

The Six Party Talks and Beyond: Cooperative Threat Reduction and North Korea

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Executive Summary

North Korea's weapons of mass destruction (WMD) and ballistic missiles are a clear and present danger to the United States, the countries of Northeast Asia and the international community. Therefore, their verifiable elimination will be a key element in building peace in the region and in strengthening the global non-proliferation regime. The Beijing Six-Party Talks represents the beginning of that effort, dealing with the immediate threat posed by Pyongyang's nuclear weapons program. But the process of eliminating all these programs—nuclear, chemical and biological and missiles—could stretch out over the next decade, require a series of agreements and cost hundreds of millions of dollars. It will be a difficult process that will require using all means to secure North Korean agreement and to provide reasonable assurance that Pyongyang is living up to its commitments.

Cooperative threat reduction (CTR) programs should be an important part of this effort. In operation since 1991 in Russia and elsewhere, these programs involve the host country working with others to eliminate the dangers posed by weapons of mass destruction. Such cooperation can include securing or eliminating weapons, their components or the facilities used to produce them. It may also involve redirecting resources formerly devoted to WMD programs, particularly production facilities and technical personnel, to civilian purposes. In 2002 the G-8 countries pledged to spend \$20 billion on such programs. While CTR has primarily focused on Russia and the former Soviet states, U.S. legislation passed in 2005 made it possible to spend threat reduction funds in countries such as North Korea.

Skeptics believe that conducting CTR programs with the secretive, hostile regime in Pyongyang is unrealistic. But past experience shows that such programs have been effective even during tense periods between Moscow and the United States and that their conduct in North Korea may be possible if a process of political normalization is in place between Pyongyang and other countries. Before the nuclear crisis broke out in 2002, governments, international organizations and non-governmental organizations conducted a wide variety of cooperative programs on the ground in North Korea. These ranged from the provision of humanitarian assistance and development aid to implementation of the 1994 U.S.-North Korea Agreed Framework that ended the first nuclear crisis. One project of note was the U.S.-North Korean effort to safely store and place under international safeguards spent nuclear fuel containing enough plutonium to build five to six nuclear bombs.

Cooperative threat reduction programs could serve five related objectives. First, incorporating them into negotiations would enhance the chances for peaceful settlements and sustained implementation by providing additional incentives for North Korea. Second, CTR programs would reduce uncertainty, enhance transparency and bolster verification, critical objectives in dealing with

Pyongyang. Third, these programs would help ensure that North Korea remains free of WMD over the long-term, not only through cooperative elimination efforts, but by redirecting the underlying infrastructure, such as facilities and scientists, away from military uses. Fourth, threat reduction programs would establish beachheads of cooperation which may have a spillover effect, helping to break down the North's isolation and to integrate it into the international community. Finally, these programs could encourage Pyongyang to modernize its civilian economy, in part by shrinking its military sector and redirecting key resources to peaceful uses.

Even with a process of political normalization, past experiences working inside North Korea as well as in conducting threat reduction programs in Russia, provide important lessons to help ensure that any new programs are effective.

- Just as in Russia, a flexible non-adversarial approach will be needed to build effective working relationships. Demonstrating that partners are there to get the job done, not to change, bribe or spy on the North will be critical.
- Showing that cooperation is a two-way street will also be important. That can be done by involving the North Koreans from the beginning of projects and by “Koreanizing” those efforts, particularly through the use of training programs.
- In North Korea, just as in Russia, it will be important to work the system. The North is a dictatorship but different organizations and individuals will have different interests and those can be used to help overcome obstacles and to speed implementation.
- While disputes will be inevitable, keeping them from escalating will require not only good working relationships but also a willingness to reach ad hoc solutions. A basic element of North Korean ideology is pragmatism although there will be limits to exercising it.
- Using a combination of political and technical dialogues will be essential. When technical issues are slow going, political dialogue can help achieve breakthroughs. When the political atmosphere is not good, technical dialogue can provide “pragmatic islets.”
- The need to be consistent and persistent in order to break down barriers to cooperation is a common thread running through experiences working in the North. The North Koreans may initially reject what appear to be reasonable requests but more often than not they eventually agree.

A multilateral approach will give CTR programs in North Korea the best chance to achieve success. While Northeast Asia has not been a hotbed of multilateralism in the past, the Six-Party Talks have demonstrated a new shared willingness to tackling difficult security problems. A multilateral approach would allow political and financial burden-sharing that will make it easier to shape effective programs as well as for participants to make and meet commitments. Moreover, each country will bring different skills and resources to the table, such as past experience with CTR, experience in building nuclear weapons or a cultural and language affinity with the North, which will be indispensable in shaping effective programs. A multilateral approach will also help sustain implementation even with inevitable changes in national governments, disputes arising out of implementation or others that have nothing to do with it. Multilateralism can run amok, making implementation of projects cumbersome because of the involvement of too many countries. But that risk can be avoided by designating project leaders and limiting the number of participants. Or North Korea could try to play participants off against each other but close coordination can prevent that from happening.

Building on the process established in the Six-Party Talks, the five members of that forum in addition to North Korea can be expected to play a role in a cooperative threat reduction program. While not involved in those talks, the European Union and its member states might also play a role by virtue of their commitment to peace in the region as well as to an effective non-proliferation regime. Based on an evaluation of technical capabilities, financial resources, political and strategic interests and threat reduction experience, the United States should play the leading role in this effort. While China's political support will be critical, South Korea may be an even more important partner because of its strong interest in rapprochement with the North, significant financial and technical assets and on-the-ground experience working with Pyongyang. One important drawback for both Beijing and Seoul is lack of experience with CTR efforts although the South is a member of the G-8 Global Partnership.

While threat reduction programs can be used to help eliminate all of North Korea's WMD programs, the near-term priority is to incorporate them into a process of cooperative denuclearization. That process will prove technically challenging and difficult to implement, perhaps stretching out five years or longer after an agreement is reached and costing anywhere from \$200-500 million dollars.¹

¹ This is a rough estimate based on the total cost of the nuclear CTR programs in this report. However, it is worth noting that past projects in North Korea, such as the US-North Korea spent fuel storage project, suffered from significant cost overruns as well as from delays in completion. Therefore, it is possible that the

CTR programs could be effectively used to bring to bear the technical and financial resources of other countries in working with North Korea to achieve key dismantlement tasks mandated by a diplomatic settlement. In the case of the Beijing Six-Party Talks such tasks could include multilateral programs to ship out of country North Korea's weapons-useable plutonium and newly irradiated spent fuel, dismantlement of Pyongyang's operating reactor and reprocessing facility and environmental cleanup activities including dealing with low-level nuclear waste.

Second, cooperative threat reduction programs can help ensure the redirection of important resources previously used in the North's nuclear program to development of the civilian economy. Potential projects are:

- The establishment of a multilateral peaceful nuclear research center focusing on the production of radioactive isotopes for medical, agricultural and industrial purposes. The center would build on previous North Korean interest in such research, provide new non-weapons-related work for Pyongyang's scientists, enhance transparency and give added assurance that technicians are engaged in peaceful pursuits over the long-run.
- The establishment of an International Science and Technology Center in Pyongyang. Building on experiences in Russia and Ukraine, the new multilateral center would be designed to provide internationally-funded opportunities for North Korean scientists and technicians. Their work would focus on research, joint commercial projects with Seoul, helping the North's government deliver basic services to its people, and assisting in the dismantlement of nuclear facilities to be eliminated by diplomatic agreement. Private industry, particularly South Korean companies, may also play a useful role in finding new civilian tasks for trained scientists.
- The establishment of joint ventures to mine North Korea's uranium ore and other co-located minerals. These ventures would help ensure that the North's resources are not misused to build nuclear weapons and provide strong incentives for continued compliance with Pyongyang's obligations. Possible partners include participants in the Six-Party Talks and established uranium mining powerhouses like Canada and Australia.

cost of these CTR programs may be higher and the time needed to implement them longer than estimated in this report.

Threat reduction measures can also play an important role in reducing the threat posed by other North Korean weapons programs. The problem of ballistic missiles is an important priority by virtue of the potential threat they pose to Japan and the United States as well as the dangers presented by North Korean exports to global trouble spots. Potential CTR measures include the establishment of multilateral space launch cooperation designed to launch North Korean satellites, the conversion of missile plants and the redirection of scientists towards civilian purposes. On chemical and biological weapons, while resolution of this problem would seem a long-term objective, the North Koreans could jump start the process simply by joining the Chemical Weapons Convention and adhering to the Biological Weapons Convention. Those measures supplemented by CTR programs already in place in Russia and elsewhere could be critical in ensuring elimination.

While this report has outlined a vision for the future of CTR in North Korea, immediate steps should be taken to allow countries to use this important tool properly.

- **Exercise American Leadership:** By virtue of its interests, capabilities and experience, the United States is in a unique position to exercise leadership to ensure that these programs are properly integrated into diplomatic agreements. Washington should seriously consider the far-reaching proposals recommended in this report and also make sure that its analyses effectively support structuring CTR programs. This might be done by developing “positive in-country profiles” that match programs with broader economic benefits. One specific example would be to prepare an assessment of North Korea’s nuclear workforce and suggestions for how it might be redirected to serve civilian needs.
- **Build Multilateral-Capacity:** Since potential partners, particularly China and South Korea, have little understanding of threat reduction, the United States should take immediate steps to increase the knowledge base in these countries. These steps should include diplomatic initiatives in key capitols as well as others designed to enlist the support of the G-8 Global Partnership. Practical measures will also need to be taken such as developing a basic training module for all officials, experts and others who will work in North Korea. Finally, the United States should engage in efforts to help North Korea develop a basic understanding of CTR.
- **Enlist Non-Governmental Organizations:** These organizations have the expertise to promote unofficial discussions that can help build the foundation for official contacts and supplement them as well. Most likely in the case of North Korea is engagement through

scientific and academic institutions designed to draw their counterparts into unofficial dialogues, starting with non-controversial topics such as safety management, radiation protection and health physics as well as environmental topics.

- **Ensure Domestic Political Support:** Measures in addition to capacity building will be needed to convince other countries to play a role in these programs. South Korea should enact an “Inter-Korean Threat Reduction Act,” that will identify potential CTR programs of interest and provide funding. Money for CTR programs might be provided either through an increase in allocations for the inter-Korean cooperation fund or by establishing a separate pot earmarked for threat reduction. A maximum amount might reach \$320 million per year (or 2% of the South’s total defense budget) but far less is likely to be required.
- **Organize for Success:** A proper international and domestic institutional framework will help ensure implementation of a Beijing agreement. It may require a high-level committee to oversee implementation perhaps with lower-level groups responsible for the provision of political, security and economic incentives to North Korea and the timely implementation of verification measures. A third group would serve as a planning board for CTR projects. On the home front, if South Korea decides to play a major role in a CTR effort, it should establish a large-scale Office of Cooperative Threat Reduction to coordinate the contributions of different ministries and companies. Finally, Washington should work with its partners to develop model CTR implementation legislation that lays out a sound legal structure for these projects. In all partner countries, close consultation with legislative bodies will be necessary.

Introduction

In the aftermath of the collapse of the Soviet Union, the United States established an international effort to reduce the global threat from weapons of mass destruction held by its successor states. That vision of cooperative threat reduction, disarmament and rapprochement among former enemies ranks with the Marshall Plan following World War II in historical significance, according to Dr. David Hamburg, president emeritus of the Carnegie Corporation. As part of that program, the United States and other countries have successfully engaged other governments, agencies and organizations to identify, contain and eliminate weapons of mass destruction (WMD), as well as related equipment, materials and facilities. They have also redirected thousands of scientists who worked on those weapons to peaceful uses of their skills.

While cooperative threat reduction efforts have focused on the former Soviet Union, many American experts now advocate applying them to programs elsewhere. Senator Richard Lugar, a driving force behind threat reduction, has been a strong proponent of applying such measures to regional danger spots such as South Asia. Current legislation sets aside a small amount of funding for use in threat reduction programs outside the former Soviet Union. Indeed, the Bush Administration has begun such programs in Iraq and Libya, primarily to retrain scientists previously engaged in activities related to weapons of mass destruction. That concept, designed to prevent the leakage of WMD related know-how, has been an important component of the cooperative threat reduction effort in the former Soviet Union.

North Korea would seem to be both a prime and improbable candidate for cooperative threat reduction. The potential danger posed by Pyongyang's WMD to the region and the international community is obvious and growing, whether through threatening the security of its neighbors, through possibly jump-starting a regional arms race, or undermining efforts to stop the global spread of these weapons. North Korea would seem to be an unlikely participant in threat reduction given four decades of almost constant hostile relations with the United States. The North also remains the world's most secretive society. As a result, the prospect of cooperating with outside forces on an issue of vital national defense seems hard to imagine.

Yet, the past decade shows that, with better relations between Washington and Pyongyang, North Korea may be open to dismantling parts or even all of its WMD program in return for tangible political, economic and security benefits that might be provided through a program like cooperative threat reduction. The 1994 U.S.-North Korea Agreed Framework, which required Pyongyang to freeze and then dismantle its plutonium production program in return for annual deliveries of heavy fuel oil, two new light-water reactors and normalized bilateral relations

with the United States, spawned a number of such efforts. One involved South Koreans, Japanese, Americans, Europeans and North Koreans working together to build the two new reactors. Another had American and North Korean technicians working at Pyongyang's main nuclear facility to store spent fuel rods containing bomb-making plutonium. There were hints that cooperative relationship could have expanded to include environmental remediation, the joint exploration of peaceful uses for former nuclear facilities and the employment of former WMD personnel in peaceful pursuits. In addition, Pyongyang hinted it might accept help in re-training scientists and technicians who worked on its ballistic missile program as well as joint efforts in launching satellites if a deal had been reached limiting the North's missile program.

The lesson of the 1990's is that if the overall political relationship is right, cooperative threat reduction in North Korea may become possible. If a diplomatic settlement is reached to the current nuclear crisis and future agreements limit other WMD programs, building in elements of cooperative threat reduction could; 1) bolster diplomatic chances to reach agreements that are effectively implemented; 2) enhance confidence between both sides and hopefully promote more normal relations; 3) help verify agreements through providing greater transparency; 4) insure that the Korea peninsula remains WMD free over the long-term, and 5) reinforce North Korea's interest in reallocating resources from its military to modernization of the civilian economy. These would all be significant accomplishments on a peninsula that is still suffering from the effects of the Cold War.

While cooperative threat reduction remains the most appropriate model for achieving the dismantlement of WMD on the peninsula, since it is difficult to predict the outcome of the current situation, others should be considered as well. For example, if North Korea overtly builds up its nuclear arsenal, the chances of isolation by the international community—through sanctions and other measures—and the danger of system collapse could grow. Ever since the disintegration of the Soviet Union, experts have wondered whether North Korea is next. That speculation has resurfaced as advocates of "regime change" in the Bush administration have argued that North Korea is teetering on the brink of disintegration. If the North were to collapse, the resulting chaos—and particularly the lack of governmental control over Pyongyang's WMD stockpile—would pose a serious threat to international peace and security. Enacting measures to avert that danger would be an important priority for the international community.

Whatever the scenario, the task of coping with the threat of Pyongyang's WMD will be challenging. North Korea's nuclear complex alone probably includes dozens of sites and thousands of people. Nuclear facilities may be highly contaminated with radiation and will require major investments to decommission and dismantle safely. North Korea has numerous chemical weapons-related

production and processing facilities and has possibly engaged in the development and testing of biological agents. Its ballistic missile program includes hundreds of missiles, at least two test ranges and several production and support facilities. Lastly, North Korea has a trained workforce that has specialized in the development and production of WMD, many of whom would present a potential proliferation risk should they no longer be employed by the state. In sum, eliminating Pyongyang's WMD and its infrastructure will take considerable planning and major investments in time, money and personnel, regardless of the conditions under which such a program is implemented.

In view of the potential dangers posed by North Korea's WMD, the Center for Strategic and International Studies (CSIS) and the Carnegie Endowment for International Peace (CEIP) conducted a year long study applying threat reduction techniques used in Russia and elsewhere to North Korea. The examination was comprehensive, covering nuclear, chemical and biological weapons as well as missile delivery systems. The objective was to produce a set of recommendations for measures to be taken in North Korea as well as guidelines for establishing and implementing such programs under what will likely be trying circumstances.

To accomplish this objective, the project sought to draw on three pools of expertise. One consisted of Americans who have been involved in cooperative threat reduction programs in the former Soviet Union over the past decade, not only for their technical expertise but also because they have valuable on-the-ground experience. A second source of expertise the project sought has been built up over the past decade through cooperative programs conducted with Pyongyang ranging from the U.S.-North Korean program to store Pyongyang's spent fuel to humanitarian assistance efforts run by non-governmental organizations. Third, the project conducted seminars with experts in key countries—Russia, Japan, China, South Korea and the European Union—who have an interest in dealing with the danger posed by North Korean WMD.

An initial series of meetings in Washington D.C. covered topics such as: 1) the status of North Korea's WMD programs; 2) lessons from work on the ground in North Korea and Russia; 3) the experience of redirecting WMD scientists in Russia, Iraq and Libya; 4) KEDO's experience in working with North Korea; 5) the lessons of Iraq for securing WMD; and, 6) new technologies and cooperative threat reduction. Papers on eliminating North Korea's nuclear, chemical, biological and missile programs through cooperative threat reduction were presented at a daylong meeting held at CSIS in September 2004. Seminars were then held in partnership with prominent foreign think tanks in early 2005 examining possible multilateral approaches to threat reduction including potential contributions by countries other than the United States.²

² The authors would like to thank Lee Sigal for his background paper on missile issues and his help in editing this final report and Elisa Harris for her background

While many potential problems are likely to be encountered, the final report makes the case for devising a multilateral cooperative threat reduction program for North Korea's WMD and ballistic missiles. At the time that the report was written, the Six-Party Talks in Beijing had concluded an agreement under which North Korea committed itself to "abandoning all nuclear weapons and existing nuclear programs." While it is difficult to predict the final outcome of those negotiations, if they move forward a cooperative threat reduction program could have growing relevance in the context of a diplomatic solution that secures the dismantlement of North Korea's nuclear program. Moreover, if the Six-Party Talks succeed, dealing with the threat posed by Pyongyang's ballistic missiles and remaining WMD programs will move closer to the top of a diplomatic agenda designed to finally end the decades-long confrontation on the Korean peninsula. If that happens, cooperative threat reduction could continue to play an important role in securing peace and security in Northeast Asia.

paper on CW/BW issues as well as her editing assistance. They would also like to thank Rose Gottemoeller for her invaluable help as well as advice in guiding their work throughout this project.

I. Threat Reduction and North Korea

As the American experience with Iraq demonstrates, estimating the size of WMD programs in other countries is an uncertain business. The challenge is especially difficult in the case of North Korea since it remains the world's most secretive society. Complicating matters further, the public discourse about North Korea's effort is littered with dubious claims that must be viewed with skepticism. Unofficial sources--particularly press accounts and journal articles--have provided detailed information, which, however, cannot be considered authoritative. Information provided by dissidents in the intelligence community, executive branch officials, members of Congress, defectors (many of them not directly involved in WMD programs) and outside analysts with axes to grind has often been speculative.

Even so, it is clear that Pyongyang has actively sought to acquire weapons of mass destruction and ballistic missiles for almost five decades since the Korean War. That effort has been largely indigenous because other countries refused to help. It started much sooner, has been more sustained and has required a much larger commitment of resources than any of the other so-called rogue states such as Iran, Iraq and Libya. Pinpointing exactly how much money the North has spent is difficult but a reasonable estimate would run into the tens of billions of dollars, a significant investment for a small country. Moreover, as Pyongyang's economy has declined and investments in conventional military forces have become prohibitive, the North seems to have concentrated most of its annual military research and development spending—several billion dollars a year--on WMD and ballistic missiles.³

³ Im Kang Taek, "Analysis on the economic effect of North Korea's policy on military industry," *Korea Institute for National Unification (KINU)*, November 2000.

NORTH KOREA'S WMD AND MISSILE PROGRAMS

Nuclear Weapons: Overall, Pyongyang's nuclear program involves dozens of facilities and employs up to ten thousand people. But a smaller cadre numbering in the hundreds works on the weapons program. Its full scope is not well understood but is thought to be similar in size to the dismantled South African nuclear program which produced six nuclear weapons and included over a dozen key facilities. That is much smaller than the major nuclear weapons states or other nuclear powers such as Pakistan, India and Israel. The weight of evidence suggests that Pyongyang possesses nuclear weapons; it is believed to have produced and separated sufficient plutonium to build up to ten bombs and has conducted other activities, such as special high explosive tests, intended to design a weapon. Less clear is the status of Pyongyang's program to produce highly-enriched uranium (HEU) which was assisted by the A.Q. Khan nuclear smuggling network. U.S. intelligence reportedly believes production could begin by the middle of this decade. North Korea is thought to be able to mount a nuclear warhead on shorter-range missiles able to reach Japan but its ability to place such a weapon on missiles that could target Hawaii or Alaska remains unclear.

