



# A Letter From Krasnoyarsk: Disarmament, Conversion, and Safety After the Cold War

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Nuclear weapons production facilities in the Krasnoyarsk and Tomsk regions of the former Soviet Union have released massive amounts of radioactive and toxic wastes into the environment. Large quantities of spent nuclear fuel have also been generated, for which management and disposal capabilities are entirely inadequate. As independent scientists and citizens' groups have begun to penetrate the culture of secrecy that has surrounded the Soviet and post-Soviet nuclear industry, the extent of this health and environmental disaster is finally coming to light. At the Second International Radioecological Conference, held at Krasnoyarsk in September 1994, researchers, physicians, activists, and government representatives discussed waste storage proposals, environmental cleanup, the health needs of radiation victims, and the political status of a new generation of nuclear critics in the former Soviet republics. Especially controversial is a Russian government proposal to complete a new plutonium reprocessing plant in order to compete in the international nuclear energy market. [M&GS 1995; 1:19-25]

## Secret Cities, Secret Missions

**K**rasnoyarsk 26 (K26) is not in the city of Krasnoyarsk and Tomsk 7 (T7) is not in Tomsk. Rather these were the postal codes for two of the many formerly secret cities in the former Soviet Union. These cities were not publicly acknowledged to exist until the era of glasnost, and they were created solely to participate in the production and deployment of Soviet nuclear (and other) weapons.

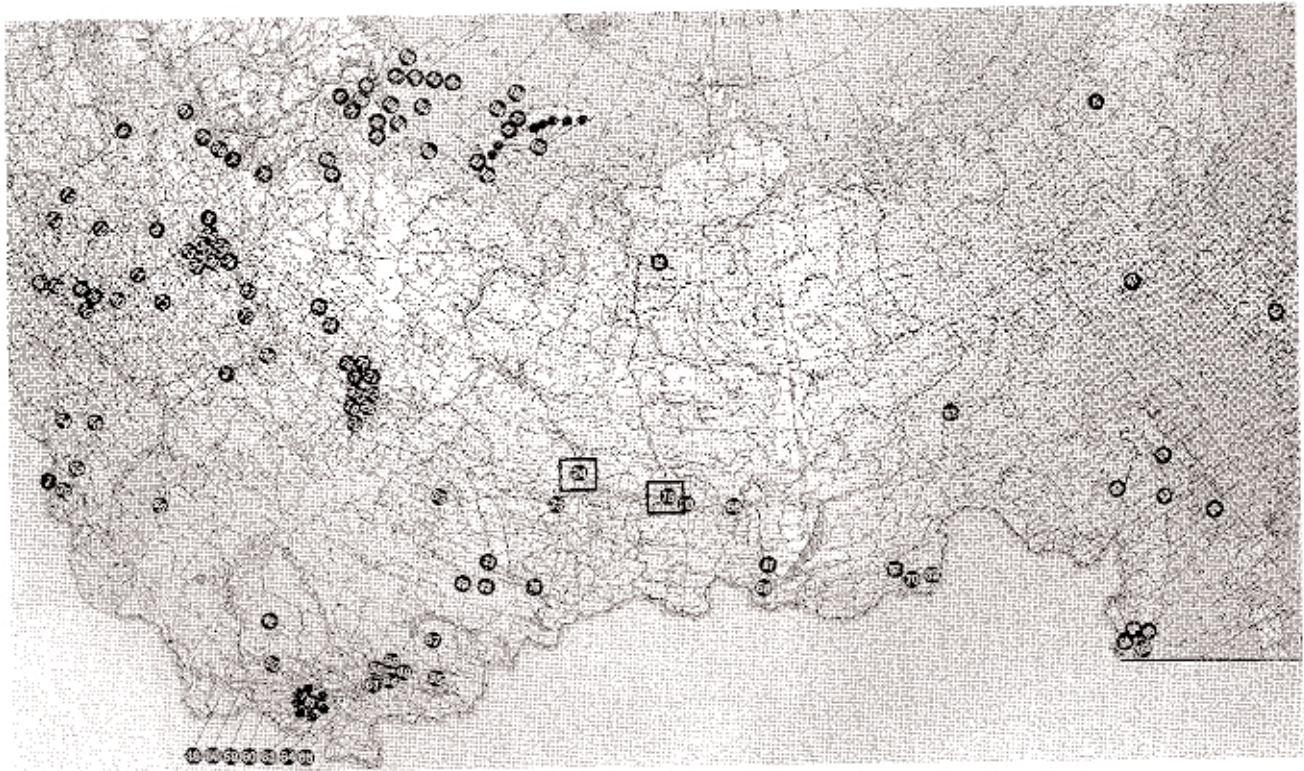
Those who worked and lived in K26 and T7 were the pampered technological elite of

