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The Domestic and International Politics of Spent Nuclear Fuel in South Korea: Are We Approaching Meltdown?

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In a little more than three decades, South Korea has emerged as the world's fifth-largest nuclear energy producer and, more recently, a significant nuclear power plant exporter. This development has been driven by concerted government action as well as South Korea's particular economic circumstances as a rising economic power lacking significant fossil fuel reserves. In the coming years, South Korea plans to increase further its reliance on this low-carbon source of power as Seoul seeks continued economic growth without increasing carbon emissions. Nuclear power has brought important benefits to South Korea but also one particularly negative consequence: an accumulation of spent nuclear fuel that will soon outstrip the country's storage capacity for highly radioactive waste.

The lack of storage capacity results primarily from domestic politics. To be sure, South Korea is not alone in this respect: public opposition to nuclear waste disposal has meant that only one country (Finland) is on track to open a permanent repository for the most dangerous nuclear waste. However, public opposition to nuclear waste disposal sites in South Korea has been more vociferous and long-standing than in many other countries, leading on one occasion to rioting. This has led Seoul to regularly unveil and then scrap proposed new sites for disposing of this material and to reach a compromise earlier this decade on disposing of lower-level wastes that may have made even more intractable the problem of permanent disposal of high-level wastes.

Seoul's dilemma has been exacerbated by some factors unique to South Korea. Korea's tight population density makes it far more difficult to build a single large permanent underground repository for nuclear waste, complicating Seoul's political challenge. South Korea's location next to nuclear-armed North Korea and its status as a major U.S. ally and longtime partner with Washington in nuclear development have also constrained South Korea's choices when it comes to disposing of nuclear fuel. Ever since the United States pressured South Korea to shut down an incipient South Korean program aimed at producing plutonium in the 1970s, the United States has used both legal restrictions embedded in nuclear cooperation agreements and political pressure to ensure that Seoul does not follow that path again. In particular, Washington has concentrated on ensuring that South Korea does not separate plutonium from spent nuclear fuel—a process that can be used to provide both additional fuel for nuclear plants and fissile material for nuclear weapons. Other countries such as France and Japan have used that process, commonly known as "reprocessing," to delay the day of reckoning when it comes to high-level nuclear waste. Washington, at times, has also sought to involve Seoul in regional and multilateral efforts to build spent-fuel repositories but has yet to meet with success.

The current nuclear cooperation agreement between South Korea and the United States is set to expire in 2014. Only a few years later, South Korean scientists predict, the spent-fuel pools at South Korea's nuclear plants will begin to reach capacity.[1] The urgent need for South Korea to find somewhere to put its surplus spent fuel means that Seoul is seeking to use the talks to relax some of Washington's long-standing restrictions on the separation of spent fuel. In particular, Seoul is trying to win Washington's blessing for constructing new facilities to test the economic and technical feasibility of utilizing a new form of reprocessing, known as pyroprocessing. Seoul contends that the process, originally conceived in the United States, does not produce a product suitable for nuclear weapons and should not be restricted in a manner akin to traditional reprocessing. In particular, Seoul argues that it should not even be considered reprocessing because South Korea does not plan to separate pure plutonium from spent fuel, as is done in traditional re-

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processing; instead, it plans to leave it mixed with other transuranic elements. But the U.S. government has yet to give its blessing. The United States worries that the process could be altered to produce a less benign product, that it will be too difficult to institute safeguards to prevent such changes, and that any relaxation of its rules would harm its global and regional nonproliferation efforts.