Ballistic Missiles: A well-developed, largely indigenous effort based on reverse-engineering of missiles acquired from the Soviet Union, Pyongyang's program has produced weapons ranging from short-range artillery rockets to inter-mediate range missiles able to travel thousands of kilometers. Still, information on its program remains uneven. For example, U.S. intelligence does not know how many missiles North Korea has or precisely where they are located. On the other hand, types of missiles are known with greater certainty since Pyongyang's tests of these weapons can be observed by American intelligence. The accuracy of information on missile infrastructure—the Decontaminated equipment, including pumps, piping and holding tanks—could then be used in other civilian applications in North Korea or sold for scrap metal. North Korea's program is much more extensive than Libya's, which consisted of around 100 short-range weapons, all of them imported. A more appropriate benchmark is Ukraine. Pyongyang's inventory is comparable in capability and quantity but, unlike Ukraine, whose intermediate and long-range missiles were eliminated through negotiated treaties, North Korea has about ten medium-range missiles and is believed to be developing a longer-range weapon. The North's program is also more worrisome in two respects: it has a more elaborate indigenous development and production infrastructure and it is a more persistent exporter of missiles and missile components.

Chemical and Biological Weapons: North Korea's CW program is more advanced than its BW program and probably includes the production and stockpiling of weapons. However, many uncertainties remain about the size of its stockpile (the best estimate seems to be 2,500-5,000 tons), specific agents and munitions, the location of research, production and storage facilities and the number of personnel involved. The North's BW program probably has not progressed much beyond research and development with small quantities of agent produced for test and evaluation. Even more questions remain about the types of agents that may have been developed and the location of research or other facilities. Pyongyang's CW effort is probably closest to that of Iraq although with more facilities potentially involved. Following the first Gulf War, Baghdad claimed to have produced almost 4,000 tons of CW agent. North Korea's BW activities may well go beyond those of Libya but fall short of the more advanced Iraqi program. Whereas Libya has denied ever having a program but did have a past interest in acquiring such a capability, Iraq had the most advanced BW program in the developing world. In a period of just five years, Baghdad progressed from basic research to the production of thousands of liters of bacterial and toxin agents.

North Korea's WMD programs present a clear and present danger. First, they threaten the security of America's allies, South Korea and Japan, and U.S. forces stationed in Northeast Asia, all of which lie within range of Pyongyang's ballistic missiles which could be armed with nuclear or chemical warheads. Second, a nuclear North Korea could have a corrosive effect on peace and stability in the region, prompting Japan and South Korea to reconsider their own "nuclear option" and perhaps accelerate trends in Tokyo towards building more conventional forces. Third, aside from weakening the global non-proliferation regime, a North Korea armed with WMD could further undermine those constraints by virtue of its ability to export technology to other countries and terrorist groups. Recent revelations of Pyongyang's connections to the A.Q. Khan smuggling operation highlight this possibility. Finally, North Korea's WMD stockpile may leak into the wrong hands in the event of regime collapse, a periodic concern since the demise of the Soviet Union and the death of Kim Il-sung.

Box 2

What Is Cooperative Threat Reduction?

The term Cooperative Threat Reduction (CTR) applies to the entire range of international programs designed to reduce the dangers posed by nuclear, chemical or biological weapons or their delivery vehicles. They involve one or more partners working with a host state to eliminate, secure or convert WMD programs for civilian purposes. Partner countries often provide money, technology, equipment or training to the host country.

Examples might include helping to secure or destroy nuclear weapons materials, converting chemical weapons production facilities to manufacture chemicals for commercial purposes, destroying ballistic missiles and selling the scrap metal and providing new opportunities for scientists formerly employed in WMD programs to work in the civilian sector.

CTR programs are designed to; 1) reduce the risk that WMD end up in the hands of sub-national groups, particularly terrorist organizations; 2) preventing the spread of these weapons to new countries; 3) supplementing verification regimes by bolstering transparency; and, 4) establishing beachheads of cooperation that can spillover into other issues.

These programs have focused heavily on countries in the former Soviet Union. The United States has invested \$7 billion in CTR programs in the former Soviet Union since 1991 and is currently spending \$1 billion per year through programs run by the Departments of Defense, Energy and State. Other countries also participate, including the European Union and individual member states such as the United Kingdom, Germany and France as well as Japan and Canada.

While much work remains to be done, the results have been impressive. Since 1991, 6600 nuclear warheads have been removed from service, more than 470 long-range missile silos have been destroyed and over 1,800 ballistic missiles, cruise missiles, submarines and strategic bombers eliminated. One hundred and fifty metric tons of highly-enriched

uranium as well as a major biological weapons plant have also been eliminated. Moreover, these programs have provided over 50,000 weapons scientists with peaceful research work and with jobs that help improve the civilian economies of their countries.

In 2002, the G-8 Summit established the “Global Partnership” which has pledged to spend \$20 billion over the next decade on cooperative threat reduction, not just in Russia and the former Soviet Union but in other countries as well. Some U.S. government officials have raised the possibility of applying these programs to North Korea.

Today, these efforts outside the former Soviet Union include work to eliminate chemical weapons in Libya as well as to convert the Libyan IRT nuclear research reactor to use only low-enriched, non-weapon useable fuel. Libyan scientists are also eligible to receive support.

The Case Against CTR

The threat is clear, but many would argue that North Korea is an unlikely participant in a cooperative threat reduction (CTR) program. Ever since the Korean War, relations between Washington and Pyongyang have largely been characterized by hostility, not cooperation. That hostility began to thaw in the mid 1980’s as American decision-makers turned to engagement, rather than continued isolation, in an attempt to convince Pyongyang to end its threatening activities. The Reagan Administration pursued its “modest initiative” and the Bush Administration its policy of “comprehensive engagement.” Engagement reached its zenith under President William Clinton after the two countries almost clashed over the North’s nuclear weapons program and the subsequent conclusion of the 1994 U.S.-North Korea Agreed Framework that ended the confrontation. Then, seven years of inching towards better relations collapsed in the wake of disclosures about Pyongyang’s alleged secret uranium enrichment program in 2002.

On top of this continued hostility, North Korea remains the world’s most secretive society. Kim Il-sung’s vision for his country was a combination of a Confucian kingdom--which accepted a strict hierarchical social order--and the regimentation of a twentieth century totalitarian state. That vision has been reinforced by an ideology that places the leader above the people and the nation as well as a social control system that isolates 23 million people from the outside world and keeps members of its political elite in line through fear. In spite of recent economic reforms, North Korea remains a highly regimented dictatorship. As a result, many knowledgeable observers would find it hard to imagine Pyongyang cooperating with other countries in dismantling its WMD.

Skeptics would assert that in lieu of a fundamental transformation of the regime, rapprochement between the U.S. and North Korea, and a clear decision by Pyongyang to get rid of its WMD, the conduct of threat reduction programs in

that country would be impossible. The argument is that effective programs cannot be carried out with a country as secretive, closed, and highly regimented as North Korea. Skeptics believe that since the current regime may feel it depends on WMD for its survival, Pyongyang is unlikely to embark on dismantling those programs in good faith. They add that threat reduction can only be carried out properly if the right political relationship exists between participating countries since it involves fundamental engagement on vital issues of national security. Neither Pyongyang nor any other country is likely to work on an effort to diminish or eliminate the bedrock of its national defense without some confidence that it no longer needs those weapons.

A number of historical examples seem to support this view. Perhaps the most startling about-face occurred in South Africa in the early 1990's when, as a result of regime change and a radical transformation of external relationships, Pretoria announced that it would abandon its indigenous nuclear weapons program which consisted of a small nuclear stockpile, the aircraft and missiles necessary to deliver those weapons and an extensive scientific and industrial infrastructure to support that arsenal. As the Soviet and Cuban threat in neighboring Angola receded and as fundamental political reforms aimed at ending apartheid and creating a democratic South Africa began, nuclear weapons became a liability rather than an asset. There was no "cooperative threat reduction program" per se but the nuclear effort ended in cooperation with the international community. South Africa joined the Nuclear Non-Proliferation Treaty (NPT) and placed its facilities under international inspection.

The newly independent state of Ukraine found itself in possession of the world's third largest nuclear arsenal in the early 1990's after the collapse of the Soviet Union. But, in an effort to forge close relations with the United States and Russia, that country agreed to give up its weapons and long-range missile delivery systems. Aside from tangible benefits such as hundreds of millions of dollars in economic aid, Ukraine was also reassured by intangible benefits such as security assurances and a pledge by all three countries to respect each other's independence, sovereignty and territorial integrity. In addition to financial and technical assistance in helping Ukraine remove nuclear weapons and long-range missiles from its territory, the United States and others set up programs to help redirect scientists to work on peaceful pursuits, convert missile industries to peaceful purposes, and strengthen Ukraine's export control system. Moscow also provided fuel for Ukraine's nuclear power plants in amounts equivalent to the value of nuclear materials coming out of the warheads that went back to Russia for dismantlement.

More recently, in December 2003, Libya announced a fundamental decision to give up its WMD and ballistic missile programs. That decision was not made on the basis of internal political changes but rather the slow realization by the Libyan dictator Colonel Muammar Gaddafi that his country could no

longer tolerate years of economic sanctions imposed by the international community in the wake of the Libyan-supported bombing of Pan Am 103 in 1988. Some would also argue that since the war in Iraq pointed to the possibility of a worsening external security environment, Gaddafi recognized that giving up rather than keeping his programs might better serve Libyan interests. As a result, since December 2003 Libya has worked cooperatively with the IAEA, the United Kingdom and the United States on dismantling its WMD program, redirecting scientists towards peaceful pursuits and converting facilities formerly used for weapons activities to other purposes. Whether such dramatic transformations are possible in North Korea remains highly problematic. Regime change in Pyongyang has been the subject of periodic speculation for more than a decade.

That speculation has centered on change through gradual infection by outside political and economic forces, a coup by dissatisfied officers or the collapse of the North Korean system triggered by economic hardship or humanitarian crisis. Indeed, during the mid-1990's the regime seemed to be reeling from the death of Kim Il-sung and drastic food shortages. Nevertheless, Pyongyang has continued to defy predictions of its demise. More likely is a process of slow internal change carefully calibrated by the North Koreans. Such a process actually has been in place over the past decade, the result of increased contacts with foreigners as well as economic reforms enacted by the central government.

As for a dramatic change in relationships with the United States and other countries, one possible outcome of successful Six-Party Talks would be to jump-start a rapid, positive transformation. That might capitalize on past North Korean hints that Washington and Pyongyang could become close partners under the right circumstances, a view that clearly reflects the North's concerns about becoming too dependent on China. But a more likely outcome of successful Six-Party Talks is a slow, bumpy process of change as the two countries try to work through the laundry list of problems separating them. Those problems include Pyongyang's threatening ballistic missiles, conventional forces deployed on the border with South Korea, chemical and biological weapons programs, illicit activities such as drug smuggling, and human rights abuses.

The Case for CTR

Still, threat reduction programs conducted by the United States and others in Russia have functioned effectively- although not without periodic problems- under comparable circumstances. In the midst of tensions during the mid 1990's on issues ranging from nuclear cooperation in Iran to the conflict in Bosnia, the two governments continued to make progress in implementing CTR programs, which often served to anchor the bilateral relationship. Indeed, because of domestic politics in both countries, the United States has never developed the thoroughgoing cooperation with Russia that advocates of CTR would have considered ideal. As a result, cooperative threat reduction has been fitful because of the ups and downs of political relations, but nevertheless sustained. The same could be true for CTR programs in North Korea.

The experience of the 1990's shows that Pyongyang may be willing and able to conduct cooperative threat reduction programs to dismantle parts or all of its WMD program in return for tangible political, economic and security benefits. Following the end of the first nuclear crisis in 1994 and the receding external threat posed by the United States, North Korea seemed more willing to take the risk of dismantlement through cooperative efforts to help reinforce what it hoped would be improving relations. The North Korean leadership may have recognized that remaining in power could depend on a successful effort to modernize the country and on the acceptance of its right to exist by others, particularly the United States. At the same time, taking that risk was tempered by a concern that too much exposure to the outside world could undermine the North Korean system. Pursuing both courses required a delicate balancing act, but Pyongyang proved willing to try.

At the center of this effort was the 1994 Agreed Framework, which provided for a cooperative effort to freeze and dismantle the North's nuclear weapons program. In return, Pyongyang was to receive annual deliveries of heavy fuel oil, two new light-water reactors and normalized relations with Washington. Over the next decade, the Korean Peninsula Energy Development Organization (KEDO), an international consortium, worked with North Korea to implement the agreement. Its activities included: 1) negotiating the details of the new reactor project recorded in over fifty protocols, agreements and memoranda of understanding covering everything from the rights of KEDO employees in North Korea to the intricacies of transportation; 2) the opening of direct land and sea routes between the two Koreas to facilitate reactor construction; 3) periodic meetings with the North's nuclear safety experts to help strengthen their regulatory authority, supplemented by a joint safety inspection of the reactor site in 2004; and 4) participation by North Koreans in building the reactor foundation and related infrastructure projects (i.e. roads and a port).

Another element in the 1994 agreement that involved close collaboration between Washington and Pyongyang was the spent fuel storage project. Until the end of the crisis, the Yongbyon nuclear facility had been one of North Korea's most secret, secure installations. Indeed, even after the agreement Americans were permitted inside but North Korean foreign ministry officials were not. Under the 1994 agreement, technicians from the two countries worked together to store nuclear spent fuel--containing enough plutonium to manufacture five or six nuclear weapons-- recently removed from the North's five-megawatt reactor. That spent fuel was supposed to have been eventually shipped out of North Korea once a certain amount of progress had been made in building the light-water reactors. From 1995 until 1997, American technicians worked at the Yongbyon facility with the North Koreans placing 8,000 rods in 400 stainless steel canisters provided by the United States. Daily meetings planned the day's tasks and Americans and North Koreans worked side by side to store the rods. In addition, because radioactivity placed all workers at risk, health experts from both countries worked together to ensure that safety protocols were established and observed.

At the end of the spent fuel project, the two countries agreed to expand cooperation between the Department of Energy and the North Korean General Atomic Energy Bureau, an agency involved in its nuclear weapons program. Building on the working relationship begun during the spent fuel storage project, the intention was to hold regular meetings to develop a cooperative agenda including the dismantlement of facilities intended to produce plutonium for Pyongyang's nuclear program. Other potential topics included environmental remediation, the joint exploration of potential peaceful uses for former nuclear facilities and the employment of former WMD personnel in peaceful pursuits. Such programs were already in widespread use in Russia under the rubric of threat reduction. Unfortunately the agreement was never implemented.

In the late 1990's North Korea appeared to be inching towards accepting threat reduction programs as part of limits on its ballistic missile program. Pyongyang seemed willing to consider an American demand that the North end its missile exports. But the North's diplomats, concerned that shutting down factories devoted to exports would put scientists and technicians out of work, demanded assistance in converting plants to peaceful purposes and in retraining personnel. In response, the United States planned to set up "clearinghouses" to bring the North Koreans together with foreign companies who might be interested in investing in former missile-related facilities. Later, far-reaching talks to end Pyongyang's long-range missile program would probably have required North Korea to work closely with other countries, such as Russia, to launch its satellites and perhaps to conduct joint peaceful research on space science. Those negotiations ground to a halt with the end of the Clinton administration.

Finally, the possibility of cooperative threat reduction was raised during negotiations in 1999 to gain access to a suspected, secret North Korean nuclear weapons facility. One provision of the agreement that allowed American inspectors access to the site was that the two countries would jointly explore possible commercial applications for the underground facility. For the American negotiators, North Korean insistence on this provision was somewhat surprising since it seemed unlikely that a remote underground site located in a sparsely populated, mountainous area near the Chinese border could have any commercial purpose. Yet North Korean insistence on such a provision probably meant that in Pyongyang some officials were willing to allow American inspectors to visit a militarily sensitive facility if there was even the slightest possibility that it might be turned into a joint venture of commercial value.

While cooperative threat reduction could be conducted most effectively if there is a radical transformation for the better of the North Korean political system and the U.S.-North Korean relationship, even if both only evolve over time, history suggests that these programs have merit. One important caveat is that Washington and others must have realistic expectations about what threat reduction can achieve under less than ideal conditions. That has certainly been the historical experience in Russia where CTR programs have been plagued by problems ranging from differences between governments to more mundane, but just as important on-the-ground difficulties. It was certainly the case with the U.S.-North Korean spent fuel project which took much longer to complete at a much higher cost than anticipated.

A threat reduction program in North Korea could serve five related objectives:

1. **Enhance the chances for peaceful settlements and successful implementation of agreements:** Integrating CTR proposals into talks with North Korea can enhance the chances for diplomatic success. The prospect of a sustained effort by the United States, probably working in conjunction with others, not only to dismantle Pyongyang's WMD and ballistic missile programs, but also to inject valuable resources into modernization of the civilian economy is likely to not go unnoticed by North Korea. Moreover, threat reduction programs may enhance the prospects for successful implementation of any agreement. One serious problem with the 1994 Agreed Framework was the lack of long-term commitment on both sides to implementation. Because CTR programs will require working together closely, in some cases over the long-haul, they could help ensure the sustained effort necessary to achieve a Korean peninsula free of WMD. Moreover, joint activities will provide many important opportunities along the way to gauge the performance of all parties to the agreement,

particularly North Korea, to ensure sufficient political momentum for full implementation.

2. **Reduce uncertainty, enhance transparency and bolster verification:** Negotiators will seek provisions, including on-site inspections, which will give them assurance that the terms of any agreement are being met. This will be especially important given uncertainties about the North's WMD programs and its violations of past arrangements. In combination with traditional verification measures, CTR may be one of the best tools available for gaining insight into the breadth and depth of a WMD program. Since threat reduction will require frequent access to facilities, officials and technicians, it can reduce uncertainty about what we know and do not know, leading to the discovery of weapons-related activities or facilities that were not originally included in any agreement. The CTR experience in Russia is full of examples where successful threat reduction efforts led Russian officials to acknowledge and open up previously unknown facilities. Even during the limited cooperative experience of the 1990's at the Yongbyon nuclear facility, the American team was able to gradually expand its activities and gain new insights, all in the name of achieving the objective of storing the spent fuel rods.
3. **Ensure that North Korea remains free of WMD over the long-term:** Any agreement with North Korea, in addition to ensuring that its WMD programs no longer pose a threat, must also put in place a lasting solution that will avert periodic blowups over undiscovered facilities and programs. To better ensure the achievement of that objective, agreements must not only remove WMD and the materials used to build them from the Korean peninsula but also the underlying infrastructure—facilities and scientists—that are the foundation for those programs. Threat reduction can help smooth the way for a long-term solution by assisting in dismantling or converting important weapons facilities and redirecting scientists and technicians into the civilian sector. In Russia, this led to reliance, in some areas, on commercialization for CTR projects.

In North Korea, commercially viable joint ventures and other enterprises may prove to be one component of a CTR effort. But the North may prove to be more like Libya where CTR programs are feeding into economic development and reconstruction programs required to recover from years of debilitation. If this effort is successful, North Korea's desire and ability to breakout of

a diplomatic settlement will erode over time and eventually disappear.

4. **Promote more normal relations between North Korea and other countries:** Patterns of cooperation put in place by threat reduction programs may have a spillover effect by helping to break down North Korea's isolation, promote more normal relations with other countries and possibly help induce gradual change in its system. Cooperative threat reduction programs may also spark more frequent interactions that can, over time, develop in depth and scope. That has certainly happened in Russia and elsewhere where contacts between individual government agencies have burgeoned as a result of threat reduction programs.

There were also signs of this spillover effect developing in North Korea with the prospect of regular meetings between the U.S. Department of Energy and the Pyongyang's General Bureau of Atomic Energy. Whether these more frequent interactions will lead to closer ties is uncertain but they can open up the possibility.

5. **Encourage Pyongyang to modernize its civilian economy:** A long-term objective for the United States and other countries should be to encourage Pyongyang to shrink its military by shifting resources to modernization of the civilian sector. In spite of North Korean rhetoric about its "military first" policy, there have been signs over the past few years of a quiet debate in Pyongyang over whether resources should be shifted to the civilian sector. By dismantling WMD and the supporting industrial infrastructure through, in part, the redirection of resources towards peaceful pursuits, threat reduction programs could bolster efforts undertaken by moderate forces in Pyongyang to reform and modernize the North Korean economy.

Securing U.S. Domestic Political Support

While conducting cooperative threat reduction programs seem to make security sense, such an approach is likely to be a hard sell on Capitol Hill. Aside from suspicions caused by North Korea's violation of previous agreements, many will argue that it will be difficult to verify any agreement and point to other threats posed by North Korea, from its drug smuggling activities to its dangerous conventional forces on the DMZ.

Others may assert that the new programs will divert resources from important threat reduction work already ongoing in Russia. Still others will point out that Pyongyang's mistreatment of its own people should be an important

factor in considering CTR assistance, an argument that will have resonance given the recent passage by Congress of the North Korea Human Rights Act.

