
Conversion of Russian Chemical Weapons Production Facilities: Conflicts with the CWC

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Russian chemical weapons production facilities (CWPFs) are in a paradoxical situation. While they face a highly volatile environment caused by the economic and political crises in Russia, they have to convert to civilian production according to very specific rules set by the Chemical Weapons Convention (CWC). These rules determine the options available to CWPFs, the timing of conversion, and the timeframe for completion. But they can be implemented only if the states concerned can choose between the two options offered by the CWC—destruction or total conversion—and have the necessary financial means and organizational structures. These conditions are met in the United States, but not in Russia.

In Russia, the choice in practice is often limited to one option—total conversion. Because of the Soviet legacy in terms of production and social organization, destruction of facilities would result in a loss of commercial production lines and jobs that probably could not be replaced. This leads local, regional, and national authorities to favor conversion. However, the political and economic instability in Russia makes it very difficult to develop the plans and find the funds required to implement conversion. As a result, conversion of Rus-

sian CWPFs cannot be achieved within the limited timeframe imposed by the CWC. And more importantly, a conflict arises between the requirements of conversion in the Russian environment and the nonproliferation goals of the CWC. This conflict is a major source of potential proliferation of CW and their related technologies.

This analysis suggests nonproliferation policies and international assistance should cover *conversion* of Russian CWPFs as well as *CW destruction*. This would allow Russia to implement the CWC in a timely manner, and reconcile conversion and nonproliferation.

In order to highlight the unique characteristics of CWPF conversion in Russia, this article will first present the main features of Russian defense conversion. The second part will focus on the provisions of the CWC, which render CWPF conversion more difficult than the conversion of other Russian defense enterprises. This problem will be illustrated in the third part with analysis of the conversion process at the Volgograd CWPF Khimprom. The fourth part highlights the contradiction between nonproliferation goals and conversion needs in the Russian environment. The fifth part explores the in-

creased proliferation threat that would be caused by a failed conversion. The conclusion recommends ways to prevent CW proliferation and improve existing foreign assistance programs.

CHARACTERISTICS OF DEFENSE CONVERSION IN RUSSIA

In order to understand why conversion is made more difficult for Russian CWPFS it is necessary to examine the conversion process in Russia and how it differs from conversion in the United States. In the United States, conversion is generally understood as a “destruction process” that leads to the closure of firms no longer needed for defense purposes, and unable to be reconfigured to make a profit. Former employees are able, perhaps with assistance, to find jobs in other sectors of the economy or in other defense firms, and studies are made to determine how the facility’s equipment and land can be used or sold.

However, even in an economy with the ability to absorb the resources liberated by shutdowns in the defense sector, support from states or the federal government is needed to absorb the shock of conversion.² For instance, the conversion program that was adopted for the former nuclear-bomb-detonator producer at Rocky Flats in Colorado³ was preceded by a study that evaluated the site’s needs in term of restructuring, new equipment, personnel training, and its potential privatization.⁴ It is worth noting that conversion was preferred because closure would have been more costly. The site was contaminated, and the surrounding land could not be sold or used for productive activities. Further, owing to the large number of employees—10,000—a closure would have generated pockets of unemployment in neighboring communities. Therefore, the site was converted to the production of containers for the storage of nuclear material. However, one of the main aims of the conversion program was to allow a step-by-step recycling of its personnel until the site can be shut down without too much economic consequence for the area.⁵

The US model of conversion cannot be implemented in Russia for economic, cultural, and political reasons. On the economic side, Russia does not benefit from a dynamic economy—demand is low and the unemployment rate is high—meaning personnel and equipment made surplus by a plant shutdown are not easily absorbed elsewhere in the economy. Moreover, the Russian state

does not have the financial means to support conversion when and where required.

In addition, the defense industry represented the backbone of Soviet industry. Therefore, closing unneeded defense firms would deprive Russia of a great part of its productive sector. Further, defense firms were not only weapons producers but also major producers of consumer goods⁶ and of machinery for other sectors of the economy (like agriculture, and the manufacture of textiles and automobiles).⁷ The closure of unneeded defense firms today would strike a hard blow to civilian industries, which have already been disrupted by the break-up of the Soviet Union. Closing only the military sections of these enterprises is not an option either as military and civilian production lines within defense enterprises were highly integrated: they were located on the same territory, had a common technological infrastructure, and shared some of their personnel.

Defense enterprises also served as social agencies, providing their employees and their regions with health care, education, and other services. In fact, the construction and maintenance of social and cultural infrastructures (hospitals, schools, museums, vacation camps) were part of their functions. As the economic and political crises have not yet allowed the creation of a federal system of health, education, and culture, the implementation of a US-type conversion would also result in a total disorganization of the social system. Despite the break-up of the Soviet Union, this system has survived more or less intact in the regions.

Finally, the lack of a strong market and the fragmentation of the Russian economy into regional economies obeying different rules and regulations and sometimes using different “means of payments”⁸ create obstacles to the mobility of goods, labor, and capital. Mobility is made more difficult by the underdeveloped transportation and communication systems in Russia.

On the political side, the closure of unneeded enterprises has been a sensitive issue as many uncertainties remain about Russia’s place in the world and its future needs in terms of weapons. Making the decision to close a certain number of defense enterprises was a risky step even for the most liberal members of previous governments,⁹ not only because of its financial implications, but also because defense enterprises are active members of the various interest groups that formed after the

break-up of the USSR. Furthermore, the reforms and the disorganization generated by the break-up of the USSR resulted in a dramatic weakening of the state while allowing the emergence of increasingly powerful local leaders who would oppose shutdown decisions.

Nevertheless, conversion is taking place, but the Russian conversion model has very specific features. It generally results in the preservation of Soviet structures with only a few departments or workshops actually being converted. Conversion also has a very strong regional aspect. Owing to the fragmentation of the Russian economy, defense enterprises have to design their conversion using the resources existing in, and according to the conditions prevailing in, their respective regions. This creates discrepancies among defense enterprises in their conversion results that cannot be explained by their respective technological abilities. Some defense enterprises indeed evolve in a very favorable environment (a dynamic and diversified regional economy, sufficient financial resources, assistance provided by local authorities), while others suffer from a very unfavorable environment (a very specialized economy, lack of assistance from local authorities, insufficient financial resources, political conflicts at the regional level). The regional characteristics also determine the range of conversion and restructuring strategies that defense enterprises can use. As a result, some enterprises can use the whole range of strategies available in Russia, while others have a very limited choice or no choice at all.¹⁰

In the context of an incomplete transition from a Soviet economy to a market economy, defense enterprises have few means to identify new sources of profit. Therefore, conversion has to follow a “trial and error” pattern, where defense enterprises use several strategies simultaneously or one after the other until they reach a solution that is sustainable and profitable at least in the medium term. Because of these conditions, conversion in Russia cannot be assessed in general terms, but needs to be measured individually, by looking at each defense enterprise’s ability to adapt to the new economic environment and to take advantage of characteristics of its regional environment.

Among defense enterprises in Russia, CWPFs form a group apart. Although they have to perform their conversion under the same conditions as other defense enterprises in Russia, the CWC imposes additional constraints, making CWPF conversion even more difficult.

THE CWC FRAMEWORK FOR CWPF CONVERSION

Conversion of former chemical weapons producers in Russia is very different from the conversion of other Russian defense enterprises. Since 1992, most Russian defense enterprises have been able to choose either to convert or to remain weapons producers, and they can select the conversion and restructuring strategies that they want to use.¹¹ Except for specific cases, their conversion is not subject to approval,¹² and they have no imposed timeframe to complete their conversion. CWPFs are in a very different situation. Their conversion has to take place within a framework imposed by the CWC, which not only explicitly determines the options for CWPFs—destruction or irreversible conversion—but also the timeframe, and the conditions under which these options have to be implemented.

The CWC is unique in that it not only bans the development, production, stockpiling, and use of chemical weapons, it also requires the destruction or irreversible conversion of the facilities producing them. Other disarmament agreements ban some types of weapons or provide for monitoring of production facilities, but they do not require the destruction or conversion of production facilities. For instance, the Intermediate-Range Nuclear Forces (INF) treaty prohibits the production of Pershing-2 and SS-20 missiles, and imposes, among other things, a permanent verification regime at two assembly facilities—Magna (Utah) in the United States and Votkinsk in Russia. Inspectors have been deployed around the facilities and monitor portals to ensure that exiting vehicles do not transport Pershing-2 or SS-20 missiles. But the facilities’ other production is not monitored: the Votkinsk facility continues producing missiles for military and commercial use.¹³ Thus, Russian defense enterprises producing conventional or nuclear weapons can continue manufacturing weapons or performing research as long as these activities do not fall under the limitations imposed by the corresponding disarmament agreements. In contrast, CWPFs must stop all activities related to CW.

