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SNAPSHOT

What I Found in North Korea

Pyongyang's Plutonium Is No Longer the Only Problem

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On November 12, during my most recent visit to the Yongbyon nuclear complex, North Korean scientists showed me and my colleagues, John W. Lewis and Robert Carlin, a small, recently completed, industrial-scale uranium-enrichment facility and an experimental light-water reactor (LWR) under construction.

I was stunned by the sight of 2,000 centrifuges in two cascade halls and an ultramodern control room. But it was not until the long drive back to Pyongyang that the political implications of these findings hit home. It will be more important than ever to limit Pyongyang's nuclear progress and calm tensions on the Korean peninsula. This is particularly true in light of the clash in the Yellow Sea between the two Koreas late last month.

Although I and other nonproliferation experts had long believed that North Korea possessed a parallel uranium-enrichment program -- and there was ample evidence for such a belief -- I was amazed by its scale and sophistication. Instead of finding a few dozen first-generation centrifuges, we saw rows of advanced centrifuges, apparently fully operational. Our hosts told us that construction of the centrifuge facility began in April 2009 and was completed a few days before our arrival. That is not credible, however, given the requirements for specialty materials and components, as well as the difficulty of making the centrifuge cascades work smoothly.

How North Korea managed to obtain all these materials is a troubling question for the global nonproliferation regime. Indeed, there is no evidence that North Korea can produce high-strength aluminum or steel alloys on its own, or that ring magnets, bearings, and vacuum valves were manufactured indigenously.

The most likely scenario is that the equipment was built and brought into operation over many years at a different location and then moved into the new facility. The items needed to manufacture the centrifuges were likely obtained through North Korea's complex and far-reaching procurement network -- in which Pakistan likely played a significant role. Former Pakistani President Pervez Musharraf admitted in his memoirs that the Pakistani scientist A. Q. Khan delivered what amounted to an enrichment starter kit of 24 centrifuges around the year 2000. There were also reports that before A. Q. Khan's house arrest in 2004, North Korean scientists had cooperated closely with the Khan Research Laboratories, which provided hands-on training at their centrifuge facilities. In addition, in late 2001, the CIA reported to Congress that North Korea had attempted to acquire centrifuge-related materials in large quantities from Russia and Germany to support a uranium-enrichment program. It is also quite likely that the North Koreans fabricated at least some of the many components

themselves.

And Washington cannot rule out North Korean cooperation with Iran, since the two have collaborated closely on missile technologies before. North Korea's centrifuge facilities appear to be more sophisticated than what Iran has shown to international inspectors, but it is well known that Tehran is developing next-generation centrifuges. Moreover, North Korea has much greater experience in uranium processing and reactor technologies than Iran, raising concerns that such expertise could flow from Pyongyang to Tehran.

These findings demonstrate the difficulty of accurately evaluating clandestine uranium-centrifuge programs. The small footprints and signatures of such facilities make assessment problematic. The best indicators of North Korea's progress were its procurement activities and technical cooperation with other countries -- in this case, Pakistan. These markers led the CIA to conclude in 2002 that by mid-decade North Korea could produce two highly enriched uranium (HEU) atomic bombs annually. The George W. Bush administration used this evidence to confront Pyongyang in October 2002 in a manner that led to the termination of the 1994 Agreed Framework, which had foreseen eventual diplomatic normalization in exchange for denuclearization. Terminating the agreement provided North Korea with an excuse to withdraw from the Nuclear Nonproliferation Treaty, reprocess bomb-grade plutonium from the spent uranium fuel rods, and build its first bomb.

In retrospect, it was not faulty intelligence that led to the disastrous outcome of the October 2002 confrontation but rather the Bush administration's misguided political determination to end the Agreed Framework without preparing for the consequences. At Yongbyon, the North Koreans told us that they will eventually build larger power reactors, and although they anticipate difficulties because the technologies for the reactor and fuel are new to them, they are confident of success. Our Foreign Ministry host reminded us that they had previously threatened to build a LWR and do their own enrichment but that "no one believed us, including you, Dr. Hecker." He made it clear that, in their minds, they had no choice; U.S. actions had pushed them in this direction.

The existence of a North Korean light-water reactor poses its own set of policy challenges. Pyongyang has seriously pursued LWRs since 1985, when it struck a deal with Moscow to supply two such reactors. The Agreed Framework was an attempt to replace its gas-graphite reactors, which are useful for making bombs but bad for generating electricity. By contrast, LWRs, which are less suitable for bombs, are very good for electricity. Shortly after the North's April 5, 2009, rocket launch and the predictable UN condemnation that followed, an official government press release stated, "We will see a light water reactor, which is vigorously 100 percent running on our own raw materials and technology." Now, as promised, they have started construction on a small, experimental LWR designed to deliver roughly 25 to 30 megawatts of electric power.

