zero, the problem of radioactive dispersion had been inadequately studied in advance. All of them also agreed on the danger of having disgruntled employees working on such delicate operations.

According to Vladimir Mikhailovich Gerasimov, who is said to have been working primarily on safety issues for twenty years, the installations were not designed with high safety standards in mind. "Our understanding of safety then was fundamentally different. Earlier we thought that the release of plutonium was a trifling matter [yerunda], that it could be practically contained locally at the place of the accident" (Gorodskoy kur'yer, November 4, 1992). Zhogin stated that they had no buildings in which non-nuclear explosions could be safely contained, to lower the risk of radioactive dispersion (Gorodskoy kur'yer, November 4, 1992). A more recent report indicated that work on the dismantling of one kind of cartridge has been stopped because of a problem with the volatility of the explosive materials. It confirmed that "the special structures [where dismantling is occurring] cannot localize the results of a conventional (non-nuclear) explosion if, despite expectations, this happens. At present a search is on for places where the dismantling of these and several other types of cartridges could be organized" (Gorodskoy kur'yer, February 26, 1994). While it was proposed then to move the work to exhausted underground mines located far away from populated areas, the article left unclear when such a move was expected to take place.

In late January 1994, a fire broke out in a ventilation system that was under repair in one of the buildings in which work involving radioisotopes took place. "A smoldering filter did not succeed in containing a radioactive compound," but apparently the release was minor enough that safety was not compromised, and the population was not alerted (although schoolchildren were apparently sent running out of classrooms) (Gorodskoy kur'yer, January 29, 1994). More serious accidents that also resulted in the release of radioactivity occurred in two other nuclear cities, Tomsk-7 and Cheliabinsk-65, during 1993. A presidential investigator at Tomsk-7 apparently found evidence of four previous accidents there that had never been reported (Moscow Correspondent, 1993-94).
Unfortunately for the workers at Arzamas-16, the threat of such accidents presents them with a dilemma. On the one hand, they would like to complain loudly to the central government about their fears, so that they could obtain more funding to build safer installations for warhead dismantling, and to ease their concerns about disgruntled workers. On the other hand, they fear having the work taken away from them. According to Gerasimov, "The worst thing would be if now, under the influence of public opinion, they stopped dismantling at Avangard [the nuclear weapons production factory--KMZ]. That would be a blow to the whole city" (Gorodskoy kur'yer, November 4, 1992). He added that theoreticians at Avangard had written a letter to the Atomic Energy Ministry expressing their fears, and that the Ministry had called the First Deputy Scientific Director of the nuclear physics institute in response, telling him to ensure that panic was not spread over the issue (Gorodskoy kur'yer, November 4, 1992). Thus, candor about nuclear dangers may be incompatible with the economic health of the city.

**SOCIAL AND ECONOMIC VIABILITY**

In the past, one of the mechanisms for ensuring the loyalty of Arzamas-16 employees was the special treatment they received. Sakharov (1990, pp. 114, 117) reported that he and his colleagues received "huge" salaries, and that those who worked at the nuclear installation within Arzamas-16 received better service than did other residents of the city, at the state-run hospital, for example. The law "On Closed Administrative-Territorial Regions" (ZATOts, in the Russian abbreviation), adopted by the Russian Supreme Soviet in July 1992, was designed to ensure continued favorable treatment for ZATO residents. They were given the right to go on retirement pension two years earlier than the rest of the population and to receive their old salaries for six months if they were laid off and had to search for other work. The state also promised them free health, property, and life insurance.8

These measures, while providing a safety net of sorts, could not cushion residents of Arzamas-16 from the crisis in the broader Russian economy that was unfolding in that very year, and that would deepen during 1993. As in the rest of the Russian defense complex, salaries were often paid late, if at all, as state orders for nuclear weapons disappeared. During a payments crisis in late-June 1993, when workers had not yet received their April wages, much less those for May or June, the Arzamas-16 collectives threatened to go on strike.9 The authorities had promised in mid-June to deliver the unpaid wages, along with a state credit to pay off large debts to energy and water suppliers who were threatening to cut off installation...
supplies (Sladkov in *Gorodskoy kur'yer*, June 12, 1993); but these did not arrive until early July. In the interval, authorities halted the dismantling of nuclear warheads at the Arzamas-16 Avangard factory. As one observer explained:

Fearing the consequences of possible carelessness in the work of employees who haven’t received their salaries for two months, it was decided in the Center not to allow its workers to participate in work on the dismantling of nuclear weapons, [and] to interrupt all generally dangerous kinds of work.\(^{10}\)

More recently, scientific workers from Arzamas-16 were “prominent among the protestors” at a June 1994 demonstration outside Moscow’s Ostankino television tower against proposed cuts in the Russian defense budget (Lepingwell, 1994). At present it is unclear whether the economy of the city will be able to support its residents much longer. In mid-1993, Arzamas-16 had a reported population of 82,648 (*Gorodskoy kur‘yer*, September 9, 1993). But it contained only three major enterprises, all of which were related to activities geared toward the development and production of nuclear weapons: (1) VNIIEF, the nuclear physics institute; (2) Avangard, the associated factory that built the first Soviet atomic bomb in 1951, and in which nuclear warheads have been produced and are now being dismantled (*Zavalishin in Gorodskoy kur‘yer*, June 17, 1993);\(^{11}\) and (3) the Sarov Construction-Industrial Joint Stock Company, an organization which, until 1992, was part of the “basic enterprise,” (*Bulgakov in Gorodskoy kur‘yer*, June 17, 1993), and was apparently responsible for most construction in the city. In addition to these major enterprises, the city has rented out most of its municipal property, which formerly belonged to the nuclear installation, to private craftspeople and shopkeepers. If they receive official permission, outsiders may relocate to the city to run businesses there, but as yet there is no evidence that many have tried. Certainly, there is no reason to expect that unemployed nuclear scientists would necessarily become profitable shopkeepers.

