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Trilateral Collaboration Between US, Russia, Kazakhstan on Reducing Proliferation Risk

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1. Introduction

After the collapse of the Soviet Union, Russia and the US collaborated to reduce proliferation risk at 26 sites in Semipalatinsk Testing Site(STS) in Kazakhstan. The project consisted of US, Russian, Kazakhstani specialists and the Defense Threat Reduction Agency of the US Department of Defense. This case provides insight into how multilateral cooperation for nonproliferation can be achieved between nuclear weapon states and non-nuclear weapon states. This paper briefly summarizes the motives that brought on the trilateral collaboration between US, Russia, and Kazakhstan. It then analyzes the planning and implementation of nonproliferation operations and seeks to provide the implications the case might have to other cases.

2. US-RF-RK Trilateral Collaboration (1999~2012)

2.1. Background

The dissolution of the Soviet Union meant its territory was split into the Russian Federation and a handful of independent nations such as the Republic of Kazakhstan(RK). Initially, Kazakhstan was left with 1,410 nuclear warheads and the Semipalatinsk Testing Site(STS) after the breakup of the Soviet Union. The nuclear warheads were repatriated to Russia in 1995 while STS was official shutdown in 1991. However, nuclear testing infrastructure (ie. testing tunnels), and radioactive waste (ie. plutonium) left in STS was still vulnerable to potential proliferation risk such as scavengers or terrorists.

Kazakhstan signed bilateral agreements between the US and Russia to prevent such risks. However, in 1999, the US side proposed a joint effort to better identify, assess and handle remaining fissile material still scattered across STS. This led to a trilateral collaboration that spanned 15 years (1999~2012) and relied on the cooperation of US, Russia, and Kazakhstan scientists and engineers. As such, they were able to prevent unauthorized nonofficial extraction of about 100 kilograms of weapons-grade dispersed nuclear material. [1]

2.2. Implementation Procedures for Collaboration

While US and Russia agreed that leaving STS in its current state posed a proliferation problem, the Russian side initially rejected participating in the joint project. This was because it had yet to adopt criteria for assessing proliferation risks related to nuclear waste presence. Also, it feared once the US side had sufficient information on the nuclear wastes at STS, it would cut renege from funding the project. The parties compromised on their differences by developing the necessary criteria with the US within framework of contracts between Los Alamos National Laboratory (LANL) and Russian Federal Nuclear Center All-Russian Research Institute for Experimental Physics (RFNC-VNIIEF, hereafter VNIIEF). The US side also agreed not to identify specific former STS sites in the "information" contracts. This laid grounds to adopt a special set of procedures (summarized below) to execute the trilateral project.

1. The criteria for assessment of proliferation and terrorism risks on specific sites of the former STS would be developed jointly with the US side within a framework of "information" contracts between VNIIEF and LANL.
2. The selection of sites and development of technical solutions for liquidating or reducing the proliferation and terrorism risks would be made in the framework of the information contracts between VNIIEF and LANL without identifying specific locations.
3. Any design and field construction and assembly operations undertaken to implement technical solutions within the framework of information contracts and performed under contracts between the US and Kazakhstan sides would require participation of VNIIEF specialists at every stage of the project.
4. The sites where necessary activities had to be performed would be identified only after the applicable contracts were signed and/or appropriate decisions had been made by the Coordinating Group(CG), with the participation of the three sides.
5. Only fictitious names of the sites containing radioactive waste would be allowed in the engineering and field documentation.
6. The verification of radioactive waste required for confirmation of the pre-agreed substantiation of work would be performed according to a procedure agreed upon by Russia and US sides.
7. Obligatory independent radiation monitoring of the territory before and after the cleanup operations would confirm the absence of negative environmental consequences for Kazakhstan.