The CWC also provides for the monitoring of dual-use chemicals by organizing chemicals in three lists (Schedules 1, 2, and 3), which contain items that may directly or indirectly be used for the production of chemical weapons. The lists of chemicals are not exhaustive, and new chemicals that are unknown today can be added to the lists in the future. For instance, the guidelines for

Schedule 1 state that a chemical possessing “a chemical structure closely related to that of other toxic chemicals listed in Schedule 1, and [that] has, or can be expected to have, comparable properties” should be added to Schedule 1. In other words, the CWC not only monitors the use of dual-use chemicals in the civilian sector, it also creates the future right to ban or limit the use of new chemicals that were unknown when the convention was drafted. The other disarmament agreements do not contain such limitations.

Another unique aspect of the CWC is that conversion is not a right or a choice that CWPFs can make independently but a “privilege” granted by the Organization for the Prohibition of Chemical Weapons (OPCW) in The Hague.¹⁴ Indeed, the primary objective of the CWC is to *destroy* existing chemical weapons and their production facilities. Conversion is allowed only under two circumstances. First, former CWPFs may be converted to CW-destruction facilities, but they must be destroyed as soon as they are “no longer in use for destruction of chemical weapons” and “in any case, not later than 10 years after entry into force of the Convention.”¹⁵ Second, in cases of “compelling need,” CWPFs can be permanently converted to facilities engaged in civilian activities not prohibited by the CWC. In either situation, however, conversion projects have to be submitted to the OPCW prior to their implementation, and approval is granted only after a careful review of conversion plans and justifications. In other words, CWPFs must get permission before they can be converted; indeed, such conversion can start only with the approval of a supranational authority.

The timing of CWPF conversion to civilian activity also depends on the international community. CWPF conversion cannot take place unless the destruction of the “specialized” CW production equipment has been completed and the OPCW has given its approval. If approval for such a conversion is granted, conversion must be completed no later than six years after entry into force of the CWC, that is, in 2003. CWPF conversion is also subject to international scrutiny: a verification regime is imposed for up to 10 years after completion of the conversion program, and the cost of verification is borne by the host country.

Consequences of the CWC’s Rigid Framework

The rigidity of the CWC’s conversion framework has several consequences for Russian CWPFs. First, it trans-

lates into a very limited range of conversion and restructuring strategies for CWPFs. Second, it increases the dependence of CWPFs on the federal government, which in turn makes their conversion more sensitive to the ups and downs of the Russian economy. Finally, a successful conversion will be very difficult to achieve in the chemical sector, for the criteria used to assess conversion do not take into account the constraints of the Russian environment.

The Limited Number of Conversion and Restructuring Strategies

One of the consequences of the CWC framework is that the range of available conversion and restructuring strategies is more limited for CWPFs than for other defense enterprises. Because of the combined consequences of the Soviet structural legacy and Russian economic and political reforms, the set of strategies available for individual enterprises depends less on their technical characteristics than on those of their regional economic, political, and social environment. Consequently, some enterprises can use the whole set of available strategies, while others have a more limited choice. Case studies reveal that defense enterprises other than CWPFs use several strategies simultaneously, and may shift strategies to adapt to changes in their own situation or in the economic, political, and social situations in their region or in Russia as a whole. In some cases this flexibility allows a learning process by trial and error.¹⁶ Chemical enterprises cannot be this flexible; the set of strategies that they can use is determined by the CWC, not the individual enterprise. Indeed, because of the provisions of the CWC, many of the strategies used by other Russian defense enterprises cannot be used by former chemical weapons producers, even if they are available in theory.

For instance, so-called “economic conversion,” which consists of financing conversion with the profits made through arms exports, is obviously out of the question. This strategy implies that defense enterprises maintain military production, which in the case of CWPFs would be in violation of the CWC.¹⁷

The intensification of former civilian production and the employment of dual-use technologies can also be problematic for CWPFs. These options may cast doubt on the reality of conversion and suggest that Russia maintains the ability to produce chemical weapons.

Passive conversion strategies, such as renting production space to other enterprises or creating economic free zones (EFZs) on the grounds of CWPFs, may also raise concerns. It would be necessary to determine whether the new enterprises or activities fell under the provisions of the CWC. EFZs are particularly problematic because the newcomers not only rent space but also utilize the equipment and sometimes the personnel of the former defense enterprises.

Because of the duality of chemical technologies, the conversion of scientific teams—through the creation of a small private business or a joint venture with a foreign partner—also requires a determination of whether their activities fall under the CWC. Former CW scientists and engineers could use in the civilian field the technologies and expertise they formerly used in the military sector.

Breaking up an enterprise into a number of smaller entities with different activities, management teams, and independent budgets is also not an option for CWPFs. If some of these entities were privatized, there would be a need to determine whether they still fall under the CWC and are subject to inspections. Determining whether these activities are covered by the CWC is complicated by the lack of a clear dividing line between civilian and military activities during the Soviet period.¹⁸ If these activities were determined to fall under the CWC, restructuring might end up multiplying the number and cost of inspections. In that case, it would make sense to maintain the unified structure. However, research shows that when former defense enterprises do not restructure, they tend to increase their rigidity and maintain the mentality and organization of the Soviet era. As a matter of fact, these are some of the main reasons for failed attempts at conversion in Russia.¹⁹

Given these conditions, the only conversion strategy for Russian CWPFs that would meet the CWC's conditions would appear to be to change markets and products, that is, to produce new goods designed for new clients and eventually to change sectors. This is the most difficult and costly strategy for any defense enterprise, since it implies buying new equipment, conducting market research, training personnel, and acquiring new commercial and technical knowledge. Given Russia's economic crisis and instability, this option is out of reach for CWPFs unless they receive assistance from an outside partner. Unfortunately, cooperation with foreign partners accounts for a very small portion of conversion efforts in the Russian defense sector, mainly because of

the uncertainty and instability of the Russian economy and its legal framework. CWPFs may be even less attractive to foreign investors for various additional reasons.

Drawbacks of Russian CWPFs for Investors

One obstacle to foreign investment is that Russian chemical facilities remain state property, and as such, they cannot open their capital to foreigners.²⁰ Foreign investors are usually reluctant to cooperate with Russian defense enterprises when they cannot control a subsequent portion of the shares. Further, like other state defense enterprises, CWPFs cannot cooperate with foreigners without the approval of the Russian government.

Also, foreign investors are generally not attracted by state enterprises because they maintain their Soviet organization and mentality and tend to use cooperation as a means to survive and reinforce their structural rigidities rather than as a means to develop a viable product. In other words, state-controlled enterprises simply absorb outside resources without exploiting them efficiently to generate new profits. For this reason, foreign investors generally will not launch joint ventures with CWPFs unless they obtain guarantees from their own governments, or unless a "higher" interest guides their actions. For instance, the American company DuPont has formed a joint venture with Khimprom in Novocheboksarsk (a former CWPF located 434 miles east of Moscow) to make herbicides for grain and sugar-beet crops.²¹ One of the reasons why DuPont preferred the Novocheboksarsk facility to other Russian chemical enterprises is that facility had violated one of DuPont's patents for herbicide production. Cooperation with the enterprise is therefore a way to recover rights on the production of this herbicide.

Greater Dependence of CWPFs on the Federal Government

CWPFs cannot attract outside funds to finance their conversion because their state-owned status limits cooperation with foreign partners. As a result, the federal government is the only other possible source of financing.²²

The dependence of CWPFs on the state is exacerbated by the fact that the rules on conversion cannot be modified. In other sectors of the defense industry, company directors, as well as local or regional authorities, often

bend the rules in order to help some enterprises survive until they can find a viable way to convert. For instance, directors and local authorities often lobby the government to obtain military orders so that the defense enterprises can maintain their workforce and avoid social unrest. In the case of CWPFs, this strategy is not allowed because it would violate the CWC. This implies that the regional and local authorities can only marginally intervene in CWPF conversion. Their role is limited to providing funds for conversion, which very few of them have. Therefore, they cannot compensate for a lack of state support.

CWPF conversion rules are fixed and cannot be changed, and there is little room for intervention in the process by regional and local authorities. Thus, the conversion of CWPFs will be dependent on the federal government's decisions and money. In turn, the Russian government's financial situation will have a greater impact on the progress of conversion in the military chemical sector than in the other branches of the defense industry. Unfortunately, the Russian state has little money to devote to CWPF conversion.

The August 1998 crisis made the world more aware of the economic turmoil in Russia. However, the August 1998 crisis was only one of a series of financial crises that Russia has experienced since 1992. Since 1996, funds voted by the Russian Parliament for chemical disarmament have continually been reduced because of the economic crisis. The Special Federal Program for Destruction of Chemical Weapons Stockpiles approved by the Russian government in 1996 allocated a total of 16.6 trillion rubles for CW destruction.²³ Although the total budget allocation has increased since then, the funds actually appropriated have been only a small percentage of the approved amount (five percent in 1996).²⁴

In 1998, the Russian Ministry of Defense, which is responsible for CW destruction, declared that a total of 4 billion rubles was needed for CW destruction, which amounted to more than eight percent of the defense budget for that year.²⁵ However, the federal budget included only 500 million rubles for CW destruction, and only 3.9 percent of that amount was actually appropriated.²⁶

In 1998, the Ministry of the Economy, which is responsible for CWPF destruction and conversion demanded a budget of 113.5 million rubles. But the federal budget specified only 25 percent of this amount, of which only 4.4 million rubles were actually appropriated.²⁷ The

funding situation is bound to worsen in the next few years owing to the dismal financial situation of the Russian government.