These problems notwithstanding, if an acceptable diplomatic settlement is reached providing for the dismantlement of Pyongyang's WMD programs, strong Executive Branch leadership could help overcome any objections, particularly if exercised by a Republican administration with a reputation for its tough approach to North Korea. In that case, the trick may not be to secure political support but to make sure that the Executive Branch can expeditiously implement any agreement, demonstrating how CTR is helping eliminate the North's weapons in order to allay congressional concerns. Many advocates note that the Hill's requirements that the Administration make a number of certifications concerning the former Soviet Union before it receives funding have hampered CTR programs. Senator Lugar proposed legislation in the 109th Congress that would repeal these certifications, which could smooth the process. Whether the provision of such assistance free of certifications would be politically acceptable in the case of North Korea remains uncertain.

Even with political support, appropriating the tens if not hundreds of millions of dollars that may be needed for a CTR program in North Korea will prove difficult. Current legislation authorizes the Bush Administration to spend \$50 million of un-obligated funds from the existing program in states outside the former Soviet Union.⁴ An expansion of funding for new projects beyond that level may create a snowball effect that could divert resources from important efforts in Russia or create pressures for new funding that could run into congressional opposition. While careful management and incremental implementation will help, the United States is unlikely in any case to shoulder the entire, or even the lion's share, of the financial burden since a diplomatic solution will involve other members of the Six-Party Talks. Some of these countries may be willing to provide significant funding. Moreover, the European Union might be persuaded to provide limited financial support given its political and economic interests on the peninsula and past participation in KEDO. Contributions by other countries could, in turn, help convince the Hill to be more forthcoming in supporting American funding.

Aside from securing funding, legal restrictions on U.S. assistance to North Korea because of Pyongyang's past support for international terrorism and poor nonproliferation record may prove to be another barrier. North Korea could be removed from the list of "state sponsors" of international terrorism, a process that was in train at the end of the Clinton Administration but never completed. That may be more difficult now given revelations about North Korean kidnapping of Japanese citizens almost three decades ago. Or the Executive

⁴ FY2004 National Defense Authorization Act, Public Law Number PL058-16, section 1308.

Branch might regularly exercise a presidential waiver allowing assistance that helps further U.S. national security interests. This waiver permitted the Clinton Administration to move forward with implementation of the 1994 agreement. But resources could be more easily provided through programs such as State Department's Non-Proliferation and Disarmament Fund (NPDF) which have expanded over the past few years and are not subject to the same restrictions as other potential sources of money. The NPDF was used to finance a CTR program in Libya before it was removed from the state sponsors of terrorism list.

II. Working inside North Korea

For most people, North Korea appears to be a mysterious place and the prospect of working cooperatively with Pyongyang seems daunting. But that view ignores the experience of the past decade since the conclusion of the 1994 U.S.-Agreed Framework. More than thirty governments, over 130 non-governmental and virtually every major international relief group provided Pyongyang with nearly 6,000,000 metric tons of food and additional assistance in the areas of public health, agricultural recovery and development, sanitation and education. Between 1996 and 2002, the U.S. Department of Defense conducted 25 Joint Recovery Operations with the Korean People's Army and retrieved 225 sets of remains of American servicemen missing in action as a result of the Korean War. In an important private venture, the California-based Nautilus Institute built seven windmill-powered turbines in a village on North Korea's west coast to provide energy for local needs. All of these efforts and others required the presence of foreigners inside North Korea, sometimes for months at a time, working with counterparts ranging from the Ministry of Foreign Affairs and the Korean People's Army down to village headmen. South Korea has also built up an extensive body of hands-on knowledge since the inauguration of President Kim Dae-jung's "Sunshine Policy" in the late 1990's.

Skeptics might justifiably claim that these experiences would differ from efforts to conduct of cooperative threat reduction programs in Russia. After all, Russia is a different place. Moreover, these programs deal with critical defense programs, not other efforts less central to a country's security such as the provision of international assistance. Certainly, practitioners operating inside North Korea are likely to encounter a much more difficult working environment. (See Box 3)

But in spite of these differences, many of the challenges faced and lessons learned from working in Russia and elsewhere will be directly applicable to North Korea.⁵ Those experiences, plus the extensive knowledge gained from working on-the-ground in North Korea point to six important lessons for establishing CTR programs.

⁵ The authors would like to thank Charles Thornton for help in examining the Russia CTR experience.

WORKING CONDITIONS IN NORTH KOREA

Strong Suspicions about Americans and Foreigners. This was certainly a problem with Russian officials weaned on the Cold War but xenophobia in North Korea will be much more pronounced. As one expert has observed “how do you build trust between people of two nations whose only common memory is that half a century earlier their forefathers had slaughtered one another during the Korean War and since had focused on preparing to kill one another in the name of preserving peace through armed deterrence.” A North Korean Army officer greeted the U.S. military advance team for the first joint MIA recovery mission at the airport as “representatives of a hostile military force.”⁶ The indoctrination is so ingrained that during the spent fuel project, the North Koreans accused the Americans of an intentional insult since they set an empty beer can on top of a picture of the “Great Leader,” threatening to set off a serious dispute.

Clashing Cultural Perspectives. For Americans, the rule of law embodied in the written word ensures a modicum of clarity and commitment between two parties, minimizes the potential for disputes and depersonalizes differences if they occur. If one party fails to fulfill an agreement, the dispute is resolved by a court procedure, enforcement and punishment. For North Koreans, Confucian ethics and human relations define appropriate human conduct. Personal relationships more than written agreements are the essential prerequisite for cooperation and mutual trust. Americans adjusted very successfully in dealing with Japan and South Korea, both Confucian societies, but will face problems in North Korea given the intensely hostile relationship.

The Lack of Basic Infrastructure. This has been a problem in conducting programs in Russia but, once again, the problem will be much more pronounced in North Korea. That country’s economy collapsed some time ago and a major part of that decline has manifested itself in a transportation system that no longer works and basic support services—electricity and clean water—that are no longer provided. Moreover, much of the North is rugged terrain and many WMD facilities are not easily accessible. Consequently, building an infrastructure to support these programs, while time-consuming, expensive and complicated, will be unavoidable.

Stressful Working Conditions. North Korea’s closed society will present significant challenges. During the spent fuel project, Americans were exposed to constant danger including carbon monoxide poison and electrocution as well as the threat of minor injuries. In case of illness or injury, medical help was far away. Team members regularly encountered hostile guards armed with loaded weapons. No one thought they would be shot intentionally but accidents were always possible, especially when a loaded machine gun is pointed directly at the car you are seated in. The Americans worked for long periods of time away from home with only occasional opportunities to communicate with family and friends. There was limited entertainment; the only exercise was a half-mile walk from the guest house to a large tree near the main road and then back again.⁷

⁶ Kenneth Quinones, *Beyond Negotiation: Implementation of the Agreed Framework*, published in Japanese in Japan as: *Kita Chosen II – kaku no himitsu toshi ni yonbyon o iku* (Tokyo: chuokoron shinsha, 2001); “US- North Korea Spent Fuel Project,” Unpublished manuscript, 2004.

⁷ Quinones, *Beyond Negotiation*, 2001; “US- North Korea Spent Fuel Project,” 2004.

Different Safety Cultures. While Americans like to prepare for all contingencies to minimize hazards, the North Koreans like to focus on speed and trust their ability to deal with consequences should something go wrong. During the Nautilus windmill project, the American and North Korean engineers disagreed on a plan for grounding lightening rods for the towers. The North Koreans gave in only when impressed that if someone were accidentally killed, cooperation would be endangered. During the spent fuel project, the Americans were highly safety conscious given the multiple dangers present in a facility used to store radioactive fuel rods but the North Koreans did not seem to share those concerns.⁸

Lesson #1 Show you are there to get a job done, not to change, bribe or spy on North Korea: Just as in Russia, a flexible, non-adversarial approach should be adopted in building effective working relationships. Strong suspicions about Americans and foreigners, as well as preconceptions on both sides will hamper cooperation. One expert has noted that when foreigners enter North Korea they “turn stupid.” There will have to be a period of mutual education but “sooner or later they get it and we get it.” Foreigners must understand that they are not there to transform North Korea’s political system since “when eight Americans are surrounded by 22,000,000 potentially hostile hosts and under armed guard 24 hours a day, one either learns to adjust to the political reality around them or leave promptly.”⁹

Building trust and establishing credibility will be essential and that will mean demonstrating “sincerity,” a concept that is important in many cultures. A recent joint U.S.-Russian study on improving CTR programs observed that “the culture of the Russian bureaucracy is much more personal than is true in the United States, so Russian colleagues need personal and close interaction.” American managers would be most successful if they considered their counterpart’s individual and institutional perspectives and “put more emphasis on personal communication, trust and networking...”¹⁰ Cultural sensitivity will make a difference in dealing with North Korea too. Sincerity is a central concept in Confucian societies like Korea. Individuals can demonstrate sincerity by being flexible on project implementation when possible, by inquiring

⁸ Peter Hayes, et al., “The Wind Farm in the Cabbage Patch,” *Bulletin of the Atomic Scientists* (May/June 1999), Vol. 55, no. 03, pp. 44-48

⁹ Quinones, *Beyond Negotiation*, 2001; “US- North Korea Spent Fuel Project,” 2004.

¹⁰ *Overcoming Impediments to U.S.-Russian Cooperation on Nuclear Non-proliferation: Report of a Joint Workshop*, U.S. National Academies Committee on U.S.-Russian Cooperation on Nuclear Non-Proliferation, Russian Academy of Sciences Committee on U.S.-Russian Cooperation on Nuclear Non-Proliferation, Development, Security and Cooperation, National Research Council, (The National Academies Press: 2004), p. 105.

respectfully about customs and way of life and by sharing personal information (about family) when appropriate. The purpose is not to become friends; personal relationships can go long way to break down the barriers caused by long-standing enmity and will help ensure that projects move forward when problems are encountered.

Demonstrating sincerity will also require fulfilling promises and obligations, making commitments and following through on them. Outsiders do not always adequately consider the risks their North Korean counterparts take in working with foreigners. These individuals are under pressures that are hard for outsiders to understand since they are trusted to have intimate dealings with foreigners with whom the general population is prohibited any contact. Serious missteps could bring disaster to them and their families. Following through on commitments can empower proponents of engagement creating a growing number of advocates for cooperation while failure to follow through can damage their credibility and even endanger them.

On the U.S.-North Korean windmill project, tensions dissipated and the mood became one of reunion among old friends once it was clear that the Americans intended to follow through on their commitment. In return, the North Koreans demonstrated a willingness to expend political capital to move bureaucratic mountains, including allowing an unprecedented household survey to determine electrical loads powered by wind system. Since the survey touched on sensitive aspects of rural economy and village social structure, the fact that the authorities allowed it showed they were willing to take the risks, including increased transparency, to secure cooperation with the United States. Still, many North Koreans doubted that the U.S. government would allow the project to be completed. They were genuinely jubilant and “perhaps a little stunned” according to one American participant, at having succeeded in completing the windmills.¹¹

Carefully selecting and training staff that will reside in or regularly visit North Korea will also help build positive working relationships. Because of the daunting multiple challenges faced by foreigners, personal qualities that suit living and working in a closed, monitored and stressful society with few distractions will be at a premium. Preparation should include orientation sessions with others who have worked in North Korea as well as basic information on the history of Korea. The same organizational representatives should be maintained as long as possible since that will allow the building of personal trust on the part of the

¹¹ Peter Hayes, et al., “The Wind Farm in the Cabbage Patch,” pp. 44-48

Koreans (and security services) and the acquisition of needed knowledge on the part of the foreigner.

That has also been the experience in Russia where the most effective projects-- for example the joint naval nuclear materials protection, control and accounting program--have been run by small teams of managers with good working relationships. Aside from putting in place a well-defined process and mode of cooperation, these projects have been able to fall back on mutual confidence to work out problems where regulations or procedures might be non-existent.¹²

Lesson #2 Cooperation is a two-way street: Building an effective working relationship will require drawing the North Koreans into the process, sharing technology and techniques and promising them ultimate responsibility for projects when appropriate. They do not really believe there is a level playing field with the United States or any other country likely to be involved in CTR programs. That belief extends from the worldview of a small country locked in a struggle with the world's only superpower to on an individual level where educated North Koreans know they are not as technologically advanced or materially well off as others. Therefore, programs should be structured so that the North Koreans feel they are getting as much value added as other participants in the threat reduction effort.

Just as in Russia and elsewhere, showing the North Koreans that cooperation is a two-way street should start from the beginning. One former senior official in the Russian Ministry of Defense has noted that, "the CTR program hardly resembles a dialogue of the deaf," adding it is "an impressive starting point for the realization of ideas and the creation of an atmosphere of trust and transparency."¹³ Still, Americans too often have regarded their counterparts as contractors whose role is to comply with U.S.-determined checklists. Moreover, they have not participated fully in decision-making regarding priorities, equipment purchases or training elements. Involving the North Koreans from the very inception of projects might mean everything from working together on overall strategic planning to regular meetings at project sites intended to lay out daily activities. Some might be concerned about slowing down implementation. But in the past—for example during the building of the KEDO reactor—the North Koreans proved surprisingly cooperative since they knew the end result served their interests.

¹² *Overcoming Impediments to U.S.-Russian Cooperation on Nuclear Non-proliferation*, p. 116.

¹³ Yevgeny Maslin, "The CTR Program and Russia's National Interests," in *Cooperative Threat Reduction Program: How Efficient?*, PIR Center, Moscow.

A major objective should also be to “Koreanize” threat reduction programs by training indigenous personnel. This approach has been an important part of programs in Russia and could have long-term benefits in North Korea. First, “Koreanization” will give host nationals a greater stake in successful implementation. As the senior North Korean at the spent fuel site told his American counterpart, “You...are here to take away my life equipment. You want to dismantle my reactor and put me back into nothing. What are you going to do for me as an individual in terms of training?”¹⁴ Second, “Koreanization” enhances the possibility that cooperative threat reduction programs will be sustainable over the long haul. Third, drawing host nationals into ongoing programs creates advocates in support of those programs inside the government bureaucracy.

If the experience of the 1990’s is any guide, the North Koreans will be eager for training of all kinds and in all fields.

- “North Korean farmers, technicians and managers are educated and have demonstrated openness to new ideas and approaches,” according to one expert. One successful training program in the humanitarian field has been to upgrade the knowledge, skills and educational materials of the North Korean Red Cross. On a local level, an organization has set up a training center for farm mechanics and another is organizing a school to educate farmers in the use of bio-pesticides.¹⁵
- On the Nautilus windmill project, North Korean engineers were very interested in the newest renewable energy technologies and were quick learners who were well versed in basic principles but had little access to the latest in technological advances. Those engineers were provided training on all levels from guidance in the village to formalized seminars in California and elsewhere.
- On the spent fuel project, the Americans trained the North Koreans in storing the irradiated rods and on safety procedures, including taking radiation samples. The

¹⁴ Quinones, *Beyond Negotiation*, 2001; “US- North Korea Spent Fuel Project,” 2004. .

¹⁵ Edward P. Reed, “Unlikely Partners in the Quest for *Juche*: Humanitarian Aid Agencies in North Korea,” *American Enterprise Institute* (February 2004).

reaction was quite positive; this strategy fostered rapid progress in negotiations and subsequent implementation.

- South Korean companies operating in the North regularly offer training to their workers. For example, Sungham Electronics, which manufactured computer monitors, taught its North Korean workers how to build and assemble the screens. At the Mount Geumgang tourist resort, Hyundai ran a number of training programs including one for female workers on how to greet and serve the guests.

Lesson #3 Work the System: The experience in Russia has demonstrated the need to sometimes enlist the help of different central government bureaucracies as well as local authorities to move projects forward. A case in point was the Materials Protection, Control and Accounting Program (MPC&A) designed to improve security for Russian nuclear materials, a program that only succeeded when ties were established between technical experts via each country's weapons laboratories. That grass roots constituency resulted in government-to-government agreements to establish the program.

The common perception that North Korea is a monolithic, authoritarian state is in part true. Yet, experience has shown that the government is fragmented into various agencies and fiefdoms, all loyal to their leader and committed to implementing his policies, but sometimes with competing interests. That gives outsiders the opportunity to successfully push forward their agenda. Unity in support of implementation can be an advantage for outsiders but, because many North Koreans will have different organizational and personal perspectives, working the system may be both possible and necessary to achieve important objectives.

This welter of interests has become apparent time and time again. With the influx of food assistance during the 1990's, humanitarian assistance groups witnessed turf battles between the Flood Damage and Relief Committee (a body created to coordinate that assistance), the Foreign Ministry and the military, which was used as a bogeyman to justify the inability of North Korean officials to organize visits, meetings and other activities. The Ministries of Agriculture, Foreign Affairs and Health frequently quarreled with each other, probably because all were competing for the credit and influence to be gained by securing foreign assistance.

In the case of equipment installed by KEDO at power plants to monitor heavy fuel oil consumption, the Korean Petroleum Import

Corporation (KPIC) was responsible for the program although the Foreign Ministry played the role of last resort. (KPIC did not like complaints to be lodged with the Foreign Ministry since that fostered the impression it could not handle the deliveries on its own.) Complicating matters further, local plant operators, while nominally dependent on KPIC, were essentially independent. Also, soldiers guarded the power plants since they were national security installations. This miasma of interests often played out when KEDO officials tried to enter the plants. Sometimes the driver's identification card was enough to gain entry, but it often failed. The KPIC minder would then show the guard his identification card. If that failed, then the Foreign Ministry minder would step in. If that did not work, then the fourth minder—presumably a security agent-- would show his card. He was always successful.

Just in Russia, where local interests had to be reckoned with in structuring CTR programs, the same may be true in North Korea. The North Koreans working on the spent fuel project repeatedly tried to enlist the U.S. team to help grab more authority from organizations in Pyongyang and their own immediate superiors at the site. While that may have meant the on-site supervisor could make decisions more quickly, the U.S. team decided that maintaining a balance of power was the best course of action. On the Nautilus windmill project, Pyongyang might initiate the project, but the support of specialized line agencies and local authorities was critical to mobilize labor and materials. The central Peace Committee had to bargain with the farm manager to include the village clinic in the project, extend the household energy survey to randomly selected houses and obtain farm labor at peak of harvest season.

When the team returned after the project had been completed, it found the villagers had disconnected the kindergarten from the system and instead had hooked up forty more households, probably to “buy off” constituents who might otherwise grumble.¹⁶

Effectively working the system will require taking a number of steps.

- First, if there are multiple bureaucratic channels available-- and that seems to have been the case on past projects in North Korea--use all of them. Making sure the different organizations have the same information base may be necessary to ensure the same message reaches their superiors, to maintain good relationships and to avoid blindsiding them.

¹⁶ Peter Hayes, et al., “The Wind Farm in the Cabbage Patch,” pp. 44-48

- Second, secure bureaucratic champions able to get results. Just because all the organizations have the same information does not mean they will act on it. But there are usually some who will. For example, the Foreign Ministry served as the organization of last resort in the spent fuel project because it had gone out on a limb to negotiate the 1994 agreement and was firmly committed to success. Keeping multiple lines of communication open will also provide the opportunity, when appropriate, to pull different levers and possibly to play different organizations off against each other.
- Third, identify the right people. One study on CTR programs in Russia has recommended that American managers “find serious, competent...counterparts and then treat them with seriousness and respect.”¹⁷ An expert with experience in North Korea has suggested identifying the most rational individuals on the other side, someone who has been “outside their box and willing to pursue a common goal which has to be defined in terms of mutual gains.” This will often require “giving them something” they can use with their superiors.

For example, when they needed radiation samples, the Americans at the spent fuel project would give the North Korean in charge language for his memos to his superior justifying that action.¹⁸

- Fourth, always be ready to use informal mechanisms, such as inter-personal relationships, side channels or off-line contacts, to resolve problems. Americans returning home periodically would brief the Foreign Ministry, which had a vested interest in smooth cooperation. “Side channels” during negotiations allow informal proposals to be made suggesting compromises and solutions. If a proposal has merit, it can be conveyed to the “chief” for consideration. But he can also reject it without embarrassing his subordinate.

¹⁷ *Overcoming Impediments to U.S.-Russian Cooperation on Nuclear Non-proliferation*, 2004.

¹⁸ Quinones, *Beyond Negotiation*, 2001; “US- North Korea Spent Fuel Project,” 2004.

Lesson #4 Keep disputes from escalating out of control: Negotiating formal documents at all levels and all stages of work has been standard operating procedure in Russia and will be absolutely essential in North Korea. In the past, governments and non-governmental organizations operating in the North have nailed down such documents. KEDO reached detailed protocols on rules governing everything from work at the reactor site to recreational activities which may also serve as useful precedents for other projects. Seoul and Pyongyang have even set rules on how visitors to the North's Mount Geumgang resort should handle trash. Such documents lay out an agreed plan of action, delegate responsibilities, create a transparent working environment, and put in place the administrative and legal building blocks necessary for implementers to move forward while allowing the North Koreans to feel as if they are still in control. Most importantly, detailed agreements also provide a basis for helping to solve disputes.

