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POLICY ANALYSIS

Advance Draft

North Korea's Nuclear Weapons Program to 2015: Three Scenarios

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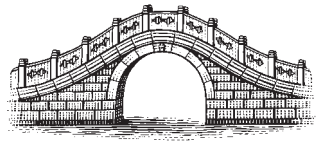

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Note *The views in this essay are those of the author and should not be attributed to the U.S. Government, the Department of Defense, or the Naval War College.*

EXECUTIVE SUMMARY

This essay evaluates three alternative scenarios for North Korea's nuclear weapons development over the coming decade: (1) pursuit of a symbolic nuclear capability, (2) pursuit of an operational nuclear deterrent, and (3) a deficient or failed effort to achieve an operational capability.

MAIN FINDINGS

North Korea's weapons are now a fact, not a bargaining chip. Absent fundamental internal change in North Korea or extraordinary changes in the negotiating strategies of the U.S. and other powers, there is virtually no possibility that North Korea will irrevocably yield the totality of these capabilities. Given that Pyongyang still confronts major technical hurdles if it expects to proceed to an operational deterrent force, however, the most likely outcome would be a symbolic nuclear capability. North Korea may be prepared to restrict some nuclear activities in return for guarantees and commitments from the U.S. and other powers. Even if such a move would not entail a definitive end to the program, this possibility warrants careful consideration by the U.S. and others seeking a negotiated end to Pyongyang's nuclear program. It would not be prudent, however, to anticipate an early end to Pyongyang's program or to the dangers this program poses both for security in East Asia and for the future viability of the non-proliferation regime.

POLICY IMPLICATIONS

There are four immediate policy considerations that the international community would benefit from exploring:

- determining additional measures to discourage or impede North Korea's future weapons development, which in the near term should focus on convincing North Korea to forego additional nuclear tests or further tests of ballistic missiles
- reiterating to Pyongyang that any transfer of nuclear materials, technologies, or completed weapons outside its borders would constitute a grave danger to the international community as a whole
- imposing additional costs on North Korea for any further nuclear tests
- fully weighing the trade-offs in pursuing partial steps to restrict nuclear weapons development versus pursuit of maximal policy goals

On October 9, 2006, the Democratic People's Republic of Korea (DPRK or North Korea) undertook its first ever test of a nuclear device in open defiance of repeated warnings from the United States, China, and other states. This essay examines possible scenarios for North Korea's future nuclear development in light of this initial test, focusing on three research issues: (1) the North Korean leadership's assessment of the purposes of nuclear weapons development; (2) the feasibility of the DPRK, in light of its current and projected technical capabilities, achieving various posited goals; and (3) the potential policy options for constraining North Korea's future nuclear development.

The policy consequences of a sustained North Korean nuclear weapons program are hugely worrisome both to the future of the non-proliferation regime and for regional security. The DPRK is the first state ever to withdraw from the Non Proliferation Treaty (NPT), a move that has created a very troubling precedent for other states that might contemplate such actions. Should North Korea opt to transfer abroad any of its nuclear technologies, materials, and weapons, the dangers to international peace and security would be exceedingly grave. Additionally, the regional consequences are also highly worrisome. Without nuclear weapons, the latent possibilities of a highly destructive military conflict on the Korean Peninsula remain very high; with nuclear weapons, the potential consequences of renewed conflict for the Republic of Korea (ROK), Japan, and for U.S. forces are incalculably greater. Quite apart from the potential for armed conflict, North Korea's possession of nuclear weapons seems very likely to prompt major security reassessments on the part of all the states of Northeast Asia.

The prospective directions in North Korea's nuclear development over the next decade nonetheless remain uncertain. For one, international observers are uncertain of what value the DPRK leadership attaches to the possession of such capabilities; an additional factor is the possibility that the international community might be able to induce North Korea to limit its programs without definitively foregoing its capabilities. At the same time, however, Pyongyang also faces major technical and other hurdles in proceeding to a credible nuclear force. This essay thus posits three alternative outcomes: (1) a largely symbolic or political deterrent, (2) a more operational capability, and (3) a failure to fully realize a credible deterrent.

Of the three scenarios, the first outcome seems the most likely and would be the least disruptive to regional and global security. Though Pyongyang may prefer a genuine operational force, achieving this goal may simply be a bridge too far, though North Korea has no incentive to disclose a failure to reach its

goals. Pyongyang's test of a nuclear device was inherently destabilizing, but pursuit of a deployed nuclear capability (whether it succeeds or fails) would be far worse. The United States and other powers must therefore undertake all feasible steps to reduce the possibilities of either of the latter outcomes.

