Ensuring Nuclear Transparency on the Korean Peninsula: What is an Adequate Approach?

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The imperative is to create a Korean peninsula free of nuclear weapons. But how do you create a step-by-step process that can reach this goal and ensure transparency? What can be done to increase the probability of succeeding?

The time-bound process outlined by the 1994 Agreed Framework between the United States and North Korea is the current approach to achieving these goals. This approach has been successful. It has seriously constrained the proliferation threat posed by North Korea. It has also served as a tool to engage North Korea constructively, when few other channels were available. By successfully freezing North Korea's nuclear capability, the Agreed Framework has earned time that can be used to resolve a whole host of contentious issues.

The issue that poses the largest proliferation risk remains North Korea's lack of compliance with its safeguards agreement and the Nuclear Non-Proliferation Treaty (NPT). Given the delays in implementing the Agreed Framework, this issue may not be resolved for a considerable time.

As a result, I would like to add my voice to those who say that a complementary, step-by-step approach based on North-South nuclear projects and inspections should be considered. Such an approach could be a catalyst to speed up the verification process undertaken by the IAEA under the Agreed Framework. Under certain conditions, this approach could provide an independent determination that North Korea is free of nuclear weapons.

Current Status

South Korea is already free of nuclear weapons, and is regularly inspected by the International Atomic Energy Agency (IAEA). South Korea has signed the advanced safeguards Model Protocol, and is expected to soon ratify it. Once implemented, the Protocol would provide additional confidence that South Korea is free of undeclared nuclear activities.

North Korea says it is also free of nuclear weapons, but the IAEA has raised credible evidence that this statement is not true. U.S. intelligence agencies go further, assessing that North Korea has enough unsafeguarded separated plutonium for one or two nuclear weapons.

Under the 1994 Agreed Framework between the United States and North Korea, North Korea must come into compliance with its safeguards agreement before delivery of key nuclear components to the light water reactor (LWR) project. The Agreed Framework makes the IAEA the final arbiter of whether North Korea is free of nuclear weapons or other nuclear activities contrary to its international obligations.

One has to expect that North Korea will comply with its safeguards agreement, but no one knows for sure that it will do so. North Korea's longstanding uncooperative relationship with the

IAEA on a range of issues raises concern that North Korea will not cooperate adequately with the IAEA once the inspection process resumes.

Under the current schedule, we may not know for years whether the IAEA will receive sufficient North Korean cooperation to conclude that North Korea is in compliance with its safeguards agreement. Under the current construction schedule of the first LWR, the IAEA is not expected to start its verification process until about 2004 or 2005. For about the last year, the IAEA's Director General and senior staff have estimated that the IAEA may need three to four years to do its inspections. Thus, the IAEA inspection process may not be finished until 2007 – 2009.

Such a long time horizon on such a critical issue creates opportunities which could disrupt the delicate balance incorporated in the Agreed Framework and seriously impair the inter-Korean peace process. Mistrust of North Korea remains high, and periodically, North Korea is accused of having undeclared nuclear weapons facilities. In addition, what if the IAEA fails? The IAEA can determine whether North Korea is in compliance with its safeguards agreement, if North Korea provides adequate cooperation. But events could conspire to make the process flounder. North Korea remains deeply suspicious of the IAEA, an attitude which could spark destructive misunderstandings.

Prudence alone recommends not relying solely on the IAEA approach in determining whether the Korean peninsula is free of nuclear weapons. A complementary approach, based on a step-by-step process of creating mutual nuclear projects and North-South nuclear inspections, could provide valuable insurance.

The 1991 Joint Declaration on the Denuclearization of the Korean Peninsula calls for the establishment of a joint inspection agency-the Joint Nuclear Control Commission (JNCC). However, the JNCC has not met since 1993. With an improved political and economic climate, North and South Korea have an opportunity to reconsider mutual inspections, either formally through the JNCC or informally through political and scientific channels.