Still, different interpretations of written agreements, often over relatively minor procedural matters, such as the cost of cars, food, rooms, laundry and telephone calls, will persistently disrupt work. While these disputes can be relatively minor, without effective mechanisms for resolving differences, they can escalate. Personal relationships and mutual trust help but also necessary is a willingness to implement ad hoc solutions. In Russia, last minute decisions by program managers were often necessary to allow projects to move forward. They were formulated under unique circumstances; there were no agreements to fall back on but both sides were committed to moving forward. Contrary to images of North Koreans as slavish to the rules of their regimented society, a basic element of the concept of "juche" or self-reliance that drives them is pragmatism. But it may be conditional; actions must be consistent with the overall direction endorsed by their leader and should not leave them open to criticism from Pyongyang. That may require, at times, seeking some cover from superiors.¹⁹

Pursuing ad hoc solutions does not mean securing North Korean help by giving them the impression that cooperative programs are potential cash cows. One American thinks North Korea suffers from the "Moscow syndrome," namely it is poor, envies the material wealth of others and has been accustomed, starting during the Cold War, with having its needs fulfilled by "big brother."²⁰ Then it was Moscow but

¹⁹ Quinones, "Beyond Collapse: Continuity and Change in North Korea," *International Journal of Korean Unification Studies*, Vol. 11, no. 2, 2002, p. 25-62.

²⁰ Quinones, *Beyond Negotiation*, 2001; "US- North Korea Spent Fuel Project," 2004.

today it may be the United States. At one point during the spent fuel project American officials made the mistake of trying to induce cooperation using material incentives, starting small with cigarettes and increasing to offers of heating equipment, computer printers and \$175,000 to build a new building. The local officials realized that persistence could gain them more than had previously been agreed to (and frustrated the Americans who felt they were being exploited). This created increasing friction and serious problems.

Lesson #5 Effectively combine political and technical dialogue to achieve success: As a former Department of Energy official with experience in Russia has observed, “You can’t have one without the other. Technical dialogues help you make progress by keeping things out of the political realm, particularly when the politics are not good. When technical issues are slow going, you need the political dialogue to make breakthroughs.”²¹ When technical differences slowed implementation, the regular meetings of the U.S.-Russian Commission, originally co-chaired by Vice President Gore and Prime Minister Viktor Chernomyrdin, helped break those logjams by providing the political impetus to move forward. While many in Russia called for suspending CTR when political relations slumped during the Kosovo crisis, technical discussions provided, according to one former Russian official, “pragmatic islets” that enabled the two sides to “cross the swamp and not perish in the quagmire.”²²

In contrast, one reason why implementation of the 1994 U.S.-North Korea Agreed Framework fared poorly was an inability to weather political and technical storms. After the 1994 agreement, KEDO--essentially a technical organization-- was left in charge of implementation. Lower-level bureaucrats worked out the details necessary to move forward with the multi-billion dollar reactor project. That was also true in the case of the U.S.-North Korea spent fuel project. But when implementation inevitably hit snags because of technical issues and delays mounted, there was little or no political effort from senior officials to get the process back on track. That changed when North Korea test fired a long-range missile in 1998 and former Secretary of Defense William Perry was asked to review U.S. policy. But by then many of the projects were far behind schedule.

²¹ Ken Luongo, a former State Department official, “Lessons from on-the-ground,” Threat Reduction in North Korea: A Joint CSIS-CEIP Project, remarks at a panel discussion, March 25, 2004.

²² Yevgeny Maslin, “The CTR Program and Russia’s National Security Interests,” *Yademy Kontrol Digest* (Winter 2000), p. 8.

Establishing a robust dialogue will require new political and technical channels of communication. In particular, senior government officials must be able to monitor programs and intervene if technical problems arise. Second, the common thread of scientific training that greatly facilitated technical communication across language barriers in past projects should be strengthened. This can be done through contacts between scientists (such as lab-to-lab contacts or the never-realized dialogue between the Department of Energy and the relevant North Korean organization) or cooperative scientific programs resulting from threat reduction initiatives. Finally, some separation should be maintained between political and technical channels. Humanitarian officials with experience in North Korea have recommended that the roles of official agency representatives and technical staff be separated to provide a buffer between day-to-day working staff and political pressures in the system.

Lesson #6 Being persistent and consistent can pay off: A common thread running through experiences in North Korea is the need to be persistent and consistent in breaking down barriers to cooperation. Establishing effective working relationships in North Korea may be harder and take longer because of political and cultural differences. Those organizations with the longest history of engagement in North Korea have had the best working relationships with the authorities and some of most innovative programs. But even if the leadership is committed to implementing programs that may not be enough. One expert recalled that he got approval for a dental project from Kim Il Sung in 1992 but it took three years to get off the ground.

Cooperative threat reduction programs are likely to be a higher national priority but “the devil is always in the details.” The history of the past decade is filled with examples of how persistence eventually paid off. For example, in 1995 KEDO requested permission for air flights to shuttle back and forth between North and South Korea in order to transport personnel to and from the reactor project. In 2002, flights finally began, possibly the result of warming relations between the two Koreas. Permission to use satellite communications had long been an objective for many foreigners inside North Korea. But Pyongyang refused repeated requests because it believed such systems posed a security threat. In the early 2000’s, North Korea finally gave the newly opening British Embassy permission to establish satellite communications but only after London threatened to not to go forward with establishing its mission.

Another great value of persistence is what one practitioner has called the “plateau effect.” Initially, a problem may seem impossible to resolve. But persistence can allow reaching a series of plateaus through incremental steps forward. After reaching those plateaus, the same problem may not seem so impossible to solve. According to this expert,

“as you change perspective on a problem you change the range of options that can be considered. From a distance, problems may seem enormous but as you get closer you can solve some details first then follow with other steps forward and that brings you closer and closer to a solution.”²³

For example, the suspension of the light-water reactor project after revelations about North Korea’s secret uranium enrichment program in 2002 presented KEDO officials with a seemingly impossible task. Since KEDO was only able to negotiate special privileges and immunities for personnel at the site as part of the original deal to build the reactors, those rights no longer seemed to apply. What originally seemed impossible for the North Koreans to accept, however, became logical over time as KEDO laid out a new “plateau,” that suspension was not the same as termination. Building on the first plateau, it then seemed logical that there was a need to preserve stability in case the project resumed. As the process gained momentum, arguments made by KEDO negotiators were fed by their North Korean counterparts into their system and were eventually crucial in securing agreement.

²³ Robert Carlin, Senior Policy Advisor of KEDO, “Working with North Korea: The KEDO Experience,” presentation at CSIS, April 27, 2004.

III. Why a Multilateral Approach Makes Sense

While it is challenging for most experts to envision a threat reduction program with North Korea, it is even more difficult to envision a multilateral effort, particularly in Northeast Asia with its history of mutual antagonism and its newly resurgent nationalism. Yet, the Six-Party Talks, while cumbersome and complicated, have demonstrated a new, shared commitment to a Korean Peninsula free of nuclear weapons. There is even talk among governments that if those talks succeed they might form the basis for a multilateral forum that would address other regional security issues. While that may seem ambitious, it shows that countries are thinking in new ways about problem-solving. If CTR were part of a diplomatic solution reached in Beijing, all the parties are likely to want to play a role in that program since it would be central to the successful implementation of an important diplomatic achievement. Indeed, a multilateral CTR program in North Korea could reinforce a nascent trend for cooperation more broadly in Northeast Asia.

From a practical perspective, a multilateral approach makes sense. First, burden-sharing—securing broad political and financial support for cooperative efforts that may cost hundreds of millions of dollars--will make it easier for participants to make and meet their commitments. International participation will reduce the direct burden on any one state. At the same time, demonstrating that many countries are doing their part will make it easier to build political support and obtain additional funding. That will certainly be the case in the United States where diplomatic settlements with North Korea that include CTR programs will be a tough sell in Congress. It may also be true for Japan whose relationship with North Korea has been bumpy.

Second, involving countries with different skills and resources may be indispensable in shaping effective CTR programs. For example, the United States and Russia have the previous experience and the technical skills necessary to conduct these programs. Neither South Korea nor China has that experience. But Seoul shares a common language with Pyongyang, has done extensive work on the ground in the North and might be willing to contribute funds given its strong interest in a peaceful peninsula. As a nuclear weapons state and a major diplomatic player, China could help deal with sensitive weapons components and contribute unique lessons learned from converting its own military factories to civilian uses. Japan may be more willing to devote resources to eliminate North Korea's missiles than its nuclear program because Tokyo perceives those weapons to be a greater threat. In short, a larger set of countries participating in the CTR program will make available a wider variety of tools and resources necessary to get the job done.

Third, the active involvement of multiple partners will help sustain cooperative threat reduction programs (and implementation of diplomatic agreements) even in the face of inevitable changes in national governments and disputes among the parties. While the new Bush Administration seemed inclined to ditch the 1994 agreement negotiated by its predecessor, the fact that the arrangement was multilateral and had the support of Washington's close allies—South Korea and Japan—worked in the favor of its continuation. When the inevitable disputes over implementation occur, the involvement of multiple partners could prevent a stoppage in work or allow face saving solutions. Finally, multiple partners reduce the risk that a bilateral dispute, which has nothing to do with implementation, will place it in jeopardy.

There are drawbacks to such an approach but they seem manageable. One challenge will be not to let multilateralism run amok. Decision-making and project implementation could become cumbersome because of the involvement of too many countries. To avoid that risk, balancing the benefits brought by multilateralism with the need for speedy implementation will require carefully shaping projects, for example by designating national project leaders and limiting the number of participants. Multilateralism may also present North Korea with the opportunity to play participants off against each another. This was true even during the most effective periods of implementing the 1994 agreement, which involved the United States, South Korea and Japan. It was also true dealing with the former Soviet states. Coordination inside the U.S. government, not to mention with other countries, proved challenging. In short, multilateral programs will make it all the more important to create the right structures and procedures for coordination.

Prospective CTR Partners

Building on the process established in the Six-Party Talks, the United States, China, Japan, Russia and South Korea could realistically be expected to play a role in cooperative threat reduction programs. In addition, while not directly involved in the Beijing talks, the European Union (and its member states including the United Kingdom, France, and Germany) might also play a limited role given past participation in KEDO. Finally, other countries, such as states in the former Soviet Union who have acquired a degree of experience with CTR that might be applicable to North Korea may be brought in to contribute to projects. An analysis of each country's ability to participate, while somewhat subjective, should be based on political and strategic interests, technical capabilities, financial resources and threat reduction experience. (See Table 1)

Table 1

Country	Technical	Financial	Political	CTR Experience
United States	Very High	Medium	Medium	Very High
South Korea	Medium	High	High	Low
China	High	Medium	Medium	Low
Japan	High	High	Medium	Medium
Russia	High	Low	Low	High
European Union	High	Low	Low	Medium

The United States

The United States should play a leading role in any threat reduction efforts in North Korea. Pyongyang’s development of WMD has taken place in the context of the decades-long confrontation with the United States. The political resolution of that conflict, including elimination of North Korean WMD, will require a hands-on American effort. Moreover, Washington has a great deal to gain from the peaceful elimination of North Korea’s unconventional weapons arsenal given the threat it poses to American security interests. The United States also has a wealth of experience in cooperative threat reduction in the former Soviet Union as well as from its own efforts to develop, manage and eliminate WMD arsenals. In short, because of its scientific capabilities, economic resources, interests and relationships in the region and unmatched CTR experience – to say nothing of its global position -- the U.S. role will be critical to success. Indeed, without American leadership, it is hard to imagine a CTR program in North Korea.

Political and Strategic Factors

Washington’s self interests would seem to dictate that it take a leading role in any cooperative threat reduction program. First, North Korea—and its WMD programs--pose a major threat to U.S. security interests in the region, not to mention American military forces stationed on the peninsula and in Japan. Moreover, continued hostile relations with North Korea are a major obstacle to future peace and stability on the Korean peninsula. Therefore, ensuring their elimination through all means, including a cooperative threat reduction program, is essential. Second, should an agreement to eliminate North Korea’s WMD capabilities emerge, the development of closer ties with the United States would appear to be an important motive for North Korea, both ensure its long-term stability and to reduce political obstacles to economic development. Therefore, the extent of U.S. involvement in threat reduction may be a major factor in determining North Korea’s future behavior. Third, direct involvement will help Washington develop confidence that North Korea is carrying out its obligations.

Even with objective third party verification, there will be no substitute for an on-the ground presence. That is also the case with U.S. threat reduction efforts in Libya.

Technical Capabilities

The U.S. national laboratory complex provides unique capabilities to develop and implement threat reduction activities. Parts of the American laboratory community already have a familiarity with the North's nuclear complex, in part through past efforts to implement the 1994 Agreed Framework. Moreover, the elimination of graphite-moderated reactors at the Hanford reservation used in the production of nuclear weapons provides Pacific Northwest Laboratory with a unique experience that will have direct application to similar reactors in North Korea. Both Argonne and Idaho National Laboratories have been key players in efforts to convert Soviet designed research reactors such as the one currently at the North's Yongbyon nuclear facility to the use of low enriched uranium fuels (LEU) fuels that are less likely to pose a proliferation threat. Decades of tending to the American nuclear weapons stockpile could enable the Los Alamos and Lawrence Livermore National Laboratories to play a critical role in ensuring the elimination of the North Korean program. Finally, the labs provide the United States with the ability to pursue scientist-to-scientist and engineer-to-engineer engagement with North Korea, a process that laid the groundwork for the most productive CTR efforts in the former Soviet Union.

Likewise, American laboratories and private companies have had to address the environmental legacy of nuclear activities during the Cold War. They could help North Korea deal with similar problems raised by its past activities, including the proper storage and disposition of waste from reactor operation and spent fuel reprocessing. Returning sensitive nuclear facilities to a condition that might allow joint economic ventures may hold appeal for both North Korea and the United States.

Lastly, the U.S. technical community has had to cope with its own downsizing, an experience that has been useful in devising programs for the former Soviet Union and may also apply on a smaller scale to North Korea. That process of downsizing and redirecting U.S. national laboratories from military to civilian activities after the Cold War has created a wealth of knowledge in turning former national security capabilities into commercial enterprises. It includes programs designed to provide basic education in developing and writing business plans as well as to match western companies with scientific counterparts in Russia. While the economic and political conditions in North Korea are vastly different from those in the United States, this knowledge may prove useful in redirecting North Korea nuclear activities into commercial or at least peaceful activities.

The American technical community also has considerable experience with chemical and biological weapons as well as ballistic missiles. On CW, the design, production and now destruction of chemical weapons in the United States and elsewhere, particularly the construction and operation of chemical demilitarization facilities, may prove useful. Americans could also play a special role in helping to identify and eliminate BW samples or stocks in North Korea. In both areas, given past experience in the former Soviet Union, U.S. entities could partner with other countries, such as South Korea, to redirect facilities and personnel to peaceful endeavors in North Korea including commercial chemical production and pharmaceutical-related activities. The same applies for North Korea's ballistic missile program; the American technical community has past experience in the peaceful elimination of key assets and the redirection of missile related activities--such as plants and personnel-- to civilian areas.

Financial Resources

While the United States is in a position to provide considerable resources to the elimination of North Korea's weapons programs, as was the case in the 1994 Agreed Framework and in the financing of CTR programs in the former Soviet Union, domestic politics will make it hard for Washington to provide the lion's share of funding. Just as it did in 1994, the United States will probably look to states in the region to carry the bulk of financial commitments. While Washington's contributions are likely to come in the form of political and technical resources, there may be cases where the executive or congressional branches will see value in a direct financial role such as the elimination of North Korea's nuclear weapons or its long-range missile production and development infrastructure.

Another channel for American funding may be through the national laboratory complex and government/industry partnerships so that they may play a positive role in North Korean threat reduction efforts. Efforts that support the threat reduction process in North Korea in this manner may have a greater chance of passing political muster than those that may be seen as providing direct support to Pyongyang. This might include financial support for groups similar to the U.S. Industry Council that has done considerable commercialization work in Russia as well as engagement of the North Korean scientific community through programs akin to the International Science and Technology Centers. Even in these cases, however, financial contributions are likely to be directed and modest.

CTR Experience

The United States has the most extensive experience of any of the prospective partners, with the possible exception of Russia, through almost 15 years of implementing CTR programs.²⁴ Government agencies, such as the Departments of State, Defense and Energy, have developed a wealth of knowledge in the political, bureaucratic and technical aspects of conducting CTR activities across a range of sensitive projects. Likewise, the technical community-national laboratories, private firms, public-private partnerships, research organizations and non-governmental organizations--have conducted threat reduction activities in a dizzying array of circumstances. In many respects, U.S. capabilities to plan and implement threat reduction activities will far outstrip what will be necessary in North Korea. Nevertheless, these capabilities can serve as a valuable “menu of options” from which the key players can choose. In addition, other countries with both motive and opportunity to contribute to CTR activities in North Korea may well make use of this extra capacity to improve their own ability to effectively participate in CTR programs. As discussed below, this transfer of knowledge from the U.S. to other countries may be critical since they lack the experience necessary to plan and conduct such activities.

South Korea

South Korea has the motive, capability and resources that should enable it to play a major role in a CTR program. In addition to its overriding interest in ensuring peace and stability on the peninsula, the process of threat reduction would be designed to enhance both inter-Korean as well as regional trust and cooperation, an objective that clearly fits in with Seoul’s policy. Moreover, sharing a common language and culture puts the South in a strong position to work directly with North Korea as does its proximity, which has advantages in terms of providing assistance or in the removal of material and equipment overland for demilitarization. Lastly, South Korea has the financial resources to assist North Korea greatly and has proven in the past (with its multi-billion dollar commitment to the KEDO reactor project) that it is willing to make large funding commitments if convinced that diplomatic solutions serve its broader political and security interests. One major problem is that the South Korean government and its expert community have little or no understanding of threat reduction. In addition, partisan political jockeying may make designing and implementing a broad array of threat reduction activities challenging.

²⁴ “Cooperative Threat Reduction Annual Report to Congress, FY 2006” [online: web], updated February 28, 2005, URL: http://www.nti.org/e_research/official_docs/dod/2005/dod022805.pdf

Political and Strategic Factors

The political and strategic motivations for South Korea to participate in a CTR program are strong. Aside from helping to build peace and stability on the peninsula as well as providing another avenue for inter-Korean cooperation, the benefits that threat reduction may have in easing the economic, political, and environmental impact of reunification all point to such a role. One key challenge will be to recognize that participating in such a program, which will almost certainly be multilateral, will also offer opportunities to bolster ties with other countries in the region who have long standing interests in the future of the Korean peninsula. There is an understandable sense of pride of ownership in South Korea for engagement with North Korea which could at times conflict with broader interests to create a widely supported threat reduction effort. Close cooperation with other countries will be essential, however, to harness national contributions to threat reduction fully, to deal any problems that may arise with North Korea and to ensure successful implementation of individual CTR projects.

Technical Capabilities

South Korea has considerable technical resources, most of which reside in the commercial sector although there are pockets of government technical expertise that can also be brought to bear. Given South Korea's robust commercial nuclear industry, the government has developed a strong nuclear regulatory and engineering base which might provide useful in certain areas of nuclear threat reduction in North Korea. South Korea's role in the more sensitive areas of nuclear threat reduction – especially those directly related to weapons and weapons production – will be limited for political and legal reasons (given its status as a non-nuclear weapon state under the Nuclear Non-Proliferation Treaty). Other areas including nuclear and chemical facility elimination, environmental remediation and reclamation, scientific redirection and facility dismantlement may be promising. To date, however, little if any planning for such activities appears to have taken place within the government's main technical agencies, such as the Ministry of Science and Technology or within the Ministry of Unification.

Seoul also has a large industrial base that may prove helpful in dealing with certain parts of the North Korean CW arsenal and production capabilities as well as with the disposal of North Korean missile fuel and fuel production facilities. Seoul's advanced pharmaceutical and bio-medical industry may have a special role to play in eliminating any North Korean biological weapons capabilities and in possible efforts to redirect chemical and biological efforts to civilian health and commercial ventures. As is the case with the nuclear complex, however, little advanced work has been carried out inside the government or in

cooperation with industry to prepare for the possible implementation of threat reduction efforts.

Finally, Seoul has a unique body of experience in retraining North Koreans for commercial employment, having integrated several thousand North Korean refugees into its society. While not all refugees have fully made the transition, understanding the kinds of skills, background and obstacles to redirecting North Koreans to contribute to a modern civilian economy may prove a valuable asset.

Financial Capabilities

South Korea may be expected by other partners to provide the bulk of funds for any North Korean threat reduction program given its previous commitment in 1994 to provide billions of dollars for the KEDO light water reactor project. Seoul has a strong incentive to see North Korea's WMD eliminated because of the potential threat they pose and in the creation of projects that will improve the North Korean economic base and infrastructure to minimize the potential costs of reunification. Such infrastructure projects, which will be critical for CTR efforts, could include the building of roads, railroads and ports, improving electrical production and transmission capabilities and constructing basic block housing. As noted by South Korean experts, the government already provides \$500 million per year to the Ministry of Unification, some of which could be directed toward threat reduction efforts. Difficulties may arise in establishing a political consensus in favor of committing large sums to threat reduction if a diplomatic solution saddles the South with other financial commitments (i.e. providing electricity to Pyongyang). Compared to the costs of preparing for the possible use by North Korea of WMD, however, funding for CTR programs should be seen as manageable.²⁵

²⁵ Estimates range from \$230 billion over ten years to over 3 trillion dollars. Noland, et al, "The Costs and Benefits of Korean Unification"[online: web], Working Paper 98-1, *Institute for International Education*, URL: <http://www.iie.com/publications/wp/wp.cfm?ResearchID=142>

CTR Experience

South Korea's major weakness is that it lacks any hands-on experience with threat reduction efforts in the former Soviet Union or elsewhere. Seoul's role in KEDO's light-water reactor project and in joint ventures with Pyongyang has given it valuable experience in working cooperatively inside North Korea. While South Korea has contributed funds to the G-8 Global Partnership and the International Science and Technology Center program, its general lack of exposure to cooperative threat reduction means that a sharp learning curve lies ahead.