Given Russia’s overwhelming need to open its economy to the developed world, and given the current international political and legal climate, it is unlikely that the Russian state will allocate significant resources to nuclear weapons construction in the foreseeable future. President Yel’tsin has in fact announced that, for these very reasons, a plutonium production plant at one of the ten nuclear cities, Krasnoyarsk-26, will be closed by the year 2000 (Foye, 1994c). The fact that state funding has plummeted has thus put at risk the viability, not just of specific enterprises, but of the entire city as well.

The major enterprises in the city are currently occupied to varying degrees with an array of tasks. "Avangard" is being kept at least partially busy with state orders for dismantling nuclear warheads under provisions of the START treaty although, as elsewhere in Russia's
defense complex, the state seems to be in continual debt to the enterprise for orders already completed. The "Sarov" construction company, in turn, has reportedly been playing an important role in shoring up and rebuilding structures damaged by such calamities as the 1986 accident at the Chernobyl nuclear power plant in Ukraine, the 1988 earthquake in Armenia, and a 1988 train accident in the city of Arzamas, where 117 tons of exploding materials on board killed 91 people, injured 744 others, and destroyed 1,094 homes and 160 other buildings.\textsuperscript{12} But the nuclear physics institute has been left largely without a state-financed role in the post-Cold War order. It faces problems that resemble those of U.S. nuclear weapons laboratories, but with a much larger number of employees, and with fewer sources of alternative funding.\textsuperscript{13}

None of the three facilities seems capable of surviving for long on state financing alone; each has therefore been pursuing other options. As of mid-1993, VNIIEF had 18 "conversion projects" in progress, ranging from energy production, environmental conservation, and nuclear energy safety to shoe and textile manufacturing and agricultural machinebuilding. It was cooperating with the Nizhnyy Novgorod automobile company GAZ in the production of a passive restraint system, and with the Arzamas Equipment-Building Factory in making equipment for the gas industry.\textsuperscript{14} Reportedly, as of December 1993, these conversion projects had netted VNIIEF orders worth 50 billion rubles (Sladkov in \textit{Gorodskoy kur'yer}, December 23, 1993). However, the activity does not appear to have relieved the Institute of the need for large sums of state support. In 1993, the Institute received 77 percent of its income from the Russian state budget, and an additional 1 percent from the funds of the Ministries of Atomic Energy and of Science; 19 percent came from unspecified "production services," and 3 percent from "contracts" (Sladkov in \textit{Gorodskoy kur'yer}, December 23, 1993). According to one reporter, "[P]eople are not fully occupied. There isn't money for the acquisition of materials: the buildings and equipment need repair; the threat of layoff from work has become common" (Sladkov, 1993). The director of the Institute, Vladimir Aleksandrovich Belugin, stated in January 1994 that the facility had undergone a disappointing year, and that "In general, for me personally, this was a year of vain hopes" (\textit{Gorodskoy kur'yer}, January 13, 1994). The Institute had spun off 41 small commercial enterprises; but it is not clear from press reports who received the income from these ventures or how well they were doing. We will have more to say below about these small enterprises.

The state-owned Avangard seems to have done somewhat better in its conversion efforts. During 1993, it was working with the All-Russian Scientific-Research Institute of Medical Instrumentation on the production of a kidney dialysis machine, and was striving to make this
"Renart" Association, the center for all artificial kidney research and manufacturing in Russia, replacing Russia's current dependence on foreign suppliers (Saratova and Sladkov in Gorodskoy kur'yer, September 16, 1993). Avangard was also at work on the design of a car engine filter planned for use on all Russian-made VAZ models by the end of 1994 (Saratova in Gorodskoy kur'yer, February 10, 1994). For the past 25 years, the plant had also been producing security alarms, and is able to boast that these have been installed at the presidential dacha, the Lenin Mausoleum, the Tret'yakov Gallery, the Kremlin Armory, and the buildings that used to be owned by the Central Committee of the Communist Party of the Soviet Union (Saratova in Gorodskoy kur'yer, June 19, 1993). The demand for such alarms is not likely to decline in the post-Soviet disorder. As of mid-1993, Avangard's civilian production was worth 600 million rubles per year (sales and profit levels are not available), and it was opening its own retail outlet to sell security alarms directly to the public (Saratova in Gorodskoy kur'yer, June 19, 1993). Like VNIIEF, Avangard has also spun off a number of privately-owned small enterprises.