Given the difficulty in implementing the 1991 Joint Declaration, a bilateral system may be best approached in an incremental way. Under this approach, a series of confidence building measures (CBMs) could lead to a comprehensive bilateral inspection regime. Even if such a bilateral regime is not realized, these steps could make significant contributions to achieving transparency and cooperation on the Korean peninsula.

A bilateral approach is not easy to accomplish. It risks duplication and competition with the IAEA regime. If not managed effectively, it could possibly provide a pretext to North Korea for delaying its fulfillment of its obligations under the Agreed Framework. It should be emphasized that a bilateral approach is a complementary method and not a substitute for the IAEA.

But such an approach would have several advantages.[1] It could increase the chance of the IAEA achieving its inspection goals and provide an independent check on those results. Bilateral inspections could start sooner and accomplish many of the same tasks required by the IAEA, but long before the IAEA could do so under the Agreed Framework. In this way, the time needed for the IAEA to verify North Korean compliance with its safeguards agreement could be drastically shortened. North and South Korea may be able to resolve the outstanding nuclear issues more quickly

and confidently than the IAEA and North Korea could. A bilateral approach may also provide earlier warning that North Korea does not intend to comply with its obligations under the Agreed Framework.

Under this approach, South Korea may be better able to provide North Korea with economic and political incentives for progress on verification issues. Although incentives need to be evaluated carefully, they may be justified when new initiatives are undertaken.

A bilateral approach could create its own verification vocabulary. Terms such as "special inspections" or "new declaration" could be avoided. North Korea could be spared public embarrassment or loss of face for lying, especially important for the North Korean political leadership.

However, a bilateral approach cannot work in isolation. In addition to the requirement in the Agreed Framework that the IAEA certify North Korea's compliance with its safeguards agreement, the IAEA may also have to ensure that the bilateral process is adequate under international standards. If the Agreed Framework stalls or fails, however, a bilateral approach may provide the only method to achieve a Korean peninsula free of nuclear weapons.

Transparency Measures

Any inspection strategy must address two different types of transparency measures. The first measure is that North Korea's explanation of its past, current, and future nuclear activities is consistent and complete. Under the Agreed Framework, North Korea will have to allow the IAEA to visit several undeclared sites, and it will have to resolve inconsistencies in its initial declaration. (The Appendix has a list of inconsistencies the IAEA identified in 1993 in North Korea's initial declaration that it submitted under its safeguards agreement.)

A bilateral inspection agency would need to go through a similar process of declarations and verification of their correctness and completeness. In this effort, however, it could rely on the IAEA's results.

The second type of transparency measure focuses on whether North Korea has undeclared nuclear activities that have continued despite the Agreed Framework or have developed since 1994. The media has reported that Pakistan may be helping North Korea develop gas centrifuges to enrich uranium, although recent media reports have tended to discount this assistance. The media has also reported that North Korea continues high-explosive work, apparently for the development of nuclear weapons. However, this information is difficult to substantiate or disprove in the absence of inspections.

Suspicions of undeclared reactor or reprocessing activities led the United States to ask North Korea to visit Kumchang-ni in 1999. Nothing nuclear-related, however, was found at this site during visits in 1999 and 2000. Nonetheless, such visits are useful and can provide additional transparency. They can also serve as a useful precedent for North-South inspections.

Despite visits to Kumchang-ni, uncertainties are bound to increase over time about whether or not North Korea has undeclared activities. Any inspection system will be expected to determine the absence of undeclared nuclear activities in North Korea—a standard increasingly applied world-

wide. Although it is impossible to prove a negative, the IAEA, ABACC, the IAEA Action Team, and others have developed verification procedures and strategies that can allow a determination, with adequate confidence, that undeclared nuclear activities do not exist in a country.

Achieving adequate transparency has been complicated because several years have passed since the IAEA was working in North Korea to verify the accuracy and completeness of North Korea's initial declaration. Reestablishing an inspection effort will be difficult regardless of who does the inspections. Nonetheless, establishing adequate verification is possible if North Korea cooperates.

Interim Steps to Bolster Transparency

There are many steps that can be taken under a bilateral approach to increase the probability of achieving adequate transparency on the Korean peninsula. Other speakers have or will identify many of them. These steps could speed up the IAEA verification process, or be important components in a comprehensive bilateral inspection system.