I believe North Korea's expressed interest in nuclear electricity is genuine. Although it is technically possible that the LWR will be used to produce bomb-grade plutonium, such a scenario is unlikely. Plutonium from an LWR is much less suitable for bombs than the plutonium already produced in the existing gas-graphite reactor. In fact, if Pyongyang wanted more plutonium bomb fuel, it would simply restart that reactor, not build an LWR. Still, the construction of the reactor raises a number of policy issues: an LWR requires enriched uranium, and once enrichment capabilities are established for reactor fuel, they can be readily reconfigured to produce HEU bomb fuel -- precisely Washington's concern about Iran's nuclear program.

In revealing these facilities, Pyongyang is sending a signal that policymakers must take seriously. In this case,

the revelation appears to be part of a calculated plan developed around the time of the U.S. presidential transition to proceed with its nuclear program in a way that would influence the diplomatic situation in its favor. After the international community condemned North Korea's April 2009 rocket launch, Pyongyang officially terminated its participation in the six-party talks and conducted a second nuclear test to demonstrate to its own satisfaction and to the world that it had a functioning nuclear device.

At the same time, the North Koreans designed a small LWR and began building the enrichment facility by tearing down Yongbyon's fuel-rod-fabrication facility and building a centrifuge hall. They timed our visit to show off their completed project. With these moves, Pyongyang managed to justify its need for an enrichment program while moving toward its long-standing ambition of using LWRs for nuclear power.

The truth is that North Korea has run both plutonium and uranium programs in a dual-use mode -- that is, for bombs and electricity -- from the beginning. It favored the plutonium program for both weapons and electric power in the early 1990s, but it was willing to trade in the plutonium bomb program for electricity from LWRs to be supplied by the United States as part of the Agreed Framework. It appears to have rejuvenated its uranium program for bombs later in the 1990s, when A. Q. Kahn came calling and the Agreed Framework was moving along very slowly. By 2002, much as the intelligence reports indicated, the North was making major procurements of centrifuge materials and components. The October 2002 diplomatic confrontation allowed the North to accelerate the plutonium bomb program in 2003, and subsequent nuclear tests allowed it to demonstrate its success.

The modern centrifuge facility the North Koreans showed us this time indicates that Pyongyang never gave up on the uranium path to the bomb. The North must have been able to procure enough materials and components, fabricate and assemble them into working centrifuges, get them functioning in an undisclosed facility and then install them in short order at Yongbyon. The centrifuge facility we saw is most likely designed to make reactor, not bomb, fuel, because it would not make sense to construct it in a previously inspected site and show it to foreign visitors. However, it is highly likely that a parallel covert facility capable of HEU production exists elsewhere in the country.

The question now is how this affects Northeast Asia's security calculus. North Korea already has plutonium -- by our estimates, enough for four to eight basic nuclear weapons. Possession of similar amounts of HEU does not fundamentally change the threat. HEU is easier to fashion into a crude bomb but offers no advantages for more sophisticated, miniaturized designs. If Pyongyang is content with its current arsenal or modest growth, it would be better off restarting the existing plutonium production reactor. However, if Pyongyang wants to increase its arsenal substantially, it could expand the capacity of the current enrichment facility or build parallel clandestine facilities. Pyongyang cannot expand centrifuge capacity at will, however. It is limited by the need to import key materials and components -- hence the international community must redouble its efforts to shut down Pyongyang's extensive illicit procurement network.

Even more troubling than an expansion of the North's nuclear arsenal is its potential export of fissile materials or the means of producing them, which now include centrifuge technologies. Moreover, by unveiling the LWR and enrichment facility, Pyongyang has complicated the diplomatic process by, in effect, redefining what is meant by denuclearization. Not only is it unlikely that Pyongyang will give up its nuclear arsenal anytime soon, but it will almost certainly insist on keeping its LWR program and centrifuges. Shutting down the plutonium program was

within reach, but the same is not likely for the uranium program, because the justification for its peaceful nature is more credible than for the plutonium program, even though it is no less problematic.

Nevertheless, our Foreign Ministry host maintained that Pyongyang continues to support the denuclearization of the Korean peninsula as agreed to in the September 2005 Six-Party Joint Statement. As a starting point, he suggested that it would be helpful if Washington reaffirmed part of the October 2000 U.S.-North Korean Joint Communiqué. That document, which was the culmination of a long diplomatic process, stated that neither government would have hostile intent toward the other and confirmed the commitment of both to make every effort to build a new relationship free from past enmity.

It is time for the United States to conduct a thorough review of its policies on Northeast Asia, including but not limited to the nuclear issue. The fundamental and enduring goal must be the denuclearization of the Korean peninsula. However, since that will take time, the U.S. government must quickly press for what I call "the three no's" -- no more bombs, no better bombs, and no exports -- in return for one yes: Washington's willingness to seriously address North Korea's fundamental insecurity along the lines of the joint communiqué. Our Foreign Ministry host framed his no's in terms of no vertical or horizontal proliferation. When we asked specifically if Pyongyang would entertain the concept of three no's and one yes, he said, "If the U.S. government asks that question, I will answer it."

Pyongyang's revelation of the centrifuge facility makes it more challenging and more pressing than ever to ask that question.