Soviet society. The construction, management, control, monitoring, and operations in the vast territories controlled by the military were -- and remain -- totally outside local civil jurisdiction. Military spending accounted for more than half of the entire Soviet economy; one important element, the Ministry of Atomic Energy (Minatom), a secretive agency responsible for nuclear power and weapons production, even now remains subject to control only at the very highest level of the national (federal) Russian government. Now, as under Soviet rule, Minatom typically does what it wants, when it wants. Moreover, in addition to its relatively lavish access to funds from the federal government, Minatom is an aggressive entrepreneurial organization seeking to survive and prosper in the post-Soviet economy.

K26 was built in the 1950s on the shore of the magnificent Yenisey river, a 2,500-mile long waterway with the largest flow in

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**Figure 1.** The nuclear weapons complex in the former Soviet Union comprised more than 100 research, development, and manufacturing facilities. Krasnoyarsk-26 (site 19 on map) and Tomsk-7 (site 24) are in boxes (Source: Atom ohne Geheimnis. Moscow-Berlin: IPPNW 1992)

Russia and the sixth largest in the world. Only 40 km. south a million people live in the city of Krasnoyarsk, on the banks of the river, which is very wide there and reminiscent of the Mississippi except that, like the lower Hudson, it has great hills with remarkable rock formations rising on the far bank. Krasnoyarsk is the administrative center of a vast territory more than three times the size of Texas, stretching from the Mongolian border to the Arctic, four time zones east of Moscow.

K26 is an astonishing, technologically sophisticated anomaly in a society that has neither fed nor housed its people decently, nor given competent health care to more than a small fraction. It includes a city of more than 100,000 people and a vast industrial and research complex, much of it built two hundred meters underground. There are 20 separate subdepartments, including three nuclear reactors that produce plutonium for Soviet nuclear weapons -- a task shared with T7 and the Mayak complex near Chelyabinsk in the southern Urals. Part of the shame of K26 is that it is the product of slave labor -- the best guess is that 65,000 prisoners and 100,000 military conscripts built it [1].

Since the end of the cold war K26 has seen hard times. Two of its three reactors were shut down a few years ago after the con-

clusion of the START agreements; the third remains in operation as the only source of heat and electricity to carry the city of K26 through the long, bitter Siberian winter, where average temperatures are around -20 degrees C, and often fall to -30 or 40 degrees. The problem of how now to use this vast, expensive facility and the others like it, with sophisticated staffs accustomed to challenging work and privileged lives in a society with a nearly nonexistent civilian economy, dwarfs the conversion challenge faced in the U.S.

Among the worst problems at K26 were the continuous dumping of liquid wastes into the Yenisey river, not acknowledged until five years ago (a school teacher from the village across from the discharge site said the warmth of the water there made it a particularly attractive site for swimming, fishing, and for taking water for irrigation and drinking, even though these uses were officially forbidden) and the injection of vast amounts of liquid nuclear wastes into several underlying geological strata (also very problematic under current Russian law). The physicist A. Bolsunovsky has described much of this activity in detail [2].

Spent nuclear fuel is also reprocessed at T7, which produces plutonium for use in the closed nuclear power fuel cycle, so called MOX (mixed oxide) fuel, consisting of blends

of plutonium and uranium. T7 is even closer to its Siberian urban center -- only 15 km from the academic and industrial Tomsk and an overnight train ride from Krasnoyarsk. T7's official title is the Siberian Chemical Plant. It was begun in 1949, became operative in 1953, and, at its peak, had five nuclear reactors, three of which have now been shut down. T7 shares with Mayak the reprocessing of all spent naval nuclear fuel and has been plagued with technical problems. Twenty-four "accidents" have now been admitted, of which at least five were "grade three" (serious). Local people said they believe there have been 30 or more.