This essay is organized in four sections:

- pp. 108–111 describes the near-term implications of the nuclear test and then proposes assumptions for the remainder of the analysis
- pp.111–114 assesses the DPRK's presumed objectives in undertaking the test
- pp. 114–121 analyzes the technical and resource questions that are likely to govern North Korea's nuclear and missile development
- pp. 121–123 provides overall conclusions and offers policy implications

NORTH KOREA'S NUCLEAR BREAKOUT

North Korea's October 9, 2006 test of a nuclear device marks a fundamental divide in the nearly two-decade effort to prevent the emergence of the DPRK as a nuclear armed state. The ability of a small, isolated, economically vulnerable, and acutely self-referential regime to sustain a nuclear weapons program and to conduct a nuclear test—drawing primarily on indigenous materials, technology, and scientific and engineering skills—validates at least three conclusions. First, as Richard Betts has observed, no state develops nuclear weapons by accident or inadvertence. It reflects purposive, long-term commitment and the dedication of substantial resources toward such a goal.[1] Second, building and testing a nuclear device and moving toward an operational delivery system are very difficult and time-consuming tasks, all the more so for a state as economically challenged as the DPRK. Third, under prevailing circumstances there is no meaningful possibility that Pyongyang will either yield the totality of its capabilities or forego what the leadership deems as North Korea's entitlement as a nuclear-armed state.

The DPRK's nuclear weapons are a fact, not a bargaining chip, even if the quantitative and qualitative characteristics of North Korea's capabilities remain to be determined. The leadership believes that nuclear weapons will enable North Korea to punch above its weight. In addition, the possession of such capabilities solidifies Kim Jung Il's symbiotic relationship with the

[1] Richard K. Betts, "Universal Deterrence or Conceptual Collapse? Liberal Pessimism and Utopian Realism," in *The Coming Crisis: Nuclear Proliferation, U.S. Interests, and World Order*, ed. Victor A. Utgoff (Cambridge: MIT Press, 2000), 57.

North Korean military. A coalition of outside powers is intent on denying the DPRK any opportunity to convert its test into tangible political-strategic gains. External actors are seeking to exact added costs on North Korea for Pyongyang's nuclear test, inhibiting its limited dealings with the outside world, and moving quickly to impose additional restrictions on technology transactions that could enhance North Korea's capabilities for weapons development or export. Though likely to continue, these efforts (all mandated under Security Council Resolution 1718) are very unlikely to compel Pyongyang to alter North Korea's basic commitment to nuclear weapons development. Absent a fundamental leadership transformation in the DPRK or extraordinary changes in the negotiating strategies of the United States and others, it is virtually inconceivable that North Korea will dismantle the entirety of its nuclear inventory and weapons potential. There may have been a time when this goal was feasible, but the opportunity has passed.

Pyongyang may still be prepared to "trade," "rent," or otherwise limit some of its nuclear activities in return for guarantees and commitments from external powers. One such possibility, for example, was broached in meetings in Berlin in mid-January 2007 between North Korea's lead nuclear negotiator, Vice Minister of Foreign Affairs Kim Kye Gwan, and his U.S. counterpart, Assistant Secretary of State for East Asian and Pacific Affairs Christopher Hill. Kim purportedly informed Hill that, in exchange for a U.S. commitment to resume economic and energy assistance to the DPRK and a parallel commitment to unfreeze $24 million held in North Korean accounts at the Banco Delta Asia in Macao, Pyongyang would agree to suspend various nuclear activities, including operations at its 5 MW (e) reactor at Yongbyon. Kim also reportedly indicated that North Korea would be prepared to permit resumed monitoring at Yongbyon by the International Atomic Energy Agency (IAEA).[2] These would be at best preliminary (and reversible) measures to end North Korea's nuclear weapons development and in no way would constitute the definitive end of the program. Policymakers therefore need to weigh carefully the options, trade-offs, and potential liabilities both in reducing the scope, scale, and pace of Pyongyang's nuclear development and in mitigating the more worrisome possibilities associated with North Korea's possession of nuclear weapons.

A single nuclear test establishes a baseline but does not confirm a particular trajectory. In light of the longer-term pattern of North Korean

[2] "N. Korea 'Ready to Suspend Nuclear Activities,'" *Chosun Ilbo*, January 22, 2007 ~ http://english.chosun.com.

nuclear and missile development, what kinds of capabilities are imaginable? Does Kim Jung Il or anyone else in North Korea have a specific goal in mind for the nuclear program? Is such a goal realistic or achievable in light of the DPRK's economic, scientific, and technical circumstances?

To assess these issues, this essay will examine alternative scenarios for North Korean nuclear weapons development to 2015. This requires examination at three levels: (1) policy calculations within the DPRK leadership, (2) the technical and financial resources available to the program, and (3) the policy options of external powers to inhibit the DPRK's future nuclear and missile development. Notwithstanding the leadership's insistence that it will protect the North Korean system at all costs, Pyongyang might be compelled to limit its future nuclear options. For example, although North Korea might have specific nuclear objectives in mind, other countries may be able to deny Pyongyang the means to realize these goals or North Korea may simply lack the resources to achieve them. Yet projecting the DPRK's future forces in the absence of fuller insight into its nuclear intentions remains daunting. There is also a tendency in the aftermath of the first tests of new nuclear entrants to overstate a country's prospective capabilities. One need only recall the hugely inflated U.S. estimates of the Chinese nuclear force dating from the mid and late 1960s, following Beijing's initial test, though many of these estimates were generated with justifications for a "thin" ABM system in mind. This essay cautions against linear projections based on a single presumed nuclear trajectory.

