Report:

REEXAMINING BRAIN DRAIN FROM THE FORMER SOVIET UNION

by R. Adam Moody

R. Adam Moody is a Senior Research Associate at the Center for Nonproliferation Studies, Monterey Institute of International Studies.

Prior to the breakup of the Soviet Union, scientists, engineers, and technicians in the Soviet defense sector were strictly controlled. Those with access to state secrets had almost no opportunities to travel abroad, even to Eastern Europe. Other contacts with foreign firms were subjected to stringent centralized oversight, when they were allowed at all. But Soviet military scientists and engineers traditionally had been among the highest paid individuals. Those living in closed cities enjoyed even greater benefits in order to compensate them from their almost total isolation from the rest of the world.\(^1\)

By the late 1980s, however, funding for Soviet science began a steep and steady decline due, among other reasons, to Soviet budget problems and Gorbachev’s perestroika policies, which lessened the traditional Soviet emphasis on military power. This descent sharpened significantly with the December 1991 breakup of the country, the dissolution of the central planning apparatus, and beginning of a period of hyperinflation. Runaway inflation (about 30 percent per month) undercut the former Soviet Union’s early efforts to pacify disillusioned scientists by raising salaries in closed cities, providing additional government funding for science, and alleviating tax burdens. In addition, “[s]ome of the measures taken by the Russian government were not well thought out.”\(^2\) Scientists in the military-industrial complex, in part because of their formerly privileged status, were especially disillusioned with the turn of events.

With the virtual disappearance of official restrictions on emigration, under-funded and jobless scientists began to look for opportunities to recoup their crumbling economic prospects abroad. State responses to these tendencies were inadequate and ill-prepared, as none of the Soviet successor states had effective policies, programs, or institutions in place to mitigate the migratory tendencies of its elite personnel. Indeed, the few Soviet agencies that had been in place to track such movements were primarily concerned with the ethnic, rather than the professional, character of migrations. Some Soviet agencies did track the movement of their personnel independently, but these data are incomplete and inconclusive.\(^3\)

Ironically, during the few years leading up to the Soviet Union’s collapse, Western governments and human rights organizations put significant pressure on the Soviet Union to liberalize its emigration and immigration policies, which it did on May 30, 1991, with the passing of the “Law on the Procedures of Exit from the USSR and Entry to the USSR for Citizens of the USSR” in the Supreme Soviet. The law entered into force on January 1, 1993. While the law liberalized entry and exit procedures, it also was supposed to prevent anyone with access to state secrets from emigrating for at least five years (with the possibility of extension).\(^4\)

The absence of a centralized institution in the Soviet Union to track exit patterns complicates current efforts in the post-Soviet states and abroad either to quantify the diffusion of expertise or to gain much qualitative data. However, as a result of the international community’s growing level of awareness to the risks associated with the proliferation of Soviet weapons expertise, a significant cache of data has emerged in open sources since 1991, including in-country reports, insti-
tutional studies, government documents, surveys, articles in academic journals, newspapers, and magazines, and wire service reports. The maps on the following pages represent an initial effort to present some of the available data from reported cases. These maps do not attempt to analyze or evaluate existing information, but do categorize it into two basic trends: evidence of emigration abroad and evidence of “internal” brain drain (i.e., scientists leaving military industry but remaining in-country).

Initial findings suggest that a mass exodus of scientists and engineers from the post-Soviet states has not occurred. While the data suggest that the scope of emigration in recent years (1990 to present) exceeds past emigration flows significantly, the former Soviet Union most likely is experiencing what other more politically open countries have already experienced—the development of an equilibrium between the number of scientists that stay at home and those who decide to market their skills abroad. Notably, a survey of defense sector employees conducted in Russia in 1992—the first such survey to include inhabitants of closed cities—suggests that there is a strong correlation between a scientist’s interest in opening his own business (ostensibly to improve his economic welfare) and his interest in working abroad (see Map 2).

The state secrets limitations on emigration from Russia, as well as general immigration restrictions in recipient countries, seem to play a significant role in reducing the scale of scientific emigration (see Map 2). Just as economic, social, and political factors within Russia and the other post-Soviet states play significant roles in determining actual emigration flows, these same factors in recipient countries (especially Western countries where the need for additional scientists is low) create absorption thresholds. Many scientists who would otherwise emigrate may be prevented from doing so because of such internal and external constraints. But a number of recently reported smuggling incidents, in which nuclear materials were diverted by workers from within Russian production facilities, underscores the threat idle or underpaid scientists pose to the international nonproliferation regime.5

Interestingly, it appears that the most serious drain of expertise has occurred internally—a flow of scientists, engineers, and technicians out of science and defense-related sectors and into business or whatever sort of work will allow them to earn rubles (or dollars). This internal displacement of workers in scientific and defense-related fields is proportionally greater in Russia, but other newly-independent states (e.g., Belarus, Kazakhstan, and Ukraine) have experienced similar upheavals. The movement of workers out of science and defense-related sectors and into other fields of labor has the potential to energize the former Soviet Union’s fledgling market economies, especially if employment in those new fields generates hard currency. However, those who do not complete the transition and remain unemployed will pose a threat to the international nonproliferation regime as long as their scientific expertise lies dormant.