The last of the grade three accidents occurred on April 6, 1993. Due to technical errors at the radiochemical plant, there was an explosion that spread nuclear debris over about 50 square miles. Fortunately for the city of Tomsk, the prevailing winds dispersed the cloud away from the city. The residents of the local country side were not so lucky. It is estimated that about five percent of the 560 curies in the tank that exploded were actually dispersed. Data from Minatom are scanty; others, however, measured a rate of radioactivity of 0.4 milliroentgens (0.35 millirem) per hour on a highway 30 km away on the day of the explosion [3].

One of the central policy controversies of the moment is whether President Yeltsin will allow Minatom to complete a second reprocessing plant (RT2) at K26, to make yet more plutonium to enter the fuel cycle. The RT2 plant was started in 1976, and was half built when work was halted during the period of perestroika, because of public pressure on the Supreme Soviet. Minatom, struggling to survive economically in the post-Soviet world, is trying desperately to complete the plant in order to compete with the British (Sellafield) and French (Cogema) reprocessing plants. (The U.S. stopped all development of reprocessing during the Carter administration because it was judged far too dangerous to increase the world supply of plutonium, because the closed fuel cycle using reprocessed fuel has proved to be uneconomical, given the relatively low cost of abundant uranium, and because the technology of the closed nuclear fuel cycle has its own technological problems, not the least of which is the production of yet more waste, for which no safe method for storage has yet been developed.)

President Yeltsin, in the process of making his decision whether to complete RT2, recently paid a visit to K26 at the behest of Minatom. Local activists and scientists independent of Minatom were distressed that they could not get a hearing during his visit. Yeltsin is expected to approve the completion

of the plant although the environmental movement, many local scientists independent of Minatom, and some (but not all) civil authorities are trying to block it. Minatom is dangling jobs and playing the card of Russian national pride in trying to garner local, national, and international support for the project. In the meanwhile, documents have surfaced showing that Minatom has -- probably illegally -- already negotiated agreements to reprocess spent fuel from foreign suppliers, and has also been soliciting foreign investment to complete the vastly expensive project.

Accepting spent nuclear fuel from power plants in the West could earn Minatom large amounts of hard currency, but is probably illegal under current Russian law and would require exemption from the prohibitions against storing foreign wastes presumed to exist in the new, as yet unfinished, environmental law, which has not yet appeared for public review despite four years of drafting.

## The Meeting

The Second International Radioecological Conference, held in Krasnoyarsk from 12-14 September, 1994, was jointly sponsored by the Krasnoyarsk Krai (Region) Administration, the Krasnoyarsk Regional Committee for Protection of the Environment, the Krasnoyarsk Environmental Movement, and the Socio-Ecological Union (SEU), with the cooperation of the Tomsk Regional Administration and Ecological Initiative -- a Tomsk-based nongovernmental organization -- and with sponsorship support from the Center for Citizen Initiatives (CCI) of San Francisco. In what is now a poor country, deeply demoralized by its many problems (including widespread crime and corruption, unemployment, and very low salaries relative to rampant inflation) our hosts were unflaggingly generous and attentive.

Before the conference began, the American delegation spent a day with our local hosts (citizens' groups, scientists, and city and regional officials), as well as with activists from Moscow (SEU and Russian Greenpeace), a high level scientist from the ecological section of the Russian government security apparatus, and activists and scientists from Chelyabinsk, Kaliningrad, the nuclear weapons test site area in Kazakhstan, and Nizhny Novgorod (another nuclear trouble spot, and site of an earlier conference in 1994).

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1. Physicians for Social Responsibility, CCI, ISAR (formerly, the Institute of Soviet-American Relations), the Natural Resources Defense Council, and Plutonium Free Future

Along with superb local translators (we were very fortunate, since six of the 13 Americans also spoke Russian), we climbed the bluffs across the river from the city, in an area situated in a large nature preserve. At the end of the hike we were rewarded with a generous picnic, and then shared our backgrounds and hopes for the meeting. The U.S. group included people working locally on problems at Hanford, Savannah River, and Lawrence Livermore, as well as representatives of several national organizations,<sup>1</sup> and one young Peace Corps volunteer who was among the first working in the former U.S.S.R.