It is necessary to make two additional assumptions. The first is to assume the basic stability of the North Korean system over the next ten years. Since many analysts (and more than a few officials outside the DPRK) deem this outcome almost unimaginable, this essay does not discount the possibility of significant shifts in leadership and policy. For example, very little is known about potential succession arrangements following the death or physical incapacitation of Kim Jung Il. Kim will be 65 years old in February 2007. Is it reasonable to assume that a decade hence the DPRK will still be in the era of General Kim? Thus, change within the regime or true regime change might well occur, but for purposes of analysis this essay posits neither.

The second assumption this essay makes is to preclude a highly optimistic scenario (i.e., a North Korean "zero option"). This scenario assumes that the DPRK would be prepared to forego the totality of its nuclear programs in exchange for three basic goals long sought by the leadership: validation, compensation, and assurance, in particular from the United States. A grand bargain posits both that there is a price that external powers are prepared to

pay for denuclearization of the peninsula and that Pyongyang will deem this payment sufficient to ensure the survival and legitimation of the regime. This argument, however, minimizes or neglects the internal considerations that have shaped and sustained North Korea's nuclear program. For North Korea, the Cold War has never ended; in the aftermath of North Korea's nuclear test, it is not even clear that the leadership *wants* the Cold War to end. Thus, a future where the DPRK would no longer be able to characterize itself as under acute threat might undermine the system more than its current siege mentality, since prevailing circumstances justify highly centralized control and major limits on the foreign presence inside North Korea.

The remainder of this essay will address three questions pertaining to the North's potential nuclear capabilities in 2015:

- What are the leadership's presumed objectives in developing a nuclear weapons capability?
- What resources would be required to fulfill these goals?
- How are the policies of outside powers likely to affect North Korea's ability to achieve its objectives?

ASSESSING THE DPRK'S NUCLEAR GOALS

Very little is known about how North Korea assesses its nuclear requirements, other than the obvious conclusion that the leadership believes it is now more secure with a demonstrated nuclear weapons capability than without one. The DPRK first claimed status as a nuclear-armed state on February 10, 2005, when it announced that it had manufactured an unspecified number of nuclear weapons. Though it is possible that Pyongyang believed this declaration would elicit initiatives from the United States and others to forestall an actual test, no such initiatives were forthcoming. Thus, the October test was designed in part to demonstrate definitively North Korea's ability to build and test a nuclear device. The test was also an act of assertion directed against prevailing international arrangements which Kim Jung Il opposes, including U.S. alliance commitments to the Republic of Korea. It also revealed Kim's conviction that the DPRK is not accorded appropriate political weight by outside powers, especially by the United States.[3]

[3] On the latter issue, see Peter Hayes, "The Stalker State: North Korean Proliferation and the End of American Nuclear Hegemony," Nautilus Institute Policy Forum Online 06-82A, October 4, 2006 ~ www.nautilus.org/fora/security/0682Hayes.html.

Yet what kind of nuclear capability does North Korea seek? Leaders in Pyongyang have revealed little about their thinking; it is entirely possible that they have yet to give serious consideration to this issue. Moreover, as Peter Hayes has argued, "there are no grounds to believe that the DPRK will employ a U.S. or Western conceptual framework of nuclear deterrence and crisis management in developing its own nuclear doctrine and use options."[4] This does not mean, however, that leadership calculations are unfathomable.

The fullest evidence of the DPRK's declared nuclear goals is contained in a Foreign Ministry statement of October 3 (six days prior to the nuclear test) and in another on October 17, immediately following passage of UNSC Resolution 1718.[5] The October 3 statement justified the impending test on the basis of "the United States' extreme war threats and sanction and pressure maneuvers." A "nuclear deterrent" was therefore deemed necessary as "a corresponding defensive countermeasure." There was also a pledge that "the DPRK will never use nuclear weapons first and will thoroughly prohibit threats through nuclear weapons and nuclear transfer." In addition, the statement argued:

> Our nuclear weapons will serve, to all intents and purposes, as a reliable war deterrent for protecting the supreme interests of our state and the security of our nation from the United States' threat of aggression and preventing a new war…on the Korean peninsula. We will always sincerely implement our international commitment in the field of nuclear non-proliferation as a responsible nuclear [weapons] state… Our ultimate goal [in advocating the denuclearization of the Korean peninsula] is not a denuclearization to be followed by our unilateral disarmament… but the denuclearization aimed at settling the hostile relations between the DPRK and the United States and removing the very source of all nuclear threats from the Korean peninsula and its vicinity.