Joint Seminars

North and South Korea could conduct a wide range of bilateral or multilateral seminars. Initial ones could be general in nature; later ones could be held at each other´s respective nuclear sites.

Both sides need to learn and discuss what constitutes modern inspections. One lesson of the early 1990s is that North Korea did not fully understand how IAEA safeguards had evolved in the wake of the Persian Gulf War and the revelation of a massive, secret Iraqi nuclear weapons program. With all the changes in safeguards in the 1990s, all participants must be fully apprised of what modern safeguards require in terms of broader access and more detailed declarations of nuclear and nuclear-related activities in a country. In particular, North Korea needs to acknowledge that it understands what will be required of it under these new inspections.

The IAEA's experience in South Africa may be particularly revealing and beneficial. It could shed light on the steps necessary to verify the completeness and accuracy of an initial declaration.

Participants need to learn about and appreciate the uncertainties that are inevitable in any inspection process. No matter how thorough or successful the inspection process, some uncertainty will remain.

Joint workshops or assessments of the Latin American experience could lead to a deeper understanding of bilateral inspections and possibly additional initiatives. North Korea could be invited to send officials to ABACC to learn more about bilateral inspections.

Encourage North Korean Initiatives

South Korea could encourage, and perhaps provide incentives for, North Korea to take several steps to increase its transparency or, at least, indicate its willingness to do so. One of the most urgent tasks is that North Korea cooperate more on the preservation of historical information. This has been a recurring problem between the IAEA and North Korea since 1994. The reconstruction or verification of past activities requires access to documents that can confirm what happened.

Original documents are important; in South Africa, the IAEA was able to actually date the documents and gain additional confidence through that procedure. Also, part of preservation is making sure the inspectors will have access to people who were involved in the program. That was another step that was taken in South Africa. The inspectors were able to interview people and gain deeper insight into what happened and ultimately gain greater confidence in the correctness and completeness of South Africa´s declaration.

North Korea could provide South Korea with written assurances of its intention to be transparent with the IAEA and a bilateral inspection agency, including pledges to allow inspectors to go anywhere at any time. North Korea gave this pledge to the IAEA in 1992, but it withdrew the offer soon afterwards.

North Korea could provide an amended declaration, even if it chooses to submit it under the timetable in the Agreed Framework. The IAEA already asked a list of questions back in late 1992 that North Korea said it would answer. A thorough, amended declaration could resolve many of the IAEA's questions.

Joint Inspection Activities

North Korea could permit joint North-South sampling of key North Korean sites for analysis either at that time or a time consistent with the Agreed Framework. Some of these sites are very complex to deal with, so sampling will take considerable time. Necessary inspection tools could be developed, tested, and pre-positioned in North or South Korea. These tools could also be used by the IAEA.

North and South Korea could cooperatively implement advanced safeguards procedures at South Korean nuclear facilities or non-frozen North Korean facilities at Yongbyon. These procedures are now performed in many countries, including South Korea and Japan. For example, inspectors could apply advanced procedures at North Korea's small Russian supplied research reactor or hot cell facilities at the Isotope Production Laboratory or the Institute for Radiochemistry. The Isotope Production Laboratory is where North Korea has said it first separated plutonium. Neither facility has been subject to modern IAEA inspections. If such inspections are not possible, inspections could be established at fuel fabrication plants or power reactors in North and South Korea.

Political Initiatives

A productive approach in Argentina and Brazil was Presidential visits to each other's sensitive nuclear sites. Joint declarations following the visits were used to express on-going or new commitments. These visits also increased trust and cooperation among the political and scientific leadership. In the Korean peninsula, similar visits could be critical in breaking down the high barriers created by years of suspicion and mistrust. Any such visits would have to follow Chairman Kim Jong-il's visit to Seoul, but subsequent visits to sensitive sites could be a powerful stimulus for significantly more cooperation between the nuclear establishments. South Korea could work to improve the relationship between the IAEA and North Korea. Ideally, North Korea should be requested to rejoin the IAEA, which it quit in 1994 at the height of the crisis.