The formal conference lasted three intensive days, in what was the Lenin Museum -- now the local cultural center, a somewhat grandiose modern building on a beautiful riverside site. There were about 100 attendees, including local government political, administrative, ecological, and technical staff, many local academic scientists studying ecological and health problems, representatives of local citizens' groups, several politicians, some senior Minatom officials and scientists (including the chief of K26), one or two academic Minatom defenders, a physicist who represented the ecology group of the federal national security agency (a voice independent of Minatom), and -- as is almost inevitable at such meetings in the former U.S.S.R. -- victims of the government's nuclear activities and one or two "crazies." (Russia seems now vulnerable to psychics, faith healers, astrologers, and evangelists, who probably reflect this demoralized society.)

Several themes dominated the proceedings:

1. Plutonium reprocessing:

Minatom and its few academic supporters defended the RT2 reprocessing plant doggedly. Among the many rationales offered by the agency were:

\* The need for jobs, both for the region and for the country, but particularly for the survival of K26. Arguments were offered that if the Russians do not compete for this business the British and French will take it anyway.

\* Russia has few, if any, other technologies that are saleable for hard currency; stopping this project is a plot by the U.S. finally to destroy Russia by undermining its economy (a Minatom supporter was heard to describe one of the Americans as an obvious spy, since he spoke such good Russian).

\* The U.S. lacks -- and is jealous of

-- Russia's technological proficiency, which allows Russia to reprocess with absolute safety.

\* Russia is not a third world country only able to sell oil and other natural resources for Snickers bars.

\* The closed fuel cycle is no longer very much more expensive than the open cycle (which does not require reprocessing).

The Minatom spokespeople would not discuss whether Russia will have to retain nuclear waste from foreign reactors, but even if this were necessary, they boasted that they are the world's experts and can do it safely and reliably. Plutonium, according to Minatom's view, is a national treasure -- the more plutonium Russia has the stronger, richer, and prouder she will be. Minatom criticized its opponents arguments as "political," while their own positions were said to be based on "scientific facts."

There was a remarkable change in the responses to this Minatom presentation compared with the Chelyabinsk conference held two years ago. Then opposition came mostly from concerned or victimized members of the public; this time each of the technical arguments was challenged knowledgeably by other agencies of the national or regional governments or by academic or citizen participants. The past Minatom safety record was characterized as awful. Minatom was accused of keeping accidents and other mishaps as secret as possible. The closed process, critics argued, is still horrendously expensive; the costs of decommissioning are never presented; retention of the wastes from other countries is inevitable; the country is awash in plutonium, and monitoring and accounting procedures are thoroughly inadequate.

2. Underground storage of liquid wastes:

There is currently massive injection of liquid nuclear waste underground at K26 -- a practice that had been vehemently denied until very recently -- and only Minatom has access to its safety procedures and to the data related to them. This discussion was technical and engendered much controversy. The critics were distressed that they had no way of judging whether safety procedures were adequate and that, in any case, Minatom was not sharing its data with outsiders except in very selective and limited form.

3. Dumping of liquid waste into the Yenisey river and general rehabilitation of the area:

## The Russian Law on the Protection of Nature

Russia passed a law on environmental protection in 1991 that prohibits importation of foreign nuclear waste for storage and disposal on Russian territory. In a Machiavellian interpretation, Minatom has operated on the premise that reprocessing is distinct from "storage or disposal," thus exempting them from the law. Probably only high-level vitrified waste, along with useable fuel, will be returned to senders if RT2 comes on line. The vastly larger amounts of mid- and low-level wastes will almost surely be retained by Russia, as are all the wastes currently generated from the former Soviet republics and Eastern block countries with which Minatom has existing contracts. The Russian Duma (parliament) and its predecessors have been working for four years on a new law to regulate the handling of nuclear waste and the lawmakers are under great pressure to allow reprocessing of foreign fuel. Some local officials are hesitant to open important environmental decisions to real democratic process via referendum.