The obvious result of these developments is that Russia will not be able to meet the timetable of the CWC. Even if Russia applies for and obtains a five-year extension to perform conversion, as permitted in the CWC, it is doubtful that its economic situation will improve enough to cover the costs of the CW destruction and CWPF conversion within the extended timeframe.

Foreign assistance has partly addressed this shortfall by providing funds for the disposal of CW. The cost of Russian CW disposal is estimated to be roughly \$6 billion over 10 years.²⁸ The US Cooperative Threat Reduction Program (CTR) has allocated more than \$134 million to assist CW stockpile destruction in Russia.²⁹ Finland, Germany, the Netherlands, and Sweden have provided additional destruction and environmental protection assistance in the form of grants, credits, and access to technology.³⁰

In the field of CWPF conversion, however, very few programs exist. US assistance has mainly taken the form of attempting to encourage American entrepreneurs to cooperate with former CWPFs. This attempt has been rather unsuccessful, owing to the problems of the Russian economy and political situation.

The European Union (EU) seems to be the only international body that has developed a program specifically designed to assist the conversion of Russian CWPFs. On May 21, 1997, the Council of Europe issued a declaration on EU assistance to the Russian Federation related to the CWC, indicating that the EU was prepared to allocate up to ECU 10 to 15 million (\$11.7 to 17.5 million at the January 1999 exchange rate) from the Technical Assistance to the Commonwealth of Independent States (TACIS) program for the period 1997 to 1999 to projects in the environment and safety fields, as well as conversion and restructuring of former CW industries.³¹ In 1997, ECU 3 million were allocated to assist Russia's former CW facilities, mainly with environmental issues (impact studies, development of decontamination technologies, and certification) and strategies to communicate with local populations. The 1998 Action Program allocated ECU 4 million to continue the activities launched in the first phase of the assistance program, and to cover conversion activities once they have been approved by the OPCW.³²

However, to date the funding devoted both to conversion and CW destruction purposes is only a fraction of what is needed to meet the timetable imposed by the CWC. Because of the rigid framework imposed by the CWC and the dearth of funds for conversion, CWPFs will have to find quick, cheap ways to convert that do not involve a long process of knowledge acquisition. This implies that they must use existing technologies, personnel, and infrastructure and maintain or develop their former civilian products. Because of the Soviet legacy in terms of behavior, mentality, and production organizations, however, such a strategy is doomed to fail.

CWPF Conversion Unlikely to Succeed

Success of CWPF conversion is hampered by the fact that conversion will not be assessed according to present-day Russian norms and rules. Generally speaking, conversion in Russia is a three-stage process, involving demobilization, adaptation to market rules, and reallocation of resources from the military to the civilian sector. However, because of the relative failure of economic reforms, political instability, and the inability of the government to develop a coherent economic and industrial policy, many defense enterprises have not been able to fully implement these three stages. The splintering of the Russian economy into regional economies that have followed different economic paths has also increased the impact of the regional environment on the success or failure of conversion.

However, under the CWC, as far as CWPFs are concerned, the characteristics of their regional environment, Russia's overall economic and political instability, the facilities' dependence on the state, and the impact of these factors on deadlines cannot be taken into account. As CWPF conversion is subject to approval and inspections by the OPCW, success will be measured on the basis of the commercial, financial, and technical norms prevailing in the other member countries, which are mostly market economies (while the Russian environment is clearly not a market economy). Further, the results of conversion will depend on the goodwill of the other member countries. Some may suspect that Russia maintains the ability to produce chemical weapons. If so, this could reduce the willingness of the international community to support conversion, which might in turn delay or prevent its completion. However, a flexible timeframe for conversion is not an option, as the CWC specifies the date when conversion must be completed.

Finally, since the rigidity of the CWPF conversion framework does not allow learning through trial and error, CWPFs will use the quickest, easiest, and least costly conversion strategies, i.e., the intensification of former civilian production and the exploitation of dual-use technologies. Ironically, these two strategies are likely to increase the burden of international scrutiny on CWPFs in Russia.

Conversion or Destruction?

The rigid framework imposed by the CWC renders CWPF conversion so difficult that one may be tempted to conclude that their destruction makes more sense. The economic crisis in Russia further supports this argument. If CWPFs are destroyed, inspections under the CWC are limited in number and time. In the case of conversion, however, the inspections are more intrusive, not limited in time, and inspectors can inspect the whole site and not only converted facilities. Since the inspection costs are borne by the host country, conversion is more costly than destruction. Thus, given the financial situation of the Russian government, destruction of CWPFs should be the most logical choice.

However, the choice between conversion and destruction of CWPFs in Russia is not being driven by the cost and timeframe of verification, but rather by the economic and social role of these facilities in their respective regions. As mentioned earlier, former Soviet defense enterprises were not only producers of civilian and military goods but also social agencies. Owing to the Soviet mode of development and strategic imperatives, defense enterprises were also often the major employers in their regions.

In the absence of coherent and comprehensive economic, industrial, and social policies managed by the state, the choice between conversion and destruction in Russia must be a function of the economic and social importance of CWPFs in their regions. If a given local economy depends heavily on the defense industry and CWPFs, then conversion is the "imposed" choice. If the local economy is diversified and other industrial sectors can be developed, then destruction of CWPFs may be contemplated.

Another aspect of the destruction/conversion dilemma is that defense enterprises in Russia, including CWPFs, are usually located in regional capitals and in the midst of urban areas. Their destruction may there-

fore cause environmental problems as well as security problems. The destruction process is already complicated but it may become even more complex and dangerous if it has to take place in densely populated areas.³³ It may also require the development of a new city plan, which may eventually be more expensive than conversion.

In summary, Russian CWFs are in a unique situation. As they can seldom be destroyed for economic and social reasons, they have no other choice but to implement a total conversion. But, unlike the other branches of the Russian defense industry, they must do so in a rigid framework where the rules are set and verified by a supra-national authority that does not take into account the characteristics of the Russian economic and political environment. Regional authorities cannot play a large role in their conversion, but at the same time, the federal government lacks the funds to support conversion efforts. This situation has led Russian CWFs to select conversion strategies that in theory should result in a rapid conversion. But these strategies also increase possible conflicts with the CWC or make its implementation more difficult, as the following case study shows.

CONVERSION OF THE CWF KHIMPROM-VOLGOGRAD

Description of Khimprom

The Khimprom chemical plant, located in Volgograd, was created in 1931 during the first Soviet five-year plan, along with another 518 big enterprises representing heavy industry.³⁴ It is a typical integrated Soviet organization, built according to the “natural production” principle in which the enterprise controls most of the stages of production. It consists of hundreds of buildings,³⁵ including both production workshops and sites that provide social infrastructure services.

In the mid-1980s, Khimprom employed about 10,000 people, and about 60,000 people depended directly or indirectly on the enterprise. As of May 1999, the company employed about 8,000 people, distributed as follows: 7,559 employees in industrial production (with 5,870 workers and 1,627 specialists and management personnel) with the remainder working in the social infrastructures (schools, agricultural land, etc.) maintained by Khimprom.³⁶

Like other Soviet defense enterprises, Khimprom was engaged in both civilian and military production. Chemi-

cal weapons accounted for 30 to 35 percent of the total production, and civilian products for 65 to 70 percent, depending on the production plan.³⁷ In 1992, Khimprom produced 122 products, of which more than 30 were consumer goods.³⁸

Although from its conception in the 1930s Khimprom was clearly designed as a military production facility, it is believed that its CW production originated from a German enterprise that the Soviet Union dismantled and transported from Germany after World War II. Khimprom’s CW production included V-gas, sarin, and soman, and it is believed that the facility also produced binary CW agents.³⁹ The chemical weapons produced by Khimprom were stocked in a storage facility outside Volgograd, and the munitions were stored separately from the chemical fill.⁴⁰

Among the buildings designated, constructed, or used at any time since January 1, 1946, for the production of chemical weapons, Khimprom declared two installations⁴¹ for producing the main CW precursors and six installations for manufacturing CW (see Table 1). Four of the declared installations were converted to civilian use before the Gorbachev era, and the others were converted between 1986 and 1987. On the basis of what has been declared, the last military production at Khimprom consisted of sarin, soman, and their precursors.

In August 1987, Khimprom stopped its CW production and launched a conversion program aimed at recycling the buildings as well as the former CW personnel.⁴³ Although there are some favorable circumstances for conversion at Khimprom, on closer examination they are unlikely to provide much of an advantage.

First, today’s conversion began in the Soviet era and was planned by the federal government. However, it is now taking place in a new and unstable economic and political environment with little financial help from the state. Further, because conversion started in the Soviet era, it was implemented with Soviet strategies and mindsets that are in complete contradiction with the new economic and political environment.