Pyongyang's statement bears immediate comparison with those of other new nuclear entrants, all of whom have contended that they were compelled to test under acute threats to national security, with parallel assurances that they would exercise utmost prudence as a nuclear-weapons state. The North Korean statement is especially reminiscent of China's post-detonation announcement of October 16, 1964. In late October 2006 a senior Chinese

4 Hayes, "The Stalker State."

5 Statement of the DPRK Foreign Ministry, Korean Central Broadcasting Station and Korea Central News Agency (KCNA), October 3, 2006; and statement by DPRK Foreign Ministry Spokesman, Korean Central Broadcasting System, October 17, 2006. Though a Foreign Ministry statement might sound like a routine pronouncement, analysts of the North Korean media indicate that such statements are very rare, highly authoritative, and only released following approval at the highest levels of the leadership.

Foreign Ministry official stated that North Korean diplomats (in an effort to justify their program) reminded Chinese interlocutors that "we are only doing what you did four decades ago." Chinese officials supposedly retorted that the circumstances prevailing in the 1960s were very different from those of the early 21st century.[6]

Such a judgment, however, is very much in the eye of the beholder. North Korea's essential circumstances are eerily similar to those confronting China in the early to mid-1960s. The cases of China then and North Korea now concern embattled, isolated states experiencing extreme economic deprivation (including parallel experiences with famine), with the supreme leader in both systems prepared to devote extraordinary efforts to build nuclear weapons and thereby achieving notional equivalence to their major adversaries. In addition, it is unsurprising that North Korea did not explicitly threaten to export nuclear technology, fissile material, or finished weapons. Any such threat would wholly negate Pyongyang's repeated claim that its weapons are intended only for deterrence, without specifying what it deems necessary for deterrence. The DPRK may also have concluded that any such threat would have been too overt a challenge to the United States. Thus, North Korea has not made explicit or detailed reference to the scenario that the United States finds most worrisome—i.e., that Pyongyang might choose to transfer nuclear material, technology, or even a fabricated weapon to another state or to a non-state actor.

What would the DPRK's basic logic, if accepted by the outside world, indicate about how much capability would be required to achieve the goal of deterrence? Three alternative nuclear futures for 2015 emerge:

- a largely political nuclear capability
- an operational deterrent capability
- a deficient or failed effort to achieve an operational capability

These respective outcomes seem relatively straightforward, though it would be the height of conceit to specify how each "translates" in quantitative terms. The remainder of this essay identifies some relevant signposts and possibilities that might indicate movement along one of these three paths.

6 Author's interview with senior Chinese Foreign Ministry official, Beijing, October 30, 2006.

TECHNICAL AND RESOURCE REQUIREMENTS

Most of what the outside world knows about North Korea's nuclear weapons potential concerns the DPRK's inventory of fissile material.[7] The ancillary technology, materials, equipment, and know-how needed to build an operational nuclear force (i.e., warhead miniaturization, mating a warhead to a missile, and readying an alternative means of delivery, such as aircraft) represent equally or even more daunting technical and engineering challenges.[8] The ability to build nuclear warheads and integrate such capabilities with a delivery system, however, would indicate whether the DPRK either is advancing toward specific goals or will remain highly constrained in what it can achieve. In the event of scenario one, the characteristics of a North Korean nuclear weapon would matter far less. Development of a credible warhead, however, would be decisive in determining whether North Korea is on the path to scenario two. Failed efforts to achieve such a goal would indicate scenario three.

The DPRK's production of fissile material for weapons development appears entirely home-grown and self-sustaining. The prospects for denying North Korea technology relevant to such production therefore seem dubious. It is reasonable to assume that North Korea long ago stockpiled or developed the necessary technologies and materials for fissile material production, utilizing the spent fuel from its graphite-moderated reactor. Some analysts and U.S. Government officials believe that the DPRK might ultimately possess a uranium enrichment capability as an alternative source of fissile material. Such a prospect remains highly questionable, however. Pyongyang pursued this option in transactions with A.Q. Khan (including acquisition of centrifuges with which North Korea may have undertaken experimentation or exploratory work); it also sought to procure substantial quantities of industrial materials needed for an enrichment program through black markets in Europe. Yet there is still no definitive evidence of a proven production capability, and it is possible that North Korea long ago shelved major efforts to develop one.[9]

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7 See, for example, David Albright and Paul Brannan, "The North Korean Plutonium Stock Mid-2006," Institute for Science and International Security, 2006 ~ http://www.isis-online.org/publications/dprk/dprkplutonium.pdf.

8 For a comprehensive overview, see *North Korea's Weapons Programmes: A Net Assessment* International Institute for Strategic Studies, London, January 21, 2004 ~ http://www.iiss.org/publications/strategic-dossiers/north-korean-dossier.

9 For a very useful compilation of available information, see Congressional Research Service, *Weapons of Mass Destruction: Trade Between North Korea and Pakistan*, CRS report for Congress prepared by Sharon A. Squassani, March 11, 2004, 4–9, 11–15. ~ http://fpc.state.gov/documents/organization/30781.pdf.