The Sarov Construction-Industrial Company (formerly known as Universal Building Organization [US] 909) had facilities for fabrication of concrete, mortar, reinforced concrete, asphalt, brick, and woodworking; it could produce a wide variety of building materials and could build almost any construction object on demand (Bulgakov in Gorodskoy kur'yer, June 17, 1993). As of mid-1993, it was conducting only 30 percent of its work in Arzamas-16; the rest was divided among the city of Nizhny Novgorod, the Nizhny Novgorod region [oblast], and the regions of Mordoviya, Priazov'ye, and Astrakhan (Bulgakov in Gorodskoy kur'yer, June 17, 1993). Unlike VNIIEF and Avangard, the government did not consider its basic facilities to be too strategic to undergo privatization. Indeed, in 1993 governmental plans called for retaining 49 percent of the enterprise as federal property for a period of three years, while permitting the other 51 percent to be sold to the workers' collective in a closed sale (Bulgakov in Gorodskoy kur'yer, June 17, 1993). As the only construction facility in the city, presumably this enterprise will be kept employed in the future by contracts from the local area. Nonetheless, as in other former state enterprises in Russia, the company faces problems of non-payment for its orders, and losses due to workplace drunkenness (Poltavtsev in Gorodskoy kur'yer, May 21, 1994).

Beyond these domestic civilian projects, the authorities in Arzamas-16 seem to have placed their economic hopes on contracts with Western and other foreign organizations. By mid-1993, VNIIEF had signed memoranda or protocols with the American national weapons laboratories, the Chinese Academy of Engineering Physics, the French Atomic Energy
Commission's Department of Military Applications, the Central Bureau of Nuclear
Measurements of the European Community, and the Institute of Physics of the Czech Academy of Sciences. It had also concluded contracts to supply Vietnam with 4000 perforators worth $100,000, and to supply the European Community's Bureau of Nuclear Measurements with ultra-clean transuranium elements worth $60,000 (Gorodskoy kur'yer, June 19, 1993).15

Institute officials appear to be especially proud of their relationship with the Los Alamos Nuclear Laboratory of the United States. The institute newspaper claims that the Americans spent $100,000 on “the organization of the visit of a VNIIEF delegation to American scientific centers in November 1992” (Gorodskoy kur'yer, June 19, 1993). “Close cooperation” with Los Alamos16 began in 1991, with financing from the United States Congress, specifically the fund to support dismantling of Soviet weapons of mass destruction and the conversion of that sector to civilian production (Staar, 1993). The two sides have exchanged several visits.

Authorities in Arzamas-16 have publicly treated this relationship as transcending mere business ties. For example, the municipal newspaper printed articles praising the pen-pal program started between school children in the two cities (Mikhailova-Listrem in Gorodskoy kur'yer, September 9, 1993). But, predictably, not all personnel were as enthusiastic about the new links. The head of the local branch of the Ministry of Security, A. K. Borodin, stated that the agreements signed with the Americans “could have been more thoroughly worked out to guarantee an equivalent volume” of intellectual property exchange; he felt they were signed too quickly, without enough attention paid to the loopholes that the American special services could exploit (Gorodskoy kur'yer, March 2, 1993).

While personnel of the U.S. Los Alamos laboratories have been very much interested in cementing their relationship with Arzamas-16, viewing their joint experimental projects and exchanges of advice as a contribution toward counterproliferation efforts,17 it is not clear that the U.S. Congress, increasingly restive about the effectiveness of American aid to Russia, will continue to fund the Nunn-Lugar programs at their current levels. Certainly, it does not appear that the current level of American commitment will be sufficient to sustain employment for the 24,000 employees at VNIIEF or the 10,000 at Avangard. While the Western press reported in August 1994 that American nuclear laboratories were working closely with their Russian counterparts to improve security at the installations, unnamed US officials claimed that the Russian Ministry of Atomic Energy was resisting some of Washington's efforts at cooperation (The New York Times, August 18, 1994; International Herald Tribune, August 29, 1994). Arzamas-16 thus finds itself in an economic crunch with implications for international security.

The authorities have reacted nimbly to the need to diversify customers, supplies, projects or
partners, and to find work for their employees. But their efforts to do so may have been insufficient to head off a loss of economic and social viability, and have been complicated by legal disputes.

**CONFLICTS OVER LEGAL JURISDICTION**

Many of the difficulties Arzamas-16 has faced in coping with economic reform have been due to a murky division of rights and responsibilities among various authorities. This ambiguity of jurisdiction led to ongoing political battles for control over policies and property. The most basic problem, the long-term implications of which remain unclear, is to determine whether the city should be considered part of the Nizhny Novgorod region, or instead as part of the Russian Republic of Mordoviya. Its territory straddles the boundary between the two (Gorodskoy kur’yer, June 5, 1993). Ninety-five percent of the actual territory of the city is officially in Mordoviya, but in terms of everything from ethnic mix to industrial production profile, the city's inhabitants identify with Nizhny Novgorod (Sladkov, 1993). An occasional column in Gorodskoy kur'yer on regional events, entitled “V gubernii [In the Province],” makes clear this loyalty to Nizhny Novgorod.

More important for the practical issues facing the city, the Russian ZATO law of 1992 established a new pattern of responsibility for city affairs. The federal government retained its right to set the official geographical boundaries of the closed cities, the allotment of land and financing to nuclear enterprises, and the provision of security forces that guard the cities. For the first time, however, municipal governments were assigned responsibility for monitoring environmental quality in the cities and dealing with local property issues (Ustyuzhanin in Rossiyskaya gazeta, July 30, 1992). And many obligations remained vaguely stated; for example, it remained uncertain which authorities were responsible for the provision and maintenance of housing, as well as for insuring the population against accidents (Sladkov in Gorodskoy kur’yer, June 3, 1993).