8. At the final stage, a commission staffed with CG members and experts would certify the site at a CG meeting, with the participation of all three sides. [1]

3. Joint Projects to Reduce Proliferation Risk

Over the course of 15 years (1999~2012) the three parties conducted 5 operations which helped reduce proliferation risk in STS. [1]

Year	Operation	Objective	Implementation
2000 ~ 2003	Groundhog	Develop additional protective measures for radioactive waste inside shafts of a single site (site EF)	Construct dome encasing all shafts
2003	Matchbox	Develop additional protective measures on containers with radioactive waste	Fill containers with cement-sand mixture
2003	Nomad	Develop additional protective measures on containers with radioactive waste located within a tunnel	Pour cement mixture through tunnels containing containers, embed additional protection after opening up facility portal
2005	Golden Eagle	Proliferation risk assessment of Level 2-4, secure three Level 4 sites (site X, Y, Z)	Pour cement through vertical tunnels into the stall nearest to the portal
2009 ~ 2012	K-4	Proliferation risk assessment of Level 1, Basic requirements for nonproliferation security	

3.1. Operation Groundhog

US, RF, and RK met in Almaty, Kazakhstan on June 7~11, 1999 to discuss each side's responsibilities. Russia would analyze data (Aktan-Berli testing ground), Kazakhstan would perform random testing for plutonium contamination at a couple of sites and the US would finance the project as well as retain the right to participate in fieldwork. The parties agreed to assess potential proliferation risks of dispersed nuclear materials on a single testing ground called site EF. The testing ground had two types of shafts: low as well as high concentration of radioactive waste. The team performed a detailed radiation inspection, then covered all the shafts with a protective dome. A 10-meter-deep mound covered the dome to blend it with its surrounding landscape.

While the operation was completed successfully, there was a few complications that hindered the project. First, the US side could not provide the Kazakhstani side with data that confirmed absence of explosive fragments in the shafts. This meant Kazakhstan had to conduct additional chemical analysis of samples from the shafts. Second, the US and Russian side differed in verifying radioactive waste. While the Russians proposed to verify nuclear materials in the range of 60keV for americium isotopes, the US proposed 129-keV for plutonium isotopes. Both sides compromised by measuring in the range of 129-keV and the US limited the energy range in the vicinity of this peak. Afterwards, the data in the spectrometer was erased and nuclear material samples were placed in a special shaft to be buried. Finally, the construction of the dome took around 3 years due to domestic issues in the US such as the presidential election which delays in funding.

3.2. Operation Matchbox

On July 18, 2003, a trilateral meeting was held to discuss the necessity and priority of providing additional protective measures related to Kolba containers located at STS. The meeting outlined the main stages for the project:

1. Identify method to exclude any access to materials inside containers
2. Develop technical and economic specifications and execution of the requisite paperwork to comply with Kazakhstan legislation
3. Test method on a "clean" container
4. Remediate Kolba containers to prevent possibility of future access

Technical implementation was to fill Kolba test containers with a water solution containing cement and sand. The filling of the container was monitored with a video camera. This method fixed the nuclear materials inside the container as well as increased the weight of the container to prevent easy transportation.

3.3. Operation Nomad

This operation expanded the security of containers with radioactive waste to ones in tunnels. Although US-Kazakhstan and Russia-Kazakhstan had each taken measures to improve security at sites with tunnels, parties became concerned when unauthorized extraction of metals increased. LANL and VNIIEF signed an information contract to strengthen protective barriers related to radioactive waste in three Kolba containers located at a "sample site."

Initially, the containers were to be taken from the location and filled with the cement-sand mixture. However, Kazakhstan specialists proposed to drill from the surface of the site to not disturb the shaft. The sample site also had two portals, one of which was broken into by unauthorized access. This gave the team an opportunity to prevent future unauthorized access by blocking one side of the portal by embedding a concrete plug, filling the portal with rock, then disguising it to blend in with the landscape.

3.4. Operation Golden Eagle

Based on the completion of several successful operations, VNIIEF and LANL signed a contract on tunnel sites containing radioactive waste that was easy to access. VNIIEF provided a lists of 16 sites, categorized by perceived proliferation risks to LANL and the objective was to refine prioritization of proliferation risks at each site. The sites were divided into four categories according to risk level(1~4) with level 4 presenting the greatest danger of which three sites X, Y, Z met the criteria.