Enhanced international monitoring of North Korea's foreign technology acquisition further complicates any possibilities of an enrichment capability, whereas the DPRK claims to "have mastered the entire plutonium production cycle."[10] It therefore seems highly likely that the DPRK will continue to rely on its plutonium option, since it possesses the requisite experience and know-how, a functioning technological and industrial infrastructure, and a proven weapons design. This bears in particular on warhead miniaturization, in view of the smaller size of plutonium-based weapons.

In comments to a visiting U.S. delegation three weeks after the nuclear test, North Korean officials stated that the DPRK planned to accumulate additional fissile material by reloading its 5 MW (e) reactor at Yongbyon with fresh fuel rods in 2007 and by reprocessing the spent fuel at appropriate intervals. This would be the third major reloading of the reactor since North Korea's pullout from the NPT in early 2003. According to Siegfried Hecker, a prominent nuclear scientist on the U.S. delegation, complications at the fuel fabrication facility seem likely to slow the production rate of new fuel rods. Ri Hong Sop, Director of the Yongbyon Nuclear Complex, also informed Hecker that possible changes in the "political situation" could dictate a less than optimal schedule for the unloading of spent fuel.[11] He acknowledged that North Korean engineers still hope to resume work on the 50 MW (e) reactor that was under construction at the time of the establishment of the Agreed Framework. Technical progress has been slowed, however, by the physical deterioration of equipment placed in storage more than a decade ago as well as by difficulties in assembling all the materials for the 50 MW (e) reactor. To date, there has been no meaningful resumption of work at the site. (According to Hecker, plans in the early 1990s for a 200 MW (e) reactor are fully in abeyance at this time.) If construction did resume on the 50 MW (e) reactor and it became operational, however, the reactor could enable a tenfold increase in the annual production of plutonium.[12] An enhanced production capability would enable much more ambitious goals for the nuclear program. Reliance on the single operational reactor will therefore impose inherent

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[10] Siegfried S. Hecker, "Report on North Korean Nuclear Program," Stanford University, Center for International Security and Cooperation, November 15, 2006, 6. This trip report is based on the results of a late October to early November visit of Hecker and three other colleagues to the DPRK. Hecker, former director of the Los Alamos National Laboratory and a plutonium specialist, is the only foreign scientist known to have examined plutonium metal produced at the DPRK nuclear complex. Siegfried Hecker, "Visit to the Yongbyon Scientific Research Center in North Korea," testimony before the Senate Foreign Relations Committee, Washington, D.C., January 21, 2004 ~ http://www.fas.org/irp/congress/2004_hr/012104hecker.pdf.

[11] Hecker, "Report on North Korean Nuclear Program," 5.

[12] Ibid., 6.

limitations on the scope of the program, though the consequences of a slow but steady production rate should not be minimized.

Yet North Korea has not reinvented the laws of physics. Its extant reactor can produce approximately 5–7 kg of plutonium annually, or enough for approximately one additional weapon per year, assuming no major problems either in the operation of the reactor or in the reprocessing of spent fuel. Estimates for North Korea's plutonium inventory vary. A higher-end estimate (prepared by the Institute for Science and International Security) credits North Korea with a total amount of separated plutonium in mid-2006 of 20–53 kg, or enough to fabricate between 4 and 13 nuclear weapons. (This estimate posits that 4–5 kg of plutonium would be required to build a weapon; other assumptions about the required amounts of plutonium for a weapon are somewhat higher.) By mid-2008 (i.e., when the spent fuel currently in the reactor has been unloaded, cooled, and fully reprocessed), the ISIS estimate increases to 40–68 kg, or enough for 8 to 17 weapons.[13] The October 2006 test reduced both estimates by one. Assuming no additional plutonium production capability between now and 2015 and steady state production at the Yongbyon facility, a "guesstimate" would be a maximal inventory of 14 to 23 weapons. A more conservative estimate, prepared by Siegfried Hecker, posits a total inventory in November 2006 of 40 to 50 kg., which he judges sufficient for 6 to 8 weapons. According to Hecker's assumptions, this would enable a total weapons inventory by 2015 of perhaps 14 to 16 weapons, assuming that all the separated plutonium was converted into finished weapons.[14]

Two additional considerations directly affect judgments about the sufficiency of plutonium supply: how Pyongyang evaluated the results of the first test and whether North Korea deems a political deterrent sufficient for its strategic purposes. External analysts have offered a range of views on the technical results of the October 2006. There are no indications that North Korean officials judge the test either a political or a technical disappointment, but we should hardly expect otherwise. The predominant view outside of North Korea, however, is that the test (though not an outright failure) was far from a full success.[15] If the DPRK wanted principally to demonstrate the ability

13 Albright and Brannan, "The North Korean Plutonium Stock Mid-2006," Table 1-2.

14 Hecker, "Report on North Korean Nuclear Program," 8.

15 Space constraints preclude more detailed discussion here. See Jungmin Kang and Peter Hayes, "Technical Analysis of the DPRK Nuclear Test," Nautilus Institute Policy Forum Online 06-89A, October 20, 2006 ~ http://www.nautilus.org/fora/security/0689HayesKang.html; Richard Garwin and Frank N. von Hippel, "A Technical Analysis: Deconstructing North Korea's October 9 Nuclear Test," *Arms Control Today*, November 2006, 14–16; and Hecker, "Report on North Korean Nuclear Program," 2–4.

to conduct a nuclear detonation, then even a problematic test result would have been sufficient. If North Korean expectations were greater, however, then Pyongyang has incurred "the onus without the bonus."