The lessons learned by the United States, Russia and others took considerable time and effort to glean and, in some cases, are still being learned. South Korean government and non-governmental organizations, as well as the corporate sectors, should seek to make good use of the experience gained by others and then apply their own unique capabilities and perspectives. Any CTR efforts in North Korea therefore would benefit from parallel efforts to develop capacity within South Korea's political and professional circles on threat reduction issues.

China

China's role as a central player in the Beijing talks and its influence with North Korea should enable it to play a critical role in ensuring the establishment and effective implementation of a CTR program. While other countries should seek to involve China in threat reduction efforts in North Korea, including those which involve the cooperative elimination of nuclear weapons and weapons components, there may be certain limits, primarily financial, to that participation. Nonetheless, China's knowledge of North Korea's infrastructure and economy, and its relationships with that country's officials may be of great value in planning and implementing creative approaches to simultaneously eliminating North Korea's WMD capabilities and turning them to productive peaceful applications. Moreover, China has growing state-affiliated nuclear and chemical industries that could be involved in threat reduction efforts.

Political and Strategic Factors

China supports a nuclear-free Korean peninsula, but also has an overriding incentive is to ensure the stability of the peninsula, including preventing the collapse of North Korea and armed conflict if possible. Either could spillover into Northeast China creating domestic political and economic problems for Beijing or might prompt a confrontation with the United States. Because of these concerns, Beijing has played a leading role in seeking a peaceful resolution to the current nuclear crisis and is likely to continue to do so to ensure the successful

implementation of any agreement that would contribute to regional stability. Beijing's positive role also contributes to its international standing and helps counteract possible U.S.-Chinese tensions over other issues related to Taiwan, trade and competition for scarce resources.

Technical Capabilities

China's advanced technical capabilities will be useful in working cooperatively with North Korea. As a nuclear weapon state with its own extensive technical community, China can potentially assist in dismantling North Korea's nuclear infrastructure including sensitive equipment and components for those weapons. Beijing's experience in the construction of nuclear reactors, the processing of nuclear wastes, the development of liquid-fueled ballistic missiles and space launch vehicles and broader petrochemical and industrial chemical activities all provide it with a certain level of technical capability that might be useful in other CTR-related activities. Moreover, China is clearly in a position to assist in less technical tasks including missile and launcher elimination, and redirecting North Korea's scientific and engineering base.

Financial Resources

In spite of its robust and growing economy, Beijing is only likely to play a supporting role in providing funding. China already provides North Korea with considerable economic assistance on a bilateral basis, assistance that many officials view as a kind of "threat reduction" since it reduces the dangers posed by the risks of an unstable North Korea. The dedication of additional resources, however, may be possible to the extent that their application is seen as a political necessity to secure a role in the implementation of diplomatic agreements or to further insure the stability of the peninsula. China's may also be willing to provide financial support for or offer joint participation in projects that build on its own experience with economic development and its deep understanding of North Korea's economy and that seek to redirect WMD capabilities, including scientists, towards development of the civilian economy.

CTR Experience

While Beijing is expected to play an important role in a Korean threat reduction program, it is largely unaware of activities in the former Soviet Union and elsewhere. China does have some limited experience in a CTR-like activity. For example, Chinese-American lab-to-lab discussions in the mid-1990's looked at the physical protection of nuclear materials and safety. But those discussions were suspended after the allegation of nuclear espionage by China against the United States. It also has considerable domestic experience in the conversion and redirection of defense industries to commercial activities, an activity which is fully consistent with some of the goals that may be set for Korean threat reduction. While there is a small, but growing cadre of experts in think-tanks with an understanding of cooperative threat reduction, that number still falls far short of what is necessary.

Japan

Japan has a strong interest in the elimination of North Korea's WMD capabilities as well as in Pyongyang's transformation into a more politically and economically responsible state. While this would seem to warrant an important role in any CTR program, historical tensions between Japan and the two Koreas may limit its on-the-ground participation. Moreover, unless Tokyo and Pyongyang resolve the problems created by Pyongyang's abduction of Japanese nationals, Tokyo is unlikely to make a significant contribution. If that issue is resolved, Japan certainly has important resources to bring to bear on the cooperative elimination and redirection of North Korea's nuclear, chemical, and biological weapons and ballistic missile capabilities. Of particular concern may be North Korean missiles able to strike Japan. Moreover, if threat reduction efforts are to have a broader positive benefit on political dynamics in the region, Japan's involvement in cooperative activities with North Korea would appear essential.

Political and Strategic Factors

Japan has a strong interest in ending the threat posed by North Korea's WMD program and the ballistic missiles able to deliver those weapons. Yet, Tokyo's relationship with North Korea is colored by its occupation of the peninsula prior to WWII. Two generations of North Koreans have been indoctrinated with anti-Japanese and anti-colonial messages. Pyongyang's poor handling of the issue of Japanese citizens abducted by North Korea in the past has created a major hurdle to better bilateral relations that has seriously affected the political landscape. Japanese leaders have agreed that the resolution of the nuclear issue must take precedence over the other points of contention with North Korea, but until and unless these other issues are resolved, it may prove politically

difficult for Japan to engage North Korea. If a constructive relationship develops, Tokyo could play an integral role in helping to contain and eliminate North Korea's WMD capabilities, particularly its long-range missiles.²⁶ To a lesser extent, North Korea's nuclear and chemical capabilities may also receive attention.

Technical Capabilities

Japan is an advanced technical state that could provide expertise in the nuclear, chemical and biological fields including nuclear waste treatment and environmental remediation, the elimination of chemical weapons and redirection of chemical pre-cursors, and the redirection of scientific and technical personnel to peaceful applications. Japan also has a well-developed set of heavy industries from construction to production of heavy machinery. Tokyo could easily donate trucks, earth movers, cranes, and other heavy machinery for CTR efforts in North Korea.

With its large industrial base, Japan could be in a position to contribute technical and more basic engineering capabilities to a Korean threat reduction effort although that effort may be limited by political realities. For example, Japan could help decommission the plutonium production reactor at Yongbyon which is similar in design and materials to the now decommissioned Tokai nuclear power plant. Japanese work on eliminating chemical weapons in China may also have some applicability if an agreement is reached to eliminate North Korea's CW stockpile.

Financial Resources

With the world's third largest economy after the United States and China, Japan has considerable economic resources to contribute to a Korea CTR program. Political realities may limit its ability to provide large amounts of assistance unless the issue of the whereabouts of Japanese citizens abducted by North Korea is resolved. Moreover, while Tokyo is a member of the G-8 and a founding member of the Global Partnership to Prevent the Spread of Weapons and Materials of Mass Destruction, it remains the smallest contributor to that partnership. Nonetheless, there is a considerable incentive for Japan to ensure the success of threat reduction efforts in North Korea if only to diminish the threat posed by Pyongyang and reduced pressures for increased defense spending.

²⁶ "Resolving the North Korean Nuclear Problem: A Regional Approach and the Role of Japan", Project for Northeast Asian Security, *The Japan Institute of International Affairs*, July 2005.

CTR Experience

The Japanese government, NGO's and commercial enterprises have had a mixed experience with CTR programs that could prove instructive for the future. As a member of the G-8 global partnership, Japan has engaged in a bilateral effort to dismantle nuclear submarines and to store radioactive waste in the Russian Far East. That effort has been complicated by a long-standing dispute over the Northern Territories (Sakhalin Island), conflicts between Russian and Japanese management styles and the difficulties of working in and doing business with Russia. On top of all this, numerous unexpected delays in implementing programs, well known to those involved in threat reduction programs, have severely complicated Japanese budgeting efforts and undermined domestic political support. In contrast, Japan has had a better experience participating in the multilateral KEDO light water reactor project. Still, the fact that Japan's threat reduction experience has been less than fully positive – just as is the case in the United States – may color its view of efforts to apply CTR programs to North Korea.

Russia

Russia plays a supporting role in the Beijing Six-Party Talks. Still, Moscow may be able to make a significant contribution to threat reduction efforts in North Korea by drawing on its wide-ranging WMD expertise as well as extensive hands-on experience with cooperative threat reduction programs. It also has the added advantage that many of North Korea's facilities--for example nuclear research installations or missile factories--are based on old Soviet technology. Moreover, long-time ties with North Korea's scientific establishment, many of whom were educated in the Soviet Union, may make Russia a more acceptable partner in CTR programs for Pyongyang's technical elite. As a founding member of the Global Partnership, some officials in Moscow may view providing support to Korean threat reduction efforts as a way to fulfill its obligation to ensure that the G-8 effort is global in nature. Nevertheless, continued economic difficulties and fears that spending might be diverted from its own domestic CTR programs are likely to limit any financial contribution made by Moscow.

Political and Strategic Factors

Russia's main strategic focus remains the West although Moscow continues to maintain its traditional interest in Northeast Asian security and has a strategic incentive to play a role in the region. This is reflected in Moscow's participation in the Beijing Six-Party Talks despite the relatively small role it plays on the peninsula. In this context, Russia has an incentive to play a constructive role on Korean threat reduction. Like China and others, the Russian

Far East would be negatively affected by tensions, instability, a military buildup or open conflict on the peninsula. In addition, as a member of the G-8 and the Global Partnership, some elements of the Russian government may see political benefit in playing a constructive role in the expansion of CTR efforts to North Korea in support of a political settlement. To the extent that Russia is seen as having helped reach the broader agreement or implement its terms, Moscow's international standing stands to benefit.

Technical Capability

Russia has a vast body of technical experience with nuclear, chemical and biological weapons and ballistic missiles as well as considerable related civilian industries. This expertise may prove a valuable complement to the assets available from other states. Russia's strongest assets are in the nuclear field, where it has a long history of building nuclear weapons. Moreover, Moscow's technology may be especially applicable to CTR programs in North Korea since it could be more compatible with Pyongyang's facilities. This may be especially true given the Soviet Union's technical assistance to North Korea's peaceful nuclear research program starting in the 1950's and continuing for almost three decades.

In addition to the domestically constructed 5MW reactor at Yongbyon, North Korea possesses a Soviet-supplied IRT research reactor that will have to be part of any threat reduction effort. On-going bilateral work between the United States and Russia on the conversion of Soviet-era reactors to low enriched uranium may be applicable to this facility. Moscow also has had long-standing ties to North Korea's scientific community since many of Pyongyang's scientists and technicians were trained in the Soviet Union. These ties may be useful in promoting CTR efforts designed to redirect scientists to civilian research.

Since Soviet designed missiles are the basis for North Korea's missile programs, Russia may be able to provide important assistance in the handling of missile components and fuel that could be of use in a threat reduction program. Russia's experience in developing chemical weapons, its vast chemical industry and more recent efforts to build facilities with the assistance of other states to eliminate its CW stockpile may also be applicable to North Korea. Finally, while secrecy continues to cloud many aspects of the Soviet Union's former biological weapons effort, Russian help could be useful in identifying and dealing with any BW capabilities that may exist in North Korea.

Financial Resources

As a founding member of the Global Partnership whose scope extends beyond the former Soviet Union, Russia may be pressed to contribute its own resources to CTR efforts in North Korea. While Moscow's finances have improved considerably over the past few years, its economic challenges are still considerable. Indeed, Russia continues to devote too little of its own money to domestic threat reduction programs and many would view funding a Korean program as an unnecessary diversion of scarce resources. Therefore, Moscow should not be expected to be a major source of funding for a Korean threat reduction effort although it might be able to provide considerable "in-kind" assistance, such as offering up expertise and infrastructure that would enable projects to move forward. Moreover, Russian entities might seek funds from other partners to carry out CTR efforts in North Korea. This type of work has precedent, for example Russia's acceptance of uranium fuel from Iraq's research reactor after the 1991 gulf war in exchange for payment from international partners. Finally, as Russian companies continue to develop CTR-relevant capabilities for domestic use, they may seek to bid on contracts to carry out such work in other countries, including North Korea. This, in turn, might have an additional positive benefit on threat reduction efforts in the former Soviet Union.

CTR Experience

The considerable accomplishments of CTR in the former Soviet Union have given Russia a base of experience that may be brought to bear in North Korea.²⁷ These efforts include the entire panoply of Russia's WMD programs and could have application in all aspects of the North Korean complex including handling nuclear weapons, nuclear material protection and accounting, nuclear facility dismantlement, chemical weapon elimination, CW facility elimination or conversion, missile elimination and facility redirection, identification and processing of biological weapon samples, and scientific redirection and commercialization efforts. Also, almost all of the former Soviet states have had some direct exposure to CTR activities. Several, including Kazakhstan and Ukraine, may have experience with direct relevance to North Korea. For example, Kazakhstan has worked with the United States in closing a plutonium production reactor, securing large amounts of nuclear material, shipping out of the country hundreds of kilograms of HEU, and, by virtue of its sizeable Korean minority, has political and cultural ties with North Korea. Ukraine has worked with the United States and others in dismantling former Soviet missiles on its soil and in redirecting scientists who worked on those programs.

European Union

The European Union (EU) continues to evolve as both a political actor and as a participant in international non-proliferation efforts. As a contributor to the KEDO process and with an interest in both nonproliferation and stability in East Asia, it is possible that the E.U. might play a buttressing role in Korean CTR efforts. The E.U. also has extensive food and medical assistance programs with North Korea that may prove valuable in terms of the credibility and relationships built up with Pyongyang. Thus, the E.U. may help CTR efforts through direct action and possibly by providing other assistance packages that will give Pyongyang a continuing incentive to fulfill its nonproliferation obligations.

Political and Strategic Factors

The E.U. has a limited political but a strong economic interest in ensuring peace and stability in Northeast Asia. Part of that interest is that the current nuclear crisis is peacefully resolved and that any agreement eliminating North Korea's nuclear weapons program, and other weapons of mass destruction, is effectively implemented. Europe's concern about North Korea's WMD and its ballistic missile program also is directly related to more immediate concerns.

²⁷ "Strengthening US-Russian Cooperation on Nuclear Nonproliferation: Recommendation of Action" [online: web], Report of the *Russian Academy of Sciences and the National Research Council of the U.S. National Academies*, URL: <http://books.nap.edu/catalogue/11302.html>

First, the European Union has taken on a growing role in international efforts to prevent the spread of weapons of mass destruction. This policy, built around the global legal regimes developed over the past 40 plus years, makes it likely that European decision makers will seek to support efforts that reinforce that regime, including a Korean CTR program whose premise is to strengthen global non-proliferation efforts. Second, developments in North Korea are related to the threat posed by Iran's attempts to build WMD and the missiles to deliver them, a threat Europe has attempted to address through its own diplomatic initiatives. For one thing, North Korea is the primary source of technology and assistance for Iran's growing missile capability, which poses a direct security risk for Europe.

Technical Capability

Europe has the technological assets to provide assistance to a Korean CTR program. Some assistance might be available through regional organizations, such as EURATOM, to deal with any problems related to the accounting and control of nuclear materials. Assistance might also be available for projects linked to other efforts designed to minimize the risk of North Korea's WMD capabilities while benefiting its economic development. Examples include the construction of roads facilitating work at CTR project sites. Just as if not more important, through the E.U. a CTR program would also have access to the technical capabilities of member states. France and the United Kingdom, both nuclear weapons states, have extensive civil and military assets that might be useful in addressing North Korea's nuclear capabilities. Europe's advanced scientific and industrial capabilities may also be usefully applied to cooperative threat reduction programs for North Korea's chemical and biological sectors and its ballistic missile capabilities.

Financial Resources

The European Union has considerable economic resources that could help finance a North Korean threat reduction program. But it is unclear whether Europe would provide significant assistance, particularly if diplomatic agreements providing for dismantling WMD programs are reached without its participation. The European Union did provide over \$100 million in support for the KEDO project despite not being part of the negotiations to resolve the 1994 crisis. It has also given considerable humanitarian and reconstruction assistance to North Korea²⁸ and may be willing to provide specific help to projects that meet EU objectives in building better relations with Pyongyang. Nevertheless, while the EU clearly has an interest in a peaceful peninsula, it is relatively remote from North Korea. That said, the link between North Korean and Iranian missile

²⁸ Approximately 400 million Euro since 1995. See Maurizio Martellini "Is an European Cooperative Threat Reduction Initiative towards North Korea Desirable, Feasible and Effective?" April 2005, *Landau Network-Centro Volta (LNCV)*, Como, Italy.

developments may provide sufficient motive for the EU to provide some material and financial support to CTR efforts, or to help politically bolster those efforts through providing incentives for continued North Korea implementation.

CTR Experience

The European Union has been a major participant in efforts to redirect former WMD scientists in Russia and elsewhere to peaceful pursuits through the International Science and Technology Centers. Moreover, the European Commission and the Council have experts intimately familiar with the conduct of CTR activities bilaterally and through the G-8 partnership in the former Soviet Union. Individual European states also have extensive on-the ground experience. Germany has played a key role in helping to eliminate Russian chemical weapons and has also provided assistance for securing and eliminating nuclear materials. France and the United Kingdom are also helping to eliminate large amounts of excess Russian plutonium in cooperation with the United States.

IV. A Multilateral Threat Reduction Program

Threat reduction efforts in the former Soviet Union were born out of chaos. The concern that the its collapse would leave a formidable nuclear arsenal vulnerable to use by multiple successor states or factions emerging from the chaos led the United States to utilize untested yet creative approaches. Those approaches were designed to help Russia and other states ensure that the most dangerous assets – tactical and strategic nuclear weapons – were secured and returned to Moscow as the sole nuclear successor state. After the initial appropriation of CTR monies by Washington to help Russia secure weapons, these programs evolved over time to assist it and the rest of the former Soviet states to meet their broader arms control and political obligations, so long as they supported underlying U.S. nonproliferation and security objectives. As part of this broader effort, CTR programs were designed to ensure that states did not suffer economically as a result of meeting their obligations and to provide them with incentives to encourage continued implementation of these agreements. This approach was required as most states affected by the U.S.-Soviet arms reduction agreements had not assumed these obligations themselves and their acceptance of these requirements often required significant economic and political incentives.

While that experience has proved successful, participants in negotiations to eliminate North Korea's WMD and ballistic missile programs have a unique opportunity to incorporate CTR programs directly into international agreements designed to achieve that objective. This will be important since, unlike traditional U.S.-Soviet arms reduction negotiations, talks with North Korea on this subject are unlikely to be reciprocal. They will not require, North Korean public posturing notwithstanding, an end to the "American military threat" or any cuts in the military forces confronting Pyongyang. Rather, North Korea has to bet that the perceived threat will subside as it eliminates WMD and ballistic missiles in exchange for political pledges, security assurances and economic help.

Naturally, these trying circumstances make it difficult for North Korea to give up its WMD trump card. Therefore, identifying innovative ways to reach agreements, to ensure their implementation and to obtain continued North Korean compliance should be a top priority for Washington. It is already clear from the ongoing nuclear talks in Beijing that a key component of any agreements designed to eliminate North Korea's WMD will be the normalization of relations, particularly between Washington and Pyongyang. That will require steps such as the provision of security assurances, the establishment of diplomatic relations and the lifting of any sanctions that hamper economic interactions. Cooperative threat reduction programs are not meant as a substitute for all of these measures but rather as an added incentive for North Korea to accept and implement agreements to eliminate its WMD.

These programs should not be included in diplomatic solutions because of any altruistic feelings towards North Korea or sympathy for its plight. Plainly put, the verifiable and permanent elimination of North Korea's WMD serves the national interests of United States, its close allies in the region and the international community. As was mentioned earlier, embedding CTR programs into agreements, starting with the Beijing Six Party Talks, will serve all these interests by helping to achieve sustainable denuclearization of the Korean peninsula, by enhancing transparency and the prospects for effective verification, by promoting more normal relations between Pyongyang and other countries and by encouraging North Korea to focus more resources on developing its civilian economy as opposed to its military efforts.

For Pyongyang, incorporating CTR programs into negotiated arrangements could serve a number of purposes. First, if it decides to eliminate its WMD and missile programs starting with an agreement in Beijing that will result in a time consuming resource intensive burden that North Korea will find difficult if not impossible to shoulder alone. Building threat reduction into future agreements will ease that burden by involving outside countries, almost certainly leading to the provision of both financing and technical resources. Second, incorporating CTR programs into negotiated arrangements will help satisfy North Korea's requirement for economic development and modernization as well as to enhance its national prestige. Finally, cooperative programs, economic joint ventures and normalized relations will be important to providing North Korea with the continued sense that meeting its disarmament obligations is in its security interests.