Second, since military production accounted for only one-third of total production, one might expect that the cancellation of CW production would not hurt the enterprise too badly. This is particularly true because chemical production employs dual-use technologies, which allow for lateral conversion. Therefore, a rapid conversion strategy would be to intensify civilian pro-

Table 1: Declared CW Production and Storage Facilities at Khimprom⁴²

Product/Task	Start date	End date	Status of specialized equipment	Conversion program
Mustard gas		1948	Specialized equipment was dismantled and destroyed.	New equipment was installed to produce liquid and solid copolymers on the basis of vinyl chloride.
Filling bombs with a mixture of two blister agents: mustard gas and lewisite	1946	1951	The filling equipment was dismantled and destroyed.	Buildings were re-equipped. Building 251 was transformed into housing, administrative offices, and workshops for equipment installation and repair. Building 252 was converted into housing, administrative offices, workshops to repair vehicles, and storage facilities to stock concentrates of the pesticide methylparathion, solvents, emulsifiers, and emulsions.
Prototype production facility for three nerve agents: sarin soman VX	1949 1950 1956	1958 1958 1957	Installations decontaminated and totally destroyed in 1975.	
Filling artillery shells with sarin and soman (three main buildings and six other annexes, including storage facilities)	1959	1987	-Filling equipment decontaminated; -specialized equipment in the buildings where CW were prepared and finished has been dismantled.	Buildings are used for the production of consumer goods.
Sarin production (one main technical building and three annexes, including a warehouse to stock equipment and material)	1959	1982	Main technical equipment has been dismantled and destroyed; all equipment with a specific link to this production has been destroyed. Such equipment includes the hermetic partitions between the production rooms and corridors, hermetically sealed windows (replaced by ordinary glass), and underground ventilation and water systems (now filled with concrete).	Central control room has been totally dismantled and replaced by the technological department for the production of consumer goods. The main building has been re-equipped for the production of domestic insecticides, epoxidized mustard oil, and other products.
Soman production (one main technical building and three annexes)	1966	1987	All the equipment has been dismantled, and the main technical equipment has been destroyed.	The installation is now being remodeled in order to meet the norms for the production of civilian chemical products.
Production of nerve agent precursors (one-story production building)	1959	1982	All the specialized equipment has been dismantled and part of it destroyed.	Building re-equipped to produce a semi-finished product used to synthesize permethrin, meta-phenoxybenzylchloride, and other chemicals.
Production of pinacolyl alcohol (key precursor for soman)	1967	1986		Equipment is now used to produce organic solvents, diacetone alcohol (used to manufacture photographic film and videotape), methylisobutylketone (used to synthesize paints, plastics, and other products), and methylisobutylcarbinol (a solvent and floatation agent). Production of methylisobutylketone and methylisobutylcarbinol started in 1973.

duction and assimilate former military-production personnel into the civilian-production workshops. Since their knowledge is relatively dual-purpose, there should be no need for protracted and costly training to acquire new knowledge.

There are, however, reasons to doubt that Khimprom's former civilian production could permit the survival of the enterprise in a market environment. During the Soviet era, civilian production was usually second in importance to military production. As a result, the efficiency, quality, and organization of production were not the main concerns of management. Civilian production lines at Soviet defense enterprises often had outdated equipment and poorly trained personnel, were badly organized, and received little investment. Khimprom is no exception to the rule: it produced a limited range of consumer chemicals in ill-equipped workshops.⁴⁴

Further, during the Soviet era, a portion of the civilian workforce was kept in reserve to help implement the military production plan. As a result, the civilian workshops already have surplus personnel who will need to be downsized for the sake of economic efficiency. The civilian workshops cannot absorb the military personnel rendered idle by the cancellation of CW production.

Finally, during the Soviet period, there was demand for civilian products made by defense enterprises because shortages prevailed and the Soviet system allowed no competition among producers, as all goods were distributed by the state. Now, the situation has changed: the opening of the Russian economy to foreign products has introduced competition, and compared to imported goods, Russian products are usually of poor quality. Intensifying the civilian production at Khimprom would therefore require a large investment to train personnel, improve quality control, reorganize production, acquire new equipment, and create distribution and marketing networks. This would not only be costly but it would also take time.

A third potential advantage for Khimprom is the fact that the enterprise's production in the Soviet era was highly diversified, designed for thousands of enterprises representing various sectors of the economy.⁴⁵ However, taking advantage of this diversified production base would allow an efficient conversion at Khimprom only if the enterprise were flexible enough to respond to changes in market demand. Khimprom also needs to have

a range of solvent partners. Otherwise diversification would lead to a dispersion of resources that in the long term could be fatal to the enterprise. Unfortunately, the conditions of flexibility and funding are not met.

Although Khimprom was built as a self-sufficient enterprise, it must obtain raw materials from other companies. Most of these suppliers are located in remote areas of Russia (the Russian Far East) and in other former Soviet Republics (Ukraine, Moldova, and Kazakhstan).⁴⁶ In spite of the sharp increase in the price of raw materials caused by inflation and the increase in transportation costs, the company cannot restructure its supplier network because no alternative suppliers exist in neighboring regions.⁴⁷ Khimprom hinders its conversion by being dependent on these suppliers from the Soviet era, which offer expensive materials and outdated working relationships.

Khimprom's customers' solvency is also questionable because most of them are located in the Volgograd region and exchanges with local partners are based mostly on barter. This does not provide the enterprise with the financial means to restructure and ensure a greater flexibility.⁴⁸

In order to overcome this difficulty, Khimprom has tried to expand its clientele in foreign countries. The enterprise brochure claims that the company exports about 30 brands of its products to Western Europe, the United States, Latin America, Iran, Pakistan, Turkey, India, China, and Eastern Europe.⁴⁹ Khimprom also has distributors in the Netherlands, Great Britain, the United States, Ukraine (Odessa), Iran, Germany, Poland, Finland, and Turkey.⁵⁰ However, although some of these connections with foreign countries are recent,⁵¹ many of them may date back to the Soviet era, since Khimprom already exported its products to 18 countries at that time.⁵² If the terms of exchange with these partners have not changed, this type of cooperation may not provide Khimprom with the cash flow that it needs.

Although there are some signs of restructuring attempts at Khimprom, the enterprise has not yet acquired enough flexibility to exploit a broad diversification strategy. After the break-up of the Soviet Union, the enterprise was transformed into a joint-stock company and some of its departments were made more independent. In 1995, the enterprise was broken up into four entities: Khimprom, which remains the main company; the Factory of Consumer Chemicals (Zavod Bytovoi Khimii,

or ZBK_h), which is a new entity created on the basis of the former CW workshops; a construction department; and a company called “Spektr.” A marketing department was also created, and in 1998, an economic free zone was established on the grounds of the enterprise. However, Khimprom’s reorganization can hardly qualify as a restructuring since the economic crisis and the characteristics of the local economy have not allowed the new entities to have lives of their own.

As a matter of fact, since 1992, Khimprom has become larger and more integrated. It absorbed the network of city cafes and canteens, which led to the creation of a new department to manage these new services and their personnel.⁵³ In 1993, Khimprom further enlarged its social infrastructure and created a new factory for the production of asphalt.⁵⁴ The enterprise also maintains a network of land plots for its employees and provides agricultural produce at subsidized prices.⁵⁵ As a result, Khimprom’s social infrastructure absorbs half of its profits.⁵⁶

In summary, Khimprom’s conversion will not be easy or quick. Although the adoption of a broad diversification strategy is a logical step given the characteristics of Khimprom’s earlier production, it may be a fatal choice in the long term because Khimprom lacks the flexibility required for this type of strategy. Further, Khimprom depends heavily on its suppliers, many of which date from the Soviet era. This in turn, increases Khimprom’s rigidity and does not allow it to adapt to the new economic environment.

Obstacles to Conversion in Volgograd

Previous case studies have concluded that two factors have contributed to failures of conversion in Russia: the preservation of Soviet mentalities and behaviors, and a disconnect between the conversion/restructuring strategies used and the local political and economic conditions.⁵⁷ Khimprom shows signs of both of these problems. In addition, the contamination of the facility is a third, more specific obstacle to conversion at Khimprom.

Preservation of Soviet Mindsets

One indication of the preservation of the Soviet mindset is that Khimprom has made only minor efforts to develop new products and processes that will diminish its dependence on its clients. Much of today’s pro-

duction is a continuation of civilian productions started in the Soviet time. New activities, like the bottling of shampoo concentrates by ZBK_h, have failed mainly because they were based on a technological rather than market, approach to conversion. New products were based on the available technologies rather than on the existence of a market demand. This type of “technology-push” conversion was very popular in the final years of the Soviet Union and the early years of the new Russian Federation. In the case of ZBK_h, the adoption of this approach can be explained by the fact that the enterprise was created in a Soviet environment, when conversion consisted of using dual-use technologies to attract foreign investment.

