Report

Uranium Tailings in Kyrgyzstan: Catalyst for Cooperation and Confidence Building?

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After they achieved independence in 1991, the Central Asian states of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan began to realize the scale of the ecological damage that had occurred in their region during the Soviet era. Aside from coping with the political and economic disarray they inherited from the Soviet Union, the Central Asian states recognized that they would also need to tackle an environmental legacy of acute water shortages, the desiccation of lakes and seas, and contamination associated with the accumulation of nuclear waste.[2] Most of these environmental problems were generated by the Soviet centralized economy, in which the Central Asian republics served primarily as exporters of raw materials, including wool, cotton, oil, hydropower, coal, uranium, and other minerals. Production quotas were set by Moscow and imposed upon Central Asian producers without full consideration of local factors peculiar to the region. Such policies resulted in irrational use of land and water resources which, in turn, led to the deterioration of the environment. These environmental challenges now pose a threat to regional stability, as the costs of coping with them have generated disputes among the Central Asian states.

Chief among these environmental legacies is the imprint left by the Soviet nuclear industry on Central Asia. With the development of atomic energy and its application to military purposes in the 1940s, the Soviet mining industry entered a nuclear phase. In Central Asia, this phase meant expanding the mining of radioactive ores and minerals and classifying uranium as a strategic raw material. At this time, uranium deposits were discovered and developed north of the Ferghana Valley in what is now part of modern Kyrgyzstan. Although nuclear weapons were not produced or deployed on the territory of Kyrgyzstan, the country subsequently provided a large share of the uranium used by the Soviet military-industrial complex. And the waste products left behind by that industry, especially the uranium tailings remaining at uranium mining and milling facilities, now represent a challenge not just to environmental quality, public health, and domestic political stability in Kyrgyzstan, but also to regional, political, and economic stability. Moreover, the possible contamination of rivers in Kyrgyzstan by radioactive waste from these uranium tailings would affect both Kyrgyzstan and communities downstream in Uzbekistan and Tajikistan.

A large body of literature on the nexus between international security and environmental issues concludes that environmental degradation can contribute to instability and can lead to conflict on many levels. Another less explored area of research, however, shifts the emphasis away from instability toward ways in which certain environmental issues may provide a means of enhancing trust and cooperation between nations and serve as an impetus for stability.[3] While Central Asian states could choose to squabble over who will bear the costs of cleaning up the nuclear legacy of the Soviet Union, they could also decide, with international assistance, to cooperate in finding feasible solutions to environmental challenges that affect them all.

This report will outline the development of the Soviet uranium mining and processing industry in Kyrgyzstan and discuss the legacy of this industry. It will detail the threats to environmental quality, public health, and domestic and regional security posed by inadequately maintained uranium tailings in Kyrgyzstan, emphasizing the potential regional impact of these threats.[4] The report discusses current Kyrgyzstani efforts to deal with the uranium tailings issue, as well as international cooperative efforts to address it. It concludes with recommendations for how the Central Asian states can join together to meet this challenge, potentially catalyzing broader regional cooperation and also attracting international financial support.

THE LEGACY OF URANIUM MINING IN KYRGYZSTAN

Uranium deposits were among those natural resources that attracted Russian geologists during Tsarist Russia's expansion into Turkestan.[5] Many such deposits were discovered on the territory of present-day Kyrgyzstan. From 1907 to 1913, the Tyuya-Muyun mine, located 35 kilometers (km) southwest of the city of Osh, was operated by a private Russian company called Ferghana Joint Stock Company for the Processing of Rare Metals. During this period, the company mined 820 metric tons (MT) of ore, about 655 MT of which were transported to St. Petersburg for further processing into uranium and vanadium, which were then exported to Germany.[6] Owing to the natural abundance of uranium on its territory, Kyrgyzstan was one of the major producers of uranium in the Soviet Union during the 1950s. In the late 1960s, however, uranium mining in Kyrgyzstan significantly decreased, and by the end of the 1960s most of the active uranium mines were shut down and conserved. Soviet mining efforts were diverted to newly discovered uranium deposits in neighboring Tajikistan and Uzbekistan.

