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Uncertainties in the North Korean Nuclear Threat

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Summary

North Korea is a master at denying the United States information on its sensitive military capabilities. The resulting lack of information on the North Korean nuclear weapon threat makes that threat highly uncertain. This briefing addresses those uncertainties, including the number and nature of North Korean nuclear weapons, their potential delivery means, how they could be used, and what effects they might cause.

Background

North Korea is a failing state, having serious economic difficulties and unable to feed its population. Starvation is not uncommon. North Korea is experiencing lots of rebellious behavior in the forms of refugee flows into China, major black market activities, graft and corruption by North Korean authorities, and even reported attacks on North Korean leaders. While North Korean propaganda has facilitated survival of the regime, that propaganda appears to be unraveling. And Kim Jong-Il's poor health means that in the next few years a second dynastic succession will likely be attempted; this will apparently be to a son who is very young and not well established.

While the regime is in jeopardy, it has not yet collapsed, and may not in the next few years. It is being sustained in large part by elites who know that regime collapse could doom them to trials and starvation. To moderate external pressure against the regime, North Korea has positioned itself as the ultimate poison pill: The collapse of the regime could be a disaster for China and the Republic of Korea (ROK) in terms of refugees, economic challenges, stabilization, and North Korean revenge. But, at some future time, a group of North Korean elites could decide to act against the regime, forcing it to choose a diversionary war against common external foes to unify North Koreans or risk internal overthrow and regime collapse. And if the regime collapses, a civil war could develop in which weapons of mass destruction (WMD) are used between the factions, likely spilling over into South Korea and China. Regime collapse could also open the gates for WMD proliferation.

The North Korean Nuclear Weapon Threat

North Korea has produced enough plutonium for perhaps 6 to 10 or so nuclear weapons. It may also have received enough plutonium from external sources for another 10 or so nuclear weapons. And it may have enough highly enriched uranium for several nuclear weapons. Thus

North Korea may have as many as 5 to 20 nuclear weapons (after having tested two weapons), though we know for sure only that it has produced the two weapons that it has tested. It may also have obtained external help for designing a nuclear warhead that could be carried on a ballistic missile; for boosting the nuclear weapon yield; and for improving missile/warhead accuracy, reliability, and range. Thus, North Korea may be able to deliver nuclear weapons against ROK, Japanese, Chinese, and Russian cities or other targets.

The characteristics of North Korean nuclear weapons are also highly uncertain. A basic North Korean nuclear weapon might have a yield in the 10 kiloton (Kt) range. The limited North Korean testing and other factors imply that at least some North Korean weapons might have a yield in the 1 Kt range. And if North Korea has had external help with boosting warhead yield, some weapons might have yields in the 30-to-50 Kt range. North Korean nuclear weapon reliability and delivery probability (on a missile) might vary from 30 to 70 percent or so before ROK, Japanese, and U.S. missile defenses are taken into consideration. North Korean missile accuracy might mean that half of the warheads would arrive within 2 to 5 kilometers of the desired target, though that number could be a few hundred meters if North Korea has mastered the terminal guidance that it has apparently tested.

We know little about how North Korean nuclear weapons are controlled or how they might be executed.

North Korean Use of Nuclear Weapons

North Korea actively uses its nuclear weapons for deterrence and coercion in peacetime. The United States and other countries are reluctant to use military force against North Korea because of the escalation that could result. And North Korea has gained substantial leverage in international negotiations because of its nuclear weapons.

North Korea may employ nuclear weapons in a conflict. North Korea has said a little about what it might target with nuclear weapons and when it would do so in a conflict. The available information suggests that North Korea would likely target many of its nuclear weapons on ROK and Japanese cities, hoping to coerce or deter the ROK, Japan, and the United States. For example, North Korea might threaten a nuclear attack on a city like Pusan if ROK/U.S. forces cross the demilitarized zone (DMZ) or approach Pyongyang as part of a counter-offensive, and execute that threat if ROK/U.S. forces still advance. North Korea might try to coerce Japan into withdrawing from a conflict and assuming a neutral position, denying the United States much-needed help. North Korea would likely begin posing such coercion/deterrence early in a conflict, when most of its weapons are still surviving and it has the potential of achieving conflict-winning leverage through nuclear weapon use. It might also use nuclear weapons for signaling, perhaps trying to achieve electromagnetic pulse (EMP) effects.

North Korea might also use its nuclear weapons early in a conflict because it expects early U.S. nuclear weapon use. It might wish to demonstrate its capabilities and resolve, trying to limit the U.S. use of nuclear weapons.

Kim Jong-Il has implied that he would use nuclear weapons for revenge attacks. In response to a request by his father to indicate how North Korea should respond to a war that

North Korea lost to the United States, Kim Jong-Il said, “Great Leader! I will be sure to destroy the Earth! What good is this Earth without North Korea?”¹

If the North Korean regime collapses, the leaders of various factions may take control of nuclear weapons. Most of those factions would have few nuclear weapons—perhaps only one or two. They may decide to use these weapons against other factions that threaten them, use them against external actors (such as the ROK or Japan), or try to sell them to third parties.