The fact that this approach has not been questioned until now reveals the persistence of the Soviet mentality and a lack of understanding of market rules. This problem was clearly revealed by the way the new products were designed: the company managers observed that some products were not available on the market and assumed an unfilled demand from their absence. They did not conduct market research to determine whether the goods were actually needed and whether the potential consumers could afford to buy them.⁵⁸

In order to adjust to inflation and its own lack of financial means, Khimprom decreased its reserves of raw materials by half. The management described this development in negative terms,⁵⁹ which also reveals a lack of progress toward a market mentality. In the Soviet era, enterprises commonly kept reserves of raw materials to compensate for malfunctions in the resource-allocation system. But these reserves were tantamount to immobilized resources. The reluctance of Khimprom’s management to change this attitude in the new environment shows that they have not understood the rules of the market and still operate according to the rules of the Soviet planned economy.

Another sign of the persistence of the Soviet mentality is the choice made by the company’s management to produce equipment for the oil and gas industry, as well as agriculture. These new products are not based on market research. Instead, they often reveal a very typical strategy, used in the former Soviet defense enterprises, to obtain federal funds indirectly. By cooperating with economic sectors, such as oil/gas and agriculture, that enjoy state support, defense enterprises try to capture federal funds to use for their survival. This strategy generally results in the accumulation of unsold goods,

as the original aim is not to produce and sell, but to produce and attract funds.⁶⁰

Disconnect Between Conversion Strategies and the Economic and Political Environment

The poor fit between Khimprom's conversion strategy and its economic and political environment is demonstrated by the EFZ. This conversion strategy has been used in other Russian cities with a range of results, from success to failure. To stimulate economic activity and create jobs, this strategy requires a specific set of conditions: a dynamic economic environment, the presence of foreign investors, and the participation of regional/local authorities in creating a stable market environment. These conditions do not exist in Volgograd. Volgograd's economy depends heavily on large enterprises, and the regional/local authorities do not intervene much to help create market infrastructures and stabilize the regional economy.

In fact, an open conflict exists between local directors and regional authorities. During a 1999 meeting of the "Committee of Directors and Organization of Volgograd," most of the directors blamed the regional administration for "abandoning them to their fate" and for their present and past difficulties.⁶¹ They harshly criticized the regional administration's economic policy and its lack of results.⁶² The policy is indeed very Soviet in character: it is composed of 50 programs focusing on specific issues, with no coherent ties among them. Most of the 1997 and 1998 programs have not been realized, yet instead of revising its approach, the administration simply decided to renew the existing programs.⁶³

The existence of open conflict between directors and regional authorities, added to the lack of evolution in mentality, implies that problems related to conversion will not be solved easily. This may well deter foreign investors.

The high price of electricity is another example of the disconnect between the strategies used and the economic environment. Indeed, although there is a major power plant a few miles away from Khimprom, electricity in Volgograd is extremely expensive. Khimprom, along with 15 other regional enterprises, benefits from special tariffs, which could be an incentive for small enterprises to base their activities in the EFZ. However, the price of electricity is also subject to conflicts among the administration, the local energy provider (Volgogradenergo),

and the enterprises. Not surprisingly, many enterprises do not pay their electricity bills, which puts Volgogradenergo in a difficult financial situation: its outstanding debts amounted to 3 billion rubles in the spring of 1999.⁶⁴ During the same period, the Regional Commission for Energy raised the possibility of increasing electricity prices and canceling all special tariffs. After heated debate, it was decided that prices for electricity would remain unchanged, while prices for heating may increase by 10 percent. Here again, the fluctuation of electricity prices may deter investors, especially since the conflicts among local actors do not allow them to solve problems easily.

Toxic Contamination of the Site

Reports on the extent of contamination at Volgograd are contradictory. Some specialists state that buildings at Khimprom made of porous material such as brick may be contaminated with toxic CW agents. Even if the agents could be removed, their toxic residues might still contaminate commercial products and endanger the health of plant workers.⁶⁵ One US official who visited Volgograd during an inspection under the US-Soviet Wyoming Memorandum of Understanding said that only one building—a former munitions-filling area—was so contaminated that protective suits had to be worn.⁶⁶ Another US official doubts that a serious contamination problem exists at Volgograd. He notes that concrete and mortar are chemically basic and thus would tend to accelerate the decomposition of nerve agents such as sarin and soman. If a residual hazard exists, the Russians might be able to seal the walls to prevent leaching of toxic material.⁶⁷ Nevertheless, VX and one of its decomposition products could present long-lasting contamination problems, as could blister agents, particularly arsenic residues from lewisite, which can persist indefinitely.⁶⁸

As far as the plant environment is concerned, all reports agree that the territory of Khimprom was heavily contaminated. When the enterprise was designed and built in the 1930s, no plans had been made to collect and recycle chemical wastes. Some say that at that time, the necessary waste-treatment technologies did not exist.⁶⁹ Chemical wastes were therefore stored in a pond on the grounds of the enterprise. Unfortunately, during heavy flooding, the contents of the pond flowed into the Volga River, creating an environmental disaster.⁷⁰ The Volgograd city administration finally created a network

of chemical waste ponds in the southern part of the city, thereby creating another ecological problem.⁷¹

In the 1980s, Khimprom stopped dumping chemical wastes into the city waste ponds and started directing them to the local civilian chemical enterprise Kaustik, which now recycles them.⁷² Khimprom also launched a campaign to clean up its territory that lasted two years. Now, a 20,000-square-meter park stands where the enterprise's waste pond used to be.⁷³ In 1997, Khimprom started building a facility to treat not only its own chemical wastes, but also the wastes of other local chemical plants. The capacity of this facility is expected to reach 60,000 tons a year.⁷⁴ Nevertheless, the uncertainty about the degree of contamination of the site and the surrounding city is not good publicity for Khimprom. Investors, particularly foreign investors, will not risk conducting their activities in a potentially dangerous environment.

The example of Khimprom shows how difficult conversion can be for CWFs, as they are constrained both by the characteristics of their regional environment and by the provisions of the CWC.

CONFLICTS BETWEEN NONPROLIFERATION GOALS AND CONVERSION NEEDS

The example of Khimprom's conversion also demonstrates a number of conflicts between nonproliferation goals and conversion needs in Russia that often go unnoticed. The first set of conflicts concerns the respective requirements of conversion and nonproliferation. While nonproliferation implies that former military equipment, buildings, and personnel are kept under control, conversion on the other hand leads to the dispersion of these elements. The second set of conflicts revolves around the question of time, where conversion and nonproliferation have incompatible timeframes.

Conflicting Requirements

To be successful, conversion of former Soviet defense enterprises requires that firms undergo a prior restructuring to enable the enterprises concerned to operate in a market context. As a practical matter, enterprises to be converted first need to acquire the ability to make strategic decisions. This means that they have to be independent of the state, so that the management can make long-term plans without fearing direct government intervention in the functioning of the enterprise. Such independence can be achieved through privatization, which

would transfer decisionmaking power to the management. This implies that the state would be allowed to maintain only a minority of shares, and that these shares would not provide it with decisionmaking power. Golden shares⁷⁵ are therefore excluded.

The second step for restructuring is to identify one or more new products (or revamp former products) that will maximize the available technologies, expertise, and equipment, and simultaneously meet a real demand. This process involves conducting market research and acquiring any missing equipment and knowledge.

The third step consists in concentrating the available resources on this limited number of new products, and eliminating everything that is not related to them. This includes laying off excess personnel (former defense personnel included), transferring social infrastructures to the city/regional administrations, and selling or transferring unused buildings and equipment. When products destined for different markets and requiring different types of expertise are adopted, they should be physically and financially separated (separate management teams, workforce, capital, equipment, buildings, etc.) in order to avoid the "vampirization" of profitable productions by unprofitable ones.

In such a context, conversion requirements directly conflict with nonproliferation goals. For instance, the dismantlement of the integrated structures into separate entities may result in multiplying the number and frequency of inspections by the OPCW, which will in turn increase the cost of conversion. Preserving the former Soviet structures would make inspections more coherent; however, the rigidity of such structures is a direct obstacle to conversion. Similarly, the layoff of excess personnel may pose a proliferation threat, as the knowledge and expertise of former military personnel could be transferred to other parties.

Transferring social infrastructures to city or regional administration also results in breaking the link between the enterprise and its personnel. Indeed, many employees in Russia still work for their enterprises in spite of long delays in wage payments, because by remaining on the payroll they continue enjoying the social coverage that their enterprise provides them. If the social infrastructures are transferred to another party, the idle or unpaid personnel have no incentive to remain on the payroll. As a consequence, transferring social infrastructures accelerates the dispersion of personnel and their

knowledge. To maintain its personnel, in the absence of a state-organized welfare net, a defense enterprise has to maintain a certain amount of social coverage. But this is extremely costly, and diverts precious resources from conversion.