The local residents were totally unaware of what was being done at K26 from the 1950s until about five years ago and were not protected from its hazards. Conflicting data were presented, with some arcane modelling of how radioactive waste might be distributed in river sediment, but there seemed to be minimal empirical monitoring of actual levels of pollution. The representative of the village across from the outflow pipe of the K26 plant -- whose members now realize that they were being exposed to unknown and unmonitored radioactivity for decades -- expressed the villagers' sense of betrayal in compelling terms.

#### 4. Radiation victims:

Among the representatives of groups victimized by radiation exposure were a Kazakh woman exposed along with her entire community at the test site at Semipalatinsk; a former Soviet army captain -- a specialist in radiation and chemical protection who spoke for the 2,000 men now living in Krasnoyarsk who worked as liquidators after the Chernobyl accident; villagers exposed near T7; those living across from the K26 outflow pipe; and -- among the most heavily exposed -- residents of the south Urals exposed to wastes dumped in local waterways by the Mayak complex. One constant story was how very difficult it is -- even for those most heavily exposed (e.g., Chernobyl residents and the Tcha river villagers near Mayak) -- to get categorized as having been exposed and, thus, become eligible for special governmental benefits. The stories were deeply moving and disturbing. Neither the Russian government nor the world community has responded adequately to the pain these people have endured.

5. Health research and its political and social context:

\* Worker health: Only Minatom has access to worker health data and, unlike the meeting two years ago at Chelyabinsk, this meeting did not hear any official health research. (Presenters at Chelyabinsk spoke of much higher reported exposures than in the U.S., with essentially no adverse health consequences. Promised manuscripts have yet to appear -- two-and-a-half years later.)

\* Community health in contaminated areas.

There may be one change for the better in the last two years, along with some frightening continuities from the old authoritarian past. What is new is that, with persistence, medical investigators can now get into the "contaminated zones" and are no longer forced to rely solely on Minatom-supported investigations. One very impressive independent scientist, with first hand experience in the area around the Mayak complex, characterized research published by the local institute for biophysical research -- as "lies."

The frightening news is that independent (i.e., non-Minatom) doctors and research scientists remain open to vilification in the press, removal from their posts, theft of documents, and psychological harassment. One scientist reported that after she presented her results her office was broken into and all of her original, hard-copy research protocols were stolen (while the computer and microscope were untouched). She began to receive -- and continues to receive -- obscene telephone calls, including one warning her that she was going to be in an automobile accident. Her story had the ring of truth: while she was accused in the press of seeking foreign money and notoriety, she has in fact been terrorized and her life and family are severely disrupted. She appears to be a woman of supreme courage, however, who has not yet been silenced. Another courageous doctor cared for a village in a contaminated zone; she was removed from her post after struggling for years to have those for whom she cared officially recognized as victims of radiation, in the face of consistent denial by Minatom health researchers that her patients have suffered any adverse consequences from radiation exposure. So far they have not received even minimal compensation. The local media situation is tightly controlled: T7 owns the newspapers in Tomsk; citizens' groups and scientists in Tomsk have found their printing jobs accepted, then suddenly and mysteriously refused. (Fortunately, there is no longer effective central control of

all the presses in the country: printing jobs can be done at distant sites, though at far greater cost and inconvenience.) One of the Chelyabinsk newspapers has been acting as Minatom's voice. It has accused local activists and scientists of greed, of disloyalty to the country, of promoting "radiation phobia," and of self-promotion, among other charges.

One U.S. conference participant, who has been doing a comparative anthropological study of residents near Hanford and the Mayak complex, has been attacked in the paper and named as a probable spy after being stopped at the airport and intensely questioned by the successor agency to the KGB. Having been named in the newspaper, she feels she is in real danger of violence from local fanatics.

\* Fanatics exist: A vicious local Krasnoyarsk paper -- blatantly anti-semitic and fascist -- blamed the communist era on the "Jews" and attacked the ecology movement as a foreign plot to undermine Russia. So far this is a fringe position, but the country is vulnerable to these arguments, and feels deeply its loss of major power status, as well as the grinding and raw quality of everyday life.

