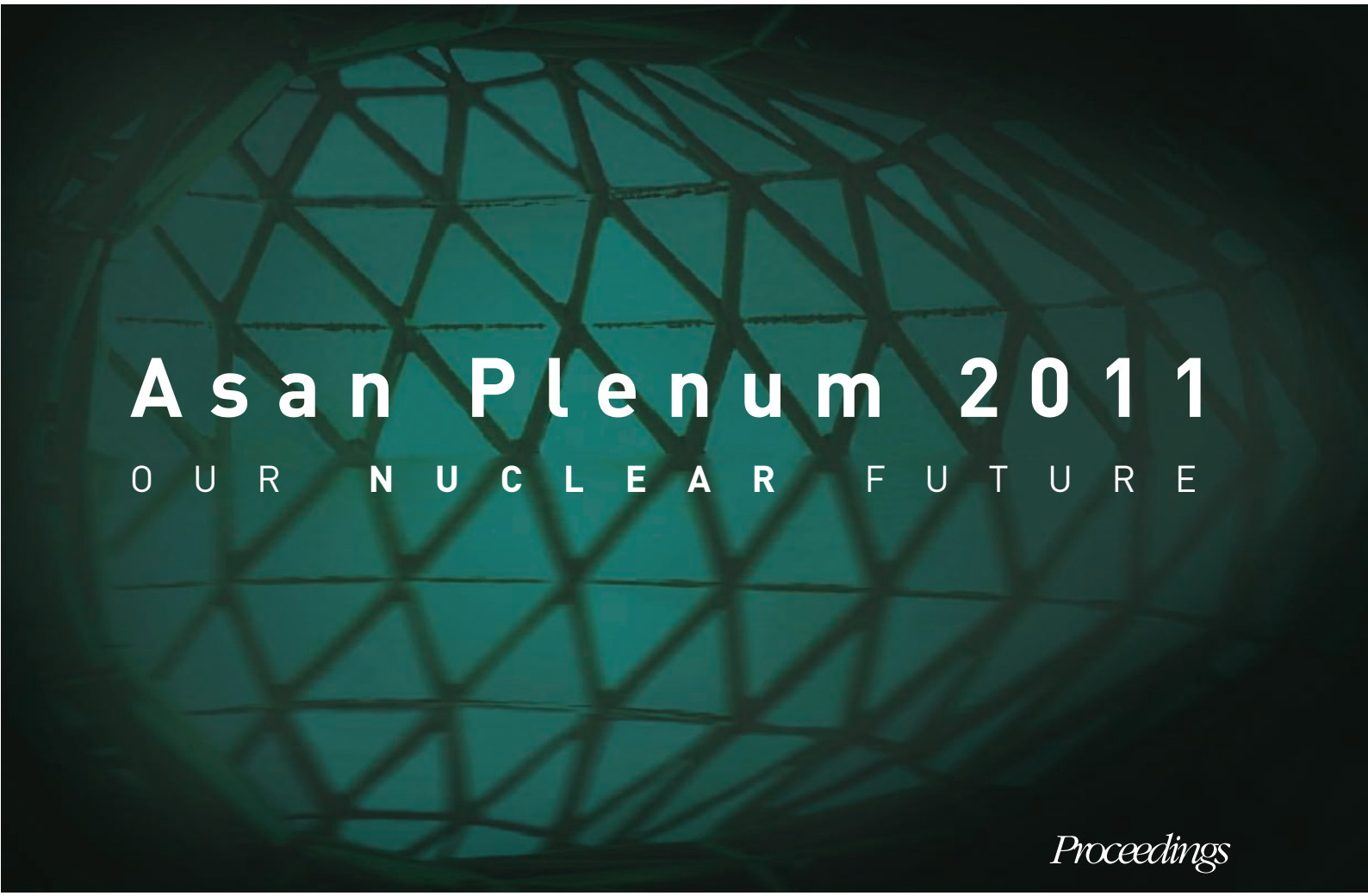

# Asan Plenum 2011

## OUR NUCLEAR FUTURE

*Proceedings*

June 13-15, 2011

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## About the Asan Institute

The Asan Institute for Policy Studies is an independent, non-partisan think tank with the mission to undertake policy-relevant research to foster a domestic, regional, and international environment conducive to peace and stability on the Korean peninsula and Korean reunification.