Uranium ore mining and milling produce significant amounts of radioactive waste, which can be divided into two groups. The first group comprises solid radioactive waste from low-grade unusable ores stored in dumps. The second group consists of solid, liquid, and gas radioactive and chemical wastes from hydrometallurgical plants producing uranium oxide (U3O8). This second group of wastes is stored in large reservoirs called tailings impoundments.[7]

Uranium oxide, also known as "yellow cake," is only mildly radioactive, since about 70 percent of the ore's radioactivity is left behind in the tailings. The tailings, if properly maintained, are at least ten times more radioactive than typical granites, such as those used in city buildings.[8] If kept dry, tailings may emit radon gas into the air, and radioactive particles can then be picked up and transported by winds. These processes can deliver significant doses of radiation to nearby populations. To prevent such contamination, tailings are usually kept underwater. Underwater storage minimizes airborne transport of radioactive particles, but also increases the probability of contamination of groundwater with radium. Ponds lined with plastic liners are used to meet accepted environmental protection standards for uranium tailings. Some experts, however, doubt that this kind of protection will ensure safety for the entire period of the potential danger from contamination, which "corresponds to a [sic] several times the half life of thorium-230, or about 75,000 years."[9]

Tailings contain such uranium decay products as thorium (Th)-230, radium (Ra)-226, radon (Rn)-222, and radon progeny elements.[10] If the tailings pond is kept dry, there is a risk of radium-226 and thorium-230 becoming airborne and contaminating the surrounding area.[11] In addition, a group of chemical pollutants commonly associated with uranium tailings—including heavy metals, acids, ammonia, and salts—contributes to the hazardous effects uranium tailings have on the surrounding environment and the health of the population living nearby. Overall, then, the operation of uranium mines and mills produces radioactive waste that can threaten four different aspects of the environment with contamination:

1. Groundwater
2. Soil surrounding uranium mining and milling sites
3. River systems
4. The atmosphere (radioactive dust).

Human activity that disturbs uranium tailings in storage could also lead to environmental contamination. At many former uranium processing facilities in Central Asia, for example, fences are often poorly maintained, and the local population sometimes uses these sites for scavenging and for grazing cattle.

All these factors contribute to the significant health risk that uranium tailings pose to nearby populations. Constant monitoring of the radiation level at the tailings sites and measures taken to improve their safety can reduce the risk of radioactive contamination. However, if these tailings are abandoned and neglected, they will continue to emit high doses of alpha and gamma radiation and, thus, will have an array of devastating impacts at many levels.

Indeed, deteriorating uranium tailings is a part of the nuclear legacy that Kyrgyzstan has inherited from the Soviet nuclear weapons program. Specifically, the republic has to cope with the large quantities of radioactive waste that are accumulated in 36 uranium tailings sites and 25 uranium mining dump sites located throughout its territory.[12] Several major accumulations of tailings are located at closed uranium mining and processing sites, including those in Kadji-Say, Min-Kush, and Mayluu-Suu, the latter being by far the largest site of uranium tailings in the country. Two other tailings sites are located at active mining facilities, including Ak-Tyuz, where gold, silver, and other rare minerals are mined,[13] and the Kara-Balta Ore Mining Combine. Tailings at these still-operational enterprises are subject to radioecological monitoring and efforts are made to keep the facilities in compliance with minimum requirements for radioecological safety. Therefore, such sites are perceived to be less hazardous than the closed Soviet-era facilities.

Other important qualitative criteria require consideration when assessing the scope of the threat that a uranium tailing site might pose. For example, tailings threats may be assessed according to exposure risks: proximity to people, probability of being transported to people, and ease of access by populations. Because this report focuses primarily on political risks, it will consider the geographical location of tailings according to their proximity to borders with neighboring countries. Uranium tailings located on or near international borders are referred to in this report as "transboundary" tailings.

All uranium tailings in Kyrgyzstan present threats to human health and the environment and have negative social impacts on the well-being of the nation's population to one degree or another. However, tailings of a transboundary nature have the potential to extend these impacts beyond the republic's borders and, thus, become a cause of conflict that could affect more than one country in the region.

MAYLUU-SUU TAILINGS: CURRENT STATUS AND THREAT

The Mayluu-Suu site in southwestern Kyrgyzstan and the damage caused there by a May 2002 landslide serve as a vivid example of how an established environmental problem can evolve into a threat jeopardizing both domestic and regional security. The 4,000-cubic-meter landslide, caused by six weeks of torrential rains in the south of the country,[14] partially blocked the Mayluu-Suu River, whose waters threatened to flood radioactive tailings located along its banks near the town of Mayluu-Suu. There was great concern that the Mayluu-Suu River might carry away the nuclear waste accumulated in uranium tailings impoundments along its banks, which would have threatened downstream regions of Kyrgyzstan, Uzbekistan,[15] and perhaps even Tajikistan, with radioactive contamination.