\* Despite having been told to stay away, Dr. Nina Solovyova, a physician who is chief of medical genetics at the Siberian Academy of Medical Sciences in Novosibirsk, persisted in studying DNA and chromosomal damage in children in one of the most heavily exposed villages on the Techa river, badly contaminated by the Mayak complex. While FIB-4 has reported that the health of this population is minimally affected, Dr. Solovyova has found profoundly higher rates of both DNA and chromosomal damage in the exposed population, compared to a reasonably well chosen control population. These results appear credible and frightening.

\* Dr. Tamara Matkovskaya is Professor of Pediatrics at the medical school in Tomsk. Like Dr. Solovyova, she was not an antinuclear activist, but also felt compelled to respond to suffering when it arrived, so to speak, on her doorstep. After the April 1993 accident in Tomsk, Dr. Matkovskaya undertook field studies among school children in the exposed areas. (It is unclear how soon after exposure she examined the children.) She reported a multiplicity of problems, including lethargy, inability to learn, weakness,

and increased susceptibility to infection. There were apparently no simultaneously studied control subjects.

This research brings up many problems and issues. It was done under difficult conditions, with few of the resources that investigators in the affluent countries would take for granted. Indeed, the research was met with open hostility. The results, on their face, are biologically implausible, given the assumption of a single, relatively low-level exposure. The investigator assumes that the severity of her findings are due to multiple unrecorded radiation exposures over the years, with potentiation by environmental pollution and poor diet. Given the uncertainty about duration and intensity of exposure, the multiplicity of effects, and the absence of carefully studied controls, research such as this would not find its way into western peer-reviewed medical journals.

Yet, I do not believe we can simply dismiss Dr. Matkovskaya's findings. Most of our knowledge of radiation effects is derived from the single large exposures of atom bomb survivors, not from chronic repeated exposure, and there are very many reports like hers from other Russian "contaminated zones." Few, if any, of these individual reports would meet the strict criteria needed to establish causality, but they suggest the possibility of serious effects on children of repeated, chronic radiation exposure, and should not be ignored. This is an issue on which the international physicians movement could well work, and help to better organize and define.

### **Future Action by Those Outside the Former U.S.S.R. -- Some Suggestions**

**Pressure on the U.S. Department of Energy and similar agencies of other governments regarding assistance to Minatom.**

Conference participants reported large transfers of funds from DOE to Minatom, the justifications for which have been environmental protection and maintaining the administrative and scientific structure that remains responsible for massive amounts of fissile materials and weapons. It was asserted that DOE has not effectively monitored the use of these funds and, particularly, that local groups and independent scientists have not been included in the monitoring process. This is a clear call to action.

**Facilitating the work of independent scientists and citizens' groups at the weapons production and reprocessing sites.**

Over the last two years the numbers of local or regional scientists who are working on problems of nuclear contamination and its health and ecological effects seem to have burgeoned. To say that resources and support are meager, however, is an understatement. Salaries are marginal; there are few or no sources of research money; travel is almost impossible (certainly by air -- train travel within the Siberian research cities of Krasnoyarsk, Tomsk, Irkutsk, and Novosibirsk is still relatively cheap, but some people have not accommodated to the reality that this is all they can now afford). A vigorous, coordinated, intergroup response to the needs of those working out in the nuclear trenches is vital. In effect, a parallel to the U.S. Military Production Network is badly needed. (The Military Production Network is a federated group of citizens and other activist organizations from around the U.S., who have been far more effective working together on common problems than they would be each in their own isolated area.)

**Addressing chronic radiation syndromes in children, adults, and nuclear workers and "liquidators."**

The many current research studies are not in easily available form; they have not been critically (albeit sympathetically) reviewed or synthesized; and no comprehensive and coordinated effort has been made to identify what should be done and how it might possibly be funded. On the other hand, if we do not act we will be left with predominantly Minatom data, which do not come from an independent or disinterested source. This body of information needs to be coordinated, further research needs specified, and pressure placed on both the Russian government and on other donors to fund such work and, parallel to the situation in the U.S., to have it done by those independent of the nuclear bureaucracy.

This is a dangerous time in the former U.S.S.R., and not just for those obliged to live there. With these risks from the residue of nuclear weapons production work, the world is jeopardized by the current situation at these sites in the former Soviet Union, a situation which has been in part exacerbated by the actions of the U.S. government. If we do not seize this moment, we may look back on our inaction with deep regret.

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