The Institute was founded by Dr. Chung Mong Joon, a six-term member of the National Assembly of the Republic of Korea, chairman of the board of trustees of Ulsan University, and Chairman of the Asan Foundation, the largest philanthropic organization in Korea. The Institute is named after Dr. Chung's late father, "Asan" Chung Ju-Yung, a global entrepreneur who founded the Hyundai Group and dedicated his life to Korea's prosperity and welfare, as well as the nation's peace and reunification.

The Institute focuses on three major areas of research, "foreign affairs and national security," "governance," and "philosophy & public policy."

## About the Asan Plenum

The Asan Plenum is a yearly gathering of the world's leading think tanks in Seoul, Korea to discuss the challenges facing the world. The Plenum is a multi-day, multi-session conference with each panel organized by a global think tank. This division of labor capitalizes on the differing areas of expertise of each think tank, as well as ensuring diversity of opinion and perspective so as to bring together as wide and as deep a knowledge-base as possible. The Asan Plenum thereby aims to impact the policy making process enabling the global community to better address the challenges it faces.

### About the Asan Plenum 2011

Asan Plenum 2011: "Our Nuclear Future," brought together 350 leading nuclear scientists, engineers, policy experts, and public intellectuals from around the world for a 3-day meeting. The Plenum focused on five major themes — nonproliferation, disarmament, peaceful use, nuclear security, and deterrence. With South Korea set to host the second Nuclear Security Summit in March 2012, and with the Fukushima nuclear crisis in neighboring Japan as well as North Korea's pursuit of nuclear weapons providing the immediate backdrop, the Plenum initiated a much needed comprehensive reassessment of myriad issues which have crucial implications for our nuclear future.

## Opening Remarks


### Hahm Chaibong

**President, The Asan Institute for Policy Studies**


Welcome everyone.

My name is Hahm Chaibong. I'm the president of the Asan Institute for Policy Studies. Thank you so much for being here.

We have two hundred ten experts coming from abroad; some sixty-five diplomatic corps are represented, and of course, scores of Korean experts will be joining us for the next three days. The topic, 'Our Nuclear Future,' can't be more stressed as this is a very critical issue at this particular time, and also the properness of actually holding this in this particular location. As our motto says, you bring a lot of incredible wealth of insights. I hope we can provide a format which you can connect those insights, and for us to come up with some real solutions to some of the most intractable and difficult issues that confront us and that will deeply affect our nuclear future.

Enjoy our hospitality.

Thank you.

## Congratulatory Remarks


### Lee In-ho

**Chairperson, The Asan Institute for Policy Studies**


Minister Kim Sung-hwan, your Excellencies, and distinguished participants,
It is a great privilege for me to welcome, on behalf of the Asan Institute for Policy Studies, so many of the world's leading experts and authorities on nuclear issues. I would like to thank you all for taking the time to come to share your wisdom and concern on an issue for which finding the correct resolution is vital to the destiny of the human race.

Since many of you are not yet familiar with the name Asan Institute, please allow me to take a moment to explain what our institute stands for. Asan, sometimes suspected of being a typographical error for Asian by international relations experts, is the endearing pen-name of the late Mr. Chung Ju-Yung, the founder of the Hyundai Group. The Asan Institute for Policy Studies was launched three years ago with the generous support from one of his sons, Dr. Chung Mong Joon, currently a six-term National Assemblyman of Korea, for the purpose of carrying on the spirit of the late Chairman Chung's life-long dedication to enhancing prosperity and peace on the Korean Peninsula. The Asan Institute strives to fulfill its mandate by addressing the most critical problems faced by the Korean nation and Northeast Asia region as a whole, being aware that no major problem in the world today can be resolved without active participation and cooperation from the entire global community. The Asan Institute actively engages itself in policy development, non-governmental diplomacy, and the training of experts in the areas of national security and foreign policy as well as governance and public policy. Currently, the research staff is comprised of 8 Ph.D. holding senior researchers, 7 junior researchers, several visiting scholars, and numerous undergraduate interns.