As was so often the case with the production of raw materials under the Soviet centralized economy, the extraction of uranium and uranium ore processing were conducted in areas that were very often unsuitable for these types of activities. The Soviet system focused on short-term production goals and discounted other considerations. Thus, Kyrgyzstan's peculiar geological formations, unusual climatic features, and frequent natural disturbances—such as earthquakes and landslides—were not adequately considered when Soviet authorities decided to establish uranium mines and processing facilities on its territory.[16]

Mayluu-Suu, the oldest and the largest uranium tailings site, is situated in an area that is highly vulnerable to landslides. The site is named after the town of Mayluu-Suu, a small town in the southwest of Kyrgyzstan, located north of Osh in Jalal-Abad oblast (province). It has a population of 23,000 people and stretches along the river that bears its name. Mayluu-Suu is located only 30 km from Uzbekistan on the northeastern border of the Ferghana Valley.

Until the early 1990s, very few people knew that this town was a part of a mining complex called Zapadnyi (Western) Mining and Chemical Combine.[17] From 1946 to 1968, more than 10,000 MT of uranium ore were processed at the hydrometallurgical plant of the Mayluu-Suu facilities[18] to provide raw material for the Soviet nuclear

weapons arsenal. The facility processed both locally mined ore and ore brought in from other parts of the Soviet Union (Tajikistan) and Eastern Europe (East Germany, Czechoslovakia, and Bulgaria).[19] Some analysts emphasize that the uranium ore from eastern Germany not only contained lead and arsenic, but also had higher levels of radiation than the locally mined ore.[20]

Approximately 2.5 million cubic meters of radioactive waste remain in 23 tailings impoundments and 13 waste-rock dump sites at Mayluu-Suu. Of these, 14 tailings and 12 dumps are located within the Mayluu-Suu town boundaries and on the banks of the Mayluu-Suu River and its tributaries.[21] The exact amount and composition of the waste remain unknown to Kyrgyzstani officials, because the facility records were taken to Moscow after the Mayluu-Suu facilities were shut down. The waste is buried under thin layers of gravel, sand, and clay.[22] Accidents involving radioactive spills into the Mayluu-Suu River have been reported in the past: In 1958 a tailings reservoir broke, and in 1994 a landslide pushed 1,000 cubic meters of radioactive material into the river and contaminated dozens of square kilometers of land.[23]

Currently, large, active, and potential landslides pose a direct threat to Mayluu-Suu. One of these landslides, named Tiktonik-1, took place in May 2002 and caused the partial damming of the Mayluu-Suu River. Kyrgyzstani officials stated that the landslide did not cause radioactive contamination, but there were explicit concerns over the threat it could have posed had any of the tailings impoundments been destroyed.[24] U.S. and Kyrgyzstani experts have outlined three possible consequences of future landslides in Mayluu-Suu: "1) a damming of the Mayluu-Suu River and flooding of the radioactive tailings pile, 2) the "bulldozing" of radioactive piles into the Mayluu-Suu River, and 3) no damage."[25] The continuing threat of landslides in this area makes the damming of the Mayluu-Suu River likely to occur, and the subsequent flooding could destroy tailings piles. The resultant contamination will affect the people of Mayluu-Suu, who live just 3 km downstream of the impoundments, and could spread further down the Ferghana Valley into neighboring Uzbekistan. [26]

Uzbekistani experts echo the concerns of their Kyrgyzstani and Western colleagues over the possible contamination of the Mayluu-Suu River with radioactive waste. They assert that such an event would contaminate the territory of Uzbekistan more than it would the territory of Kyrgyzstan, because of the peculiarities in the course of the Mayluu-Suu River. According to their estimates, in the event of a major accident such as might be caused by a landslide, about 1.15 million cubic meters of radioactive materials with a total radioactivity of 10.6 thousand curies will contaminate a territory of 300 square km,[27] mostly in part of the Ferghana Valley located in Uzbekistan.

This assertion puts the problem of the uranium tailings in Mayluu-Suu into a new perspective. The tailings pose not just an environmental and health threat to the surrounding population, but also represent a security threat that could jeopardize the stability of Kyrgyzstan and complicate Kyrgyzstani relations with its regional neighbors.