Certainly, the challenge facing the United States, South Korea and others is enormous. While the scope of Pyongyang's WMD programs is far smaller than the arsenals remaining after the collapse of the Soviet Union, it is still significant, the result of over four decades of committed effort. Given this challenge, some experts have advocated a "comprehensive approach" that would resolve all of these problems in one fell swoop. While such an approach might be justified—it would solve the WMD problem quickly and once and for all—it is unrealistic. Contrary to the popular perception, North Korea is essentially a cautious state. Locked in what it believes is a life or death struggle with the world's only superpower, if Pyongyang agrees to give up all of these programs, it will only do so slowly and for a significant price. Indeed, many North Koreans look at Libya's recent sudden decision to relinquish its WMD and ballistic missile programs as the reckless move of an unstable dictator. Perhaps just as important, most diplomats would shudder at the idea of reaching a comprehensive agreement covering all of these programs given the enormously complicated issues involved.

The reality is that solving the North Korean WMD challenge will require a series of sequential arrangements stretching out over the next decade or more. Hopefully, the current Six Party Talks in Beijing will start the ball rolling, producing an initial agreement that addresses the nuclear problem. If that happens, while a whole host of other differences will need to be resolved as the peninsula moves away from cold war confrontation, other WMD issues are likely to move closer to the top of the diplomatic agenda. Ending the dangers posed by Pyongyang's ballistic missile program would seem to be next, certainly because of the keenly felt threat that program poses to Japan and the more distant danger to the United States, but also because of Pyongyang's exports of those weapons and technology to unstable regions of the world. And then there remains the challenge of eliminating Pyongyang's chemical and biological weapons program that will probably require its commitment to global agreements banning those weapons supplemented by a threat reduction effort. All of these arrangements will be difficult to reach and even harder to implement yet are unavoidable in order to build peace and stability in Northeast Asia.

Cooperative Denuclearization

Ending North Korea's nuclear weapons program remains the top priority for the United States and other countries participating in the Six Party Talks. The process of elimination will have to address; 1) nuclear weapons/weapon usable materials and components; 2) nuclear material production facilities and infrastructure, and; 3) nuclear expertise represented by the personnel involved in the program. The first task is the most sensitive. It may present limited opportunities for CTR programs to provide financial and technical assistance to ensure that denuclearization is complete. The last two tasks, eliminating or converting infrastructure and redirecting scientists and technicians, are more fertile ground for threat reduction activities in that they will hopefully make it impossible for North Korea to reconstitute its nuclear program in the future.

In moving forward with a nuclear CTR program, the United States should be in the lead given the serious threat North Korea poses to American regional interests and the international non-proliferation regime, Washington's advanced technical capabilities, and its experience with CTR in Russia and elsewhere. Still, there are a variety of reasons why the U.S. will want to work in concert with other members of the Six-Party Talks. Russia and China, given their status as nuclear weapons states as well as better relationships with Pyongyang, may be able to provide important assistance in dealing with sensitive parts of the nuclear program as well as other specialized technical help. Russia's experience with CTR and ties to North Korea's scientific elite could also prove valuable. South Korea has the financial resources, the strategic motivation, the on-the-ground experience and some nuclear expertise that should make it an important player in a nuclear CTR program. Japan's role may be more limited as will that of the European Union.

Nuclear Weapons, Materials, Components and Spent Fuel

Table 2

Component	Weaponized Plutonium	Non-Nuclear Weapon Components/ HE	Key production components and equipment	New Spent Fuel
Partner	US/Russia/China/IAEA/Kazakhstan	US/Russia/China/ROK	US/ROK/Russia	US/Russia/France/China/ROK?
Interim Steps	Storage	Storage	Tagging, redirection	Removal from reactor and storage
End State	Disposal	Elimination	Disposal or conversion	Canning/shipment out of country
CTR Options?	Yes	Limited	Yes	Yes

Component: Weapon-Usable Plutonium

CTR options: Storage facility design and conversion, security for stored plutonium, shipment out of country and disposal.

Potential project leadership: US, Russia, China, IAEA

Other possible participants: France/UK, Kazakhstan

While the size of Pyongyang's stockpile of weapons-usable plutonium remains uncertain (it could exceed fifty kilograms), any agreement reached in Beijing will place that material under international monitoring so it can be removed from the country.²⁹ Shipping North Korea's plutonium abroad will require multilateral cooperation. Possible recipients include nuclear weapons states but particularly Russia and China, both of whom are capable of handling even the upper estimates of the North's weapons materials. The actual packaging of the plutonium before it is shipped out will require close cooperation between Pyongyang and other participants in this project. The planning and execution, which will not only have to provide for the safe handling of material in North Korea but also preparations for storage and eventual disposal at its destination, may take months.

²⁹ "North Korean Plutonium Stocks MID 2005" [online: web], *Institute for Science and International Security*, updated September 7, 2005, URL: <http://www.isis-online.org>

In that case, establishing a secure, interim storage facility for weapons-useable material that could be monitored by outside inspectors may be necessary. North Korea probably has its own storage facilities but they may not meet international standards for safety and security or for effective monitoring. Given the relatively small amounts of materials involved, North Korea should be able to upgrade existing facilities to meet these standards. Alternatively, an interim facility might be established in partnership with the United States, Russia or the IAEA (which would be the best candidate for monitoring such a site). North Korea could invite experts to install quick fix security upgrades, such as blocking up windows or installing iron doors with modern locking systems. If time permits, a more modern set of upgrades such as fencing and nuclear material monitors could be provided. Indeed, based on its years of experience at the Yongbyon site, Washington could provide design assistance and U.S. personnel who previously worked on the joint spent fuel storage project might be recalled to jump start the work.

Internal security will not be as acute a concern in an authoritarian North Korea as it is elsewhere. But the establishment of an interim storage facility might also present the opportunity for the United States and Russia to offer to use that location as a demonstration site for more modern nuclear material protection, control and accounting (MPC&A) procedures. Such a system will be necessary if Pyongyang preserves its right to use peaceful nuclear technology. Russian experts might take the lead, drawing on prior relationships with North Korean scientists and their own institutes that have received MPC&A training and upgrades.

Another interim storage option could be co-packaging the plutonium with highly radioactive materials. The United States and Kazakhstan cooperated in a similar effort at Aktau.³⁰ Three tons of high purity plutonium inherited by Kazakhstan when the Soviet Union dissolved was first secured with American assistance. Then it was placed into over packs with highly radioactive fuel to provide a physical barrier that would be more effective than an interim storage facility in preventing theft or use in nuclear weapons. On the other hand, this effort would be more expensive and take longer to implement. In addition to the United States and perhaps others, cooperation might involve Kazakhstan in view of this experience and its ties with North Korea.

Component: Non-Nuclear Weapon Components

CTR options: Limited

Potential project leadership: United States, Russia

Other possible participants: International Atomic Energy Agency

³⁰ “BN-350 Spent Fuel Disposition” [online: web], *US Department of Energy Webpage*, URL: http://www.nnsa.doe.gov/na-20/bn_350.shtml

Eliminating the non-nuclear components of North Korea's nuclear weapons—including high explosives, initiators and casings--would seem to offer only limited opportunities for cooperation. This task will require the North to dismantle or destroy components through smashing, cutting, welding or other basic physical alterations. High explosives can be detonated at existing or temporary test ranges. One possibility would be to seal destroyed or inoperable components and place them under interim international monitoring without revealing sensitive weapon design information. Given their status as nuclear weapons states and track record of cooperation, the United States and Russia may be the best suited to provide oversight and support for these operations. If and when states are satisfied that the components provided by North Korea are from nuclear weapons and have been rendered harmless, they can be safely eliminated or removed from North Korea.

Component: Key Weaponization equipment

CTR options: Limited, possible placement of some converted dual use items for commercial ventures.

Potential project leadership: U.S., Russia, China

Other possible participants: France/UK, Republic of Korea

While eliminating North Korea's nuclear weapons program will rely mainly on ending its ability to produce fissile materials, weapon-related production equipment will also be destroyed or converted as was the case in Iraq after the first Gulf War. This equipment might include, for example, special, multi-axis and computer controlled machine tools, specialized furnaces and arc welders, all of which are considered dual-use (military and civilian) items. Any program that seeks to use this equipment for civilian purposes will have to prevent diversion to North Korea's missile and conventional weapons production. This might be done through declaring the number and location of all such items in the country not eliminated, allow them to be tagged and make them available for inspection. Or an agreement could be reached on a "contamination principle," namely equipment used in weapons production should be eliminated. Other items could be used in civilian applications, but the right to inspect sites where they are located could still be necessary. With an acceptable verification regime, some equipment might be used in joint economic projects. For example, high technology equipment such as machine tools and furnaces were used in Iraq after the first Gulf War for specialized purposes, such as the production of prosthetic limbs. Such projects with South Korea might be especially appropriate.

Component: Newly Irradiated Spent Fuel

CTR options: International monitoring, storage, canning and removal for disposition

Potential project leadership: United States, Russia

Other possible participants: China, France, Republic of Korea

The cooperative challenge facing participants will be to ship all spent fuel out of North Korea. Pyongyang claims to have reprocessed all fuel unloaded from its 25MW reactor as of spring 2005. Whether that is true or not remains unclear. In any case, Pyongyang will need to discharge and ship out an additional core load that is currently undergoing irradiation. The condition of the fuel will be critical. Since fuel that was discharged from its reactor in 1994 was badly degraded, it had to be treated and canned to avoid reprocessing and the risk of a nuclear accident before being shipped out. As a result, the canning of this spent fuel in stainless steel, sealed canisters is now a demonstrated technology. If the spent fuel is in good condition, it may be shipped without canning. Moreover, given previous experience many of the technical and operational delays encountered in the earlier operations can be avoided. Nevertheless, the cost of entire project will be considerable, running into the tens of millions of dollars. Complex legal issues related to liability, ownership, and the final disposal of wastes produced as a result of final disposition will also need to be resolved.

Washington's extensive previous experience in dealing with North Korea's spent fuel will allow it to play the lead role in carrying out any similar activities in the future. To do so, the United States will need to: 1) prepare a thorough survey of its past canning activities in North Korea, perhaps working with the private contractor who provided the majority of services in country; 2) establish a database of those workers who participated in the canning operation to review lessons learned and reestablish a rapid response capability; 3) develop a strong training and briefing program for new workers to be engaged in this work should be pursued; and, 4) select a partner country that can receive and dispose of the spent fuel.

There are three potential candidates. Russia has a robust reprocessing capability that could easily handle the North Korean fuel as does France. The relatively small amounts of plutonium included in the spent fuel could be mixed with radioactive wastes and disposed of in either country. China has a less well-advanced commercial reprocessing capability but may be a potential destination given its closer relationship with North Korea. Of the three, Moscow would appear the best candidate because of previous technical cooperation with the United States in reprocessing foreign fuel. That would make also make it easier to complete the task quickly. After the 1991 Gulf War, Russia accepted the return of Soviet origin HEU fuel from Iraq but only after being paid for its services by the United Nations. It remains unclear whether the improved Russian financial situation would allow Moscow to contribute funding to this project.

Monitoring of the storage, canning (if necessary) and removal of newly irradiated spent fuel might also involve cooperative efforts. Once again the IAEA is the most appropriate body for this important task, but possible cooperation between North and South Korea as foreseen by the 1992 North-South Denuclearization Declaration might play a role. The two Koreas could establish a

regime of reciprocal visits to spent fuel sites. That might also provide South Korea with the incentive to fund other spent fuel activities, such as IAEA monitoring, storage, canning or final disposition.

Nuclear Material Production Facilities and Infrastructure

Table 3

Site	IRT Reactor	25 MW Reactor	Pu Reprocessing facility and wastes	U mining and processing	Reactors under construction
Partners	US/Russia ROK/China/Japan	US/Russia Japan	US/Russia Japan China	Six Party Australia Canada	Six Party? Russia China Japan
End State	Conversion	Elimination	Elimination, disposal	Conversion?	Conversion Elimination monitoring?

Component: IRT Reactor, isotope handling equipment (hot cells, etc)

CTR options: Regional peaceful nuclear cooperation

Potential project leadership: US, Russia, Republic of Korea

Other possible participants: China, Japan, France/United Kingdom

Pyongyang's insistence in the Six-Party Talks that it be allowed to continue the use of peaceful nuclear technology could be satisfied by working with other states to establish a regional center for peaceful nuclear research in the North. One option would be to convert its old Soviet IRT reactor from the use of highly enriched uranium to low enriched fuel, reducing the danger of such a facility being misused for weapons-related purposes. The United States has a long-standing and proven technical capability to convert American designed research reactors and since the mid 1990s has been cooperating with Russia on joint work to convert Soviet-designed reactors to the use of low enriched fuels. That program is in the process of converting its first Soviet-designed reactor in the Czech Republic with Libya's IRT reactor expected to be next. Japan and South Korea have also been active participants and could help with the conversion of the Korean reactor as well as its future joint operations.

The new regional center could be used in the production of nuclear isotopes with various peaceful applications including medical, agricultural and industrial uses as well as for training purposes and the conduct of research in basic nuclear science. Since continued operation would still pose some non-proliferation risks, all of the projects would be carefully screened and activities

carefully monitored.³¹ Such materials could be effectively used in North Korea or elsewhere in Northeast Asia. They may even have a commercial value in South Korea or China although both countries have their own means of production. South Korea seems the most likely customer, if only because purchasing the material could be part of its broader engagement policy with the North.³² One potential problem is the age of the IRT reactor, built in 1965. Aside from limiting its use for advanced scientific research beyond training and isotope production, operating the reactor for a prolonged period might require extensive upgrades.

The costs of converting the North Korean research reactor will be significant but not prohibitive. The main cost will be the price of the newly produced fuel itself, which is likely to be several million dollars, and would have to be assumed by one or more of the participating countries. Conceivably, North Korea could contribute by exchanging some of its extensive uranium supplies, materials that have a real commercial value on the open market. Operating costs for the running of the reactor, provision of irradiation targets and processing of isotopes that may reach over \$1 million annually could be assumed by the international partners. In-kind contributions might be made through the IAEA's technical cooperation fund once North Korea comes back into compliance with its NPT and safeguard obligations.

A less ambitious program for peaceful nuclear cooperation would involve facilities other than the research reactor for isotope production. The reactor would be closed and its fuel removed. International cooperation would focus instead on the use of cyclotrons to extract isotopes. This option would allow North Korean scientists and technicians to retain some expertise with application to plutonium extraction/reprocessing but the risks this would entail would be extremely small without a working nuclear reactor. Pyongyang acquired a cyclotron from Russia in the mid-1990s, but its current status is unknown. Existing isotope extraction and sampling equipment could be permitted in either case, albeit under strict international monitoring since this equipment has been used in the past for weapons applications.

³¹ Any work that would require the refining/extraction of isotopes in North Korea would have inherent application for plutonium separation. However, North Korea already has acquired this knowledge. Key to any effort of this kind will be the trade off between occupying the reactors use and allowing North Korea to maintain a base of knowledge with weapons applications. While the preferred nonproliferation outcome would be the total absence of nuclear facilities in North Korea, the operation of the IRT reactor would be the least worrisome, if converted and monitored.

³² South Korea has ample isotope production capabilities and would likely only be interested in the North Korean product from a political perspective.

The complete shutdown and dismantlement of the IRT reactor would also open up other opportunities for cooperation. The American and Russian national labs have extensive experience in the decontamination and decommissioning of nuclear facilities that could be shared with North Korean institutes. (Lab-to-lab engagement was extremely important in developing positive relationships between the U.S. and Russia and could play a similar role with North Korea.) The Global Threat Reduction Initiative (GTRI) program launched by the United States in 2004 could easily be expanded to include the removal of spent fuel from the IRT reactor to Russia where it would be disposed of. Then, cooperative efforts involving the U.S., Russia, possibly China and South Korea could address decontamination and dismantlement. Key to this operation would be dealing with the radioactive waste disposal (discussed below). The cost of the project might run into the tens of millions of dollars, but could generate political support in the United States and elsewhere since it would fit well within the objectives of the G-8 Global Partnership and could facilitate contributions from other members.

Component: 25MWt Plutonium Production Reactor – Yongbyon

CTR options: Dismantlement of facility

Potential project leadership: United States, Russia

Other possible participants: Japan, France/UK, Republic of Korea

Denuclearization will require the dismantlement of North Korea's 25 MW reactor which has played the central role in the production of nuclear material. Elimination will be a daunting task. Aside from requiring extensive investment and years of work, considerable technical expertise will also be needed since the reactor's core will be highly radioactive. An additional task will be the careful handling and disposal of many tons of graphite, steel, concrete and other materials. While North Korea could well request assistance, other countries may want to actively participate in any case for added transparency.

The United States, Russia, the United Kingdom, and Japan all have experience with the construction, decommissioning and dismantlement of graphite-moderated reactors similar to the North Korean model and may be able to contribute to the project.³³ South Korea does not have such experience, but in view of Seoul's advanced civilian nuclear industry, it may also be willing to participate. As part of previous planning to implement the 1994 Agreed Framework, the United States, through the Pacific Northwest National Laboratory, did extensive advanced work on the requirements for dismantling the Yongbyon reactor. This work could be restarted and used to engage other

³³ Among the possible candidates for cooperation, the inclusion of Japan may be the most difficult for North Korea to accept given difficult history and recent tensions. Nevertheless, the Japanese experience in decommissioning the Tokai-Mura graphite moderated reactor may be useful and provide an opportunity for cooperation with North Korea (see discussion of Japanese technical capabilities).

participants. Elimination and decontamination of the facility could be carried out by the North Koreans, possibly employing hundreds of workers, including engineers and nuclear technicians, many of whom may have been involved in the reactor's construction.

Should on-site cooperation prove too complicated or difficult for North Korea to accept, the parties might opt for another approach used effectively in the elimination of Russian strategic submarines--contract work. Since the reactor site can be observed by satellite, providing material support for North Korea to carry out elimination along technical plans agreed to by Pyongyang and the other countries might be sufficient. Pyongyang would be required to provide evidence of having achieved specific tasks, including turning over or making available for verification purposes key pieces of equipment and components. Photographic satellites could also be used to monitor progress. Once again, North Korean scientists and engineers would carry out the work.

Decommissioning, dismantlement, and decontamination could cost as much as \$100 million. While North Korea may be able to provide the labor, specialized equipment, materials, chemicals and the means to transport and dispose of large amounts of construction materials will be expensive. Funding might be provided in the form of salaries for workers through a science and technology center (discussed below), in-kind contributions of heavy machinery and equipment and expertise through IAEA assistance. Construction equipment for the terminated KEDO project, which probably will be left behind in the North, could help dismantle the reactor.

Component: Reprocessing facility / Radio-Chemical laboratory at Yongbyon and wastes

CTR Options: Decontamination and Dismantlement Assistance

Potential project leadership: United States, Russia, Japan, Republic of Korea

North Korea's plutonium reprocessing facility is the second key component of its nuclear weapon program that will have to be dismantled. Pyongyang will probably require outside assistance since it likely lacks the resources or know-how to conduct such an operation. In particular, the radioactive contamination of equipment in the facility and the wastes produced in the course of previous reprocessing campaigns will pose daunting environmental and health safety challenges.

These challenges can be combined since the disposal of the wastes and contaminated nuclear equipment from the facility are likely to require similar treatment. Three participants in the Six Party Talks-- the United States, Russia and Japan--have extensive experience with plutonium reprocessing and could provide training, expertise, material and funding for the elimination of the facility. Moreover, the direct nonproliferation benefits of elimination suggest that the

United States and others may be willing to provide funds more easily than compared to other potential cooperative tasks in North Korea.

Since dismantlement of the reprocessing lab is closely related to the elimination of the 25MWt reactor (both were used to produce whatever weapon-usable plutonium North Korea now possesses), managing them as a joint project may make sense. This task is made simpler by the fact that both facilities are located at the Yongbyon research facility, albeit separated by over 1.5 kilometers. Moreover, much of the same heavy equipment, including cranes, bull dozers, and remote handling equipment could be used to eliminate both facilities. Since this project will be among the most complex challenges facing the members of the Six-Party Talks, planning should begin as soon as appropriate, even before the final terms of an agreement can be worked out.

Waste Considerations

Radioactive waste management and disposal, an important concern for North Korea and other countries, could benefit from the establishment of cooperative projects. Existing wastes from previous nuclear material and reprocessing campaigns as well as those related to the dismantlement of reactors, reprocessing equipment and other facilities will require storage and elimination. Members of the Six-Party talks, particularly its neighbors, will have a considerable incentive to ensure that Pyongyang disposes of these materials safely in the context of full implementation of its nonproliferation obligations. Moreover, waste management and disposal projects could offer an important opportunity for the nuclear scientific and technical community in North Korea to put its skills to a peaceful use that benefits the country. In addition, the creation of a competent waste processing capability in North Korea might open up opportunities for commercial work. Taiwan negotiated with North Korea for the disposal of low-level radioactive waste during the late 1990s but the deal was called off after South Korea and other states objected. If Pyongyang were technically capable of safely processing such materials, it might prove more acceptable under different political circumstances.

