Summary of “Update Review of Safety Aspects of Nuclear Power Program in Republic of Korea”

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December 23, 2010

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I. Introduction

The following is a summary of the report, "Update Review of Safety Aspects of Nuclear Power Program in Republic of Korea" by S. Levy, which was prepared for World Bank/UNDP, and dated April 1982 and appeared as a NAPSNet Special Report on December 23, 2010.

This summary was prepared by David von Hippel, Nautilus Institute Senior Associate.

The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Nautilus Institute. Readers should note that Nautilus seeks a diversity of

views and opinions on contentious topics in order to identify common ground.

II. Summary by David von Hippel

The 1982 document *Update Review of Safety Aspects of Nuclear Power Program in Republic of Korea*, by S. Levy, consulting for the World Bank and UNDP, was a follow-up to a 1980 review of nuclear power program safety in the Republic of Korea (ROK). The 1982 report focused in particular on regulatory aspects and operational safety of nuclear power plants in the Republic of Korea, which was then in the early stages of developing its nuclear power program; the first ROK commercial reactor went on line in 1978, and the second and third in 1983. The reason that this older report is of salience today is that the ROK's northern neighbor, the Democratic People's Republic of Korea (DPRK), has recently revealed a surprisingly mature program for enrichment of uranium to produce (it claims) fuel for a domestically-developed fleet of small light-water nuclear power reactors (LWRs) [1]. The international community is currently considering how to respond to the DPRK's enrichment program. One (though certainly not the only) response would be for concerned nations to engage the DPRK to make sure that its nuclear energy program, as it develops, conforms to international norms and standards regarding safety, transparency, and regulatory oversight [2]. Findings from report, written three decades ago about another Korea, are therefore applicable, suitably interpreted, to the DPRK situation today.

Following an Executive Summary, the S. Levy report provides a short introduction outlining the goals of the study, the status of nuclear power in the ROK at the time of the author's study mission, and the meetings and site visits in the ROK undertaken as a part of the author's review. The two main sections of the report focus on regulatory aspects of nuclear power in the ROK at the time, and on operational safety at nuclear facilities.

Discussion of the regulatory aspects of the nuclear sector starts with a discussion of changes in the ROK's Atomic Energy Law, the establishment of ROK agencies to control and oversee elements of the ROK nuclear industry, and the issuing, implementation, and enforcement of safety and quality-control regulations. Recommendations for improvements in these areas focus on high-level government commitment to nuclear safety and quality (even at the expense of meeting project timelines); capacity-building in both number and capabilities of staff, as well as analytical methods, for ROK nuclear institutions; prioritization of agency activities to focus first on operating reactors; establishment of a considered program for developing "regulations, criteria, codes, and standards" at a pace such that they can be assimilated by both regulatory and regulated authorities; development of a clear understanding of the authorities of the different ROK nuclear regulatory actors, with coordination through an Advisory Group reporting to the Director of the Nuclear Safety Center; and standardization of reactor designs, with the promise of streamlined safety and operating review as a reward for standardization.

The operational safety section of the report describes the status of the operating Kori-1 and under-construction Kori-2 and Wolsung-1 reactors, and emphasizes the need for ROK reactor operators to realize that reactors will need to be continually upgraded. Other recommendations in the operational safety area include capacity building for nuclear plant operators (including training simulator modifications and upgrades), development of emergency procedures in response to specific reactor "symptoms", development of an action plan for upgrades based on what had been learned from the (US) Three Mile Island reactor accident, and development of an inventory of adequate reactor spare parts.

A section of the report providing "Other Comments" notes the need for quality assurance improvements, underscores the need for manpower development in the Korean nuclear industry, notes that progress on radioactive waste disposal—still, by the way far from settled in the ROK or practically anywhere else as of 2011—"should be accelerated", and highlights that "a total integrated and cooperative Korean nuclear power program is needed". Appendices to the report describe the conduct of the mission to the ROK, list changes in the ROK nuclear regulatory framework and organization, and provide background documents relating to the nuclear power and nuclear regulatory organizations in the ROK as of 1982.

In the Executive Summary of the report, the author lists the mission's principal conclusions as:

- "…it is essential and urgent that there exist in the Republic of Korea a strong, independent, and competent nuclear regulatory function as well as associated Korean safety laws, regulations, codes and standards."
- Given limited progress in operational safety at the ROK's Kori-1 plant since the previous review, it was important to recognize the difference in complexity between nuclear and other types of power plants, and as a result the emphasis required on continual upgrading in equipment and personnel training.
- An effective program of audits and inspections of ROK nuclear facilities by independent third-parties was needed.
- An "integrated and complete Korean nuclear power safety program" was not available, but was needed, and would require coordination among various ministries and organizations.

These conclusions, and the other recommendations summarized above, provide a snapshot from the early history of the ROK nuclear program, but also provide useful guidance to those in the US, the ROK, international organizations such as the International Atomic Energy Agency (IAEA), others international actors, as well as the DPRK itself, as to what will be required, if the DPRK continues to move forward with an LWR program, to make sure that program absorbs the lessons of the ROK and elsewhere, and does not repeat the same mistakes. To be sure, three decades have provided a wealth of additional knowledge that can and should be applied to capacity building for a safe, transparent DPRK nuclear program in which the international community (as well as the North Koreans) can have confidence, but an appreciation of the history of the previous nuclear power development program on the Korean Peninsula is an instructive start.

III. Citations

[1] See, for example, Siegfried S. Hecker (2010), A Return Trip to North Korea's Yongbyon Nuclear Complex. NAPSNet Special Report, dated November 22, 2010, and available as https://nautilus.org/publications/essays/napsnet/reports/a-return-trip-to-n-rth-korea2019s-yongbyon-nuclear-complex.

[2] See the January, 2011 Nautilus Special Report Online Engaging The DPRK Enrichment And Small LWR Program: What Would It Take?, by David von Hippel and Peter Hayes, which provides some initial thoughts on the forms that international engagement with the DPRK on their small LWR program might take.

IV. Nautilus invites your responses

The Northeast Asia Peace and Security Network invites your responses to this essay. Please send responses to: bscott@nautilus.org. Responses will be considered for redistribution to the network only if they include the author's name, affiliation, and explicit consent.