Municipal authorities in Arzamas-16 seemed particularly unhappy about having been given responsibility for ensuring the safety of the citizenry in the event of an accident at the installations, especially given the rash of accidental radioactive releases in closed nuclear cities in recent years (Karataev in Gorodskoy kur’yer, July 10, 1993). The Association of Closed Cities of the Ministry of Atomic Energy, representing the municipal governments of the ten closed cities, met to work out a unified position on these questions, but their situations differed enough from each other that a common stance was often difficult to achieve (Sladkov in
Gorodskoy kur'yer, June 3, 1993). Most of the personnel in the city administrations had at one
time been employees of these installations (Khven' in Gorodskoy kur'yer, November 4, 1993),
and were thus undoubtedly at least somewhat familiar with nuclear safety procedures.
However, since the city governments themselves were only established in 1990 (Sladkov, 
1993), they probably lacked established procedures for ensuring nuclear safety, leaving them
quite unprepared to deal with exigencies.

Ambiguity in responsibilities also caused significant friction to develop between the
nuclear research institute and the municipal government on a number of issues involving
property maintenance and ownership. The major problem was that neither body had sufficient
resources to accomplish all that it was legally required to do. The municipal government
complained in February 1993 that “our budget was without deficit, with the exception of the
fact that full compensation of VNIIEF for the maintenance of infrastructure is impossible for
us” (Saratova in Gorodskoy kur’yer, February 25, 1993). Adding some color to his
observations, one city official reportedly exclaimed: “There is one small but important
difference between the state budget [which supports VNIIEF] and the city budget...: the state
has a printing press [for rubles]” (Khven' in Gorodskoy kur'yer, September 9, 1993). The level
of disgruntlement was revealed in a comment about the experience of Arzamas-16 residents
who had visited the Los Alamos City Council in New Mexico. Wrote an Arzamas-16 reporter
with apparent amazement,

There are seven people on the council, elected by the entire population of the city,
and they alone decide all questions. They work on a voluntary basis, without
receiving any pay. The professionals working in the city council apparat merely
carry out their decisions. When we asked about the level of their professionalism,
they told us: “They reflect the opinions of the inhabitants of the city...As far as I
know, they interact well with the leadership of the Los Alamos National
Laboratory. It’s true that I was unable to ask how they resolve conflictual situations
that arise (Sladkov in Gorodskoy kur'yer, January 15, 1994).

Residents of Arzamas-16 lack experience with a society in which the laboratory is not
politically synonymous with the town.

Curiously, one issue that led to unusual rancor between VNIIEF and the municipal
government was the question of who owned the VNIIEF preschool, and what its future would
be. At first, it might seem startling that nuclear physicists and engineers would spend their
time arguing about preschool education. Managers of nuclear facilities in the United States, for
example, would not have to concern themselves with such issues, since the private lives of
employees and their families are lived off-campus. But in Arzamas-16, as elsewhere in
Russia’s defense complex, the enterprise was politically, economically and socially synonymous with the town, and there was no strict division between worklife and homelife.

In this case, the city government claimed that VNIIEF was spreading intestinal illness among the children by failing to repair a decrepit kitchen facility in the preschool. VNIIEF, in turn, responded that the city would be unable to maintain the high quality of care that the children were receiving (Korochkina in Gorodskoy kur’yer, February 23, 1993). These concerns for children’s health were probably sincerely felt. But fuller analysis of this debate makes apparent that the real issue was actually the disposal of the building which housed the preschool. The Institute wanted to keep the building as its own, and to use the space for “conversion work,” while giving the city responsibility for the upkeep and expenses of a preschool to be run in a different location (Zaguskina in Gorodskoy kur’yer, June 12, 1993). Municipal authorities responded that this would disrupt the “microregional” infrastructure of the city and force families to endure a commute to the new locale (Zaguskina in Gorodskoy kur’yer, June 12, 1993). Yet there is reason to believe that hidden motives were at work. City authorities were apparently eager to gain control of the facility and to rent it out to private businesses (Korochkina in Gorodskoy kur’yer, February 23, 1993).

VNIIEF delayed resolving the matter for several months, causing much handwringing. In July and August 1993, however, it ran out of money for paying salaries, much less running a preschool, and the city had to give VNIIEF credits to pay for food for the preschoolers Gorodskoy kur’yer, July 10, 1993). That appeared to decide the issue of formal jurisdiction, for by February 1994, the preschool was listed among the VNIIEF facilities that had become municipal property.20 By April, the preschool was charging parents 15,600 rubles per child per month (about ten percent of the average Russian wage at the time), and was renting out empty space on the property.21 Newspaper reports available to the author leave unanswered the question of how the building is currently being used.

PROBLEMS OF PRIVATIZATION

The battle between VNIIEF and the city over who owned the preschool is symptomatic of many other contentious privatization issues facing Arzamas-16. A large number of VNIIEF “departments of worker supply” (“ORS” or otdelyeniya rabochego snabzheniya) were handed over to the city in 1993. In addition to the preschool, these included the city water and sewage system, and a variety of wholesale and retail outlets that provided Institute employees in the past with subsidized goods and services (Gorodskoy kur’yer, February 3, 1994). This transfer
process was also protracted, since in many cases it remained unclear whether the city or the federal government owned the ORS.

VNIIEF and Avangard each owned farms, now independent and apparently in dire need of investment and workers, as installation employees no longer make the yearly pilgrimage to the harvest (Saratova in Gorodskoy kur'yer, September 23, 1993). VNIIEF's energy plant also declared itself an independent actor and opened its own bank account. The plant collective had hoped to pay itself salaries out of the money it brought into the Institute from the city, but by the end of 1993 the energy plant found itself in debt to its natural gas suppliers because of back-payments owed by VNIIEF and Avangard (Zaguskina in Gorodskoy kur'yer, December 16, 1993).