Threat to Kyrgyzstani Domestic Security

The deterioration of the uranium tailings in Mayluu-Suu and neglect by Kyrgyzstani authorities may contribute to domestic political instability by exacerbating the long-lasting tensions between the south and the north of the country. Traditionally, most of the Kyrgyzstani ruling political elite has come from the northern part of the country, while the political opposition has consisted primarily of representatives from the south. The north of Kyrgyzstan has also been considered to have a higher standard of living, especially during the Soviet era. After the country gained independence in 1991, the standard of living of the Kyrgyzstani people deteriorated. In the southern regions comprising Batken, Jalal-Abad, and Osh oblasts, which are dominated by a Muslim population and heavily dependent on agriculture, the situation was particularly bad. Most of Kyrgyzstan's ethnic Uzbek, Tajik, and other ethnic minorities live in this southern region alongside the ethnic Kyrgyz, who are the majority. The southern city of Osh witnessed interethnic violence in 1990 between Uzbeks and Kyrgyz, caused by the distribution of fertile land plots in favor of the latter.

On March 17, 2002, an armed clash between police and residents of the Aksy District took place in Jalal-Abad oblast. In addition to staging a political rally for the release of an opposition politician who had been arrested for alleged abuse of his powers, the demonstrators made demands to improve living conditions, allocate extra plots of land, and reestablish freedom of the press and human rights.[28]

Furthermore, the southern part of Kyrgyzstan lies in the heavily populated Ferghana Valley. The Ferghana Valley was once a cohesive economic unit, but for political reasons, Stalin divided its territory between Uzbekistan, Tajikistan, and Kyrgyzstan in the late 1920s. The area is considered the "political barometer of Central Asia,"[29] and has served as a base of operations for some fundamen-

talist extremist organizations acting in the region. These groups include the Islamic Movement of Uzbekistan (IMU), a militant pan-Islamist group that operates largely in the Ferghana Valley and receives support and some protection from some local inhabitants.[30] Another group that has emerged as a concern to the Central Asian governments is the political Islamist party Hizb ut-Tahrir. The activities of this party, which is banned in Kyrgyzstan, have recently been on the rise in the south of the country. In the summer and fall of 2002, several reports appeared in the Kyrgyzstani media about the detention of alleged Hizb ut-Tahrir members for distributing flyers promoting their organization.[31]

More research is needed to determine whether uranium tailings in Kyrgyzstan, and at the Mayluu-Suu site in particular, contain radioactive materials suitable for the production of radiological dispersal devices (RDDs, also known as "dirty bombs"). This report will, therefore, not address the possibility that the IMU could pose a proliferation threat by targeting the Mayluu-Suu uranium tailings as a potential supply of materials for producing RDDs. However, one can argue that IMU members may point out the deteriorating condition of radioactive waste accumulations at Mayluu-Suu and other former uranium mines in their propaganda flyers to recruit new members: The impoverished population near Mayluu-Suu may well be receptive to political propaganda stressing the scale of the ecological disaster they are facing. Although some may question the credibility of such a statement, one cannot but agree with the editor of a major newspaper in Kyrgyzstan who has written that the Kyrgyz people are so beset by poverty and despair that the smallest extra thing could be enough to exhaust their patience.[32]

Threat to Regional Security

To discuss the regional security implications of Kyrgyzstani uranium tailings, it is necessary to examine the geopolitics of the Central Asian region. As noted above, radioactive waste from Mayluu-Suu threatens to spread radioactive pollution down the watershed of the Ferghana Valley, affecting territories of Uzbekistan and possibly Tajikistan. Therefore, radioactive contamination of the Mayluu-Suu River, specialists assert, would be a catastrophe on a regional scale.[33] The Mayluu-Suu River feeds the Syr-Darya River and the other smaller rivers used for irrigation as they pass through the Ferghana Valley, often referred to as a breadbasket because of its fertile soil and the cultivation of a variety of agricultural products. Five large rivers, including the Syr-Darya River, flow through the valley, providing irrigation for the region's extensive agriculture.[34] The valley's major water supply, the Syr-Darya River, originates in northern Kyrgyzstan, crosses into Uzbekistan, then flows to Tajikistan, and later again into Uzbekistan. Although most of the Ferghana Valley lies in Uzbekistan, in the northeast the valley extends into Kyrgyzstan, and in the south it continues into Tajikistan. It should be noted that Central Asia is one of the most arid zones on the planet, and that the geographical division of its water resources is very uneven. Most of the region's water resources originate in Tajikistan and Kyrgyzstan, which are mountainous areas that have the least amount of arable land. By contrast, Uzbekistan and Kazakhstan have three quarters of the region's arable land, but have only meager water resources.[35] This distribution of water resources makes Uzbekistan and its part of the Ferghana Valley dependent on neighboring republics for the water supplies that sustain its agricultural industry. Thus, the pollution of water resources in Kyrgyzstan would have a direct impact on water quality in Uzbekistan. If the Mayluu-Suu uranium tailing impoundments flood and leak into the river, radioactive pollutants will be carried by the Mayluu-Suu River waters across the border to the Syr-Darya River. Flooding in Kyrgyzstan would thus contaminate the water supplies of two neighboring countries and threaten their populations, since they depend on these rivers for their livelihoods. While there is no direct threat of water pollution to the territories of Kazakhstan and Turkmenistan, the contamination of food supplies with radium-226, which is easily absorbed by vegetation, is a possibility—the bulk of the Ferghana Valley's agricultural produce is exported from Uzbekistan to these countries, for example.