The migration of scientists, engineers, and defense workers from Eastern Europe and the former Soviet republics to Russia, as well as the inordinate dislocation of scientific workers from the far reaches of Russia’s borders to central Russia, adds another dimension to this issue: namely, an overabundance of underemployed scientific workers focused in a region characterized by diminished opportunities in scientific and defense-related fields. The absence of opportunities creates a unique set of incentives for scientists to engage in diversionary activities. Similarly, lack of opportunities, combined with constraints on movement, can increase the likelihood that scientists will use whatever means are available to “market” their expertise. This is seen in the recent phenomenon of Moscow scientists “moonlighting by modem” for countries of significant proliferation concern (see Map 2).

Finally, while information from the sources gathered to date suggests that emigration abroad is occurring, in many cases the movement of specialists occurs within the confines of state-sanctioned projects or long- or short-term temporary work to countries that appear to be less threatening to the nonproliferation regime (see Map 1). In those cases where scientists work on projects in countries of concern (e.g., Cuba, Iran, and Iraq), the potential for diversionary activity beyond the scope of such projects certainly exists and merits further attention.

A U.S. government official, who works closely with this issue, stated recently that “for those few people who will be tempted to share critical information for money, there is little that can be done, regardless of whether that person is Russian, American, British, or any other nationality.”6 While this may be true, the timely implementation of programs both from within the former republics themselves and from without is helping to alleviate this problem. These include the International Science and Technology Center in Moscow, the International Science Foundation (funded by George Soros), the U.S. Civilian Research & Development Foundation for the Independent States of the former Soviet Union, the NATO Science Program, the
Russia

In 1992, Congress enacted the Soviet Scientists Immigration Act, which permitted 750 scientists with expertise in nuclear, biological, chemical, or other high-technology defense fields to immigrate to the United States. The act waived the requirement that a job offer be secured prior to entry. All 750 openings are expected to be filled well before the act terminates on October 24, 1996.

In late 1995, 60 Russian technical specialists for nuclear reactors were moved semi-permanently to New Mexico to work on the Topaz Project.

In 1992, several Russian scientists were reported to be working in Mexico at the National Autonomous University of Mexico’s Institute of Physics.

In early 1992, 450 nuclear technicians from the former Soviet Union were reported to be working in Cuba on the Juraguan nuclear power plant.

In late 1991, two Russian scientists at the Kurchatov Institute of Atomic Energy received a $2,000-per-month offer to work at the Tajura Nuclear Research Center in Libya.

In early 1992, Igor Cherniyev, a Russian nuclear physicist from the Dubna Nuclear Research Center, was reported to have moved to Libya after accepting a work offer. Cherniyev’s move was confirmed by his relatives in Russia.

In late 1994, as many as 1,000 Russian specialists were reported to be working in China to improve China’s nuclear and rocket programs.

In late November 1994, three Russian scientists were reported to be working for the China-Russia Nuclear Company in Shenzhen, China. Kong Fandai, president of the company, was quoted as saying that more Russian scientists would be hired.
In late 1992, some 30,000 workers were reported to have left the Sverdlovsk military-industrial complex for jobs with "new cooperatives" that pay higher salaries.

In August 1993, about 30,000 Russian Ministry of Atomic Energy workers were reported to have left the ministry during an eight-month period in 1992.

In mid-1995, 17 Russian scientists with expertise in physics, mechanical engineering, and other fields were reported to be cooperating by modem with countries, including Iran and Pakistan, that "appear to be trying to develop nuclear warheads and the missiles to deliver them." In late 1992, some 30,000 workers were reported to have left the Sverdlovsk military-industrial complex for jobs with "new cooperatives" that pay higher salaries.

Between 1990 and 1992, 200 scientists with advanced degrees, including 75 physicists, were reported to have left the Ukrainian Academy of Sciences.

Between 1992 and early 1996, 100 of the "least qualified personnel" left the Belarusian Institute of Power Engineering Problems.

Between June 1994 and June 1995, the Russian Interagency Commission, the body charged with hearing appeals of cases in which permission to emigrate is refused on the basis of access to state secrets, reviewed 198 refusals. Of these, 16 applicants were refused permission to emigrate, of which one was required to wait six months, 13 were required to wait two to three years, and one was required to wait four years.