Current Nuclear Energy Production and Nuclear Waste Accumulation in South Korea

Korea utilizes 20 nuclear reactors, which generated 144.3 terawatt hours of electricity in 2008, a little more than one-third of the country's total electricity production. South Korea's nuclear energy production only slightly trails that of Russia although its output still falls considerably behind that of the United States, France, and Japan, the world leaders.[2]

According to the 2008 National Energy Basic Plan, however, South Korea plans to increase nuclear energy's share of electricity generation to 59 percent by 2030, and the government plans to build approximately 18 more nuclear reactors.[3]

Yet, by the end of 2008, the existing reactors alone had already generated 10,083 tons of spent fuel and were adding 700 tons more each year.[4] By the end of the century (assuming the new planned reactors come on line), the cumulative amount of spent fuel produced by South Korean reactors is expected to exceed 110,000 tons. To dispose of such a large amount of spent fuel at a single site, an underground repository (and an exclusion zone surrounding the site) would need to cover as much as 80 square kilometers, an area considerably larger than Manhattan. Finding that much free space in South Korea would be enormously difficult. The country is approximately the size of Virginia and is home to about six times as many people.

The Domestic Politics of Spent Fuel in South Korea

Seoul has been trying to tackle the issue of spent-fuel disposal almost from the moment its first nuclear plant began operating in 1978. Because of the perception that Seoul would not have to decide on the ultimate means of dealing with spent fuel or high-level nuclear waste for decades, Seoul's early measures were aimed at finding a site for disposing of low- and intermediate-level nuclear wastes (LILW) and an interim storage facility for spent nuclear fuel located away from reactor sites.[5] The early decisions not to construct interim storage facilities at reactor sites (such as had been done in countries like Germany) reflected both historical circumstances and political judgments. When Seoul made these decisions in the mid-1980s, dry cask storage technology, which would prove so useful in Germany and is easier to manage at reactor sites, had not been widely adopted; instead, liquid pools were seen as the model. Seoul decided that, if spent-fuel rods were to continue to be housed in water pools after they had cooled, it would make more sense to locate them all in a single facility. Likewise, Seoul calculated that it would be easier to decommission nuclear plants and clean up the sites when they were no longer functional if no interim spent-fuel storage sites were located at the facilities.

Seoul made these decisions without a great deal of public input, and subsequent attempts to locate a site for these facilities repeatedly foundered amid public opposition. During 1986–89, for example, the Korea Atomic Energy Research Institute (KAERI) conducted a broad geological study and picked what it saw as the top three potential sites for LILW and interim storage of spent nuclear fuel; these were on Korea's southeastern coast and were supposed to begin operation by 1995 (for LILW) and 1997 (for spent nuclear fuel). But in 1989, this effort was stopped by opposition from local residents living near the potential sites.

One year later, the government tried again, with plans to locate these facilities on Anmyeon Island, west of the mainland, and it sweetened the pot by proposing to construct a second headquarters for KAERI there. But a riot broke out when the plan was leaked to the press, the government again scrubbed the plan, and the minister responsible for the radioactive waste project resigned. Efforts to shift tack in 1991 and 1994 and seek public bids for the sites also fell through. Finally, another effort for a LILW facility proved fruitless: the government had planned to locate the site on the tiny, uninhabited Gulup Island, 90 kilometers southwest of Incheon harbor, but it suspended the plans after an active fault was found near the island.

In 1996, the government decided to split responsibilities for dealing with nuclear waste. It charged the electrical utility, Korea Electric Power Corporation (KEPCO), with finding a site for LILW and an interim spent-fuel storage facility (in 2001 this responsibility was transferred to Korea Hydro and Nuclear Power [KHNP]). KAERI, in turn, was assigned to focus on researching technology for ultimate disposition of spent fuel, with the ultimate decisions put off to a later date. The change, however, did not convince communities to house the facilities. Therefore, in 2005, the government took a new approach

that helped it to secure a two-square-kilometer site for LILW in Gyeongju, a city in the southeastern part of the country. The new approach, however, involved not tackling the most dangerous waste and providing a number of sweeteners to the host community. A new law pledged that no additional spent-fuel storage facilities would be located in the host area, and it included a number of additional incentives:

- Providing a one-time $300 million contribution along with additional contributions of $600 per waste drum accepted (with a total potential cost of nearly $500 million if the site reaches full capacity),[6]
- Relocating KHNP headquarters to the same community,
- Locating a proton accelerator and related research and development facilities in the area, and
- Promising additional long-term federal support to the area.