Radioactive contamination of the rivers and adjoining territories of the Ferghana Valley would add to the already lengthy list of controversial transnational issues generating tensions between Kyrgyzstan, Uzbekistan, and Tajikistan. The most pronounced current disputes among these countries concern water, energy supplies, and the series of so-called enclaves, which are plots of land that are geographically isolated from the countries to which they officially belong. Radioactive waste from the Mayluu-Suu uranium tailings could serve as a potential cause of conflict in the region on three levels:

1. Possible hostility between Uzbek and Kyrgyz villages on the border between the two countries: Such hostility could be caused by a flow of environmental refugees[36] from Uzbekistan to Kyrgyzstan in the case of a radioactive waste spill into the Mayluu-Suu River

causing heavy radioactive particles to be carried downstream to Uzbekistan. If the radioactive contamination of Uzbek water resources made them dangerous for daily use, Uzbek villagers would likely consider fleeing to neighboring Kyrgyzstan where, being perceived as an additional burden to locals already coping with poor living conditions, they would be met with a certain degree of hostility.

2. Diplomatic disputes between Central Asian nations, particularly between Uzbekistan and Kyrgyzstan: The possible contamination of Uzbek resources—including irrigation waters and agricultural lands—with the radioactive waste from Kyrgyzstan could spark a diplomatic dispute between the two states. Such a dispute could require the involvement of a mediator, such as an international organization or one of the major powers, to persuade the parties to the conflict to settle the issue peacefully.
3. Economic sanctions are a possible response to radioactive contamination: Should Uzbekistan's water resources come under risk of pollution from Kyrgyzstani radioactive waste, Uzbekistan could retaliate by imposing economic sanctions on Kyrgyzstan. For example, Uzbekistan could significantly cut or entirely stop the supply of natural gas to its neighbor, which is dependent on imports of this raw material.

These few examples are useful to demonstrate possible worst-case scenarios that could develop if the Mayluu-Suu uranium tailings continue to be neglected, and if steps necessary to improve their condition are not taken.

KYRGYZSTANI URANIUM TAILINGS AS A CATALYST FOR REGIONAL MULTILATERAL COOPERATION

It is clear that the active engagement of the Kyrgyzstani government is crucial in finding more effective ways of treating its uranium tailings and in attracting attention to this problem on a regional and international level. In fairness, the government has taken some measures to address the issue of radioactive waste accumulated in the country. On January 29, 2001, the Kyrgyzstani Parliament passed a draft law concerning hazardous waste disposal sites located on the country's territory.[37] In May 2002, a branch office of the Ministry of Ecology and Emergency Situations was opened in the city of Osh, the second largest city in Kyrgyzstan, close to the Mayluu-Suu tailings site. In 2002 the government allocated 2 million soms (about $42,000) from the state budget for the rehabilitation of uranium tailings. It should be noted, however, that more than $20 million will be needed to rehabilitate the territory of the Mayluu-Suu tailings alone.[38]

Critics, however, argue that the government is not doing enough to address the problem of uranium tailings and contend that it should present a concrete plan of action to demonstrate its commitment to resolving both the short-term and long-term aspects of the issue.[39] The government could play a more active role in several areas. First and foremost it could share more information with its own population and the populations of neighboring countries about the hazardous effects of uranium tailings on human health and the environment. Educational programs in this area are sorely needed. The Kyrgyzstani governmental agencies that deal with uranium tailings in particular and radioactive waste in general should provide accurate and reliable information to the respective bodies of neighboring countries, detail the current state of their uranium tailings, and consistently report cases of radioactive waste spills or impending threats of such spills.