Component: Uranium Mining and Processing, Fuel Fabrication

CTR options: Cooperative development/expansion of mining, conversion and elimination of fuel fabrication and uranium processing/conversion

Potential project leadership: United States, Republic of Korea, China

Other possible participants: Japan, Russia, Australia, Canada

North Korea has extensive uranium deposits; older surveys dating back to the 1960s and 1970s suggest it may possess upwards of 4 million tons of ore. Since the potential commercial benefits for Pyongyang are considerable, mining operations for uranium and other co-located minerals for domestic needs and possibly for export are likely to continue, even if other parts of North Korea's

nuclear complex which have used this ore are eliminated. But the continued production and export of uranium ore leaves open the possibility of processing into yellow cake or uranium oxide by other countries, an important step towards producing material for nuclear weapons.

Joint projects could greatly reduce the risks created by uranium mining and conversion. It will be important for North Korea to dismantle or convert its uranium fuel fabrication facility, possibly with labor provided by North Korean engineers and workers and funding by the United States, South Korea and others. Key equipment from the site could be used in other commercial chemical applications following extensive decontamination activities to remove uranium traces from piping and other items. Beyond dismantlement, to further reduce the potential proliferation risk posed by uranium mining and to provide strong incentives for continued compliance with its nuclear obligations, parties to a denuclearization agreement with experience in mining or heavy industries should consider commercial joint ventures with North Korea.³⁴ Such operations might also be conducted with other countries, including established international uranium powerhouses like Canada and Australia, both of whom have diplomatic relations with Pyongyang.

Component: Nuclear scientists and technicians

CTR options: Redirection

Potential project leadership: United States, Republic of Korea, Russia, European Union

Other possible participants: Japan, China

The third major component of North Korea's nuclear complex is its scientific and engineering expertise. Since this community represents a base from which North Korea might seek to either maintain or reconstitute its nuclear infrastructure, a long-lasting solution to the nuclear problem will require the establishment of programs that redirect the capabilities of this group to peaceful pursuits. There are no reliable estimates of exact numbers. There may be up to 10,000 workers involved in every facet of North Korea's nuclear program including reactor design and construction but a much smaller group numbering in the hundreds involved with the weapons component.

The United States, European Union, Japan and others have extensive experience in redirecting former weapon scientists, engineers and technicians in the former Soviet Union. Similar programs have also been started in Libya and Iraq. While these efforts provide valuable experience, the circumstances in North Korea will be markedly different. In the former Soviet Union, redirecting scientists helped address the concern that economic or political factors might lead

³⁴ The potential list of countries is extensive and could include: the ROK, Japan, Russia, China, Canada, the United States, Kazakhstan and Australia.

to a mass exodus overseas to countries or terrorist groups seeking to build weapons of mass destruction. This danger is much less of a concern in a tightly controlled society like North Korea. But there is a potential security benefit in pursuing these programs, namely that unless otherwise engaged, many trained experts might find work in other parts of the North Korean military complex. Moreover, a Pyongyang increasingly focused on developing its civilian economy may welcome programs designed to maximize the benefits provided by a new infusion of highly educated scientists and workers.

Special mention should also be made of South Korea which could potentially play a critical role in this CTR program. Seoul has little experience with redirecting weapons scientists but does have extensive experience in retraining North Korean refugees. And a close cultural affinity as well as common language will prove extremely useful in dealing with the North Koreans. Perhaps just as important, if the nuclear issue is resolved ties between North and South are likely to increase with Seoul providing Pyongyang increasing amounts of assistance to rebuild its economy. In that context, South Korean participation, including private industry involved in this reconstruction process, could be essential in helping to redirect trained North Korean personnel to important sectors. To the extent that overseas companies from Russia, China, Japan, Europe and the United States also participate in this process, they might establish retraining programs as well.

Scientific redirection efforts might focus on four areas.

- First, ensure that nuclear scientists and technicians are engaged in basic research or cooperation in their areas of expertise through internationally-funded projects conducted with foreign experts. The main purpose of this initiative would be to employ North Korean scientists in non-military pursuits while establishing cooperative relationships with the international scientific community.
- Second, personnel might be redirected toward joint commercial projects like the Kaesong Industrial Zone which seek to foster North-South rapprochement. These projects may be able to make good use of educated, well-trained engineers, technicians and workers. In this context, South Korean industry and other private companies may play an important role in helping with the redirection effort.
- Third, former weapons experts could use their skills to assist North Korea's government to deliver basic services to its people. Displaced scientists, engineers, and trained workers have been paid in other countries to provide their expertise to ministries in charge

of housing, education, health, and other important civilian functions. This kind of redirection might not be necessary in a centrally controlled country like North Korea, but providing some support for such efforts would increase the chances that these workers will be reassigned to civilian tasks.

- Finally, experts who were involved in the design, construction and operation of North Korea's nuclear program could help with the dismantlement or conversion of that program's facilities. For example, after the 1994 agreement, the engineer in charge of the Yongbyon reactor was assigned to help run the joint spent fuel canning operation.

Many of the above activities could be run through a Korean International Science and Technology Center in Pyongyang (KISTC). While North Korea may present unique political and cultural challenges that will have to be addressed, similar science centers in other countries such as Russia, Ukraine and Libya have been established to serve as clearinghouses for thousands of projects ranging from basic research to commercial development. In addition, the centers provide a funded process for redirecting former weapons-related experts into civilian activities.

The Pyongyang Science Center, serving a similar function, could be modeled on those centers with the Six Parties, including North Korea (and maybe others like the European Union) forming the executive committee and additional donors the general membership. Countries with a security, economic or political incentive to cooperate with North Korea could be invited to participate in work through the center which could then become a focal point for building normalized relations between Pyongyang, its neighbors in Northeast Asia and the global community. While the initial focus would be on redirection of nuclear personnel, the center could expand to include scientists who have worked on ballistic missiles and CW/BW as agreements are reached to eliminate those weapons.

The establishment of a Pyongyang ISTC should not preclude bilateral programs, particularly between North and South, also aimed at scientific redirection. As has already been mentioned, private industry in the South and elsewhere may also play an important role in redirecting these personnel. Non-governmental scientific organizations can also help in this task. Finally, government technical agencies could start their own exchange programs. For example, the South's Korean Atomic Energy Institute (KAERI) might establish programs similar to training sessions in nuclear safeguards and physical protection of nuclear materials held in 2000 and 2002 that were attended by North Korean specialists. There may also be opportunities for bilateral exchanges related to the production and uses of nuclear isotopes for civilian purposes. But it

will be important for these bilateral exchanges and others to be closely coordinated with members of the Six-Party Talks as well as the Pyongyang ISTC.

Another option, which would have the advantage of enabling scientists-to-scientist contacts to get off the ground before an ISTC could be established, would be to build on existing programs, such as the Department of Energy “Sister Laboratory” Program. First organized in 1980, its purpose is to further American efforts to share peaceful uses of nuclear technology by bringing together experts in the U.S. national laboratories with their counterparts in developing countries. Current projects range from radioisotope production to nuclear waste management to environmental safety and health surveillance. The objective is to build mutual confidence and transparency in a low-key way without major transfers of funds, equipment or materials. The focus is on exchanges between scientists and on developing new areas of science and technology collaboration, including longer-term spin-offs.

Beyond the Six-Party Talks: Ballistic Missiles

Dealing with North Korea’s ballistic missiles is likely to be important diplomatic priority, particularly if the Six-Party Talks succeed. Tokyo is almost certain to push for an end to Pyongyang’s threatening program as part of any diplomatic solution that will allow normalization of bilateral relations to proceed. Washington also has serious concerns about the danger to the United States posed by the continued development of the North’s long-range systems and its exports to potentially unstable regions of the world.

Indeed, it is easy to forget with all the attention paid to the nuclear crisis that Pyongyang and Washington were close to reaching a deal in 2000 that would have, at the very least, ended the North’s longer-ranger missile programs and its exports. Moreover, an agreement would have jump-started threat reduction programs to allow the conversion of missile factories for other purposes, the redirection of scientists to peaceful tasks and the establishment of cooperative space launch programs. Those negotiations, however, ended with the election of the Bush Administration.

Presumably, a new missile agreement would build on the initial success of the Six-Party Talks and would be embedded in an ongoing process of political, security and economic normalization. But it would pose new challenges for negotiators. While missile negotiations were advanced at the end of the Clinton Administration, a significant technical problem yet to be addressed was Pyongyang’s insistence that it be allowed to keep its shorter-range systems. The problem is that facilities used to develop and produce these shorter-range systems might also be used to maintain a secret program for longer-range weapons. Therefore, an agreement might have to incorporate monitoring of these facilities in order for verification to be effective. Such monitoring was part of past U.S.

arms control agreements with the Soviet Union but whether North Korea would accept it remains uncertain.

Washington and Tokyo would seem the logical candidates to lead a missile CTR program although Moscow might also make an important contribution. Aside from their strong interest in resolving this problem, the United States and Japan could contribute different resources, the combination of which would help structure an effective program. Washington has the past practical experience of participating in such programs, the technical resources necessary for this effort and extensive experience in verifying limits on missiles. While Japan has no prior experience in missile CTR programs or in verifying negotiated limits, it has technical resources and, more importantly, might be willing to make a substantial financial contribution. Russia could play an important supporting role by virtue of its past CTR experience and the fact that North Korean missiles are based on older Soviet weapons. Moreover, Russia was the country of choice to launch North Korean satellites if a diplomatic solution to this problem had been reached by the Clinton Administration in 2000.

Component: Missiles and missile fuel

CTR options: International assistance for dismantlement and fuel disposal

Potential project leadership: United States, Russia

Other possible participants: Republic of Korea, China, Japan

Dismantlement of North Korea's longer-range missiles--Taepo-dongs and Rodongs—will be an important priority given the more imminent threat they pose to Japan, American forces in the region and perhaps the United States if left unchecked. In contrast, Seoul has lived with the threat of the North's shorter-range missiles for some time and their elimination would still leave it hostage to North Korean artillery. Moreover, North Korea did not insist on reciprocal limits on medium- and longer-range missile for South Korea but if the United States seeks to eliminate all missiles including shorter-range systems, it may trigger a demand by the North to make the Korean Peninsula a missile-free zone. Finally, because shorter-range missiles are assigned to artillery units of the Korean People's Army, North Korea is likely to defer negotiating their dismantlement to conventional force reduction talks to take place only after political relations on the Korean peninsula are greatly improved. One indication of Kim Jong-il's negotiating priorities is his offer to freeze development and deployment of the longer-range missiles but not others during negotiations with the Clinton Administration.

A cooperative effort to eliminate missiles and launchers could be modeled on programs conducted in the former Soviet states. That American effort began in 1994 and as of 2004, helped destroy over five hundred intercontinental ballistic missiles that had once been deployed in Russia, Ukraine, Belarus, and Kazakhstan, hundreds of hardened silo launchers, 153,000 metric tons of fuel, and

916 rocket engines. Annual funding ran into the tens of millions of dollars. As part of this effort, the United States supplied cranes, earth-movers, cutting and other industrial tools, scrap metal handling equipment, tank cars to transport fuel, and propellant disposal systems that break down fuel into commercial chemicals such as explosives for mining.³⁵

While Pyongyang has its own cranes and other equipment, additional resources could be provided by the United States and perhaps Russia. Scrap metal handling equipment could help reuse metal from missiles. Sales to China could become a source of income for Pyongyang. The North might convert its mobile launchers, which are essentially heavy-duty flatbed trucks, for use as heavy transport in the civilian sector. As for missile fuel, tank cars to transport the fuel might be brought in by rail from South Korea. The fuel could then be shipped back to be broken down into commercial chemicals like explosives for mining that North Korea could export or use at home. Alternatively, Pyongyang may want its own propellant disposal system, perhaps similar to the one the United States provided to Russia, but that may not make sense given its proximity to the South's chemical industry. Finally, some missile bases collocated with military installations and could be put to other military uses would be dismantled. Bases dedicated to missile use might be more suitable sites for conversion for civilian purposes. The overall cost would be a fraction of what the United States spent on former Soviet Union, in part because North Korea's missile program is much smaller.

A cooperative program will present important challenges. Unlike missiles earmarked for elimination in the Soviet Union, North Korea's weapons are not deployed in hardened silos at well-known locations but instead on mobile launchers, only some of which are located at known bases. As a result, North Korean cooperation will be necessary for finding and dismantling all of its mobile missiles and launchers since they are relatively easy to hide, especially in a country known for protecting its military from air attack by tunneling.

That will mean on-site monitoring to secure the missiles in place until dismantlement is negotiated in detail and then implemented. On-site monitoring to verify a ban on production and deployment – what negotiators called "transparency" and "confidence-building measures on missiles" – was discussed with North Korea at the end of the Clinton Administration but Pyongyang refused to make any commitments until the President agreed to visit the North. A precedent for this type of inspection can be found in the Intermediate-Range Nuclear Force Treaty signed by the United States and Soviet Union.

³⁵ Defense Threat Reduction Agency, "Cooperative Threat Reduction Scorecard" [online: web], updated January 23, 2004, URL: <http://www.dtra.mil/toolbox/directorates/ctr/scorecard.cfm>

Component: Missile production facilities

CTR options: Provision of satellite launches, investment and training for conversion and infrastructure improvements

Potential project leadership: United States, Russia, Japan, Republic of Korea

Other possible participants: European Union, China

Dismantling or converting factories that manufacture missiles, components, and fuel can also be handled through threat reduction programs since it will be essential to prevent a secret indigenous or export program. During U.S.-North Korean missile negotiations in the 1990's, Pyongyang hinted at a willingness to shut production facilities if they were either converted or employees were retrained. Conversion, however, may present some difficulties. For example, a plant that produces liquid or solid fuel could easily be used for civilian purposes but conversion back to military uses may also be easy. Indeed, experience in the former Soviet states shows that missile manufacturing plants are not easily retooled for productive civilian use. While some machinery may be reused, it may be more preferable to strip or dismantle the factory and build a new one nearby than to convert a missile production plant as a whole.

Another potential problem will involve verification. North Korea might permit a freeze though not dismantlement of its capacity to produce shorter-range SCUDs. If the North continues to make SCUDs, its fuel and missile component plants would remain in operation and final assembly plants for missiles would need to be subject to continuous on-site monitoring to impede production of prohibited missile types. Arrangements for portal monitoring under the INF Treaty could be a model but those measures were reciprocal. Once again, whether the North would accept this arrangement, even in the context of incentives provided by other countries, remains uncertain.

While North Korea may want to preserve its missile infrastructure for space launches, such a capability would have to be eliminated given the danger it poses for rebuilding a long-range missile force. Rather, any interest the North has in launching satellites would be better satisfied along lines of the U.S. negotiating proposal of October 2000 which offered to have others launch satellites for Pyongyang. Potential partners would include China, Japan and Russia. The first two would come with considerable political baggage. Japan would probably be unwilling to see China hone its missile skills through additional launches of North Korean satellites. Japan might prefer to do so as part of a compensation package once the abduction issue is resolved satisfactorily and Tokyo moves to normalize relations with the North, but it is still hard to imagine North Korean-Japanese relations advancing to the stage of cooperative space launches.

Russia would seem a more acceptable alternative; it would be free of political baggage and has shown some interest in the past in providing a space launch capacity for Pyongyang. Moscow will almost certainly want compensation

but cost could be defrayed by contributions in cash or in kind from the United States, European Union, and perhaps even Israel, all of whom have a stake in eliminating North Korea's missile program or Pyongyang's exports. Another option might be the establishment of a KEDO-like entity, a Northeast Asia Space Agency, to launch satellites on North Korea's behalf. This approach would be particularly interesting if Pyongyang is reluctant to accept the elimination of its longer-range missiles without similar limits on indigenous South Korean development of space launch vehicles. If so, phasing in a Korea-wide agreement may be necessary. But it would still seem to be a distant solution given current political tensions in the region between China, South Korea and Japan.

Component: Missile scientists and technicians

CTR option: Redirection to Peaceful Purposes

Potential project leadership: United States, Russia, European Union

Other possible participants: Republic of Korea, Japan, Ukraine

Redirecting scientists and technicians to nonmilitary work could have benefits, albeit maybe more limited than for other WMD scientists, for Pyongyang's efforts to develop its civilian economy. Through the work of the International Science and Technology Centers, the United States and other countries already have experience establishing such programs, particularly in Kiev since Ukraine had been home to part of the former Soviet Union's missile manufacturing complex. From 1994 to 2002 the International Science and Technology Center, backed by a multi-national consortium, funded 75 projects in aeronautics and space at a cost of \$20.4 million, about 4 percent of its total.³⁶ Many of these projects involved continued research.

While few efforts have proven commercially viable, some exceptions are adapting hemispherical resonator gyroscopes in ballistic missile navigation for use in drilling oil and gas wells, a more environmentally-sustainable combustion chamber for turbojets, erosion-resistant coatings for gas turbine engine blades, industrial grinding and separation systems for biomass waste, and small-scale windmills. Establishing programs for North Korean missile scientists and technicians under the Korean ISTC would cost less than in Ukraine although finding commercially viable projects will be at least as difficult.

³⁶ International Science and Technology Center, *Annual Report*, 2002, p. 32.

Chemical and Biological Weapons

Most experts believe North Korea's CW and BW programs would be the last priority for elimination. Also, unlike nuclear weapons and ballistic missiles, there have been no detailed discussions of elimination with Pyongyang. But the existing international framework banning these weapons--the Chemical Weapons Convention (CWC) and Biological Weapons Convention (BWC)--provides North Korea with an ever-present opportunity to quickly jump-start this process simply by declaring its intention to meet its obligations under the BWC and to join the CWC. Moreover, the Organization for the Prohibition of Chemical Weapons (OPCW), charged with overseeing implementation of the global CWC, is empowered to provide technical advice on and to monitor the elimination of chemical weapons as well as the conversion of former weapon production facilities to legitimate commercial activities. The elimination of CW/BW programs could prove challenging since the facilities where weapons are developed and produced generally have no unique signatures. Most of the equipment and materials are dual-use and thus can have both military and non-military applications. Cooperative threat reduction will therefore be essential to help build confidence in elimination, to assist in the dismantlement process, and to redirect resources into the civilian sector.

Over the past decade, the international community has gained important experience conducting CTR efforts to reduce the CW/BW threat. The most extensive effort has been conducted in Russia and the former states of the Soviet Union, largely by the United States, but with the participation of others such as the European Union and individual member states. The purpose of this program has been to help Russia meet its obligations under the Chemical Weapons Convention and to build confidence that it was living up to commitments under the Biological Weapons Convention. More recently, the United States and the United Kingdom have conducted such programs in Libya, albeit on a much smaller scale given its much smaller military programs. All of these experiences will be directly relevant to North Korea.

Components: Physical protection for CW and BW agents and munitions

CTR Options: Cooperative security upgrades

Potential project leadership: United States, Russia, OPCW?

Assistance might be considered to ensure the security of stocks until a destruction plan can be designed and implemented. Such cooperation, which has been undertaken in the former Soviet Republics including Russia and Uzbekistan, has helped expand confidence among partners in preparation for the more complex task of elimination. Improving security for CW agents and weapons would involve basic assistance such as the provision of computers and bar code tracking equipment for inventory control as well as kits for security upgrades including fencing and access controls.

Assuming North Korea had joined the CWC, the OPCW would help verify Pyongyang's stockpile pending its elimination. Similar assistance and specialized equipment could also be provided for BW stocks to secure smaller libraries of pathogenic materials. The cost would be moderate, perhaps tens of thousands of dollars, and would be well within the capabilities of members of the Six-Party Talks. Cooperation with Russia, which has received assistance from the United States and others, might also prove attractive as a way for Moscow to meet its G-8 Global Partnership commitments and to play a leading role in WMD elimination efforts in North Korea.

Component: Chemical Weapon Elimination

CTR option: Technical and financial support for destruction of CW

Potential project leadership: US, Russia, China, Japan

Other possible participants: UK, Republic of Korea

Cooperative threat reduction programs have helped with the elimination of chemical weapons in countries such as Russia and Libya. Washington has extensive experience, particularly in the construction and operation of CW elimination facilities at home and abroad. The United Kingdom and Germany have a great deal of experience as well. Japan is working with China on the destruction of chemical weapons it left behind during World War II. Efforts might be conducted through either bilateral channels or possibly through the OPCW if North Korea is a party to the CWC. Pyongyang may prefer the former approach as it might allow closer engagement with the United States, Russia and others. Alternatively, using the OPCW would have the advantage of helping to integrate North Korea into the international community. Whatever the circumstances, North Korea will require other states to help fund the construction of its chemical weapons destruction facilities.

The elimination of North Korea's CW stockpile could require the construction of two dedicated destruction facilities if estimates of its size--2,500-5,000 agent tons--prove accurate. Depending on how and where North Korean chemical weapons are stored, one destruction facility could be built at or near a main storage facility with a second located at a production site that has been converted temporarily for destruction purposes. Such sites need not be state of the art but will probably require foreign assistance. There are several technologies that can be used, depending on the materials to be destroyed, including incineration and systems to neutralize active chemical agents.

Some approaches would even produce chemicals that can be used in peaceful commercial applications including for industrial or agricultural purposes. In addition to outside assistance, equipment from the North Korean CW production program might be used in the destruction effort including for

environmental monitoring and other activities that support destruction operations.³⁷

A side benefit could be reusing scrap metal recovered from the destruction of filled munitions (artillery shells, mortars, rockets and missile warheads) for civilian or commercial applications. If a large portion of North Korea's chemical agents have been filled into weapons, many tons of scrap might be available for the production of items for sale in South Korea and elsewhere. The "cultural" value of consumer products (pots, pans, ashtrays, lighters, etc) made from former North Korean chemical weapons could be significant in certain markets, as seen by the high demand for North Korean-produced pots and pans in South Korea.