In April 1993, the city managed to declare the entire ORS a new City Trade-Production Enterprise, which paved the way for privatization of its functions (Artem'yev and Ablesyov in Gorodskoy kur'yer, June 17, 1993). Yet a major dilemma remained for the closed city: many of these outlets were monopoly providers of certain goods and services to the population, and residents were therefore completely dependent on these outlets for basic household needs (Artem'yev and Ablesyov in Gorodskoy kur'yer, June 17, 1993). The only alternative was to make a more than thirty-mile trek to the city of Arzamas, a trek that in itself required transiting security checkpoints for each exit from and entry to Arzamas-16. And even the open city of Arzamas was not positioned to handle an approximate doubling of consumer demand. If Arzamas-16's one or two vegetable wholesalers were to disappear, the populace would have no clear way of obtaining vegetables. As a self-contained installation, then, Arzamas-16 did not have many outside trade links upon which to fall back.

To ensure that such basic provisions would continue, the city began selling and/or renting the former ORS facilities to the highest bidder, but with a stipulation in the contract that the production profile of the facility must be retained for 15 years. In an indication of the communitarian value system of the city, these enterprises were also required to retain their workers collectives for a period of one year, with no significant decrease in the number of personnel employed.22

Also alleviating the consumer situation somewhat was the emergence of some highly motivated entrepreneurs. The Fruit and Vegetable Combine, for example, found cheaper supply sources after becoming independent, and somehow managed to cut its workforce by 50 percent. It demands fixed contracts from its buyers, giving it "wasteless output" of both raw vegetables and its own tomato paste, potato chips, and sauerkraut; and it is turning a profit (Rezenko in Gorodskoy kur'yer, December 25, 1993). In an additional example of apparent
success, a conglomerate called TOFIS owns a number of department stores, in addition to its own knitting and sewing enterprises and tradehouse. Its sales have been high, it has negotiated direct contracts with a number of foreign firms, and it has avoided laying off any workers, while continuing to provide them with salaries and benefits packages high enough to foster a competitive labor market in the city (Katayeva in *Gorodskoy kur'yer*, June 3, 1993).

Yet these seem to be the exception. Municipal controls have limited both the amount of competition among small businesses, and their flexibility in pursuit of profits. Chayka, the lone knitwear shop in the city, and Elektron, another monopoly producer, put all their income back into workers' wages, and by September 1993 were in danger of closing (Saratova in *Gorodskoy kur'yer*, September 9, 1993). Some in the city regretted the dearth of competition among firms, arguing that consumers ultimately benefit from such competition (Artem'yev and Ablesimov in *Gorodskoy kur'yer*, June 17, 1993). Others argued that, in the absence of competition, continued state subsidies were needed to ensure the functioning of the city (Saratova in *Gorodskoy kur'yer*, September 9, 1993). As elsewhere throughout Russia, acknowledgement of the positive aspects of capitalism clashes with the perceived need to take care of the local population harmed by its arrival.

**RETENTION OF LABOR AND CADRES**

Privatization issues became enmeshed in labor issues at the Arzamas-16 nuclear installations, which had an insufficient number of orders to keep their personnel occupied. The dominant response of leading personnel was to seek ways to protect the viability of the institution by preventing an outflow of cadres. Thus, from the perspective of Igor' Nuriyev, Chief of Production of Technical Means of Protection at Avangard, "the fundamental goal today is to keep the collective. To give people work so that they don't leave, since the cadres have been trained for decades" (Saratova in *Gorodskoy kur'yer*, December 16, 1993). V. Belugin, Director of VNIIEF, expressed a similar view: "There is only one goal [for the future]: to preserve [VNIIEF] as a scientific center" (*Gorodskoy kur'yer*, January 13, 1994). In a speech to the VNIIEF labor collective, Belugin is reported to have said:

"Unfortunately, a significant reduction of our workforce has begun, with two-thirds of those leaving (and this is 1,670 people) consisting of highly qualified cadres....In an attempt to keep qualified scientific cadres, the institute has created small enterprises" (*Gorodskoy kur'yer*, December 23, 1993).
In other words, one of management’s highest priorities has been to keep the collective (and thus the town) together, even if this means having personnel with security clearances working on projects that are not under the control of management.

But spinning off small enterprises also brings direct benefits to the projects of institute managers. According to one source writing in September 1993, “Practically no businessman today, either large or small, wants to work directly with a large state enterprise such as VNIIEF.” Because of the institute’s huge debt, potential contractors feared they would not get paid; also, contract registration taxes were higher for those working with the state institute than for those working with the associated private small enterprises. As a result, “under the cover of the small enterprises, contracts are being executed whose clients would not transfer [them] to the institute” (Sladkov in Gorodskoy kur’yer, September 4, 1993). Business was kept in the town.

City administrators expressed anger that both VNIIEF and Avangard split off parts of their property to rent to private small enterprises without first clearing this with the Municipal Property Committee. Especially upsetting was the loss of municipal revenues: “Money for the rent, naturally, went to them, and was not shared with the government” (Khven’ in Gorodskoy kur’yer, January 29, 1994). In August 1993, the city, working with the Nizhny Novgorod regional administration, put together a committee to investigate the legality of the privatization transactions. As the committee concluded,

A whole range of violations of laws and decrees of the President of the Russian Federation were revealed....There was no permission from the Nizhny Novgorod Committee on Administering State Property to let them for rent, and there is as yet no list of the property attached, with rights of full economic control, to [the installations] (Gorodskoy kur’yer, August 5, 1993).