Another important role the government could play in reducing the threat of uranium tailings is in helping the mass media accurately report the situation. Throughout the 1990s, public discussion of the problems of radioactive waste and uranium tailings in Kyrgyzstan has been curtailed. Discussion was hampered by the failure of Kyrgyzstani authorities to acknowledge openly that uranium tailings and dump sites may pose an immediate and serious threat to the people and environment of Kyrgyzstan and its neighbors. Only recently has the problem of accumulated radioactive and nuclear waste in Kyrgyzstan become more transparent and open to public discussion. With increasing interest in the problem on the part of journalists and broader audiences, the government should take a proactive approach and engage in dialogue through press conferences and round-table discussions.

The government should also work in cooperation with indigenous nongovernmental organizations on activities that enhance public awareness about the threats that uranium tailings pose. Unfortunately, people residing near uranium tailings sites are often unaware of the high levels of radioactivity at these sites since there are no barbed wire fences enclosing them nor, in many cases, any warning signs. Since access is often unhindered, local residents are attracted to uranium tailings sites for a variety of reasons, including the collection of scrap metal and free construction materials, small-scale farming or pasturing cattle, and holding traditional Kyrgyz equestrian game competi-

tions. The use of uranium tailing sites for such activities risks spreading radioactive contamination.

On a more optimistic note, the way in which the problem of uranium tailings in Kyrgyzstan has been addressed by the multinational community of experts on radioactive waste disposal serves as a good example of how an environmental issue pertinent to a particular state may bolster multilateral cooperation and regional confidence building, enhance trust, and foster stability. A great deal of effort on the regional and international level has been made to change the perception of the problem of uranium tailings in Kyrgyzstan.

Tailings deterioration is no longer considered a solely Kyrgyzstani domestic problem, but is now treated by the governments of neighboring states as an issue of regional importance. Already the challenge posed by uranium tailings has fostered bilateral cooperation between Kyrgyzstan and Uzbekistan, and Kyrgyzstan and Russia in the field of radioactive safety. For example, in September 2000, a joint Kyrgyzstani-Uzbekistani training program took place in the Ferghana Valley city of Andizhan, Uzbekistan. This training focused on the possible evacuation of the local population in the event that radioactive contamination of the Mayluu-Suu River would spread onto the territory of Uzbekistan.[40] Another example of bilateral cooperation is a feasibility study on the rehabilitation of the tailings in the areas of Mayluu-Suu, Kadji-Say, and Min-Kush conducted by Kyrgyzstani experts and specialists from the Russian Ministry of Atomic Energy. Such examples of bilateral environmental cooperation serve to engender confidence-building and enhance overall stability in relations between these nations. Moreover, in a May 2002 meeting in Bishkek, experts of a working group of the Interparliamentary Assembly of the Eurasian Economic Community discussed the problem of uranium tailings, and it was suggested that this group take on the responsibility of regularly monitoring and thoroughly investigating all transboundary uranium tailing sites in the region.[41]

This picture would not be complete without mentioning that efforts to address uranium tailings in Kyrgyzstan are not solely limited to cooperation among the Newly Independent States (NIS). The problem has attracted attention from the international community as well. In June 2001, the European Union Technical Assistance to the Commonwealth of Independent States (TACIS) program launched a 500,000-euro project for the rehabilitation of uranium tailings in Mayluu-Suu. The United States is also playing an active role in assisting Kyrgyzstani efforts to cope with the degradation of uranium tailings. The U.S. government has allocated about $500,000 to rehabilitate uranium tailings in Kaji-Say.[42] This project, and a similar one recently initiated to help manage the Mayluu-Suu tailings, are conducted through the U.S. Department of Energy's Lawrence Livermore National Laboratory.

All territories where uranium tailings of a transboundary nature are located need to be routinely monitored with international assistance. Currently, efforts are under way to conduct joint monitoring projects engaging Central Asian states and donor countries. One example of such cooperation is a multi-year project called Navruz. The Navruz project is a cooperative, transboundary river monitoring project involving rivers and institutions in Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. The project is being conducted by scientific experts from these countries, facilitated by the Cooperative Monitoring Center (CMC) at the U.S. Department of Energy's Sandia National Laboratories. The Navruz project focuses on monitoring waterborne radionuclides and metals in Central Asian rivers. The project thus addresses both important public health and nuclear materials proliferation concerns in the region.[43] Similar joint activities could monitor uranium tailings in Kyrgyzstan, Tajikistan, and Uzbekistan and assess their impact on the Ferghana Valley environment.