Finally, the decrease of state control and involvement in the decisionmaking process is extremely dangerous as far as CWPFs are concerned. First, without state control it will be extremely difficult to make sure that CWPFs respect the requirements of the CWC, namely to stop the production and development of chemical weapons. As a result, the OPCW may encounter greater obstacles in conducting inspections. Similarly, without state involvement in the decisionmaking process, it may be very difficult to make sure that knowledge and technologies are not transferred to terrorist groups or rogue countries, even unintentionally. Therefore, if the state loses leverage on CWPFs, it may not have the ability to meet its international obligations. As a consequence, state control over CWPFs is of utmost importance in order to ensure that the CWC is implemented, and that CW and their technologies do not proliferate. But as noted above, state control or involvement in the enterprises' decisionmaking processes is a major barrier to a successful conversion.

ZBKh is a very good illustration of the contradiction between nonproliferation and conversion requirements. ZBKh is not really a new entity—it absorbed the former employees of the CW production installations and is currently managed by the former CW facility director, Vladimir Grigorievich Sidorov.⁷⁶ Since the same personnel and management teams have been maintained by the mother company Khimprom, the culture and values developed during the Soviet period are still present at ZBKh as well as at Khimprom. As far as nonproliferation is concerned, the fact that the former CW production staff is concentrated in the buildings of the former CWPF facilitates the work of OPCW inspection teams, as well as control of technology transfer through “brain drain” of expert personnel. In terms of conversion, however, the preservation of the staff and management team solidifies their former beliefs and routines and does not allow them to adapt to the new economic and political environment.

The preservation and even expansion of Khimprom's social infrastructures also serve nonproliferation goals: providing personnel with medical coverage, subsidized goods, and the like is an efficient tool to maintain them

on-site. However, Khimprom's social infrastructure absorbs half of its revenues, crowding out long-term investments in production.

Similarly, although Khimprom has been transformed into a joint-stock company, it remains de facto a state enterprise. The state still controls a majority of the firm's shares, and no outsiders have been allowed to purchase stock.⁷⁷ Although this situation is not necessarily bad in terms of proliferation, in terms of conversion it may deter foreign investors.

Conflicting Timeframes

A second set of contradictions between nonproliferation and conversion lies in their conflicting timeframes. In order to limit proliferation and ban the use of chemical weapons and their technologies, CW stockpiles have to be destroyed and CWPFs have to be destroyed or converted in a very short period of time. However, such a timeframe is unrealistic in the industrial sector in general, and impossible to comply with in the economic and political conditions prevailing in Russia.

Indeed, the conception and implementation of a new product line generally take about 15 years, provided the funds, the expertise, and the institutions required to distribute this new product are available.⁷⁸ In Russia, conversion has to take place in an unstable environment in which the former Soviet institutions have been destroyed but the new (market) institutions have not been created yet. Commercial knowledge within defense enterprises is almost nonexistent, and funds are very difficult to obtain, mainly because the banking system is unstable. Thus, in Russia, the average timeframe required for the development of a new product line in a stable environment (about 15 years) must be extended by the time required for reforms to be completed. In short, conversion in Russia is a very long-term process (at least a generation), which cannot take place within the short timeframe imposed by the CWC.

Further, the instability of the economic and political systems has resulted in a situation where *survival* has become the primary aim of converting enterprises. The question of time is a concern for any defense enterprise in Russia, but it is of greater concern for CWPFs as their “survival time” is *legally* limited. This situation is aggravated by the fact that approval for conversion is granted by the OPCW only in cases of “compelling need” following a careful review of conversion plans and the

justification for each conversion request. But requiring CWPFs to provide a well-designed and long-term conversion plan is not realistic in Russia's highly uncertain economic and political environment. In fact, when such uncertainty prevails, it is economically more efficient not to make plans for the long term in order to maintain flexibility. Waiting for approval would be possible only if the state could support CWPFs in the meantime, which is not the case in Russia. Therefore, CWPFs have most likely submitted to the OPCW only conversion plans that fit what they have already begun implementing. In other words, they did not revise their projects on the basis of market research or study the possible ways to finance and distribute their products, but simply asked for approval for on-going projects. By approving these projects, the OPCW has not only supported a Soviet approach to conversion but also helped maintain the illusion that CWPF conversion can be achieved in the short term.

THE PROLIFERATION THREAT FROM FAILED CONVERSION

The combined effects of the CWC's requirements and CWPFs' economic and social role in their regions make total conversion the only real option for CWPFs. However the lack of funds for conversion makes this option extremely difficult to implement. A failed effort at conversion could lead to several types of CW proliferation.

First, as the CWC makes the member states responsible for the conversion of former CWPFs, Russia may be tempted to withdraw from the CWC because it imposes too heavy a burden. While the likelihood of this is low, this outcome should nevertheless be mentioned.

Another possibility is that CWPFs may decide to resume production of chemical weapons. Typically, Russian defense enterprises that cannot convert simply resume their former military production and then try to convince the government that their products are essential for national security. Some defense enterprises have succeeded owing to their connections in the government (e.g., nuclear submarine producers at Severodvinsk), and some have failed, because of their lack of political clout. There is no reason why CWPFs would not resort to the same tactic, should they find it too difficult to convert. Since they are still very dependent on the state and maintain good relationships with key officials,⁷⁹ CWPFs may succeed in swaying the government.

The preservation of military orders to support enterprises in a difficult situation was practiced by many countries (including the United States) after World War II in order to allow a smoother transition to a post-war economy. In the case of CWPFs in Russia, however, continued military production would be a clear violation of the CWC. This scenario is unlikely given the inspection regime imposed by the convention.

However, CWPFs might secretly resume production of CW without asking federal approval and export these weapons to countries of proliferation concern. This strategy would be risky because of the possibility of challenge inspections by the OPCW, particularly because it is difficult to erase all traces of CW production only a few days prior to an inspection. Yet detection would be likely only if CW production resumed at the former CWPF sites. Clandestine production facilities might be harder to find. In Russia, some facilities and specialized equipment had been declared converted or destroyed long before the entry into force of the CWC. Thus, it would be difficult today to check whether this equipment has been actually and properly destroyed.

Volgograd presents other characteristics that make the possibility of clandestine CW production even more worrying. For instance, a branch of the federal agency Rosvoorujenie, responsible for arms exports, has recently been created in Volgograd.⁸⁰ Rosvoorujenie agencies are often headed by former representatives of local administrations who dealt with the defense industry in their prior duties. Moreover, these officials are often close to defense directors and more sympathetic to their fate than are the federal authorities. Further, Khimprom-Volgograd already has contacts with countries of proliferation concern such as Iran. Finally, some representatives of the city administration have stated that owing to the serious economic difficulties that local defense enterprises are facing, they have not ruled out any cooperation with foreign countries, and economic relationships will be considered on request.⁸¹ It is worth noting, however, that Russian officials often use the threat of proliferation to pressure Western countries to invest in conversion projects or to finance disarmament.

Another proliferation threat stemming from failed conversions is the possibility of brain drain. Often brain drain is not considered a major threat, as many of the countries of concern already have the ability to produce CW. However, few of them can produce complex chemi-

cal weapons like binary agents (which, it is believed, were produced by Russian CWPFs), and terrorist groups could also use CW experts' knowledge. A failed conversion could result in setting adrift experts who could be a source of proliferation.

For instance, at Khimprom-Volgograd after the decision to cut back and then halt military production, about 2,000 employees left the enterprise. According to the management, none of them were fired, the loss of personnel did not result from the decline in military production, and none of the former military production personnel have left. It is difficult to determine, however, if all the former CW workers are now working for ZBKh, as many may have retired, emigrated, died, or moved to new jobs. In fact, the only way to verify that ZBKh's current personnel actually come from the former CWPF staff would be to interview the chemists and engineers and ask them questions about their detailed knowledge of CW production processes. A trained scientist would certainly be able to determine whether today's ZBKh personnel are former CW employees. But the necessary questions would involve highly sensitive information, and it is doubtful that an outsider would be allowed to ask them.⁸²

If we take the management's declaration at face value, the proliferation threat from brain drain concerns about 1,000 Khimprom specialists who are still working at ZBKh. In order to prevent them from transferring their knowledge, it is necessary to support the development of ZBKh. The problem will be to separate ZBKh from the rest of Khimprom so that the financial assistance can be concentrated on conversion and not distributed unproductively throughout the enterprise.

If we do not accept management's reassurances and instead assume that the personnel who left the enterprise did so soon after the break-up of the USSR, there are strong reasons to believe that, contrary to the assertions of the management, the personnel loss was indeed related to the decline in military production. This would mean that proliferation of know-how through brain drain has already occurred to some extent. The enterprise stopped its military production in 1987, during the Gorbachev era. Military personnel probably remained employed at the enterprise until late 1991. As soon as the USSR broke up, however, many scientists and technicians may have left the country in search of a better life. Therefore, if the personnel loss took place in 1992, little can be done now to prevent possible CW prolifera-

tion except to determine how many specialists are still there and try to keep them employed in peaceful activities.

In sum, failed conversion has serious proliferation consequences that need to be addressed urgently.

CONCLUSION: CAN PROLIFERATION BE PREVENTED?