With these concessions in hand, Seoul was able to begin construction of the facility in 2007. It is estimated to cost $1.5 billion at its initial capacity of 100,000 drums and considerably more if it reaches its full capacity of 800,000 drums. South Korea's leaders worried about the potential cost if they were to use a similar process to find a final disposal site for more highly radioactive material (which would require 30–40 times more space), and they have sought other alternatives.

In its December 2008 long-term research and development plan, the Korea Atomic Energy Commission (KAEC), the country's top nuclear policymaking body, which is chaired by the prime minister, called for investigating the possibility of using pyroprocessing to treat spent nuclear fuel, with the resulting product to be burned in new fast-burner reactors. It called for the construction of a demonstration pyroprocessing facility and fast-burner reactor by 2028 in order to test this proposed system's economic and technical viability.

Moving forward with these facilities would effectively require Seoul to convince the Obama administration to alter, to Seoul's benefit, its views on pyroprocessing and reprocessing, something that the U.S. administration has been quite reluctant to do for political, diplomatic, and historical reasons.

U.S.-ROK Tensions over Spent Fuel

U.S.-ROK cooperation in the civil nuclear field is governed by the 1974 Agreement Concerning Civil Uses of Nuclear Energy, which expires in 2014.[7] Insofar as spent nuclear fuel is concerned, the provision that is most relevant in that agreement is Article VIII (F), which provides that, with respect to reprocessing or "alteration in form or content" of U.S.-obligated spent fuel, "such reprocessing or alteration" shall be performed in facilities acceptable to both parties upon a joint determination of the parties that the provisions in Article XI (dealing with the application of International Atomic Energy Agency [IAEA] safeguards) may be effectively applied. Thus, its legal emphasis is on the ability of IAEA inspectors to detect whether material from the civil nuclear program could be diverted to weapons, rather than trying to forestall this possibility altogether.

By contrast, the new agreement will be negotiated against the background of the 1978 U.S. Nuclear Non-Proliferation Act (NNPA), which amended the Atomic Energy Act of 1946 pursuant to which the 1974 agreement had been concluded. The NNPA established new criteria for nuclear exports, including a provision on "subsequent arrangements" covering a range of activities. The NNPA requires that any new nuclear cooperation agreements condition the supply of U.S. nuclear material on the willingness of the recipient country to agree that it will have to obtain prior consent from the United States for any "alteration in form or content." It also broadens U.S. consent rights to cover not only nuclear material supplied by the United States, but also nuclear material that has been irradiated in a U.S.-supplied reactor. Agreements with non-nuclear-weapons states that adhere to the NNPA are subject to a congressional process that is biased toward approval: after Congress receives such an agreement, lawmakers must pass legislation opposing it within 90 legislative days for it to be blocked. Although the United States has sought to have South Korea sign a new cooperation agreement adhering to the NNPA terms, Seoul has refused to do so, preferring to wait until the current one expires.

Instead, South Korea in the new negotiations is seeking advance, long-term U.S. consent to pyroprocess or even reprocess U.S. fuel and use the fuel in fast reactors, a right the United States has so far granted only to Japan and Euratom several decades ago and to Switzerland and India recently. Such a deal would likely be seen as falling short of the NNPA's requirements and would thus face far tougher requirements for congressional approval. Under this circumstance, the administration would have to convince majorities in both the House and Senate to approve the change. South Korean officials have sought to dodge this issue in part by arguing that, given the differences between pyroprocessing and traditional reprocessing, South Korean technology should not be subject to

the same limitations; but it is unlikely this argument will sway lawmakers or nonproliferation advocates.