Particular ire was raised when Avangard sold some machine tools to a small enterprise and kept the money for itself, even though the Municipal Property Administration Committee had already earmarked the money for the city schools (Gorodskoy kur’yer, August 5, 1993). As of the end of 1993, rents at many of the small enterprises were apparently absurdly low (reports range from 20 rubles—at that time equivalent to 1 U.S. cent—per square meter per year, to 76 rubles per square meter per year) (Gorodskoy kur’yer, August 5, 1993; and Khven’ in Gorodskoy kur’yer, January 29, 1994). These low rents accruing to the installation perhaps indicate that the arrangement was serving the economic or political purposes of the individuals arranging the deals, rather than serving as a means of direct income for the installations per se. Many of the owners of these new businesses are installation managers.
To a certain extent, this was merely a replay of the conflict over the VNIIEF preschool. Both the city and the nuclear installation managers wanted the money and other personal benefits that came from renting property. But several troublesome issues were raised by the city regarding the fact that apparently illegal activities were being carried out at the nuclear installation.

First, scientists and technicians were working at the small enterprises on company time, since there was an insufficient number of state orders to keep them occupied during the workday. This meant, for example, that workers could ask their bosses technical questions that might be appropriate for classified state orders, and then apply the answers, unbeknownst to the boss, to non-state projects. Workers no longer needed the permission of management to work on private projects; in fact, managers reportedly did not even have the right to know who was working in which small enterprise (Sladkov in Gorodskoy kur'yer, September 4, 1993). Thus, control over classified intellectual property had evaporated.

Second, some of the contracts signed for renting space at the installation contained clauses indicating that the renters might eventually take possession of the involved property. According to one report, some of the contracts stipulated that those who are not in possession of the property, but who voluntarily and openly control it as owners, for not less than 15 years for immovable property, and for other property no less than 5 years, will acquire the right of ownership on this property (Khven' in Gorodskoy kur'yer, January 29, 1994).

The colorful report continued:

To put it simply, the guys from these associations, those who are the most brazen, can in five years, on a legal basis, say, 'Excuse me, friends, but these machines and equipment are mine.' And after another ten years, they can say it about the buildings of the shop or laboratory (Khven' in Gorodskoy kur'yer, January 29, 1994).

Since many of these small enterprises had not been properly registered with the state, the state had no apparent control over who would end up owning pieces of the nuclear installation. All faith was put in the individuals from the installations who signed the contracts.

Third, the arrangement fueled conflicts within the labor collective between those who were making money off the small enterprises and those who were not. The collectivism of Soviet culture again became an issue here, because the workforce as a whole had always been told that it was working together on projects for the common good. Yet now the bold entrepreneurs were using the installations' intellectual property for individual profit (Sladkov in
And, as in the case of the municipal shops that had been privatized, some of the installations' small enterprises were making profits, at a time when the installations of which they had once been a part were foundering.

For example, a firm called "Binar," established in 1989 by VNIIEF employees, and whose workforce was largely comprised of former VNIIEF and Avangard specialists, apparently enjoys a virtual monopoly in Russia on the mass production of some key automated systems for natural gas extraction. By mid-1993, VNIIEF considered this firm, whose knowledge base must certainly have benefited from VNIIEF inputs, a competitor (Mikhailova in Gorodskoy kur'yer, December 2, 1993). In a state with an established intellectual property rights system, such an arrangement would have been challenged by the parent company, probably successfully, as a violation of patents or trade secrets. In Arzamas-16, the spinoff seemed delighted to parade its success before the press.

While the spinoffs whose activities have been reported in the press do not seem to have a defense component, this does not necessarily mean that small enterprises with a military orientation do not exist. One article in Gorodskoy Kur'yer claimed that VNIIEF was participating in two "competitions" to make weapons for non-Russian customers. According to this article, the small enterprises could receive permission "to administer work with state secrets" (Sladkov in Gorodskoy kur'yer, September 4, 1993).

Simpler labor issues have further exacerbated the situation. As we noted above, there have been many reports in the press of discontent about wage levels in Arzamas-16. Perhaps the saddest was a letter to the editor written by female VNIIEF workers about a market fair [yarmarka] that VNIIEF was sponsoring for its employees. They wrote:

We lose count of how many times [the fairs] are held on the institute's initiative, but they bring no joy to those of us who work there. Our pay is continually withheld. People are running away from VNIIEF--what more will there be? We sit at home and have nowhere to go. And earlier we said, 'Money can't buy happiness.' A little more of it would (Gorodskoy kur'yer, November 27, 1993).

Times have changed since Sakharov wrote of the huge salaries employees at the installation used to receive.

Undoubtedly due largely to poor pay and benefits, a great deal of conflict has arisen between the labor collective and the management of VNIIEF in particular. Throughout the spring and summer of 1993, there were numerous reports in the newspaper of acrimonious meetings of the VNIIEF labor council. The council complained that it was not allowed to participate in decisionmaking at the factory; it particularly objected that the management
distributed institute pay raises differentially, using a worker productivity measure (Khven’ in Gorodskoy kur’yer, March 18, 1993). The council also became angry when the institute director forbade it to hold unsanctioned meetings during work hours. As the council argued:

It doesn't follow from the law...that the director is boss over the STKI [the Council of the Labor Collective of the Institute]. To the contrary, the director is accountable to the labor collective and its elected organ (Khven’ in Gorodskoy kur’yer, May 20, 1993).