Conversion of CWPFs must take place within the rigid framework and limited timeframe specified by the CWC. As a consequence, CWPFs can only employ a limited number of conversion and restructuring strategies, which to be successful require substantial investment and commercial knowledge. Both of these conditions are lacking today in Russia. This leads to the conclusion that CWPF conversion cannot take place. Yet the lack of conversion may lead to the resumption of CW production, which would cancel out the benefits of existing assistance programs for CW destruction.

Financing conversion by encouraging cooperation with commercial enterprises is an option that will be difficult to implement in the present unstable Russian environment. Further, promoting cooperation with private enterprise does not preclude proliferation. For example, a CWPF might enter into a joint venture with a private enterprise in a country that is not party to the CWC. Under Article III of the CWC, Russia is forbidden from transferring any technologies or know-how relevant to CW production, but such activities could be difficult to monitor.

To prevent proliferation, conversion needs to be financed through international or bilateral assistance programs. The funds should not go through the Russian federal government, however, but directly to the facilities concerned. In the current financial crisis, the line between corruption and survival is difficult to draw in Russia, and channeling funds through several federal bodies may lead to abuses. Financing the various facilities directly would make it possible to reduce the number of middlemen and trace (and therefore control) the use of funds more easily.

The Russian government should still be involved in the conversion process, however, in order to preserve the CWPFs' loyalty to the state. Practically, assistance to CWPF conversion could be constructed on the model of the European Union program "Conver," which aims at financing conversion projects in European regions

highly dependent on defense industry. The regions concerned design conversion programs, which are endorsed by their respective governments and then sent to the European Community. When approved, the EU money goes directly to the regions. By adopting a similar mechanism, the Russian government would still have influence but would not control the use of funds. Further, a direct link would be established between the funding of conversion and the compliance of Russian CWPFs with the CWC, since the first would depend on the second.

Another recommendation that follows from the above analysis is that foreign assistance to CWPF conversion in Russia has to be differentiated and granted on a case-by-case basis. Two types of conversion can be envisioned. The first, which one could call “disarmament-driven conversion,” consists of financing civilian activities in CWPFs so as to avoid the breakup of scientific teams and the transfer of their knowledge to countries of proliferation concern. This type of conversion does not need to be economically sound and would be short- to medium-term (about 10 years).

The main aim of this type of conversion is to employ scientists in civilian activities until their expertise fades through lack of use. Knowledge can be explicit or implicit. Explicit knowledge can be transmitted through documentation, whereas implicit knowledge—which is by definition not written—can be transmitted only through the interaction of individuals working on the same project over a certain period of time. When development teams are broken up, or when they stop working on a project for a certain period of time, their implicit knowledge tends to fade, making it very difficult to resume the project years later even if the same people are involved.

Thus, disarmament-driven conversion aims chiefly at preventing brain drain by destroying the implicit knowledge that permits a more effective use of explicit knowledge. In principle, this type of conversion is in conformity with the purpose and the timeframe of existing assistance programs, like the CTR. However, this type of conversion can reach its goal only if the whereabouts of former CW scientists are known.

The second type of conversion can be called “economically sound conversion.” This consists of designing long-term programs to allow the conversion of CWPFs to operate in a market environment. This type of conversion should be contemplated when: (1) the

local economy is too dependent on the CWPF concerned, and (2) former CW personnel and scientists cannot easily be identified. If both of these conditions are present, preventing brain drain in the short term will be much easier if the program embraces a wide number of personnel. Further, if local economies are too dependent on CWPFs, the failure to convert may create serious brain-drain threats because the affected personnel will include not only current workers but also retirees. (In 1994, more than 8,000 retired people depended on pensions from Khimprom.)⁸³ Because of the purpose and timeframe of this type of conversion, it cannot be implemented under disarmament assistance programs. A more general assistance program, however, modeled on the EU program “Conver” or on the Nuclear Cities Initiative, would be appropriate here.

Whatever the type of conversion chosen, business training should be offered at least to CWPFs’ management and local authorities. Even in the case of a disarmament-driven conversion, the acquisition of commercial knowledge will allow CWPF management and local leaders to gain a better understanding of foreign investors and create the conditions to attract them. Such training would shorten the duration of disarmament-driven conversion, since alternative financing through commercial ventures could be sought. Disarmament conversion could then transform itself into economically sound conversion. In the case where economically sound conversion is attempted from the outset, the acquisition of business knowledge is a prerequisite for success.

In order to reinforce nonproliferation policies, export control offices should be created within CWPFs. At present, CW export control issues are dealt with by federal bodies, which because of the prevailing disorganization may not be fully aware of illegal activities taking place in the regions. This potential source of proliferation can be halted by raising the awareness of CWPF personnel in the fields of export control and nonproliferation. Today, because of the economic problems that CWPFs and their personnel have to address on a daily basis, the importance of nonproliferation and export controls is still not fully understood. More education and a change in philosophy are necessary to slow and even stop brain drain from within. This type of measure has already been applied successfully in some Russian nuclear facilities and could be implemented under the CTR umbrella.

¹ This article would not have been possible without the information provided by Anatoly Polenko, deputy head of the Volgograd Oblast administration; Viacheslav Shoustov, director of the International Business Directorate of the Volgograd Oblast; Pavel Poliakov, deputy director of the Committee for Industrial Policy; and Vladimir Sidorenko, director of ZBKKh. I would also like to thank Jonathan Tucker and George Parshall for their numerous and helpful comments.

² For examples, see Ethan B. Kapstein, "The Economic Transition in Defense-dependent Regions of Russia," *Defense and Peace Economics* 6 (1995), pp. 253-261; and Arie Zacks, "Diversification et reconversion de l'industrie d'armement," *Les Dossiers du GRIP* 165 (January 1992), p. 32.

³ This program was financed with federal funds. D.Ward, Jordin S.Cohen, and M.Betsill, "The Three Faces of Conversion in the USA," *Defense and Peace Economics* 6 (1995), pp. 221-235.

⁴ *Ibid.*

⁵ *Ibid.*

⁶ Defense enterprises even had a monopoly in the production of TV sets, videocassette recorders, freezers, vacuum cleaners, cameras, sewing machines, etc. For more details, see Clifford Gaddy, *The Price of Peace* (Washington, DC: Brookings Institution Press, 1996), p. 250.

⁷ *Ibid.*

⁸ The general indebtedness and illiquidity prevailing in Russia has led to the use of barter as the main means of exchange, as well as to the creation of surrogate money (*veksels*—promissory notes). See chapters by Sonia Ben Ouagrham, in Vlad E. Genin, ed., *The Anatomy of Conversion* (Stanford, CA: Morrison Institute for Population and Resource Studies, forthcoming).

⁹ In spite of the dramatic decrease in defense expenditure implemented by his government as early as 1992, Mr. Gaidar signed a decree the same year ordering military equipment worth \$5.4 billion for exportation purposes. This represented four times the exportation level of 1991. See Vitaly V. Shlykhov, "Economic Readjustment within the Russian Defense Industrial Complex," *Security Dialogue* 26 (1995), pp. 19-34.

¹⁰ Sonia Ben Ouagrham, "La conversion des entreprises de defense en Russie: une analyse regionale," Ph.D. diss., Ecole des Hautes Etudes en Sciences Sociales, Paris, January 1999.

¹¹ In practice, defense enterprises are not as independent as they appear to be. The political battles within the government and between the central government and the regions, as well as the structural shortcomings of the Russian economy, considerably limit the freedom of choice of defense enterprises. However, these limits are not generated by international treaties, and usually defense enterprises find ways to overcome them.

¹² Some state enterprises, however, have to obtain approval from their respective ministries.

¹³ *Washington File*, USIA publication, November 12, 1998, p. 12.

¹⁴ "The Organisation for the Prohibition of Chemical Weapons was established to achieve the object and purpose of the Chemical Weapons Convention (Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and their Destruction), to ensure the implementation of its provisions, including those for international verification of compliance with it, and to provide a forum for consultation and cooperation among States Parties." <<http://www.opcw.nl/basic/index.htm>>.

¹⁵ Text of the Chemical Weapons Convention, <<http://www.opcw.nl/cwc/cwc-eng.htm>>.

¹⁶ Ben Ouagrham, "La conversion des entreprises de defense en Russie."

¹⁷ "Economic conversion" in this context was a strategy designed in 1992 by M. Maley, former adviser to the Russian president on conversion. Although the strategy contradicted the ostensible purpose of conversion, it was a direct answer to the lack of funds for a true conversion program.

¹⁸ In the Soviet era, all defense enterprises engaged in both civilian and military production. There was no clear distinction between military and civilian personnel, and all the employees could work in both military or civilian workshops.

¹⁹ Ben Ouagrham, "La conversion des entreprises de defense en Russie."

²⁰ It is important to note that the transformation of CWFs into joint-stock companies does not transform them into private enterprises. Most of the time, the shares are distributed among the employees and the state, which remains the main shareholder. No outsiders are allowed to invest.

²¹ "Deal Allies DuPont with Russian Firm," *Wilmington News-Journal*, September 9, 1997.

²² Although some Russian investors have started cooperating with Russian defense enterprises, they are usually more attracted by speculation on the financial market than by investment in the production sector.