Throughout the life of the current agreement, South Korea has shown a consistent interest in reprocessing although its motivations and the type of technology it has pursued have changed over time.

South Korea's interest in reprocessing was first stimulated by views then popular in the global community that the world would soon see the emergence of a nuclear energy economy anchored on plutonium breeder reactors, which, of course, would require reprocessing capability. In the early 1970s, South Korea sought to purchase this technology, eventually reaching agreement to buy a small-scale reprocessing plant from France. This initial effort was halted, however, after the 1974 Indian "peaceful" nuclear test prompted the United States to turn against the spread of reprocessing technologies and after revelations that the then military government of Korea was planning to develop nuclear weapons or, at least, acquire the technology and capability to do so on short notice. Park Chung-hee, then Korea's president, backed away from the effort after the United States threatened to withdraw its security guarantee to South Korea if Seoul did not halt its weapons development plans.[8]

A second stimulant related to national security was the concern that with the end of the Vietnam War the United States would—and in fact announced its intention to—draw down its military presence in South Korea notwithstanding the divided status of the Korean peninsula and continuing tension between North and South Korea. The announcement by President Jimmy Carter in the late 1970s that the United States intended to withdraw all ground troops from the peninsula by the early 1980s reinforced Korean security concerns, leading Seoul to renew its efforts to acquire a reprocessing capability from France—an effort thwarted by Carter's personal intervention with the French prime minister and his nearly simultaneous decision to halt the withdrawal of U.S. forces from the Korean peninsula.[9]

As noted earlier, Seoul's current primary incentive to acquire a reprocessing capability relates to the spent-fuel management challenge facing the Korean government—a challenge with near-term and longer-term implications—for which pyroprocessing is seen as a suitable option from the point of view of Seoul, but less so by Washington.

A consideration that may play a larger role in the future is the emergence of South Korea as a nuclear exporter. South Korea has just beaten out leading U.S. and French nuclear-exporting firms to win its first major nuclear export agreement—a $20 billion deal to export four nuclear reactors to the United Arab Emirates—and South Korea aims to capture 20 percent of the world market for nuclear reactors by 2030. It has also clinched a smaller deal to supply a research reactor to Jordan. Entry into the international market could provide a justification for seeking to develop and offer full fuel cycle services.

All the while, the United States, a major partner of South Korea in many respects, including peaceful nuclear development, has generally not supported—in fact, has sought to impede—South Korea's engagement in proliferation-prone nuclear fuel cycle activity, primarily, at this stage, reprocessing.

Washington's approach reflects the fact that, since India's 1974 "peaceful" nuclear test, the United States has grown increasingly concerned about nuclear proliferation and has attempted to prevent the spread of enrichment and reprocessing technologies to new countries, not just South Korea. But it also reflects particular concerns about the Korean peninsula, which led Washington to block the sale of reprocessing technology to South Korea in the late 1970s and, more recently, to engage with Seoul and Pyongyang in six-party talks aimed at ending North Korea's nuclear weapons program.

In 1992, under pressure from Washington, South Korea signed the Joint Declaration on the Denuclearization of the Korean Peninsula with North Korea. South and North Korea agreed "not to test, manufacture, produce, receive, possess, store, deploy, or use nuclear weapons; to use nuclear energy solely for peaceful purposes; and not to possess facilities for nuclear reprocessing and uranium enrichment." North Korea has clearly violated the agreement by operating nuclear reprocessing facilities and producing and testing nuclear weapons; yet, to date, South Korea has been reluctant to renounce the agreement altogether, hoping that North Korea can be lured back into eliminating its nuclear weapons and nuclear weapons program. The United States has strongly supported this position, with U.S. officials believing that, if South Korea were to openly break with the agreement by constructing its own nuclear reprocessing facilities, it might provide a pretext for Pyongyang to claim that its behavior was no more illegitimate than that of its southern neighbor.