We are living in a world where the ability to understand, communicate, and sympathize with peoples who belong to different cultures is becoming just as critical as expert analysis of particular issues. As President Kennedy pointed out half a century ago, the development of the instruments of war far outpaces the development of the instruments of peace. The time allowed us to reverse this dangerous situation is short. Responding to the changing needs of our times, the Asan Institute is also interested in promoting dialogues among civilizations. The most recent Asan Memorial Lecture was given on the topic of the modern interpretation of Confucianism by Tu Wei-ming who, after his retirement from the Harvard University faculty, is now working in China.

The Asan Plenum, entitled "Our Nuclear Future," is the first ever international conference of such scale to be undertaken by our institute. It was planned with a view to assist the second Nuclear Security Summit, scheduled to take place in Seoul in March of next year, to produce the kind of result which we all so eagerly await. Although the Plenum was conceived long before the disaster which struck our neighbor Japan this past spring, the time and place for a world plenum on nuclear issues could not have been more appropriately chosen. As those of us gathered here are all too aware, the outcome of the Summit cannot exceed the level of expertise and wisdom found among the community of experts who deal with these matters day and night. In this sense, what the participants here come up with at the end of this Plenum will have a direct and enormous impact upon the degree of success the World Summit will have next year.


Once again, I would like to take this opportunity to thank all those who made this plenum possible, especially our Ministry of Foreign Affairs and Trade for its generous support and the Organizing Committee of the Asan Institute headed by Dr. Hahm Chaibong, who had to make many trips around the globe to consult with colleagues who agreed with him on the desirability of holding such a preliminary "summit" of the experts. Here we are, all gathered together to deal with a force which can either be the good fairy's magic wand in the service of humanity or turn into the bad witch's curse. I sincerely hope that by the end of this Plenum each of the participants can return home with a sense of pride and gratification that, by pooling our resources, we have personally contributed to helping to reassure that nuclear power will remain the magic wand we all want it to be and not degenerate into the witch's curse.

## Kim Sung-Hwan

**Minister of Foreign Affairs and Trade, Republic of Korea**


Chairperson Lee In-ho, President Hahm Chaibong, distinguished guests, ladies and gentlemen, it is my privilege and honor to speak at the Asan Plenum. I greatly welcome the holding of this event, which is the first of its kind to gather experts from Korea and abroad to engage in an in-depth and comprehensive exchange of views on a single theme. The initiation of such a forum in Korea, I believe, is timely and significant, given the huge challenges we are facing in the nuclear field.

My understanding is that this Plenum will focus on five topics under the theme of "Our Nuclear Future," namely: non-proliferation, disarmament, peaceful use, nuclear security, and deterrence. I am confident that we will all benefit from the diverse range of perspectives presented and that the outcomes will greatly contribute to preparing for the Seoul Nuclear Security Summit to be held next March.

The earthquake and tsunami that hit the northeastern region of Japan in March, and the ensuing Fukushima nuclear accident and radiological leak vividly illustrate the two contrasting faces of nuclear energy. Until that incident, many predicted the advent of a "nuclear renaissance," with a growing number of nuclear power plants—more than 300 are known to be under construction or are planned to be constructed by 2030.

The Republic of Korea is recognized by many as an exemplary country in its use of nuclear energy for peaceful purposes. In 1977, Korea became the 21st country in the world to construct a civilian nuclear power plant, the GORI #1, 15 years after it adopted the TRIGA MARK II, a research reactor. Since then, our nuclear industry has made great strides, reflecting our economic growth over the 40 years that followed.

Korea currently operates 21 nuclear power plants, with an additional seven under construction: we have plans to increase that number to 34 by 2024. Nuclear energy will be responsible for producing nearly half of our electricity by the mid-2020s, compared to the figure of 31.4% today. With our advanced technology and extensive experience of the safe operation of power plants, we are now an exporter of nuclear power plants.