Separate assessments of the test results, one undertaken by Richard Garwin and Frank von Hippel and another by Siegfried Hecker, suggest two possibilities: the test either involved a low yield based on a larger, simple device or was a far more sophisticated design geared to configuring the weapon for use on a Nodong medium-range missile. Though acknowledging that any judgment is speculative, Hecker considers the first hypothesis far more plausible.[16] He believes that there is only one proven means to ensure a practicable, reliable design for a warhead: North Korea would need to test and more than likely test on multiple occasions. This creates added political and resource dilemmas for the DPRK. If North Korea's goals are more ambitious (i.e., scenario two, not scenario one), Pyongyang would have little alternative but to test again, which could readily entail heightened penalties against North Korea, including those China might impose. The resource issue concerns what might be termed the nuclear credibility paradox. Further tests might move North Korea closer to the goal of an operational capability, but each additional test would also reduce the size of the DPRK's potential nuclear weapons inventory. In addition, it is always possible that a future test or tests would fail to achieve satisfactory results. As noted in another post-test assessment, "amidst Pyongyang's post-test bravado, the options to enhance its incomplete deterrent remain inauspicious."[17]

North Korean technical personnel and military planners presumably perceive the need for additional tests, but this will very likely be a political rather than a technical decision. Despite some early reports that North Korea was preparing for another test, none has occurred. Pyongyang may be holding the tacit threat of an additional test (or tests) in reserve, depending on how leaders in North Korea assess the diplomatic and political responses of outside powers to their nuclear weapons development and on whether the DPRK believes its expressed concerns are being satisfactorily addressed. According to South Korean press reports, when Chinese State Councilor Tang Jiaxuan met with Kim Jung Il on October 19, Kim reportedly informed Tang that the DPRK had "no plans" for a second test.[18] Kim also reportedly

16 Hecker, "Report on North Korean Nuclear Program," 3–4.

17 "North Korea's Nuclear Test: Continuing Reverberations," International Institute for Strategic Studies, *IISS Strategic Comments* 12, no. 8, October 2006.

18 "North Korean Leader Said to Have Promised No More Nuclear Test," *Yonhap News* (in English), October 20, 2006.

told Tang, however, that future North Korean actions would be contingent on the policies of other powers, in particular the United States. The Stanford University group visiting the DPRK observed: "None of the officials we met gave us the impression that they are planning a second nuclear test."[19] Though these are only impressions and remarks from North Korean officials should be scrutinized with ample care, the observations of the group seem credible at this time.

A decision to proceed with additional testing would constitute compelling evidence both that the DPRK deemed the first test results unsatisfactory and that Pyongyang's goals for its nuclear program are more ambitious than a one-time demonstration of strategic autonomy. To be sure, there is every reason to believe that North Korea will proceed with the refinement of its nuclear capabilities, even without further tests. Pyongyang's situation would then be somewhat akin to what India in the more than two decades between its "peaceful nuclear explosion" of 1974 and nuclear weapons tests of 1998 characterized as a "recessed deterrent." Though still not having consented either to full disclosure of its weapons program or to binding limitations on its nuclear activities, North Korea would not, however, trigger the major international responses that would undoubtedly result from additional tests. Deterrence through uncertainty and ambiguity, though entailing major risks, would be a far less consequential outcome in strategic terms than vigorously pursuing a deployed nuclear force. In a technical and operational sense, however, development without additional testing can proceed only so far. Will Pyongyang ultimately be prepared to incur additional risks by further tests or will it remain content with a more ambiguous nuclear status? As Jungmin Kim and Peter Hayes argue,

> Having tested and failed, the DPRK can no longer rely on opacity as the basis for…a credible nuclear force… The DPRK might believe that a half kilotonne "mininuk" still provides it with a measure of nuclear deterrence and compellence; but…other nuclear weapons states…[will not] perceive it…[as] anything more than an unstable, unreliable and relatively small nuclear explosive device.[20]

This suggests an uncertain and potentially unstable nuclear environment.