The Damage North Korean Nuclear Weapons Could Cause

Many of the factors mentioned above would affect the damage that North Korean nuclear weapons could cause. At the physical level, a 10 Kt nuclear weapon could have a “lethal radius” of about 1,100 meters and a “serious casualty radius” of almost 1,500 meters if ground burst. A ground burst could cause some fatalities out to perhaps 1,800 meters or so, and casualties out further. Fallout casualties would occur at much longer distances in the direction that the winds would blow the fallout.

Affecting Different Targets

North Korea is likely to focus on threatening and attacking cities with nuclear weapons to give it major leverage in a conflict. If North Korea targets ground forces, three nominal weapons would cause only about 19 percent casualties to a single ground force division—not much of an impact, since the ROK would have more than 30 divisions prepared to advance into North Korea. Damage to airfields would be higher: Three nominal weapons would cause about 70 percent casualties at a single airfield. But would North Korea have enough nuclear weapons to cause substantial damage to the ROK/U.S. air forces across many locations? In contrast, three nuclear weapons targeted against Seoul could cause an expected half-million casualties (after accounting for delivery probability and reliability). That is a huge amount of damage that would have tremendous physical impact and political ramifications.

Casualties

If a 10 Kt nuclear weapon were ground burst in Seoul (delivered and reliable), it could cause 125,000 to more than 200,000 fatalities and 290,000 to more than 400,000 fatalities and casualties combined. Only about 20 percent of the fatalities would die promptly. The majority of those receiving lethal effects would likely seek medical care along with the injured who would otherwise survive, suggesting that 300,000 or so people could seek medical care for apparent serious injury. In addition, perhaps 200,000 people would seek medical care for lesser injuries, and many hundreds of thousands could seek care as “worried well,” afraid they had been injured (especially by radiation) but in reality not having been physically injured. This total demand for medical care is highly uncertain but could easily overwhelm the doctors and beds in Korean hospitals and clinics throughout the country.

If North Korea attacked a major Japanese or ROK city other than Seoul, the casualty numbers would tend to be 5 to 40 percent less than estimated for Seoul. But the numbers used for the population of Seoul reflect a residential population distribution (nighttime). If North Korea were to attack in the middle of the day, the casualties would be much less (maybe 30 per-

¹ Kim, H., 2008.

cent) if an attack occurred in the residential part of a city, and much more if an attack occurred in the downtown office area (perhaps 50 percent higher or more).

If North Korean nuclear weapons had a yield as small as 1 Kt, the casualties might be 25 to 30 percent of the casualties from a 10 Kt weapon, depending on the city targeted. If North Korea had a 50 Kt warhead, the casualties could be 2 to 2.5 times higher.

Other Effects

Nuclear weapons can have a wide variety of effects beyond just casualties. They can damage buildings, housing, and other elements of infrastructure, causing serious economic impacts and humanitarian disaster. The fallout residual could deny the use of facilities and other areas, further disrupting the economy. And psychological reactions could affect many people such that their productivity would be lost or reduced. Outside of the attack area, the threat of radioactive contamination and other factors may stigmatize Korean goods, further complicating problems for the Korean economy. And economic disruption can ripple through an economy in devastating ways: While the United States lost less than 0.002 percent of its population to the September 11, 2001, attacks, it lost 1 to 5 percent of its gross domestic product (GDP) that year.

Even a single nuclear weapon hitting Seoul might have devastating economic consequences. Considering only primary and secondary effects, the Korean GDP might be reduced by at least 10 percent for ten years or more, amounting to a cost of roughly \$1.2 trillion. The ROK wealth might be reduced by perhaps 4 percent, or \$120 billion. And the population loss might cost the ROK economy \$220 billion in lost productivity. Together, these costs amount to a nearly \$1.5 trillion (1.5 quadrillion won) loss to the ROK economy. The serious magnitude of such effects would justify significant expenditures on defenses to prevent a successful North Korean attack, even if the likelihood of such an attack were low.

The North Korean nuclear weapon threat could also induce the ROK and/or Japan to develop an independent nuclear weapon capability. Both the ROK and Japan are covered today by a U.S. “nuclear umbrella” guarantee, in which the United States promises to use its nuclear weapons in response to extreme actions by North Korea. But some people in both the ROK and Japan lack confidence in the U.S. commitment; they might eventually push for national nuclear weapon capabilities to deter North Korean attack and redress the regional military balance. If they do so, they could imperil the nuclear Nonproliferation Treaty, start a regional arms race, and raise questions in the United States about the wisdom of its alliance with these countries.

Conclusions

North Korea is a failing state that is increasingly dependent on its nuclear weapons for deterrence of outside intervention, for both internal and external leverage in peacetime, and for overcoming its conventional inferiority in a time of war. North Korea’s nuclear weapon capabilities are highly uncertain, but even modest nuclear capabilities could cause immense damage, especially if ROK and/or Japanese cities are attacked as North Korean references suggest. Even if North Korean nuclear weapons fail to provide North Korea with enough military power to win a conflict with the ROK and the United States, they may be sufficient to damage the ROK so seriously that it would not be able to absorb the North without immense foreign assistance.

Will the ROK spend what is needed today to develop military capabilities to minimize or avert nuclear weapon damage, or will it instead accept vulnerability and the potentially huge cost of resolving the damage that North Korean nuclear weapons could do?