There may be many divergent views on the future of nuclear energy, especially in light of the Fukushima accident. Yet we should learn from this experience and turn crisis into opportunity, just as the Chernobyl accident in 1986 served to catalyze major reforms in international norms on nuclear safety. Nuclear energy needs to continue to play a vital role in facilitating low-carbon green growth in a way that balances protection of the environment and economic development. It is a key to solving the two most important challenges the world faces today: climate change and energy shortage.


Korea is fully aware of the fact that the right to the peaceful use of energy brings with it nonproliferation obligations. As is clearly stated in the Nuclear Nonproliferation Treaty (NPT), nuclear nonproliferation, nuclear disarmament, and the peaceful use of nuclear energy constitute the three pillars of the NPT and cannot be addressed separately. As a non-nuclear weapon state, the Republic of Korea has fully complied with its nonproliferation obligations and has actively joined in international nonproliferation efforts.

In this vein, I reaffirm that the "Four Principles on the Peaceful Use of Nuclear Energy" that my government declared in 2004 still stand firm today. The "Four Principles" are as follows: 1) the Korean Government has no intention of developing or possessing nuclear weapons; 2) the Korean Government will firmly maintain its principle of nuclear transparency and strengthen its cooperation with the international community to this end; 3) the Korean Government will faithfully abide by international agreements on nuclear nonproliferation; 4) the Korean Government will expand its peaceful use of nuclear energy with the confidence of the international community.

The IAEA publicly confirmed that Korea's nuclear activities are conducted in a peaceful way by drawing a "Broader Conclusion" in 2008. Korea is also actively participating in the international efforts to counter the proliferation of WMD; it is an active member of all major export control regimes, including the PSI, which we officially joined in 2009.

In sharp contrast, North Korea has taken actions which undermine the very basis of the NPT regime. It has abandoned its obligations under the NPT by abusing the right to the peaceful use of nuclear energy in order to develop nuclear weapons.

The Republic of Korea government has been patiently exerting efforts to realize the denuclearization of North Korea, but North Korea has not yet shown any sincere change in its attitude toward denuclearization, and the threat posed by North Korea's nuclear capabilities has grown more serious than ever. North Korea continues to develop its nuclear program despite sanctions imposed by the United Nations Security Council. It conducted nuclear tests in 2006 and 2009, violated the agreements of the Six-Party Talks by reversing the disablement conducted at the Yongbyon nuclear facility, and intentionally revealed its uranium enrichment program (UEP) last November. Furthermore, suspicions over North Korea's nuclear proliferation activities, such as its collaboration with Syria, are constantly raised by the international community.

North Korea refuses to take any responsible measure for the series of provocations it has made. Rather, its behavior has been simply irrational. Not long after it stated its willingness to return to the Six-Party Talks without preconditions and discuss its UEP, just last week, after Kim Jong-Il returned from China, North Korea declared that it would no longer deal with the Korean government and threatened to launch an all-out military retaliation.

Such pattern of behavior has been repeatedly demonstrated by North Korea. It has tended to first make provocations, such as launching missiles or conducting nuclear tests, then attempt to establish its actions as a fait accompli and seek to make bargains on this basis. If that attempt fails, it then resorts to military threats to extract concessions.

We are determined not to condone North Korea's tactics of brinkmanship any longer. It follows that while there are high expectations for the resumption of the Six-Party Talks, we believe that the Six-Party Talks should be resumed when they can yield substantive progress, rather than being held merely for the sake of dialogue. North Korea must demonstrate its sincerity toward denuclearization through concrete actions and thereby restore the trust of the international community prior to the resumption of the Six-Party Talks.

In this regard, I would like to emphasize that the door to dialogue is always open for North Korea. My government proposed an inter-Korean dialogue on denuclearization in January; the Five Parties are in agreement to create appropriate circumstances for the resumption of the Six-Party Talks through various contacts, with inter-Korean dialogue as an essential first step. Despite the recent provocative statements by North Korea, my government will continue to take a calm and resolute posture while continuing our unwavering pursuit of dialogue with North Korea.