Joint Civil Nuclear Cooperation

Undertaking joint production of medical and industrial isotopes could be useful. North and South Korea could form permanent joint committees to promote technical and scientific coopera-

tion, exchange information on civil nuclear technology, or establish common nuclear policies that could be presented at IAEA meetings or before other international bodies dealing with nuclear energy.

Creating a Bilateral Inspection Agency

Both a bilateral approach that results in a fully functioning bilateral inspection agency and the IAEA approach rooted in the Agreed Framework seek to provide adequate transparency and achieve a Korean peninsula free of nuclear weapons. These approaches are complementary. However, a bilateral inspection agency is not established.

Both approaches must seek to resolve a complicated list of verification issues involving North Korea' former and suspected current nuclear activities. The appendix, which is drawn from ISIS's October 2000 publication *Solving the North Korean Nuclear Puzzle*, reviews inconsistencies in North Korea's declaration to the IAEA and a set of questions that the IAEA or a bilateral inspection agency must address during a verification process.

IAEA Inspections are Established

Armed with recent advances in safeguards, IAEA inspections would provide the most assured method to determine the truth about North Korean nuclear activities. To accomplish this goal in a timely manner, however, the IAEA and North Korea will need to significantly accelerate their activities. Acceleration is possible. After all, nothing prevents the IAEA from starting its inspection process early, if North Korea agrees.

The IAEA has sufficient legal basis to conduct its inspections. Based on North Korea's commitments in the Agreed Framework and confidential minute, the IAEA can ask for access to additional sites and information it may deem necessary to verify North Korea's initial declaration. This provision allows the IAEA to visit sites not listed in North Korea's declaration.

The IAEA has at its disposal a considerable range of new safeguards methods and procedures that have been deployed over the last decade. North Korea's implementation of the Model Protocol would permit a set of more sophisticated inspection methods to be deployed.

The application of advanced safeguard approaches, including the implementation of the new safeguards Protocol, could efficiently address many of these concerns in the same manner as in other non-nuclear weapon states. The IAEA could implement many of these measures in North Korea under its own legal authority, although North Korean cooperation would be necessary. However, as mentioned above, implementation of the Protocol would require North Korean ratification. Under these new safeguards measures, the IAEA would have greater ability to determine countrywide the absence of plutonium production and separation activities, and of uranium enrichment programs.

Because the situation in North Korea is so unprecedented, and appears to involve a violation of a safeguards agreement, additional, innovative inspection methods may be necessary. These methods could be more difficult for North Korea to accept. Nonetheless, standard, albeit advanced, inspection methods may be insufficient, and this limitation must be recognized. North Korea may need to declare a much broader range of activities and provide access to more facilities to provide assurances that it does not have a nuclear weaponization program.

There is no doubt that much needs to be accomplished both to prepare for and carry out the inspections and verification exercise in North Korea. If the political will exists and North Korea cooperates, the IAEA can accomplish its tasks.

Bilateral Inspection Agency

Using a bilateral inspection agency to verify independently that North Korea is free of nuclear weapons requires significant resources and political commitment. Most importantly, North Korea needs to demonstrate that it wants such an agency.

Re-invigorating or redefining the Joint Nuclear Control Commission is a reasonable starting point. A considerable effort is needed to create an effective inspection agency, and establish its rights and obligations. The experience of Argentina and Brazil could be especially helpful here, particularly the experience of ABACC and its relationship with the IAEA. A bilateral agency could also draw upon the extensive experience gained by the IAEA in North and South Korea.

Creating such an inspection arrangement would require the intensive training of South and North Korean inspectors and managers. Both countries would need to develop sufficient expertise and experience. This problem could be difficult for North Korea without extensive outside assistance.

Because the Joint Declaration has the benefit that it bans all uranium enrichment and reprocessing facilities on the Korean peninsula, bilateral inspections may have an easier time verifying the absence of uranium enrichment activities than inspections under the Agreed Framework where uranium enrichment is allowed.