After an initial survey of site X, the team found special-purpose technological equipment and associated components. The items being repatriated to Russia would solve proliferation risk in STS. Initially, activity was stalled because Russian law forbad importing radioactive waste into Russian territory. However, Rosatom formed a high-level working group for the preparation of the expatriation of equipment. Site X, Y, Z was secured using the vertical method, which was to pour cement through vertical tunnels into the stall nearest to the portal like Operation Nomad.

3.5. Operation K-4

Operation K-4 expanded the goals of Operation Golden Eagle by analyzing proliferation risks of Level 1 sites as well as defining basic requirements to ensure security of all sites of STS. To do so, no economic activity should occur in areas where nuclear wastes are located. Second, the area must be secured against any attempted unauthorized activities.

4. Implications

The case provides five insights that may prove useful when constructing a multilateral collaboration in securing nuclear materials and equipment in former nuclear weapons related sites.

First, prevention of proliferation risk requires a long-term management and cooperation. This is especially true when the testing site is located in a country that does not have access to all the nuclear tests and activities, but is burdened with environmental remediation like Kazakhstan. Although both the US and Russia carried out subsequent measures for nonproliferation after closing down STS, they were unable to identify all the sites that required security. As such, denuclearization of a country may require years of follow-up measures to ensure that identified materials remain buried and unidentified material receive proper and timely attention.

Second, all relevant parties maintaining a consistent policy is important to successfully implement a multilateral collaboration. While Operation Groundhog started the series of successful cooperation, it was also delayed due to various domestic political factors in the US. The US and Russia were in agreement on the dangers of proliferation risk at STS, which is why the project could continue despite delay in funds. However, parties in future multilateral cooperative operations may not always be in agreement about the common goal/danger. Also, the operation may be vulnerable to potential risks if security measures remain unfinished for an indeterminate period.

Third, participating parties should come to an agreement on key procedures and responsibilities at the beginning of the process. The three parties hammered out the details of their roles at the beginning of the first operation (Operation Groundhog). The roles were also very simple as Russia, the inheritor of Soviet Union's nuclear weapons, analyzing the data and US funding the endeavor while reserving the right to verify Russia's activities. While Kazakhstan was not granted access to all of the information, it could arrange for additional random testing to ensure absence of radioactive waste materials. This case shows that while non-nuclear weapon states may not be privy to sensitive information, it can have the opportunity to verify the absence or presence of the relevant material.

Fourth, once the key procedures and responsibilities are outlined, finer details of implementing the project can be negotiated and modified to maintain flexibility. The successful completion of Operation Groundhog meant that experts of three countries had been working together for about four years. This improved understanding between each other allowed the LANL and VNIIEF to build trust which led to continuous cooperation. This was also true during the repatriation of special-purpose technological equipment during Operation Golden Eagle which required quick decision-making among parties. If the parties did not trust each other, it would have taken a longer time to repatriate the equipment.

Finally, the role of scientists, engineers and specialists are essential in endeavors such as this. The success of the trilateral collaboration was heavily due to the fact that the driving force of the joint operation was scientists and engineers, not high-level politicians or negotiators. This allowed the people capable of implementing, securing or verifying a certain material to discuss a set of procedures.

5. Conclusion

Any type of multilateral collaborative project requires a clear objective and the need to see the goal completed. In US's case, it provided financial support but promised not to collect intelligence data to reassure some of Russia's concerns. The Russian government was also willing to incorporate some of US's criteria on assessment or verifying nuclear materials. Finally, Kazakhstan understood that it would not have access to much of the information on the operations, but would have to take US's word for granted.

Certain factors may be useful when applying the framework of the trilateral collaboration to North Korea's case. First, North Korea can provide a list of sites to US or other parties but the names could remain in code to allay some of North Korea's security concerns. Second, after verifying the presence or absence of a nuclear material, the data could be erased from the device and the sample buried to ensure further security. Third, South Korea is most likely to participate as a risk stakeholder as well as funding party. In return, South Korea could request fieldwork participation or verification information on 1~2 sites.

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