The Ministers at the ASEM Foreign Ministers' Meeting, which I attended last week, underlined the importance of sincere and constructive inter-Korean dialogue. I believe this represents the international community's broad support for the Korean Government's efforts to induce positive change in North Korea's behavior toward denuclearization, starting with inter-Korean dialogue.

It is also essential to clearly define North Korea's UEP as illegal before discussing the issue at the Six-Party Talks. As long as North Korea continues to assert that its UEP is for peaceful purposes, the Six-Party Talks are bound to be caught up in time-consuming debates on the legitimacy and legality of North Korea's UEP. The resumption of the Talks would then be utterly fruitless. This is why the international community needs to clearly state, in a unified voice, that North Korea's UEP is inconsistent with the 2005 Joint Statement and is a violation of UN Security Council resolutions 1718 and 1874, just as the leaders of the G8 recently condemned it as a violation of UN Security Council resolutions.

Meanwhile, North Korea's nuclear program also gives rise to concerns from a safety perspective. The recent nuclear accident in Japan clearly demonstrates that the dangers stemming from the North Korean nuclear issue are twofold: threats to the peace and stability on the Korean Peninsula and in the Northeast Asian region, as well as economic and environmental threats to the region and the world. As it is highly likely that North Korea's nuclear facilities are not commensurate with international safety standards, the safety of North Korea's nuclear programs should be given more attention by the international community, and should be treated as a key agenda in future Six-Party Talks.

North Korea should meet its people's wish for a better future and respond to the international community's call for denuclearization. To improve inter-Korean relations, North Korea needs to demonstrate responsible behavior concerning the Cheonan and Yeonpyoung issues which is acceptable to the Korean people. It is my sincere hope that North Korea may respond to our proposal for inter-Korean dialogue as soon as possible as a first step toward that end.

On the Korean Peninsula, there are two very different countries: the Republic of Korea, a model country in its peaceful use of nuclear energy and an active participant in international nonproliferation efforts; and the DPRK, which undermines the very basis of the NPT regime by developing nuclear weapons. I believe this stark contrast clearly illuminates the direction in which we need to be heading in "Our Nuclear Future," which is the topic of this plenum.

Against this backdrop, we appreciate the significance of the next Nuclear Security Summit which will be held in Seoul, on the 26th and 27th of March, next year. The Korean Government believes that the Seoul Summit holds great significance for the following reasons:

First, for Korea, hosting the Nuclear Security Summit means engagement in the overall trends of the post-Cold War era, in particular, post-9/11 international security discussions. Nuclear terrorism is one of the most serious threats to international security, considering the devastating consequences it would have on the global economy and beyond, regardless of where it takes place. It is said that one should be prepared for

the worst-case scenario with regard to security issues; in this sense, we should not neglect to address even the slightest possibility of nuclear terrorism. In a globalized world in which countries are more mutually dependent than ever, nuclear terrorism is not a problem solely for the West; it is a common challenge from which even Korea is not immune.

Second, the fact that Korea was chosen as host of the second Nuclear Security Summit serves to demonstrate Korea's increasing role in international fora. It may be seen as recognition by the international community of the responsible role Korea has played in supporting nonproliferation principles and leading green growth against global climate change. It can also be seen as recognition of Korea's role as a bridge between developed and developing countries in solving major global issues, as demonstrated by last year's G20 Seoul Summit. Korea will play a bridging role in the nuclear field as well, between nuclear and non-nuclear weapon states, and between states with advanced nuclear energy industries and those with developing industries.

Third, the 2012 Seoul Summit will strengthen the nuclear security regime by expanding the scope of discussions, building upon the achievements of the Washington Summit. While we will have to consult with participating countries, we plan to address the issue of securing radioactive sources more comprehensively. Although the destructive impact of radiological terrorism using 'dirty bombs' is much weaker than that of nuclear terrorism, appropriate management in safely securing radioactive sources is vital given the higher probability, relative ease, and enormous psychological effect of radiological terrorism.