To be sure, Washington has been far from consistent in how it treats the issue of pyroprocessing both in the United States and in South Korea. From the very beginning, the George W. Bush administration saw pyroprocessing as a potential solution to spent-fuel problems in the

United States and as less dangerous than conventional reprocessing. Indeed, the 2001 U.S. National Energy Plan defined pyroprocessing as "spent-fuel conditioning, not reprocessing."[10] This also led the U.S. government in the Bush administration to take a less critical view of South Korean pyroprocessing. It allowed South Korea to move ahead with building a laboratory-scale advanced conditioning processing facility to research pyroprocessing technology on its territory, but it allowed South Korean scientists to use only natural uranium, rather than irradiated fuel, in the facility. The United States has also allowed South Korean researchers to conduct on a case-by-case basis some experiments with irradiated material at U.S. laboratories. And the two countries have been working with the IAEA on demonstrating that the technology can be effectively safeguarded. South Korea was also assured that the administration's Global Nuclear Energy Partnership (GNEP) would not impact U.S.-South Korean cooperation on pyroprocessing.

A subsequent draft nonproliferation impact assessment of potential GNEP alternatives preliminarily concluded, however, that pyroprocessing was not significantly better from a nonproliferation point of view than traditional reprocessing when it came to limiting the ability of countries to develop nuclear weapons.[11] And the Obama administration does not appear inclined to expand existing U.S.-ROK cooperation to the extent that South Korea wants—that is, permitting Seoul to build an engineering-scale facility that uses "hot" material. In part, this reflects the fact that the Obama administration appears to be shifting course on its own approach to dealing with spent fuel, putting less emphasis in the near term on advanced reprocessing techniques, such as pyroprocessing, and more emphasis on interim storage of spent fuel.

In addition to shifting bilateral dynamics, U.S. credibility in pressing Seoul on reprocessing or pyroprocessing has been undermined by the Bush administration's decision to conclude a nuclear cooperation with India. That agreement pledges that, pending subsequent negotiations, India, a state that has not signed the Nuclear Non-Proliferation Treaty (NPT), will be granted the right to reprocess U.S.-origin fuel for exclusively peaceful purposes for a future reprocessing facility as long as it is placed under effective IAEA safeguards. Given that agreement, Obama administration officials will certainly have difficulty in arguing why such a right should be denied to a close ally that is a non-nuclear-weapons state party to the NPT.

Conclusion

When South Korea and the United States negotiated their last nuclear cooperation agreement in the early 1970s, the talks attracted little political attention or concern. Now, Seoul and Washington are gearing up to negotiate a new nuclear agreement within a radically changed economic, political and diplomatic context. Among other changes, South Korea now boasts one of the world's largest and fastest growing nuclear power reactor fleets and has become a significant nuclear exporter.

To win U.S. support for a nuclear cooperation agreement, South Korea may have to be willing to take on new global nonproliferation commitments commensurate with its new role as a major global nuclear technology supplier, or in some cases be more public about doing so. In this context, Seoul can be expected to face particularly strong pressure from Congress not to proceed with the construction of a pyroprocessing test facility.[12]

More than three decades ago, the United States ended its own large-scale reprocessing efforts (based on an older technology) because it found the technology uneconomical and feared that it was providing a poor example to other countries. In dealing with domestic spent fuel, the Obama administration has indicated that it is inclined to rely on interim storage of U.S. spent fuel at reactor sites for the foreseeable future while looking at the possibility of centralized interim storage sites and conducting research on long-term alternatives advanced reprocessing options such as pyroprocessing. Seoul is likely to face pressures from Washington to adopt the same approach. [13]

Indeed, South Korean nuclear experts acknowledge that, with or without pyroprocessing, they will need to rely on interim storage for decades as they do not plan to build commercial-scale facilities for pyroprocessing until close to the middle of the 21st century. But they say that to win public acceptance they need to show that pyroprocessing or other long-term storage options are viable. Otherwise, local communities will not be convinced that any interim storage facilities will in fact be temporary.