As of April 1996, the International Science and Technology Center, a 1992 multilateral initiative to prevent the proliferation of technology and expertise of weapons of mass destruction by providing weapons scientists and engineers of the former Soviet Union meaningful alternative employment opportunities in their own country, employed about 12,500 scientists, engineers, and technicians on peaceful projects of up to three years duration.

A survey of 1,388 aerospace and nuclear specialists from randomly selected defense industry enterprises, conducted in mid-1992 by the Institute of Economic Forecasting for the Russian Academy of Sciences, found that 71.6 percent of the respondents in the aerospace industry who were interested in opening (or had already opened) their own businesses were also interested in working abroad; 59.9 percent of the respondents in the nuclear industry who were interested in opening (or had already opened) their own businesses were also interested in working abroad.
American-Russian Biomedical Research Foundation, the Association of Scientific Societies of Russia, the U.S. Industrial Partnering Program, U.S. lab-to-lab activities, and others. Without these efforts to keep former Soviet scientists gainfully employed by creating collaborative (and independent) research opportunities and broadening cooperation among scientific institutions within the newly-independent states of the former Soviet Union, attendant proliferation risks assuredly would be more pronounced.


5 Correspondence to author from a U.S. government official, March 15, 1996.


7 Public Law 102-509, 102nd Congress of the United States of America, October 24, 1992. See also “Commonwealth and Baltic Scientists Immigration and Exchange Act of 1992,” Report 102-881, Part 1, 102nd Congress of the United States of America, 2nd Session, September 21, 1992. See also Adam Treiger, “Plugging the Russian Brain Drain: Criminalizing Nuclear-Expertise Proliferation,” Georgetown Law Journal (November 1993), p. 266. One expert on the brain drain issue says that “[a] defense specialist from the former USSR would not, in all likelihood, be able to practice his/her profession in the United States because of the security regulations... Thus one could not dismiss a scenario where a Russian weapons specialist who was somehow able to leave a closed city for the United States only to find himself deprived of opportunity to work in his professional field leaves the U.S. for a ‘problem’ country where he would be guaranteed such an opportunity.” See Shkolnikov, p. xx.


11 Yevgeniy Bovkun, “Nuclear Scientists Leaving CIS,” Izvestiya, October 20, 1992, p. 7; in FBIS-SOV-92-205 (22 October 1992), p. 4. The actual number of Russian immigrant scientists now residing in Israel is much larger. Of the 950,000 Russians that have immigrated to Israel since the period of detente in the 1970s (750,000 since the late 1980s), 10,000 are scientists, 70 percent of whom are “working as truck drivers, bricklayers and in other jobs outside their fields.” See Joseph Berger, “Question Mark In Israel Ballot: ‘The Russians,’” The New York Times, May 29, 1996, pp. A1, A8.

12 One of the hired Russian specialists is identified as “Sophia,” a middle-aged expert in “aerospace deflection determination” who worked previously at the Research Institute for Applied Mathematics in Moscow. Another Russian employee is identified as “Mark,” a computer engineer who worked at the “Sverdlovsk nuclear facility” prior to emigrating to Israel in mid-1991. Mark’s employment history also includes work at two “leading Israeli software companies,” See Neal Sandler, “Real Rocket Science Comes to High Finance,” Business Week, January 17, 1994, pp. 69, 72.


15 Ibid.


23 Michael Lysobey of the Center for Nonproliferation Studies, interview with Anatoliy Yakoushev, Deputy Director of the Belarusian Institute of Power Engineering Problems, Minsk, Belarus, April 19, 1996. According to Yakoushev, Belarus places no travel restrictions on the institute’s employees; a nuclear scientist is only required to obtain a visa to visit “any country.” Current Belarusian law places no further constraints on a nuclear scientist’s travel abroad.


28 Paul R. Josephson, “Russian Scientific Institutions: Internationalisation, Democracy and Dispersion,” Minerva (Spring 1994), p. 4. See also “Ukraine Academy of Sciences at ‘Edge of Abyss,’” Post-Soviet Nuclear & Defense Monitor, November 17, 1995, pp. 7-8. According to Viktor Zelensky, Director of the Ukrainian National Science Center, Kharkiv Physics and Technology Institute, the loss of scientists from the institute is more of a concern than the potential theft of nuclear materials. As of late May 1996, none of the scientists at the institute had been paid for four months. Of the 1,839 scientists working at the institute, about 150 worked directly on the Soviet weapons program. Emily Ewell of the Center for Nonproliferation Studies, interview with Viktor Zelensky, Director of the Ukrainian National Science Center, Kharkiv Physics and Technology Institute, Kharkiv, Ukraine, May 27-28, 1996.