With adequate support and commitment, a bilateral agency could verify that the Korean peninsula is free of nuclear weapons. If desired by both North and South Korea, this agency could possibly complete its verification significantly quicker than the IAEA is currently expected to do.

Conclusion

Ensuring nuclear transparency on the Korean peninsula has not been easy, and it will not become any easier over time. It makes sense to consider a bilateral approach as a way to provide more confidence that adequate transparency will be achieved. If a bilateral approach can speed up the IAEA's verification process or increase trust between North and South Korea, it is worth pursuing. If it leads to a robust bilateral inspection agency, all of our security will be strengthened.

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[1] For a more thorough discussion of the advantages of bilateral inspections in the Korean peninsula, see Tom Collina and Fernando de Souza Barros, "Bilateral Nuclear Inspections for the Korean Peninsula: Can the Latin American Experience Help Reduce Tensions Between North and South," *The Korean Journal of Defense Analysis*.

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Annex: Reviewing Inconsistencies and Fundamental Questions in the Verification of North Korea's Nuclear Activities

Initially optimistic in the spring of 1992, the IAEA subsequently uncovered a number of inconsistencies in North Korea's declaration under its safeguards agreement. These inconsistencies pointed to the conclusion that North Korea had separated more plutonium than it had declared, perhaps enough for one or two nuclear weapons.

Most of the evidence developed by the IAEA involved complicated sampling and analytical methods, which are described in the ISIS publication *Solving the North Korean Nuclear Puzzle*. However, some dramatic evidence depended on a series of high-resolution satellite images provided by the United States.

These images showed that North Korea was concealing activities from the IAEA, particularly the concealment of what are suspected to be facilities to hold radioactive waste from the processing of spent nuclear fuel.

Evidence of undeclared activities, which are described in *Solving the North Korean Nuclear Puzzle*, includes:

- Numerous inconsistencies between the information provided by North Korea and the IAEA's findings developed as a result of the IAEA's initial inspections in 1992 and early 1993;
- Despite all the inconsistencies found at the Radiochemical Laboratory, which is the main plutonium separation facility at Yongbyon nuclear research center, the material balance was consistent with the declaration. Achieving such consistency may have required the plant operators to adjust the levels of the liquids in the nuclear waste tanks;
- North Korea's refusal to address all but a few of the inconsistencies discovered by the IAEA in North Korea's initial declaration;
- Its unwillingness to turn over records that had been established to exist, and the professed lack of documentation for activities that are often well documented in other countries;
- Its camouflaging of an active nuclear waste site;
- Its apparent camouflaging of a building suspected to contain nuclear waste from undeclared reprocessing campaigns;
- Its apparent mischaracterization of a declared nuclear waste site as holding both liquid and solid wastes since 1977;
- Its construction of trenches in the winter of 1991-92 between the Radiochemical Laboratory and the nearby suspect waste building, giving the appearance of rapidly moving liquid nuclear wastes into a disguised building; and
- Its delay in unloading the 5 megawatts-electric (MWe) reactor, and once unloading started, the refusal to allow IAEA inspections.

Most experts believe that North Korea was actively pursuing nuclear weapons at least until the late 1980s or early 1990s. Its program was large, as evidenced by the size of the Radiochemical Laboratory at Yongbyon. North Korea would have undoubtedly possessed enough separated plutonium for tens of nuclear weapons by now, if its facilities had not been frozen under the Agreed Framework.

But beyond this basic agreement, experts are divided about why North Korea undertook the actions listed above. For the purposes of this discussion, three basic scenarios are presented. Although there are many other possibilities, those presented here provide a basis for the subsequent discussion of the types of inspection activities that will be required. Figure 1 summarizes the scenarios.

FIGURE 1: SCENARIOS THAT MAY EXPLAIN NORTH KOREA'S BEHAVIOR

Scenario	Enough separated Pu for a nuclear weapon by the end of 1994?	Deception Activity	Attempt to get nuclear weapons since 1994?
A. It has the capability to make the bomb	Yes	Extensive	No
B. It's bluffing	No	Moderate	No
C. It keeps cheating			
-- Subcase 1	No	Extensive	Yes
-- Subcase 2	Yes	Extensive	Yes

Scenario A: North Korea has the Capability to Make the Bomb

The first scenario is that North Korea produced enough plutonium for one or two nuclear weapons, and then stopped its program in the early 1990s as tensions on the peninsula eased and pressures to sign the safeguards agreement increased.