Component: Biological Weapon Elimination

CTR option: Destruction of BW agents

Potential project leadership: US, Russia, UK, others

BW agents could be destroyed by use of steam autoclaves, a proven technology that should be available at any BW-related facility. But many other countries, including those with experience in elimination or with active biodefense programs, could provide Pyongyang with the technology or equipment needed to carry agent destruction. In addition, destruction would require an environmental sampling capability to ensure no live agent remained at the end of the destruction process, a capability that might be applicable to broader environmental work once elimination had been completed.

Dangerous pathogens used in the North's BW program or that might be available in culture collections, disease tracking stations or diagnostic laboratories might be used in a cooperative effort to establish a legitimate reference library with modern research and communications capabilities to help bolster its public health system. It would, however, be among the more complex and sensitive CTR programs since the agents could still be used to develop biological weapons, a risk that might not be justified in the short-term but might be acceptable in the long-run depending on the state of North Korean relations with the United States and its neighbors. Such an effort would need to be accompanied by a robust bio-safety and security program involving everything from training in the safe handling of pathogens to physical security upgrades.

Component: CW and CW precursor production site elimination

CTR options: Joint elimination or conversion of facilities

Potential project leadership: U.S., Russia, China

Other possible participants: Republic of Korea

³⁷ The CWC has strict rules concerning the types of equipment that can be retained. These may apply if North Korea's elimination is carried out in conformity with the CWC.

Redirection of North Korean CW production facilities for the production of civilian chemicals is possible provided there are sufficient assurances that the plants are not being used for military purposes. Indeed, as of 2005 the OPCW certified 14 former chemical weapons production facilities located in member states as “converted.”³⁸ Domestic demand for certain chemicals for a variety of applications in North Korea could be high although the exact details of what chemicals might be produced depends on the type of facility and its design parameters. In addition, while products are unlikely to meet international standards, upgrades or assistance to North Korea might enable certain sites to begin production of commercial chemicals for export. China, South Korea, or developing countries in Asia could provide a market for such products. Assistance from other countries, the World Bank or international financial institutions might be possible.

In the event that sites are considered too dangerous or unsuitable for conversion to civil applications, shutting down, dismantling and decontaminating the facilities could provide an attractive area for cooperation. . . Decontaminated equipment, including pumps, piping and holding tanks might be able to be used in other civilian applications in North Korea or sold for scrap metal. Environmental remediation is also likely to be required at former weapons-related sites. The United States and other countries have experience in these areas which could be shared with North Korea. The OPCW could also provide technical advice and ensure that North Korea’s conversion activities are consistent with the CWC. Such offers of assistance might prove to be an important quid pro quo for Pyongyang to cooperate in CW destruction activities and a form of reassurance to donor countries.

Component: BW research, storage and production facilities

CTR options: Joint elimination, conversion activities

Potential project leadership: U.S., Russia

Other possible participants: World Health Organization

While the technical level of North Korea’s BW program remains unknown, BW related facilities are typically dual use and could be used for both offensive and defensive military purposes as well as for civilian health and scientific applications. Assuming North Korea is interested in pursuing cooperation with others, some or all of its BW related facilities could be converted to support a number of civilian uses. At a minimum, they could be used to monitor outbreaks of diseases within North Korea and form part of a broader disease tracking system in Northeast Asia. Second, although few other countries are likely to be interested in importing North Korea medicines and vaccines,

³⁸ Organisation for the Prohibition of Chemical Weapons, “Results” [online: web], updated September 21, 2005, URL: <http://www.opcw.org/ib/html/results.html>

domestic uses may be possible. Converting dual-use BW facilities to such applications should be considered although in some former Soviet states, the poor state of facilities has often precluded their use for this purpose. Alternatively, other countries might consider providing assistance for North Korea to build more modern facilities with safeguards in exchange for the complete elimination of others previously dedicated to weapons work. Assistance from the World Health Organization, including funding and training in best practices, could be an important step to broader international cooperation. Also, commercial partnerships might be possible with South Korean companies, partnerships that would also provide added assurance that facilities were being used for peaceful purposes.

Component: CW/BW experts

CTR options: Scientific engagement and redirection

Potential CTR partners: United States, Russia, South Korea, China, Japan, European Union

If North Korea agrees to eliminate its CBW stocks and capabilities, displaced chemical and biological weapon experts will have to be redirected towards work on civilian projects. Some experts might find useful roles in the CBW elimination process ranging from helping to build infrastructure needed for destruction facilities to environmental monitoring necessary for the safe conduct of these activities. In the near-term, assuming a CBW elimination program is further in the future, their skills might be useful in decontaminating nuclear facilities. That might, in turn, open the door to gradual contacts with this segment of North Korea's scientific community.

But the bulk of CBW personnel should be redirected to peaceful activities through cooperative programs to address some of the country's most urgent industrial, agricultural, research, medical and pharmaceutical needs. CW experts could play an important role in helping reverse more than a decade of famine conditions by developing and producing fertilizers to enhance crop yield and micro-organisms for pest control. This would require both outside financing and technical assistance from individual countries, the United Nations and other international organizations. BW scientists could help develop single-cell proteins and drugs for healthier livestock as well as bolster public health by producing chemicals to sanitize water supplies and drugs to treat waterborne diseases like cholera and infectious diseases like Tuberculosis and Hepatitis-C. They might also be used to develop disease surveillance programs (possibly as part of a regional effort) and to work in diagnostic laboratories and hospitals. Finally CW and BW experts could contribute to institution building by serving as technical consultants to civilian ministries in North Korea responsible for agriculture, science, health, the environment and utilities.

Most, if not all, of these cooperative programs could be organized under the leadership of the Korean International Science and Technology Center. In that context, the United States, along with other participants in the centers in Russia and elsewhere, have extensive experience in redirecting former CW and BW experts to peaceful activities. Washington has sponsored a wide range of collaborative government programs as well as partnerships with private industry to engage former BW personnel in activities such as the development of vaccines and drugs. As part of these programs, the United States has also provided training in developing business plans, conducting marketing research, identifying commercial partners and other activities. This effort might serve as a model for South Korean drug and bio-technology companies who might be most interested in tapping the North's scientific expertise in this area

IV. Getting off on the Right Foot

Negotiating and implementing a mutually acceptable solution to the problems presented by North Korea's weapons of mass destruction and ballistic missile programs may take years and cost hundreds of millions of dollars. It will involve a process of normalizing political, security and economic relations with Pyongyang in return for verifiable elimination of its weapons. Multilateral CTR programs that serve the interests of all countries involved, including North Korea, should be an important part of that solution. This report has outlined the reasons why multilateral CTR should play an important role, why it is possible to work cooperatively with the North Koreans under the right circumstances and a series of possible threat reduction programs covering nuclear, missile and chemical/biological weapons. These programs, if adopted, would serve the United States and North Korea well over the next decade. But outlining this vision of the future also makes crystal clear that steps need to be taken beforehand to allow all countries to use this important diplomatic tool properly, starting with the Beijing Six-Party Talks. The following is a series of recommendations designed to achieve this objective.

Exercise American Leadership

The United States, by virtue of its regional and international security interests, technical expertise, and historical experience, should play the leading role in making sure cooperative threat reduction programs are an important part of diplomatic efforts that deal with North Korea. First, that means injecting CTR proposals into negotiations designed to end the threat presented by North Korean programs and making sure they are part of any final agreements. Doing so can also help educate other countries by stimulating discussion and debate on issues with which they have little experience. Outside the negotiating room, Washington should take every opportunity to foster understanding of and support for CTR initiatives on the Korean peninsula.

As of the writing of this report, Washington is already considering what programs to propose at the Six Party-Talks in Beijing. Given the political constraints on bureaucrats, American proposals may prove to be limited, for example, focusing on the retraining of small numbers of North Korean nuclear scientists and technicians. While such programs will be worthwhile, Washington should seriously consider the more far-reaching proposals made in this report which, while perhaps presenting greater challenges, may also have commensurate benefits that serve both American and North Korean interests. They would serve to demonstrate to North Korea a long-term commitment on the part of the United States not only to implementation of any Beijing agreement but also to helping Pyongyang redirect important resources that may bolster its economic development. And more far-reaching proposals would give the United States and

others a greater chance of increasing transparency as well as of increasing the chances that a diplomatic solution will be long-lasting and irreversible

A critical component of Washington's leadership will be to ensure that intelligence estimates effectively support the structuring of CTR programs. In general, for such programs to have the greatest possible impact, efforts need to be made from the beginning to make sure they provide a positive benefit to Pyongyang and, therefore, strong incentives for North Korea officials. Planning is all the more complex because of the scarcity of reliable information about the North's economic conditions. Nonetheless, efforts should be made early on to match possible CTR programs, such as joint ventures and scientific redirection, to North Korea's pressing needs and to programs that will further its economic integration with neighbors. The development of "positive in-country profiles" should be prepared in advance to identify measures that will have a positive impact on the modernization of North Korea's economy and the delivery of basic services to its people.

One specific recommendation would be for the U.S. intelligence community to prepare an assessment of North Korea's nuclear workforce, its scientists, technicians and others. While information may prove limited, such an assessment could attempt to cover its composition and skills, potential obstacles to redirection (bureaucratic and others) and suggestions for how the nuclear workforce might be redirected to serve North Korean civilian needs and to help modernize its economy.

Build Multilateral-Capacity

The United States, perhaps supported by others, should launch an initiative to build support in countries likely to be key players in a multilateral CTR program, particularly China and South Korea. An important part of this study has been to engage governments and non-governmental organizations in East Asia and Europe to determine the level of interest, expertise and understanding for the role CTR might play in eliminating North Korea's WMD. The results were mixed. Russia clearly understands the benefits and challenges by virtue of over a decade of experience with threat reduction. Europe also has extensive experience but limited interests in Korea. Japan has some experience but is constrained by poor relations with the North. China and South Korea have virtually no understanding of threat reduction although both would clearly be called upon to play important roles in any effort. And until recently, all potential participants including the United States gave little or no consideration as to how these programs might serve their interests. This also has been certainly as been true in Pyongyang.

In view of this situation, the United States should take immediate steps to increase the capacity of potential partner countries to understand, plan and implement CTR programs as part of any solution reached in the Six-Party Talks. While Washington should play a leading role, perhaps supported by American non-governmental groups who have a wealth of experience in analyzing and promoting cooperative threat reduction, the United States should seek to enlist others in this effort. Moscow is a prime candidate given its wealth of CTR experience. Indeed, capitalizing on this experience in order to play a key role in capacity-building could help offset other limitations—for example financial—that may seriously hamper Moscow's help in implementation of an agreement at the Six-Party Talks.

As mentioned above, capacity building should place special emphasis on China and South Korea. Beijing's support remains central to reaching an agreement at the Six-Party Talks. Its support will be critical in building CTR into such an arrangement and in helping to convince North Korea that these programs are in its self-interest. Seoul's support will also be important in crafting agreements but particularly in implementing them given its strategic interest in rapprochement with Pyongyang and potentially significant financial contribution. Capacity-building efforts also should fan out to Tokyo, Brussels and Moscow if it needs convincing.

Three diplomatic steps will be crucial. First, briefings on CTR should be provided to senior officials in key capitols outlining the need for such programs in reaching a diplomatic solution with North Korea. This might be followed by working-level exchanges to further explain these programs. Second, a parallel effort should begin in the Six-Party Talks with Washington jump-starting the discussion--and an educational process--among the participants by putting CTR proposals on the negotiating table as an integral component of implementing the September Joint Statement. Emphasis should be placed on the concrete benefits of these proposals for North Korea as part of the dismantlement process. Third, states and actors beyond the Six-Party framework, particularly the G-8 Global Partnership and international organizations who may play a key role in eliminating North Korea's WMD programs, should be engaged. The G-8 Global partnership and its members may provide additional resources but their political support will also be important. As was mentioned above, the IAEA and OPCW could play important roles in helping to implement future CTR arrangements.

Capacity building will not only involve diplomatic efforts but also practical ones. One such measure would be for the United States to develop a basic module for training all officials, experts and workers who will be work in North Korea. As discussed above, there will be new challenges posed by working with Pyongyang. In many cases, culture clashes can be severe, the work environment oppressive and the isolation numbing.

These problems and others resulted in significant delays in the implementation of past projects (e.g. spent fuel canning). Fortunately, there is a large and growing base of personnel who have worked in North Korea and their expertise should be tapped for any future programs to be carried out in country. Conducting interviews and drawing lessons from these people could then prove a useful resource and avoid some (but not all) potential clashes if and when CTR work begins.

Finally, since cooperation will require North Korea to develop a basic level of understanding and comfort with CTR programs, the United States should engage in its own efforts and encourage those by non-governmental organizations to help achieve this objective. Contacts with the North should seek to explain the CTR experience of the past decade and the positive benefits—political, security, technical and financial-- that host countries have received as a result of these programs. Capacity-building in Pyongyang (as well as in other potential participants) might also include visits to Russian and other facilities that have benefited from cooperative threat reduction programs. These visits would have to be carefully planned to demonstrate that cooperation is possible and so that the sites are relevant to future agreements with North Korea. Examples might include facilities that have received materials production, accounting and control upgrades, research reactor conversion efforts, visits to International Science and Technology Centers, plutonium storage projects and waste disposal efforts.

Enlist Non-Governmental Organizations (NGO)

While governments will be central to promoting CTR, non-governmental organizations—academic institutions, national academies, public interest and humanitarian groups, foundations and research organizations—have expertise that could also help promote unofficial discussions on cooperative threat reduction. The academic and non-governmental communities have a long history of establishing channels of communication between hostile nations, particularly between scientists, that dates back to the Cold War. In Russia during the initial years of cooperative threat reduction, non-governmental organizations played an important role in reaching out to key political and technical elites, helping to build consensus and constituencies for threat reduction, in part through sponsoring small cooperative projects.

More likely in the case of North Korea is that scientific and academic institutions as well as non-governmental organizations might seek to engage key elites in discussions of the substance of cooperative threat reduction and the redirection of resources to help develop the civilian economy. Indeed, Pyongyang has had extensive contacts with non-governmental organizations and, in the right circumstances, has used those sessions to hold wide-ranging talks that can go beyond the substance of official meetings. For example, building on the Russia experience, it may be possible to draw North Korean scientists and technical

bureaucracies into unofficial dialogues with outside organizations. Indeed, such contacts might be multilateral, involving organizations from more than one country participating in the Korean threat reduction program. Organizations such as the Russian Academy of Sciences might play an important role given the history of technical ties between Moscow and Pyongyang.

These dialogues should initially focus on developing the environment in which threat reduction could succeed. For that reason, scientist-to-scientist engagement should begin as early as possible before the actual projects commence. Engagement might start with non-controversial topics such as:

- 1) integrated safety management, radiation protection and health physics; and,
- 2) environmental evaluation and surveillance. They might involve a series of small experts meetings, workshops and more extensive consultation and training on these topics including visits to relevant scientific facilities in other countries.

Ensure Domestic Political Support

Capacity building will only be the first step towards building political support for cooperative threat reduction in North Korea. This will be particularly important in South Korea since Seoul should play a major political, technical and financial role in such programs. But as was mentioned earlier, key elites in South Korea—the government, legislature, media and think-tank experts--have no direct experience with cooperative threat reduction and little knowledge of what it is. Therefore, additional measures that use capacity building as a foundation will be needed if the South is to play a significant role.

One recommendation is that South Korea legislate an “Inter-Korean Threat Reduction Act” to form the political basis for its participation in CTR programs initiated through diplomatic agreements, beginning with the Six-Party Talks. This act could be modeled after the American “Soviet Threat Reduction Act of 1991,” sponsored by Senators Sam Nunn (D-Ga) and Richard Lugar (R-Ind) that led to cooperative programs in Russia and the other former Soviet states. The new South Korean legislation would; 1) identify potential CTR programs that are of most interest to Seoul, such as redirecting North Korean scientists and technicians to play a role in the civilian sector; 2) provide funding for projects that entail the significant involvement of South Korean technology or technicians; 3) direct the government to set up an appropriate inter-ministerial organization to coordinate Seoul’s role; and, 4) form the basis for future participation in threat reduction programs, for example covering chemical and biological weapons programs.

While the Nunn-Lugar Act was initiated by two senators, it seems unlikely that any National Assembly members would take a similar step since few understand or support CTR programs. A more likely alternative would be for the Korean government to start the ball rolling through the Ministry of Unification, which manages all policies towards North Korea, and controls inter-Korean cooperation funds that might be used for CTR programs. The Ministry has already requested an increase in next year's allotment from \$650 million to \$1 billion. Funding for Korean CTR programs would probably require a further increase, particularly if Seoul has to follow through on its proposal to provide the North with 2 million kilowatts per year of electricity, or the establishment of a separate fund specifically earmarked for threat reduction. A reasonable amount might range up to \$320 million per year (or 2% of the South's total defense budget) depending on the total cost of a CTR program. Significant funding provided by other countries, hopefully matching, would help secure political support for Seoul's contribution.

Organize for Success

One of the lessons of the 1994 Agreed Framework is the need to provide organizational support for agreements in North Korea. That means governments must invest the political and financial resources needed to establish strong institutional commitments between and within member countries. Avoiding ad hoc efforts for matters such as funding is a key objective. This may require adoption of resolutions of support in international organizations, such as the IAEA, as well as domestic legislation and regulatory action in multiple countries. Complicating matters further, for all of the success CTR programs in the former Soviet Union the chaotic nature of the first efforts, for example bureaucratic and legal struggles over programs, made implementation difficult. In the case of North Korea there are two factors that give CTR programs a good chance of avoiding these problems: the time to plan and recognizing the lessons of the past. In short, there will be a strong need for high level coordination among the six parties and others to ensure that the implications, timing and consequences of programs are fully understood as well as to make the domestic arrangements to support that effort.

Implementation of any Six-Party agreement will require the successful completion of discreet tasks. The first will be the timely provision of political, security and economic incentives to North Korea. Another will be the timely implementation of verification measures designed to ensure that Pyongyang is living up to its end of the bargain. A third might be ensuring the effective implementation of CTR projects. All of this suggests an organizational structure headed by a high-level committee that would consist of senior political representatives whose job it would be to monitor all aspects of implementation and to ensure that it moves forward smoothly and effectively. Lower-level technical bodies (working groups or new multilateral organizations) would be

charged with implementing the discreet parts of an agreement. But their work would be, once again, monitored and directed by the high-level committee.

As part of this new structure, a permanent CTR coordinating group should be established. The new group, essentially a planning board for CTR projects composed of national representatives, would have the ability to designate project leaders and participants as well as to determine blueprints for individual efforts based on the recommendations of member states. It would be required to provide strong management and oversight given the potential for overlapping work, for North Korea to play one party off against the other, for mismanagement and for resources to be diverted to unapproved uses. Each country can organize as it sees fit but the process should be flexible enough that issues brought before the CTR committee can be resolved and new requirements passed down and implemented by the lead countries.

Organizing for success may also require the establishment of new national organizations. To a large degree, that will depend on the level of involvement of individual countries. It may make sense for states that make a significant financial and technical commitment. If South Korea makes such a commitment, it should establish an Office of Cooperative Threat Reduction under the Ministry of Unification patterned after a similar large-scale operation created to support Seoul's significant role in the KEDO reactor project. The new office would include a range of specialists from the Ministries of Foreign Affairs and Trade, Industry and Resources, Science and Technology and Defense. In addition, scientists and engineers might participate from research institutes such as the Korean Atomic Energy Research Institute (KAERI), the Korean Institute of Nuclear Safety (KINS) and companies such as the Korea Electric Power Company.

Lastly, some of the main challenges to the smooth implementation of CTR projects by the United States in Russia have been legal. The need for sponsor countries to organize themselves internally for CTR projects, including preparing domestic legislation to cover how money might be transferred, and issues related to liability or workers, intellectual property rights, visas, access etc need to be pursued in advance of any implementation in North Korea. Just as the United States has sponsored the development of export control by preparing model legislation and working legal issues with partner states, Washington should work with South Korea, Japan, China and Russia and others to develop model CTR implementation legislation that can anticipate problems and lay out a sound legal structure in all participants for such work.

Conclusion

This report has outlined the reasons why multilateral CTR should play an important role in future efforts to eliminate the threat posed by North Korean weapons programs, why it is possible to work cooperatively with Pyongyang under the right circumstances, the potential contributions of key countries to this effort and a series of possible threat reduction projects covering nuclear, missile and chemical/biological weapons. Elimination of these threats will require a series of diplomatic agreements, perhaps stretching out over the next decade at a cost of hundreds of millions of dollars. It will be a difficult process that will require using all means to secure North Korean agreement and to provide reasonable assurance that Pyongyang is living up to its commitments. The Beijing Six-Party Talks represents the beginning of that effort, dealing with the immediate threat posed by Pyongyang's nuclear weapons program. Integrating cooperative threat reduction programs into those talks and any subsequent agreements would serve the interests of the United States and other participants in those negotiations as well as those of North Korea.