²³ A.N. Kalyadin, *Issues of Russian Compliance with the Chemical Weapons Convention*, July 1999, <<http://www.sipri.se>>.

²⁴ *Ibid.*

²⁵ *Ibid.*

²⁶ *Ibid.*

²⁷ *Ibid.*

²⁸ Lev Fedorov, "Difficulties of Chemical Disarmament in Modern Russia," Union for Chemical Safety (Russia), May 17, 1998, <<http://www.pgs.ca/pages/cw/ucs980517.htm>>.

²⁹ John Hart and Cynthia D. Miller, eds., *Chemical Weapon Destruction in Russia: Political, Legal and Technical Aspects* (Oxford: SIPRI/BICC and Oxford University Press, 1998).

³⁰ *Ibid.*

³¹ The approval of projects was conditional upon the Russian Federation depositing its instrument of ratification of the CWC. This document was submitted on November 5, 1997. <<http://europa.eu.int/comm/dgla/scr/tci/russia/env7.htm>>.

³² *Ibid.*

³³ Mr. Sidorov, director of ZBKKh-Khimprom, Volgograd, interview with the author, May 17, 1999.

³⁴ "Volgogradskoie Proizvodstvennoe Obiedinienie Khimprom" ("The Production Association Khimprom-Volgograd"), *Volgogradskiaia Pravda*, October 15, 1992, pp. 4-5.

³⁵ Jonathan B. Tucker, "Converting Former Soviet Chemical Weapons Plants," *The Nonproliferation Review* 3 (Fall 1996).

³⁶ Mr. Sidorov, director of ZBKKh-Khimprom, Volgograd, interview with the author, May 17, 1999.

³⁷ *Ibid.*

³⁸ "Volgogradskoie Proizvodstvennoe Obiedinienie Khimprom," pp. 4-5.

³⁹ Tucker, "Converting Former Soviet Chemical Weapons Plants."

⁴⁰ "Khotiat li Ruskie voiny" ("Do the Russians want war?"), *Volgogradskiaia Pravda*, June 3, 1993, p. 4.

⁴¹ I have used the term "installation" to translate more accurately the vagueness of the Russian word "Obiekt," which can be translated as a building or as a facility composed of several buildings.

⁴² Information from unpublished paper by Nikolai Kovalyev, member of the Monterey-Moscow Study Group, and former department head in the Soviet Military Industrial Commission from 1986 to 1991. A copy of the paper was provided by George Parshall.

⁴³ "Na Khimprome vsio chisto" ("At Khimprom, all is clean"), *Volgogradskiaia Pravda*, March 19, 1998, p. 1.

⁴⁴ "Stavka na sotrudnichestvo," *Ekonomika i jizn* 46, November 1992, p. 19.

⁴⁵ In 1992, more than 10,000 enterprises in Russia used Khimprom's chemical products. "Volgogradskoie Proizvodstvennoie Obiedinienie Chimprom," pp. 4-5.

⁴⁶ "Khimprom—edinstvennoie v oblasti krupnoie gospredpriatie nie sokrashivshee za gody perestroiki ni odnovo chelovieka" ("Khimprom, the only regional big enterprise not having downsized a single employee since the perestroika"), *Gorodskie Vesti*, special edition, August 2, 1993.

⁴⁷ Mr. Sidorov, director of ZBKKh-Khimprom, Volgograd, interview with the author, May 17, 1999.

⁴⁸ *Ibid.*

⁴⁹ Khimprom's brochure.

⁵⁰ "O perspektivakh razvitiia otiechesvenoi khimicheskoi promyshlennosti mojno sudit na primiera chastnovo AO Kaustik i polugosudarstvennovo AO Khimprom" ("Perspectives on development of the domestic chemical industry can be judged by the example of the private enterprise Kaustik and

the state enterprise AO Khimprom”), *Dielovoie Povoljje* 15, April 1995, p. 9.

⁵¹ A US company from Arkansas, Jar-Ptisa, serves as an agent for Khimprom and another local chemical enterprise (Voljskii Orgcintez) on the US market. Jar-Ptisa take samples of Khimprom’s products, tests them, and promotes them in the United States. In exchange, Jar-Ptisa sells rice from Arkansas to the city of Volgograd. “Amerikanskaia Firma Jar-Ptisa, mojet nakormit khoroshim risom vsiu oblast” (“An American company, Jar-Ptisa, can feed the Oblast with good rice”), *Dielovie Vesti*, April 22, 1996, p. 1. In July 1997, a delegation of US officials came to Volgograd to establish commercial ties with Khimprom. Four contracts have been signed for a total of \$100,000. Jeffrey Moore, head of the US delegation, declared that this amount was seed money for future research and to launch new cooperative work sources. “Amerikantsy platiat za konversiu Khimproma sto tysiach dolarov” (“Americans pay a hundred thousand dollars for the conversion of Khimprom”), *Dielovye Vesti* 20, July 9, 1997, p. 1.

⁵² “Volgogradskoie Proizvodstviene Obiedinienie Khimprom,” pp. 4-5.

⁵³ “Zolotaia zvezda volgogradskikh khimikov” (“The golden star of Volgograd chemical enterprises”), *Volgogradskaia Pravda*, June 25, 1994, p. 3.

⁵⁴ “Khimprom—edinstvennoie v oblasti krupnoie gospredpriatie nie sokrashivshee za gody perestroiki ni odnovo chelovieka.”

⁵⁵ “Zolotaia zvezda volgogradskikh khimikov”; Mr. Sidorov, director of ZBKk-Khimprom, Volgograd, interview with the author, May 17, 1999.

⁵⁶ Ibid. For instance, in 1995, 87 percent of the company’s profits went to pay taxes and to maintain the social infrastructure. “O perspektivakh razvitiia otiechesvenoi khimicheskoi promyshlieniosti mojno sudit na primiera chastnovo AO Kaustik i polugosudarstvennovo AO Khimprom,” p. 9.

⁵⁷ Ben Ouagrham, “La conversion des entreprises de defense en Russie: une analyse regionale.”

⁵⁸ “Zolotaia zvezda volgogradskikh khimikov”; Mr. Sidorov, director of ZBKk-Khimprom, interview with author, Volgograd, May 17, 1999.

⁵⁹ “Zolotaia zvezda volgogradskikh khimikov.”

⁶⁰ Ben Ouagrham, “La conversion des entreprises de defense en Russie.”

⁶¹ “Chevo khotiat promyshlenie generaly” (“What do the industrial generals want?”), *Delovoe Povoljje*, March 8, 1999, p. 3.

⁶² Ibid.

⁶³ Ibid.

⁶⁴ “Energetiki prognulis, no nie slomalis. potomy shto nie khotiat rabotat v kredit” (“The energy sector tightens its belt, but does not give up, because they do not want to work on credit”), *Delovoie Povoljje* 13, April 1999.

⁶⁵ Tucker, “Converting Former Soviet Chemical Weapons Plants.”

⁶⁶ Ibid.

⁶⁷ Ibid.

⁶⁸ George Parshall, former director of Chemical Science at the DuPont Company and chemical weapons expert, personal communication with author, August 10, 1999.

⁶⁹ “Protivogaz i rosa” (“The gas mask and the rose”), *Gorodskie Vesti*, September 12, 1996, p. 2.

⁷⁰ This waste pond was commonly called the “White Sea.” “Protivogaz i rosa,” p. 2, and Lev Federov, “Chemical Weapons in Russia: History, Ecology, Politics,” *Arms Control*, July 27, 1994.

⁷¹ “Protivogaz i rosa,” p. 2.

⁷² Ibid.

⁷³ Ibid.

⁷⁴ “Khimprom dumaiet o nas” (“Khimprom cares about us”), *Gorodskie Vesti*, November 12, 1997, p. 2.

⁷⁵ Golden shares allow the state to veto the decisions of the management if they contradict its policy.

⁷⁶ Mr. Sidorov, director of ZBKk-Khimprom, Volgograd, interview with the author, May 17, 1999.

⁷⁷ “O perspektivakh razvitiia otiechesvenoi khimicheskoi promyshlieniosti mojno sudit na primiera chastnovo AO Kaustik i polugosudarstvennovo AO Khimprom,” p. 9.

⁷⁸ This timeframe may be shorter in the chemical sector owing to the high quality of technologies.

⁷⁹ One way to determine whether a defense enterprise maintains good connections within the government is to determine the amount of federal funding it receives compared to other local enterprises. If an enterprise continues to receive federal funds (like Khimprom) while others do not, it is an indication of its political clout.

⁸⁰ “Rosvoorujenie: vsio zavisit ot predpriatii” (“Rosvoorujenie: everything depends on the firms”), *Delovoie Povoljje* 4, February 1999, p. 1.

⁸¹ Mr. Pavel Vladimirovitch Poliakov, Committee for Industrial Policy and Development of Entrepreneurship, City Administration, Volgograd, interview with author, May 1999.

⁸² George Parshall, interview with author, July 26, 1999.

⁸³ “Zolotaia zvezda volgogradskikh khimikov.”