The Obama administration is likely to insist that the new nuclear cooperation agreement conform to the terms of the 1978 NNPA and will not readily grant South Korea programmatic prior consent for reprocessing or pyroprocessing. Any other agreement would lead to substantial procedural and substantive problems in winning congressional approval for the pact.

It is clear that South Korea faces a significant problem in dealing with its spent nuclear fuel problem. Locating politically acceptable spent-fuel storage sites on Korean territory is a major challenge. Seeking to address the problem through supplier take-back of spent fuel, officials have found that regional or international alternatives

have not to this point proven to be a viable and reliable solution. Still, reprocessing, including pyroprocessing, poses its own economic, technical, diplomatic, and nonproliferation challenges. Even the intuitively appealing notion of placing the facilities under some kind of multilateral structural or institutional arrangement—an approach some in Seoul are suggesting—will not serve to completely banish skepticism or challenges.

Nevertheless, given the close relationship between the United States and South Korea and both countries' positions as leading nuclear energy producers and now exporters, the negotiations over a new nuclear cooperation agreement provide an opportunity to influence the course that others will follow in making effective use of nuclear energy without incurring increased risks of nuclear proliferation. Creative solutions are needed to address Seoul's challenges regarding spent fuel without triggering Washington's anxieties about proliferation.

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Glossary of Terms

Dry cask storage—spent nuclear fuel stored in casks, surrounded by steel or concrete casings in order to shield workers and other personnel from the radiation that the fuel emits. Dry cask storage is distinguished from wet storage, when spent fuel is kept in pools of water.

Fast burner reactor—A "fast" reactor is capable of producing fission in a wider range of materials than a conventional reactor. These reactors are capable of using the mix of fissionable materials generated by pyroprocessing as fuel. A "burner" reactor produces less fissile material through the nuclear reaction than it takes in as fuel. Burners can be contrasted with "breeder" reactors, which create more fissile material (in the form of plutonium) than they take in.

High-level waste—Highly radioactive materials created as a byproduct of the reactions that occur inside nuclear reactors. High-level waste includes spent nuclear fuel, and the waste products that are isolated from spent fuel by nuclear reprocessing.

Irradiated fuel—Nuclear fuel that has been used, or "irradiated," in a reactor.

Low-level waste—Objects or materials that have been contaminated with radiation or radioactive material.

Natural uranium—Uranium as it is found in nature has a very low proportion of the fissile uranium-235 isotope and a very high proportion of uranium-238. As such, it is not readily useable in many (though not all) U.S. and South Korean nuclear reactors or in nuclear weapons.

Nuclear fuel cycle—The progression of nuclear fuel through various stages, beginning with the mining of uranium ore. Some other stages of the cycle include the enrichment of uranium to include a higher proportion of the fissile uranium-235 isotope, fabrication into fuel, and use in a nuclear reactor. Following use in a reactor, the material becomes spent fuel, and may either be stored or reprocessed to fashion new fuel.

Plutonium—An artificially created fissile element that may be used to fuel a nuclear reactor or to form the core of a nuclear weapon.

Plutonium breeder reactor—A reactor that generates more fissile material, in the form of plutonium, than it consumes.

Pyroprocessing—A recently developed form of reprocessing that extracts uranium, plutonium, and other fissionable materials from the spent fuel in a mixture. Unlike traditional reprocessing, the plutonium is never intended to be separated from these materials.

Reprocessing—The process by which spent nuclear fuel is broken down into some of its component materials and waste is separated from useful plutonium and uranium. The plutonium and uranium can then be refashioned into nuclear fuel and reused in a reactor. Since some of these materials could also be used to create a nuclear weapon, reprocessing poses a proliferation risk.