North Korea's ability to deliver a nuclear weapon also assumes intrinsic importance in any assessment of its nuclear weapons potential. This is not an issue with respect to targeting the Republic of Korea since—with or

19 Hecker, "Report on North Korean Nuclear Program," 3.

20 Kang and Hayes, "Technical Analysis of the DPRK Nuclear Test."

without nuclear weapons—North Korea already holds South Korea hostage. (Targeting of U.S. bases in the ROK with nuclear weapons, however, would constitute a much more worrisome possibility.) Even in the event of a recessed deterrent, North Korea wants to demonstrate a capability for strategic reach, in particular the ability to target Japan and U.S. military facilities in Japan and beyond, beginning with Guam. These missiles are reportedly armed with conventional warheads at present, though there are scattered indications that some might be armed with chemical weapons. In addition, some analysts also speculate about the possibility of a missile armed with a biological warhead, but the available data does not enable an informed judgment on the credibility or feasibility of this claim.

The pivotal issue is whether North Korea is undertaking major efforts to pair a nuclear warhead with extant or future ballistic missiles. There is the additional question of whether the DPRK deems the ability to reach the continental United States, Alaska, or Hawaii with a ballistic missile either feasible or necessary. Repeatedly over the past decade, the DPRK has threatened to retaliate for any U.S. strike on North Korea by launching strikes against U.S. assets anywhere in the world or even against U.S. territory. For example, a December 1998 statement proffered the following warning:

> We have our own operation plan. "Surgical operation" style attack and "preventive strike" [by the U.S.] are by no means an exclusive option of the United States. The mode of strike is not a monopoly of the U.S., either. It must be clearly known that there is no limit to the strike of our People's Army and that on this planet there is no room for escaping the strike.[21]

Though the DPRK has yet to demonstrate the capability for building and testing such a missile, such threats cannot be discounted and must necessarily be a factor in long-term U.S. planning. A successful launch of a multi-stage missile would also help validate Pyongyang's self-perception of its presumed equivalence with U.S. strategic power.

Pyongyang's more immediate requirement is to put its neighbors and U.S. regionally deployed forces at risk. North Korea already possesses a daunting array of conventionally armed short and medium-range missiles and other weapons systems such as long-range artillery that can be directed against targets in South Korea and beyond. These capabilities are based on indigenous production capabilities as well as the continued development of

[21] Statement of the DPRK Korean People's Army General Staff Spokesman, KCNA, December 2, 1998.

new or improved capabilities.[22] According to General B.B. Bell, commander of U.S. Forces Korea (USFK), North Korea currently deploys over 800 missiles, comprising "over 600 Scud missiles of various types and as many as 200 Nodong missiles."[23]

Siegfried Hecker's observation about the need for nuclear testing applies with equal relevance to ballistic missiles. Pyongyang cannot expect to achieve a credible longer-range missile capability simply by having tested a prototype first in 1998 and a more advanced version eight years later, with no testing in between. (This long interregnum, however, reflected North Korea's pledges of a moratorium on the testing of longer-range missiles, with advancement of multi-stage missile capabilities during this period limited principally to engine testing at static test beds.) The contrast between the clear success of three Nodong missiles and three Scud variants—all proven, reliable systems—in North Korea's July 2006 tests as well as the conspicuous failure of the Taepodong 2, highlights an inescapable conclusion: additional testing of missiles, especially multiple stage missiles, is essential to any North Korean plans to more fully operationalize its delivery capabilities, whether or not the missiles are armed with nuclear warheads.[24] Though it is possible that after October 9 North Korea will feel less constrained in pursuing a longer-range missile option, resource constraints and technology and engineering requirements may impose serious constraints on any such plans relative either to the continued investment in more "tried and true" missile systems or to the pursuit of less ambitious nuclear goals.

The DPRK might, however, have an alternative and less obtrusive path to missile enhancement through its long-standing relationship with Iran. Tehran has been among North Korea's closest and longest-term customers and collaborators. Iran has purchased and tested versions of the Nodong, designated the Shahab-3, with a range of approximately 1,500 km.[25] Tehran is engaged in a vigorous testing program, purportedly based on an indigenous

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22 For a detailed and helpful overview, see "CNS Special Report on North Korean Ballistic Missile Capabilities," Center for Nonproliferation Studies, Monterey Institute for International Studies, Monterey, March 22, 2006 ~ http://cns.miis.edu/pubs/week/pdf/060321.pdf.

23 General B.B. Bell, testimony before the Senate Armed Services Committee, Washington, D.C., March 7, 2006 ~ http://armedservices.senate.gov/statemnt/2006/March/Bell%2003-07-06.pdf.

24 "North Korea's Missile Tests-Troubling Trajectories," The International Institute for Strategic Studies, IISS *Strategic Comments* 12, no. 6, July 2006.

25 See in particular Congressional Research Service, *Weapons of Mass Destruction*, 10–11. Despite the study's title, the report discusses North Korea's missile transactions with both Pakistan and Iran.

manufacturing capability.[26] Iran claims to have developed a new model of the missile, with an estimated range of 2,000 km; other reports suggest an additional missile variant with a range of 1,300–1,400 km. Recent innovations have also encompassed new configurations in warhead design. The accuracy of the missile has also reportedly been enhanced and the estimated weight of the warhead reduced to 700 kg. In view of the lengthy, close collaboration between the DPRK and Iran, there is a real possibility that design innovations and test data are being shared between them. If so, North Korea may be an indirect but substantial beneficiary of this collaboration. Such cooperation might enable Pyongyang to accelerate progress toward ultimately "mating" a Nodong missile with a nuclear warhead.