In this scenario, the North Korean deception activities as outlined above were necessary. Based on what has been learned about the experience of Iraq and other countries that have sought nuclear weapons, traditional IAEA inspections were perceived as relatively easy to deceive. In addition, member-states did not share intelligence information with the Agency, meaning that North Korea may have believed that the IAEA was unlikely to obtain overhead surveillance. Once it was caught, however, North Korea moved to prevent the IAEA from obtaining firm evidence that it possessed enough plutonium for one or more nuclear weapons.

In the future, North Korea can be expected to thwart inspections to sufficiently protect its secret, while at the same time appeasing it enough to assuage concerns from KEDO partners, particularly the United States. North Korea may also seek to exploit the preference among the nuclear-weapon states for proliferant states to keep their nuclear weapons in the "basement," rather than to make them overt. This tendency was reinforced by the negative reactions after India and Pakistan's nuclear tests in May 1998. Israel continues to use this approach to minimize pressure on its nuclear weapons program and avoid the imposition of sanctions.

Under this scenario, North Korea may or may not give up its nuclear weapons. It may continue to hide its plutonium stock, and scheme to trick the inspectors once it can no longer stall. If unsuccessful, it may just openly violate the Agreed Framework. Alternatively, it may decide that having nuclear weapons is neither desirable nor necessary. At the appropriate moment, it could divulge its extra plutonium, cooperate fully with the IAEA, and possibly reveal that it had nuclear weapons.

Scenario B: It's Bluffing

The second scenario is that North Korea failed to make enough plutonium for a single nuclear weapon, but it decided to hide some of what it did accomplish and create an impression that it had accomplished more than it did. It was on the verge of success and believed that it could trade this program for tangible benefits more effectively if the world thought it had already produced enough plutonium for a few nuclear weapons. Reinforcing this bluff, North Korea has made it clear that it could reprocess the spent fuel from the 5 MWe reactor in order to obtain enough plutonium for several nuclear weapons.

Sending a signal that it possessed nuclear weapons was also useful domestically. The North Korean leadership bolstered confidence in the regime by falsely leading its political establishment to believe it had nuclear weapons. Simultaneously, the nuclear establishment was protected from accusations of failure.

Under this scenario, North Korea's decision to refuse to allow the IAEA to take measurements of the spent fuel rods in 1994 is straightforward to explain. North Korea would have wanted to prevent the exposure of its bluff until such time as a "package solution" to the nuclear issue had been reached, and the rewards were in hand. Revealing that it does not possess nuclear weapons would remove a key instrument of blackmail.

In the future, North Korea would probably cooperate with inspectors. Under this scenario, North Korea could still turn out to have a few kilograms of separated plutonium.

Scenario C: It Keeps Cheating

The third scenario is that North Korea may or may not have made enough plutonium for a nuclear weapon before 1994, but it has been seeking the wherewithal to make nuclear weapons in undeclared facilities since then. It is thus taking advantage of every opportunity to get nuclear weapons, while appearing not to have them. In this case, it has resisted IAEA inspections to protect exposure of its accomplishments prior to 1992 and any successes thereafter.

North Korea would be expected to focus on developing or maintaining secret nuclear facilities or capabilities. It will go to great lengths to hide these facilities, likely located away from Yongbyon.

North Korea would hope to prevent the resumption of or otherwise limit inspections. However, at some point, its program could be exposed to the international community through a defector with direct knowledge of the program, convincing intelligence information, or IAEA inspections. Once exposed, North Korea might renounce the Agreed Framework, and maintain a nuclear weapons program.

It may also seek more negotiations to buy more time. In exchange for benefits, North Korea might admit to a small portion of its secret nuclear program, while keeping other portions of it hidden.