Spent nuclear fuel—Fuel that has been used in a nuclear reactor and is no longer useful for generating a sustained nuclear reaction. Spent fuel typically contains a small percentage of uranium-235, a small percentage of plutonium, a slightly larger percentage of highly radioactive "fission products," and a large percentage of uranium-238 (which is not useful for generating a nuclear reaction in light water reactors, a common type of reactor). The plutonium and uranium can be extracted through "reprocessing" and reused in a nuclear reactor or, potentially, in nuclear weapons.

Transuranic element—An artificially made, radioactive element that has an atomic number higher than uranium in the periodic table of elements. For example, plutonium, neptunium, americium, and curium.

Glossary prepared by Cole J. Harvey, research associate at the James Martin Center for Nonproliferation Studies.

Endnotes

[1] Spent fuel from Korea's four CANDU (Canada deuterium uranium) reactors is now in interim dry cask storage at a reactor site in Wolsong, but this facility will be full by 2017. Additional construction of any interim spent-fuel storage facilities at Wolsong is effectively prohibited by the special law (law no. 7444) passed on 31 March 2005, which prohibits any construction of spent-fuel-related facilities in the same region as the low- and intermediate-level radioactive-waste-disposal facility. Such a facility is now under construction near the Wolsong reactors in Gyeongju. No English version of the 2005 law and its subsequent revisions is available. The text in Korean is available at http://likms.assembly.go.kr/law/jsp/Law.jsp?WORK_TYPE=LAW_BON&LAW_ID=A1885&PROM_NO=09885&PROM_DT=20091230&HanChk=Y.

[2] For a chart, see "Top 10 Nuclear Generating Countries (2008)," Nuclear Energy Institute, www.nei.org/resourcesandstats/documentlibrary/reliableandaffordableenergy/graphicsandcharts/top10nucleargeneratingcountries/.

[3] "National Energy Basic Plan," Press release, Ministry of Knowledge Economy, Seoul, 28 August 2008, www.naenc.go.kr/sub_04/sub04_02_view.asp?page=1&bNo=87&keyfield=&key=.

[4] If and when all these planned reactors are built, they would produce an additional 400 tons of spent fuel per year.

[5] In Korea, the Ministry of Education, Science, and Technology decides what qualifies as high-level nuclear waste based on the concentration of radioactivity and heat production rate. LILW are classified as all nuclear waste below these thresholds. High-level waste is defined as that with a radioactivity concentration of 4,000 Becquerel per gram, which emits alpha rays with a half life of 20 years or more and a heat production rate of 2 kilowatts per cubic meter. Typical spent nuclear power plant fuel qualifies as high-level waste while certain medical waste is classified as lower-level waste.

[6] The facility is initially slated to hold 100,000 drums, but it could hold as many as 800,000 drums.

[7] The text of the agreement is available at http://www.carnegieendowment.org/static/npp/treaties/southkorea_123.pdf

[8] Fred McGoldrick, "The Peaceful Nuclear Program of the Republic of Korea and Global Nonproliferation Considerations" (paper prepared for CEIP-KAERI-IPC joint seminar on ROK-U.S. Nuclear Cooperation in the 21st Century, 14 July 2008, Carnegie Endowment for International Peace, Washington, D.C.), 5–6.

[9] Ibid.

[10] Ibid., p. 11.

[11] Fred McGoldrick, "New U.S-ROK Peaceful Nuclear Cooperation Agreement: A Precedent for a New Global Nuclear Architecture" (Washington, D.C.: Asia Foundation, Center for U.S. Korea Policy, November 2009).

[12] Miles A. Pomper, " Stakes Rise for U.S.-ROK Nuclear Energy Talks," Center for U.S.-Korea Policy newsletter," Vol. 2, No. 2, February 2010.

[13] See Ellen Tauscher, "Addressing the Nuclear Fuel Cycle: Internationalizing Enrichment Services and Solving the Problem of Spent Fuel Storage," Remarks Delivered at Hoover Institution, Stanford University, January 19, 2010, available at http://www.state.gov/t/us/136426.htm.

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