In April 1993, the council sent an appeal to Russian President Boris Yel’tsin about the crisis conditions at the institute. The former council chief, V. Punin, argued that the institute should declare itself bankrupt and create a liquidation committee in order to get the attention of the authorities. “Moscow visitors,” he said, “including the Minister [of Atomic Energy]...regularly utter speeches to conferences of the labor collective to lull them to sleep” (Zaguskina in Gorodskoy kur’yer, April 29, 1993). By July, the situation had apparently deteriorated even further. The council sent a unanimous memorandum to the Ministry which said, in part, “The conference of the labor collective reflects a lack of confidence in the leadership of the institute, which has not found a way to guarantee VNIIEF work and finances and has allowed a production, economic, and scientific crisis of the institute” (Gorodskoy kur’yer, July 31, 1993). The council accused management of lacking “businesslike cooperation with the scientific leadership of the institute, the council of the work collective of the institute [and] the city authorities,” and said that the director, Belugin, in particular, has “a confrontational, rude style of behavior” (Gorodskoy kur’yer, July 31, 1993).

In Spring 1994, the labor council accused management of having failed to fulfill the labor contract for the previous year, and VNIIEF had difficulty reaching an accord for the 1994 contract that is required of all state enterprises by Russian law. Some workers claimed that "the administration is working at [a grade of] three minus, but receiving pay at [a grade of] five plus" (Gal’chenko in Gorodskoy kur’yer, March 10, 1994). The labor council wanted to take away from the directors control over awards of prizes and bonuses to division managers (Kholin in Gorodskoy kur’yer, March 10, 1994). Particular anger was raised in the labor collective by profits that managers receive from the small commercial spinoffs. The workers claimed that VNIIEF was continuing to charge these spinoffs artificially low rates for rent and supplies (Katayeva in Gorodskoy kur’yer, March 12, 1994). According to the institute’s director, V. Belugin, an audit undertaken in response to the labor council’s complaints revealed that most of the 44 small-enterprise spinoffs "work for the benefit of the institute," acting as either a customer or supplier for institute business. This audit nonetheless recommended that
the institute cut off its support for nine of the spinoffs (Belugin in Gorodskoy kur'yer, April 21, 1994).

While conflict between labor and management is not unexpected during a time of economic upheaval, the fact that it is occurring among people responsible for the safety and security of nuclear materials has very disturbing implications.

CONCLUSION

In many ways, then, the economic well-being of enterprises and nuclear safety and security are at odds with each other in Arzamas-16, leading to dangers that state subsidies used to prevent. The absence of adequate state wages can lead workers to psychological despair or economic desperation, either of which could imperil nuclear safety and security in Russia’s closed cities. Impoverishment of the facilities themselves leads to inadequacy both of the physical structures where work proceeds and of the structures for controlling classified information and materials.

Privatization, while offering great opportunity to the entrepreneurial spirits who are taking advantage of its benefits, has aggravated the ability of VNIEF and Avangard to control the work that goes on there and the uses to which it is put. The opportunity for wealth that privatization engenders has also led to conflicts between city and installation and between workers and management, further endangering the fragile web of discipline and ethical behavior that held Arzamas-16 together and kept its materials in relatively safe hands.

A solution to these dilemmas is difficult to specify, particularly because it is impossible for outsiders, even in Russia, to measure how bad the economic situation really is. While we know that the problems in the nuclear cities are real, and that leaks in both security and safety have occurred, press reports and protest activity can be used by insiders to blackmail the government for more funds, whether or not more funds would really solve anything. At least one observer, Dmitriy Sladkov, a prolific Arzamas-16 reporter, believes that a feeling within the city of corporateness against the outside world allows local leaders to organize stronger pressure on the government than would be the case in most locations (Sladkov, 1993).

Even if we knew that money would ease the problems of Arzamas-16, there is no clear source for such money. The Russian legislature seems unsympathetic to demands by military officers that the defense budget be raised, and Prime Minister Viktor Chernomyrdin has already attacked defense industrialists for not using their own funds more wisely (Reuters, July 15, 1994). Perhaps faith should instead be put in the West. Yet there seems to be a general
lack of sympathy in the U.S. Congress at present for continuing to support defense conversion in Russia at even the level currently provided, given the perception that such money has not been well spent.

In addition to providing assistance for the construction of safer buildings and the payment of higher wages to those who might otherwise be tempted by theft or emigration, the West might be of use in the development of relevant socially-useful knowledge. For example, Western social scientists could try to specify the reasons that nuclear scientists and managers in the West stay reasonably honest in handling nuclear materials and installations. In all probability, it is neither the carrot of good salaries nor the stick of high fences and harsh punishment that keeps leaks of nuclear materials from happening constantly in the West. Instead, self-discipline may well reflect an internalized norm of morality, responsibility and honor, backed by confidence in the worth of the domestic political system and by the belief that one's fellow citizens deserve one's protection. Along with direct assistance to the closed cities, whether in the form of joint experiments with Western nuclear laboratories or as security service cooperation in stopping the theft of nuclear materials, the outside world might therefore attempt to build confidence in the viability of the Russian state and in the ultimate success of Russia's economic reforms. It could be that the perception of domestic chaos helps to create new crises, while trust in the future may head them off.
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ENDNOTES

1Assistant Professor of Political Science, and Faculty Associate of the Mershon Center, The Ohio State University. Research was generously supported by the Social Science Research Council/MacArthur Foundation Program on International Peace and Security, by the National Council for Soviet and East European Research, by the Stanford University Center for International Security and Arms Control, and by the Mershon Center at The Ohio State University. None of these organizations is responsible for the findings and contents of this report. The author thanks these organizations for their support, and David Holloway for advice and source materials.