In addition, there is an ever growing need to address the issue of nuclear safety within the context of the Nuclear Security Summit in light of recent developments as a result of the Fukushima nuclear accident. Nuclear security and nuclear safety need to be enhanced in a mutually-reinforcing way, considering the fact that the consequences of a terrorist attack on a nuclear facility may be equivalent to a nuclear accident. The Seoul Summit aims to address the interface between the two.

Lastly, the year 2012 is a highly significant year both for the Korean Peninsula and beyond. It is the centennial of the birth of Kim Il-Sung and the year in which North Korea has pledged to turn itself into a "strong and prosperous country." It is also a year in which there will be changes in the global leadership, not only in the Republic of Korea, but also in the United States, Russia, and China. By bringing world leaders to Seoul to discuss key international security issues, the 2012 Summit will send out a strong message on renewing the importance of maintaining peace and security on the Korean Peninsula and pursuing the denuclearization of North Korea.

I look forward to insightful and constructive debates over the next three days, and would like to wish you every success in ensuring highly fruitful outcomes from the Asan Plenum.

Thank you for your attention.

## Dr. Chung Mong Joon's Dinner Speech

Dr. Lee Hong Koo, Dr. Edwin Feulner, General B.B. Bell, Dr. Gary Samore, Mr. David Sanger, distinguished experts, ladies and gentlemen, welcome to the Asan Plenum.

I would like to start my speech by telling you why we are gathered here tonight. My father, the late Chung Ju-Yung, was born and raised in a small, rural village named Asan in present-day North Korea. Like other Koreans at the time, he was fated to till the land. However, he refused to bow to this fate, and in 1932, at the age of 17, he ran away from home with the money that my grandfather had made selling the family's only cow.

From that time he promised himself that he would return home once he became successful, to return the money, and to ask for forgiveness. However, by the time he became a successful businessman in South Korea, he could not return because of the national division.

However, on June 16, 1998, my father crossed the cease-fire line to enter North Korea and among his entourage were 1,001 cows. Among others, he also started the Mount Geumgang tourism and Gaesung Industrial projects. His intention was pure and simple. He wanted to help the people in North Korea. It is too bad that many of the projects that he started have since been politicized and misappropriated, but I hope that one day the projects that he started help the North Korean people produce the intended results.

He used to say that the ultimate purpose of business is to contribute to the nation's social development. For that purpose, he founded the Asan Foundation, the largest philanthropic organization in Korea. It is my hope that the Asan Institute for Policy Studies will also become an indispensable institute in its fields of expertise. I ask for your continued interest and cooperation.

The theme of this year's Asan Plenum is "Our Nuclear Future." The Fukushima nuclear disaster in March of this year has forced many countries to reconsider their nuclear programs. Since the Fukushima accident, Japan has closed 37 of its 54 nuclear reactors, and will shut down four more this summer for safety checks. The German government recently announced that it would phase out all nuclear power plants by 2022, with Switzerland and Italy said to be ready to follow Germany's lead. The nuclear disaster in Japan has forced a serious review of our ability to master nuclear safety, and we are suddenly in the age of "nuclear uncertainty."

I am not a nuclear expert, but I once became involved in the disputes over the construction of nuclear reac-


tors in Korea. From 1988 to 2008, I was elected to 5 consecutive terms as a National Assemblyman in Ulsan, a city in southeastern Korea. At the time, the government had planned to build 12 more nuclear reactors in addition to the 8 reactors already in operation. The decision making process was deeply flawed as well, which made me protest against the government's decision. As I protested against the government's decision, I found myself in alliance with leftist political groups, and my conservative credentials became suspect among both conservatives and liberals. However, it was a good experience for me, and what I learned was that, when it comes to nuclear issues, the more prudent we are, the better.

There are experts here tonight with different views regarding our nuclear future. What I am saying is as a politician, not as a nuclear expert, but I hope that we can all work together to create a safer world.

For South Korea, the future is closely tied to the nuclear issue in so many ways, and our nuclear future now seems very uncertain. First, South Korea is under the threat of a nuclear-armed North Korea. North Korea has not only conducted nuclear tests, but recently revealed sophisticated uranium enrichment facilities. Under the "nuclear shadow," North Korea continues to engage in provocations using conventional weapons. The future of our nation's security depends on how we resolve the North Korean nuclear threat.