Alternatively, North Korea may decide to abandon its prohibited activities. Such an outcome would certainly be dramatic. It would rival South Africa's renunciation of apartheid and abandonment of its nuclear weapons program in the late 1980s and early 1990s.

Fundamental Questions

The first goal of any inspection effort is to determine if scenario A or B is true. Toward this goal, credible answers are needed to the following questions:

- How many cores were irradiated in the 5 MWe reactor, and how much plutonium was produced?
- Is nuclear waste stored in the two camouflaged sites and, if so, how much and of what content?
- How much plutonium was produced in the IRT reactor? How much was separated?
- How much plutonium was separated in the Radiochemical Laboratory?
- If North Korea has more plutonium than it has declared, where is this plutonium?
- What is the history and status of efforts to weaponize?

The IAEA has asked North Korea for a wide range of additional information about its nuclear program beyond its initial declaration in order to verify both its correctness and completeness. In December 1992, the IAEA submitted a list of topics which the IAEA requested that North Korea address. The topics went way beyond those that the IAEA had traditionally requested under safeguards agreements. In fact, observers have pointed out that this list of topics is an important precursor to the expanded declarations under the Model Protocol, now in force in several countries including Japan.

Although the answers to the bulleted questions may be sufficient to distinguish between scenarios A and B, they would not exclude scenario C. In addition, if North Korea turns over additional plutonium, inspectors may have increased suspicions about undeclared activities. To address this situation, North Korea must be prepared to provide more information and access to sites both at Yongbyon and elsewhere.

In addition, a decision is needed about what level of uncertainty is acceptable in satisfying the inspection requirements. Uncertainty cannot be eliminated. Thus, the fundamental question is: What level of uncertainty is acceptable in exchange for North Korea coming into compliance with its safeguards agreement? What if the inspection agency cannot account for one-to-several kilograms of plutonium, but still much less than a "significant quantity" of plutonium—the amount typically given as enough for a crude nuclear explosive?

What should be avoided is an effort to account for every gram of plutonium. Even if the IAEA says North Korea has nine kilograms of plutonium and North Korea says it has ten kilograms, this discrepancy may be acceptable. In addition, the inspection should not try to account for every nuclear activity North Korea has undertaken.

Such compromises are normal. After South Africa signed the NPT and submitted its initial declaration under its safeguards agreement, the IAEA faced a difficult verification problem. During the IAEA's verification of South Africa's initial declaration of its highly enriched uranium (HEU) inventory, the inspectors decided that this declaration would be viewed as accurate if the IAEA's estimate differed by less than a significant quantity—25 kilograms of uranium 235—from the declaration of South Africa. In total, South Africa produced about 1000 kilograms of highly enriched uranium with an average enrichment of 70 percent. Initial efforts by the IAEA to achieve its goal failed. After two years of efforts, including the application of unprecedented methods, the

difference was less than ten kilograms of uranium 235, or about one percent of the total stock. In the case of North Korea, a 10-20 percent difference between the declaration and the inspector's estimate may be sufficient.[1]

On a more general level, what will be the criteria to determine when North Korea is in compliance with its safeguards agreement? Under advanced safeguards approaches such as those officially embodied in the Model Protocol, a judgement of adequate compliance is much more qualitative than quantitative.

The United States, South Korea, and other KEDO members need to begin thinking about some of the possible outcomes of the inspection process. What should happen if North Korea announces it has several kilograms of separated plutonium it had not previously declared? What impact would such an announcement have on the implementation of the Agreed Framework? Will the United States, South Korea, and Japan accept leaving this material under IAEA safeguards in North Korea? Or will they insist that the material be transported out of North Korea? How would North Korea react?

But the most important question is whether North Korea will be open and transparent. A North Korean policy of transparency, consistently implemented, could become the strongest evidence of its compliance. So far, however, North Korea has provided few indications that it intends to cooperate.

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[1] Obviously, the inspectors cannot accept a difference of a significant quantity of plutonium, or eight kilograms, because in several credible scenarios, that is roughly the amount of undeclared plutonium that North Korea is estimated to possesses.

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