2Also see similar statements made by Vladislav Kotlov, the purported Russian designer of the Pyongyang reactor, in Foye (1994b). Mikhailov's views echoed those expressed publicly by at least one other Russian nuclear scientist.

3Jurisdiction was taken over by the City Administration after Russian President Boris Yeltsin shut down most city councils in the country on October 29, 1993.

4Issues of this newspaper are available at the Russian State Library newspaper reading room in Khimki, just outside Moscow.

5In fact, a column called “Novosti desyatki A [News of the Atomic Ten]” appears regularly in the newspaper. The profiles of Arzamas-16 and Cheliabinsk-70 should probably be somewhat set apart from those of the other nuclear cities; these two specialize in warhead design, while the other eight are primarily suppliers of processed uranium and plutonium.

6For some reason, the town is called “Sarova” in several, but not all, Western sources.

7These were the words of Aleksandr Konstantinovich Borodin, Chief of the Municipal Department of the Ministry of Security (MB), as quoted in Gorodskoy kur’yer (March 2, 1993).

8The law is summarized by Vasiliy Ustyuzhanin in Rossiyskaya Gazeta (July 30, 1992).

9The progress of these events may be tracked in: Moscow Mayak Radio (June 11, 1993); Vladimir Gubaryev in Rossiyskaya gazeta (June 23, 1993); Moscow Radio World Service in English (June 23, 1993); and Russian TV Network (July 5, 1993). Each of these is available in English translation in Foreign Broadcast Information Service (FBIS), Daily Report - Central Eurasia (June 14, 1993; June 24, 1993; July 8, 1993).

10These are the words of Sergey Aleksandrovich Kholin, head of the theoretical section, interviewed by ITAR-TASS, as interviewed in Gorodskoy kur’yer (July 29, 1993).

11Also see Cochran and Norris (1993, pp. 29-33) for details about the technical work of both VNIIEF and Avangard.

12The accident is described by S. Kondakov in Nizhegorodskie novosti (May 6, 1992). The article notes that if the accident had happened two minutes later, a railroad car carrying nuclear materials from Arzamas-16 would have been involved in the explosion. On the role of “Sarov” construction company in the aftermath of these calamities, see Bulgakov in Gorodskoy kur’yer (June 17, 1993).
Moscow Correspondent (1993-94, p. 68) claims that while VNIIEF employs approximately 24,000 people and Avangard approximately 10,000, the Los Alamos and Lawrence Livermore laboratories in the United States employ only 900 people each.

The activities are listed in the article by Pyotr Shulžhenko in Gorodskoy kur’yer (June 17, 1993).

This information was reprinted from an earlier issue of Impulš, the Institute’s own newspaper.

The quoted term appears in “Kur’yer Inform,” an occasional column, in Gorodskoy kur’yer (August 2, 1993).

Hersh (1994, p. 76) cites Los Alamos nuclear physicist Stephen M. Younger as saying, “This is the time to be their friends….We’re going to hold their hands. These people have a lot of information in their heads.”

Gennadiy Zakirovich Karatayev was Deputy Chief of Administration for the Security of the City.

Previously, every aspect of local life had been controlled by the Ministry through the directors of the installations.

See the interview with Vladimir Illich Lutikov, Chairman of the Committee on Administration of Municipal Property Gorodskoy kur’yer (February 3, 1994).

Nina Nikolayevna Belyanina, interviewed in Gorodskoy kur’yer (April 7, 1994). Ms. Belyanina is the director of what is now called the Sarov Kindergarten.

For examples of this, see the property sales announcements for the city boat landing and for hairdresser shops, in Gorodskoy kur’yer (June 12, 1993; and August 12, 1993).

Avangard does not seem to be reporting much conflict at its worker meetings, perhaps because it has positioned itself better for non-military production and has thus been able to give workers regular pay increases in inflationary times. For an example of an apparently uncontentious meeting of the labor collective at Avangard, see the article by G. Fillsin in Gorodskoy kur’yer (February 24, 1994).

Because of an apparent printing error, the front page of this issue of Gorodskoy kur’yer incorrectly identifies it as being from November 11, 1993. However, the internal pages of the issue contain the correct date header, and the events described are clearly from March 1994, not November 1993.

It must be noted, however, that while nuclear security was always a high priority of the Soviet state, environmental safety was not. Two of the worst accidents at nuclear cities happened in Chelyabinsk-65 in earlier times: in 1957, when 450,000 people were irradiated by an exploding storage tank, and in 1967, when a lake used for the dumping of nuclear waste dried up in a drought and sent radioactive dirt blowing away (Moscow Correspondent, 1993-94; Cochran and Norris, 1993, pp. 68-80). The latter source also discusses continuing environmental pollution caused by the nuclear cities.

This is basically the argument made in Sachs (1994).