CONCLUSION

The ongoing degradation of uranium tailings in Kyrgyzstan poses a wide range of threats. Some of these threats are imminent and require urgent solutions. Realistically, however, Kyrgyzstan cannot solve the problems posed by its uranium tailings on its own. The country's vulnerable economy cannot sustain the funding necessary for such a large project, and the situation is unlikely to change in the near future. Nonetheless, the country can feasibly take measures to avoid becoming an ecological disaster, and these measures require both international and regional environmental cooperation.

For example, Kyrgyzstani experts could work cooperatively with specialists from other NIS and Western countries to identify the highest-risk uranium impoundments and outline concrete steps to reduce the threat they pose to human health and the environment. Emphasizing a step-by-step approach would make the problem more manageable. Such a systematic multinational effort may demonstrate that this environmental problem can provide a focus for regional cooperation rather than pose a threat to stability in the Central Asian region. And more

importantly, a positive, phased, and realistic approach to the problem may attract international donors who can help finance it. In the wake of the conflict in Afghanistan, the international community has realized the importance of political and economic stability in Central Asia, which may encourage it to help tackle the challenges posed by uranium tailings. If, by contrast, sustained international efforts are not made to address this issue, another landslide in the vicinity of a uranium tailings site may trigger unpredictable international consequences.

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[1] An earlier version of this report was presented at the 25th International Conference, "Third World Studies," held at the University of Omaha in Nebraska October 10-12, 2002.

[2] Akhmed Rashid, *The Resurgence of Central Asia: Islam or Nationalism?* (London: Oxford University Press, 1994), p.8.

[3] Ken Conca and Geoffrey Dabelko, *Environmental Peacemaking* (Washington, DC: Woodrow Wilson Center Press, 2002).

[4] It should be noted that the problem of uranium tailings and radioactive waste in the Central Asia region is not peculiar to Kyrgyzstan. Kazakhstan has an infamous reputation as a "nuclear dustbin" because of its enormous amounts of nuclear waste and radioactive contamination caused by nuclear tests, uranium mining and processing facilities, and nuclear reactors. Tajikistan has significant quantities of radioactive waste accumulated during the operation of the Leninabad Mining and Chemical Combine in Chkalovsk. Uzbekistan was a major producer of uranium for the Soviet military-industrial complex, and it had several large mines operating under the auspices of the Navoi Mining and Metallurgical Combine. For more information about radioactive waste problems and related issues in Central Asian states, refer to the NIS Nuclear Profiles maintained by the Center for Nonproliferation Studies, available at the Nuclear Threat Initiative Web Site, <http://www.nti.org>. This particular report, however, narrows its scope to the coverage of the situation with the uranium tailings in Kyrgyzstan because of recent developments that make the problem of radioactive waste particularly acute in this country.

[5] Turkestan is a name commonly used in the 19th and early 20th centuries for the Central Asia region.

[6] I.A. Torgoev and Yu. G. Alyoshin, "Istoriya Otkrytiya Uranovykh Mestorozhdenii v Kirgizii," *Ekologicheskii Vestnik Murek*, No. 4 (August 2002), <http://www.zk.ru/murek.htm>.

[7] I. A. Torgoev and Yu. G. Alyoshin, "Dobycha I Pererabotka Uranovykh Rud," *Ekologicheskii Vestnik Murek,* No. 4 (September 2002), <http://www.zk.ru/murek.htm>.

[8] Uranium Information Centre Ltd., "Radioactive Waste Management," Uranium Information Center website, <http://www.uic.com.au/wast.htm>.

[9] Arjun Makhijani, Dear Arjun column, *Science for Democratic Action*10 (May 2002), p. 14-15.

[10] Gordon Edwards et al., "Uranium: A Discussion Guide, Part F," The Sustainable Energy and Anti-Uranium Service, Inc., July 28, 2002, <http://www.seaus.org.au>

[11] Ibid.

[12] Center for Nonproliferation Studies, NIS Nuclear Profiles Database, "Kyrgyzstan: Radioactive Waste," June 28, 2001, <http://www.nti.org/db/nisprofs/kyrgyz/waste.htm>.

[13] The source of radioactivity at this site is believed to be thorium, an unused element mined at the site.

[14] Patrick Cockburn, "Radioactive Flood Threat to People of Central Asia," *Independent,* May 16, 2002; in Lexis-Nexis Academic Universe, <http://www.lexis-nexis.com>.

[15] "Environmental Disaster Looms as Landslide Approaches Kyrgyz Uranium Damps," BBC Monitoring International Reports, May 15, 2002; in Lexis-Nexis Academic Universe, <http://www.lexis-nexis.com>.

