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by Jungmin Kang, Tatsujiro Suzuki, Peter Hayes

I. Introduction

The following is a paper by Jungmin Kang, Tatsujiro Suzuki, Peter Hayes. Jungmin Kang is an independent nuclear policy analyst in Seoul and Associate of Nautilus Institute; Tatsujiro Suzuki is a nuclear analyst affiliated with University of Tokyo in Tokyo; Peter Hayes is Director of Nautilus Institute in San Francisco.

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II. Essay by Jungmin Kang, Tatsujiro Suzuki, Peter Hayes

"South Korea’s Nuclear Mis-Adventures”

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Once gained, it’s hard to lose technical capacity or scientific knowledge. In the early seventies, and

reportedly in the late seventies and early eighties, South Korea tried to obtain nuclear weapons capability. This state-sanctioned effort included attempted acquisition of reprocessing plant from France, and the purchase of intermediate-range missile blueprints and an entire Lockheed jet engine factory from the United States. These early nuclear adventures were halted by American intervention.

Since then, many observers assumed that its enormous investment in nuclear reactors for power production and the admission of South Korea into the first tier OECD states, combined with continued extension of nuclear deterrence from the United States to its junior ally, had put paid to any residual pretensions to obtain nuclear weapons of its own. It was well-known that the elements of nuclear establishment in the South still want to reprocess plutonium from spent fuel to "close the fuel cycle" like in Japan. Indeed, insiders knew about the plutonium hanky-panky whereby the handling of spent fuel and related chemistry at KAERI in the early eighties transgressed the reprocessing boundary in scientific reality. And some mavericks in the South argued openly that it should obtain its own nuclear weapons.

But most analysts assumed that the gains flowing from being a certified, squeaky clean nuclear-powered state meant that the South Korean government would adhere stringently to all its nuclear safeguards obligations and rein in the pretensions of scientists such as those affiliated with the Korea Atomic Energy Research Institute (KAERI), and would forego all nuclear weapons-related research and technological capacity. The standoff with North Korea only reinforced this perception that the South would play strictly by the international rules set by NPT-IAEA safeguards system, and enshrined in both the 1992 inter-Korean Denuclearization Declaration (in which both Koreas committed to not acquiring plutonium or enrichment facilities) and in various bilateral agreements such as the 1979 Agreement between the Government of Australia and the Government of the Republic of Korea concerning Cooperation in Peaceful Uses of Nuclear Energy and the Transfer of Nuclear Material whereby Australia agreed to provide uranium to South Korea.

The revelations that South Korean scientists not only enriched uranium in 2000 to 10 percent levels of uranium 235 but also suppressed knowledge of this activity from their own superiors until it became evident that it would come to light anyway in the course of International Atomic Energy Agency environmental sampling, are therefore doubly troubling for two reasons.

First, the fact that the responsible authorities for South Korean compliance with its multilateral nuclear safeguards obligations were kept in the dark for so long suggests that the nuclear establishment may be as poorly regulated as the financial sector in South Korea!

Second, the fact this secrecy was sustained at a time that South Korea was engaged in an attempt to end the North Korean nuclear program, and specifically, its alleged uranium enrichment program, lays the South and its allies, especially the United States, open to North Korean and other third party accusation of hypocrisy and double standards.

What else have South Korean scientists been up to out of the light of public oversight is therefore a fair question and demands a thorough and complete public review by the South Korean government as well as settling with the IAEA in accordance with its standards and rules.

What They Did

Four or five researchers of KAERI (Korea Atomic Energy Research Institute) conducted uranium enrichment experiments three times during January to February 2000. The equipment used was scraped and have been stored at KAERI afterward because they were "contaminated." The original purpose of the experiment was separation of Gadolinium Gd-157 (a neutron absorber) from other Gd isotopes using AVLIS (Atomic Vapor Laser Isotope Separation) technology.

The amount and average enrichment of the separated uranium during the experiment was 0.2 gram and 10 percent, respectively. KAERI did not report the experiment to the Ministry of Science and Technology (MOST) until late June 2004. It seems that KAERI thought it could conceal the experiments because the amount of uranium enriched was very small.

As a result of its ignorance, MOST breached South Korea's obligations under its NPT/IAEA safeguards agreement by not reporting the experiment to the IAEA in 2000. So far, MOST and KAERI do not admit that they violated the safeguards agreement between the IAEA and South Korea. However, the safeguards agreement clearly requires such a report and it seems obvious that South Korea did violate it. This issue will be determined by the IAEA when it considers the ROK report in the near future.