These judgments presuppose that the North will be able to develop a workable miniaturized warhead that could be placed atop such a missile, thereby putting Japan and U.S. forces at increased risk, and even potentially extending beyond Japan. For these reasons alone, therefore, we should anticipate heightened missile defense efforts by Japan as well as the United States. Yet the outside world knows very little about the status of North Korea's R&D efforts. Based on the problematic results of the first nuclear test, this is a stage in nuclear weapons development that North Korea has yet to approach and (as Hecker also notes) would almost certainly require additional nuclear weapon tests: but this highlights yet again the potential implications of North Korea having definitively crossed the nuclear divide, without a clear sense of how the country proceeds from here. It is likely that the DPRK has only begun to ponder fully what an operational nuclear capability might entail. This is not intended to suggest that there is a single path to nuclear and missile advancement. Entirely possible, however, is that Pyongyang's weapons scientists and missile builders are only now beginning to come to grips both with the new realities that they face and with a still problematic path to becoming a more credible nuclear weapons state.

SOME POLICY IMPLICATIONS

North Korea's test of a nuclear device attests to its ability to undertake a technically demanding long-term program and see it to fruition but reveals very little else about where or how Pyongyang proceeds from here. Not at all

[26] The information in this paragraph draws substantially on Kensuke Ebata, "North Korea's Nuclear Weapon Test Prompts Concerns about Iranian Missile Development," *Sekai Shuho* (in Japanese), November 14, 2006, 48–49. The author thanks Alan Romberg for calling this article to his attention.

clear is whether anyone in North Korea could answer this latter question. Even if someone could, equally uncertain is whether the DPRK has the wherewithal to get there from here on a practicable timetable. Added to this is the question of whether the actions of the outside world will matter very much in North Korea's future decisions. As a seasoned and appropriately cynical former U.S. official has observed, if for sake of argument the U.S. directly approached Kim Jung Il to achieve a political breakthrough, would the North Korean leader be able to say what he wants and needs from the United States? The answer is not at all certain.

North Korea has tested a nuclear device, even if the results may not have been what Pyongyang expected. This act cannot be "undone." The DPRK is, however, one of the world's most impenetrable states. The immediate policy questions relate to what outside powers can do both to minimize the risks posed by North Korean actions and to make it as difficult as possible for North Korea to achieve significant headway in its nuclear goals, without triggering responses from Pyongyang that make the existing situation even more dangerous. In this context, it is imperative that communication channels remain open to North Korea and that new ones be considered. Though the persistent efforts by China to induce Pyongyang's return to the six-party talks are welcome, this is an episodic diplomatic venue, rather than an ongoing process. There is the obvious risk that the DPRK will endeavor to "pocket" the political gains that would derive from more sustained efforts to open doors to North Korea's leaders, but this should be the least of the outside world's concerns. The U.S. willingness to meet bilaterally with North Korea in Berlin in mid-January constitutes evidence of flexibility that may yield meaningful results; even if it does not produce a significant or sustained breakthrough, it is heartening that the effort has been undertaken.[27]

Notwithstanding its isolation, open defiance of non-proliferation norms, and acute internal vulnerabilities, North Korea has grimly persisted in its nuclear weapons efforts. Its indigenous technological and industrial base will likely enable it to make continued progress toward longer-term goals in weapons development, though this progress will remain halting and incomplete. The question is whether external powers can meaningfully inhibit or slow the DPRK's further nuclear development. North Korean trading companies and military-scientific personnel will maintain and even enhance their efforts to acquire a wide array of dual-use equipment and

[27] Glenn Kessler, "U.S. Open to Bilateral Talks on Ties with N. Korea: Envoy's Offer Linked to Shutdown of Nuclear Programs, as Pyongyang Had Vowed," *Washington Post*, January 18, 2007.

industrial items to advance the DPRK's weapons testing and development programs; limiting its access to these technologies must therefore be a high-priority, coordinated policy endeavor. This task is now made easier both by the international community's obligations under UNSCR 1718 and by the heightened efforts among the five other members of the six-party process to communicate and coordinate their respective actions. Yet what if (as seems much more likely than not) North Korea is able to continue its programs, all the while reminding the outside world of its ability to inflict harm on its neighbors, even as its neighbors remain equally concerned by the risks to regional stability posed by an internal meltdown in North Korea? The DPRK is a hugely repressive state and very possibly an endangered species, but what are the policy alternatives if North Korea either refuses to fold its tent or undertakes additional, even riskier steps to counter perceived threats to its survival? What if the regime is able to revive its economy through a process of incremental reform without foregoing its nuclear capabilities and longer-term nuclear potential? These questions remain deeply sobering and require full and frank discussion among all affected states, unburdened by unrealistic preconceptions about North Korea and without remaining tethered to past policy decisions and their consequences.