[16] According to official data provided by the former Kyrgyz Ministry on Emergencies and Civil Defense, about 32 mudslides, 21 landslides, 7 earthquakes, 3 avalanches, and 55 other dangerous natural phenomena were registered in Kyrgyzstan in 1998. Ch. Abdykaparov, et al., "Ekologicheskoe Vozdeistvie na Okruzhayushchuyu Sredu Khvostokhranilishch I Otvalov Uranovykh I Polimetalicheskikh Rud v Kyrgyzskoi Respublike," *Polysphera*, No. 2 (2000), <http://polysphere.freenet.kg>.

[17] Nurlan Jenchuraev, "Basic Mining Industry Sites in Kyrgyzstan," August 17, 2002, <http://ecopage.freenet.kg/wastable.html>.

[18] I. A. Torgoev and Yu. G. Alyoshin, "Dobycha I Pererabotka Uranovykh Rud."

[19] Ibid.

[20] Ibid.

[21] Nurlan Jenchuraev, "Basic Mining Industry Sites in Kyrgyzstan."

[22] Center for Nonproliferation Studies, NIS Nuclear Profiles Database "Kyrgyzstan: Radioactive Waste."

[23] Ibid.

[24] Such concern was reflected in the speech by the Speaker of the Legislative Assembly of the Kyrgyz Parliament addressed to a Canadian delegation in May 2002. For more information refer to the news report in Russian, "Spiker Zakonodatelnogo Sobraniya Parlamenta Kyrgyzstan Privlyok Vnimanie Kanadskogo Deputata k Problemam Uranovykh Ostatkov v Respublike," Kyrgyz National Information Agency Kabar, May 15, 2002, < http://www.kabar.kg/02/May/15/94.htm>.

[25] R.B. Knapp et al., "Radioactive Tailings Issues in Kyrgyzstan and Kazakhstan," preprint from *Tailings and Mine Waste* (2002), pp. 313-324.

[26] Ibid.

[27] R. I. Goldshtein and P.V. Makarov, "Radioaktivnye Otkhody na Territorii Uzbekistana i v Transgranichnykh Rayonakh, Problemy Radiatsionnoi Bezopasnosti," *Polysphera,* No. 4 (2000), <http://polysphere.freenet.kg/>.

[28] Elena Buldakova, "Kyrgyzstan Media Reporting on the Aksy Events," *Media Insight Central Asia*, No. 24 (May 2002), <http://www.cimera.org/files/camel/en/24e/MICA24E-Buldakova.pdf>.

[29] Akhmed Rashid, *The Resurgence of Central Asia: Islam or Nationalism?* p. 81

[30] Center for Nonproliferation Studies, "Islamic Movement of Uzbekistan," <http://cns.miis.edu/research/wtc01/imu.htm>.

[31] "Khisbut-Takhrir Rasprostranyaet v Oshe Listovki," Kyrgyz National Information Agency Kabar, June 26, 2002, < http://www.kabar.kg/02/Jun/26/35.htm>.

[32] Elena Bulkakova, "Kyrgyzstan Media Reporting on the Aksy Events."

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[34] Akhmed Rashid, *The Resurgence of Central Asia: Islam or Nationalism?* p. 6

[35] Ibid, p. 60

[36] Jodi Jacobson, "Environmental Refugees: A Yardstick of Habitability," Worldwatch Institute Paper 86, November 1988.

[37] Alisher Khamidov, "Kyrgyzstan Tackles Toxic Waste," *EurasiaNet,* March 27, 2002, <http://www.eurasianet.org/>.

[38] "Kirgiziya Obrubaet Uranvye Khvosty," Kyrgyz National Information Agency Kabar, April 19, 2002, <http://www.kabar.kg/>.

[39] Kyrgyz environmental activist (name withheld by request), interview by author, Almaty, Kazakhstan, August 28, 2001.

[40] "V Andizhane Byli Provedeny Sovmestnye Kyrgyzksko-Uzbekskie Ucheniya po Zashchite Naseleniya pri Chrezvychainykh Situatsiyakh," Agentstvo *KazakhstanPress*, September 15, 2000.

[41] R. I. Goldshtein and P.V. Makarov, "Radioaktivnye Otkhody na Territorii Uzbekistana i v Transgranichnykh Rayonakh, Problemy Radiatsionnoi Bezopasnosti."

[42] Kaji-Say is located on the southern shore of the Issyk-Kul Lake, the biggest tourist attraction in Kyrgyzstan.

[43] For more information about the Navruz Project, refer to the Sandia National Laboratories web site, <http://www.cmc.sandia.gov/Central/reports/reports.htm>.