Why Now?

Because the South Korean congress ratified the Additional Protocol (INFCIRC/540) of the IAEA on February 19, 2004, MOST needed to submit a detailed report to the IAEA with increased information about the South Korean nuclear fuel cycle activities and sites within 180 days after the ratification. The Additional Protocol, if implemented, requires environmental sampling at places to which inspectors demand and are granted access. Such sampling at the KAERI site will likely reveal trails of nuclear materials at the site, just as occurred at Yongbyon in the North about a decade ago.

KAERI had been concerned about that it would be difficult to keep the experiments secret with the Additional Protocol in force. KAERI finally confessed its uranium experiments to MOST in late June 2004. MOST officials reported these activities finally to the IAEA on August 17, 2004 and to an astonished world on September 2, 2004. However, more than two thirds of South Koreans appear to have been not alarmed by the news—perhaps because it is seen as "balancing the books" with North Korea.

KAERI's uranium enrichment experiment should not be interpreted as an indicator that the South Korean government is intending to obtain nuclear weapons material. The uranium enrichment experiment has not been conducted with specific planning nor was it supported by the South Korean government or high-level policymakers. South Korea has complied closely with the IAEA safeguards, often in exemplary fashion. In contrast, North Korea expelled the IAEA inspectors and withdrew from the NPT.

Nucleonics Week reported that a US expert proposed to KAERI in 2002 to conduct molecular laser isotope separation (MLIS) experiment for zinc, but the proposal was rejected by the US Department of Energy on non-proliferation grounds. If accurate, this report means that KAERI scientists remained interested in laser enrichment technologies just two years ago. However, production of highly enriched uranium for weapons purposes would have required much larger equipment than that found at KAERI.

Plutonium Separation

The enrichment revelations were underscored by the subsequent public admission that South Korea had conducted plutonium separation experiments during April to May in 1982. A small group of KAERI researchers separated tiny amount (milligram order) of plutonium from about 2.5 kilograms of spent fuel discharged from the TRIGA Mark III research reactor which has a capacity of 2MW thermal power. (The 5MWe Graphite reactor at Yongbyon in North Korea has thermal capacity is about 25MW.)

Like its enrichment activities in 2000, KAERI did not report the plutonium activity to MOST in 1982. Indeed, it seems that MOST did not know about the plutonium separation experiments until 2003 although rumors had circulated in American intelligence circles about this activity since the early eighties.

The IAEA took an environmental samples at a former KAERI site in Seoul in 1997 and 2003 and found physical evidence of separated plutonium. The 1997 and 2003 IAEA environmental sampling at ex-KAERI site in Seoul was permitted by KAERI even though it was not obliged to do so under the then safeguards agreement at that time. KAERI's plutonium separation experiment was discussed in a safeguards meeting between the IAEA and MOST in December 2003.

Conclusion

If the activities are fully documented by the IAEA and no further transgressions come to light, then South Korea’s latest nuclear mis-adventure may have the following positive outcomes.

First, this episode may put paid to any further notions that South Korea should “close its nuclear fuel cycle” by reprocessing, or gain enrichment capacity in a counter-productive quest for energy security.

Second, it suggests that the new IAEA inspection agreement works. The effectiveness of environmental sampling and forensic radiochemistry forced the South Korean scientists to the surface in spite of evident attempts to destroy physical evidence and after three long years.

Third, South Korea’s declaration may offer the North a face-saving way to explain its own enrichment activities as similarly a misguided and mistaken effort by scientists over-anxious to obtain new technology. This is not to suggest that the activities are somehow symmetrical or equivalent—but the way that the situation was resolved might be parallel. Arguably, such South Korea’s declaration is more applicable to the North Korean situation than the Libyan model of complete nuclear capitulation.

Fourth, it offers South Korea a way to reassert its non-nuclear commitments in ways that are stabilizing in the region and dampen subterranean aspirations in some parts of Japan’s leadership for their own nuclear capacity. Japan’s media, for example, reported on news of South Korean enrichment and much older plutonium reprocessing with great concern and skepticism.

Fifth, if handled correctly, the events may end up accelerating rather than delaying the next round of six-party talks in Beijing over North Korea's nuclear activities and related issues. The fact that enough plutonium for a small arsenal of nuclear weapons is no longer safeguarded and may have been weaponized in the DPRK remains the most urgent nuclear proliferation issue in this region. South Korea's surprise detour from the straight and narrow path should not divert anyone from this primary task.

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