South Korea will host the second Nuclear Security Summit next March, with 50 heads of state and 4 representatives of international organizations to gather in Seoul. This shows the high regard in which the international community holds South Korea as a partner in global nuclear governance.

2012 is also a year of political transition and uncertainty in this part of the world. Presidential elections will be held in South Korea, the United States, Russia, and Taiwan. China will go through a generational change in its top political leadership, and Japan's political leadership continues to face severe challenges. North Korea has declared that 2012 will be the opening year of its "strong and prosperous" nation.

Now, I would like to turn your attention to the Korean Peninsula. Peaceful co-existence with a nuclear-armed North Korea is not possible. However, China seems unwilling to pressure North Korea to give up its nuclear program. The U.S. seems to be exhausted from the endless and fruitless negotiations with North Korea, and may now be willing to settle for non-proliferation rather than the complete elimination of North Korea's nuclear programs.

This is why some in South Korea, including myself, are now calling for the re-introduction of tactical nuclear weapons. The presence of a counter-nuclear force may be the only thing that will discourage North Korea from developing its nuclear arsenal. The nuclear umbrella provided by the United States can protect South Korea, but it cannot be a bargaining chip for denuclearizing North Korea.

The door is still open for North Korea to escape its current isolation. If it makes the proper decision to abandon its nuclear programs, I can personally guarantee that South Korea's best companies will make major investments in North Korea that will transform its economy. This is the only viable alternative for North Korea.

What North Korea needs are not small and medium size industries that we see in Gaeseong. Nor is it the kind of infrastructure that is being built with Chinese investment. What is needed is the kind of investment in infrastructure and industry in which South Korea leads the world. In terms of industrial capacity, technology, and geography, South Korea is in the best position to help North Korea, and I urge North Korea's leaders to do the right thing.

All the challenges posed by our nuclear future seem to come to a head around the Korean Peninsula, and we now have an unprecedented opportunity to find a collective solution. It is rare that so many experts working on such a wide-array of nuclear issues are gathered together in one place. I am sure that the collective wisdom of all of you here today can find the way toward an effective global regime on nuclear issues.

I wish you the best in your endeavors.

Thank you very much.

Day 1

Monday, June
13, 2011

# OUR **NUCLEAR** FUTURE

# A World Free of Nuclear Weapons: A Bold Dream vs. A Reality in the Making

**Plenary Session 1 (Grand Ballroom)**
**June 13, 2011**

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| **Panel** | David Sanger (Moderator), *The New York Times*<br>Edwin Feulner, The Heritage Foundation<br>Han Sung Joo, Former Minister of Foreign Affairs and Trade, Korea<br>Lee Hong Koo, Former Prime Minister, Korea |
| **Author** | Wilfred Wan, University of California's Institute on Global Conflict and Cooperation |
| **Summary** | This panel explored the idea of a world free of nuclear weapons ("Global Zero"), its desirability and potential effects on international security and stability, and how the North Korean crisis brings into sharp relief the obstacles to its implementation. |

Former Prime Minister Lee Hong Koo began by emphasizing the urgent need for a world free of nuclear weapons ("Global Zero"). Integral to this objective is the elimination of the nuclear threat on the Korean Peninsula which, he argued, was the top priority and took precedence over Korean reunification. The upcoming 2012 Nuclear Security Summit in South Korea, he continued, would be a watershed in achieving both an end to the North Korean nuclear threat and Global Zero. Dr. Lee expressed South Korea's strong support for the statement for a world free of nuclear weapons published by Henry Kissinger, Sam Nunn, William Perry, and George Shultz. He also recalled that North Korea had pledged in the February 1992 Joint Declaration to keep the Korean Peninsula nuclear-free and concluded by asking that North Korea honor that commitment, saying, "That's the best way to keep 75 million Koreans on the peninsula safe and not only us, but people in our region and indeed, people around the world."

Mr. Sanger followed up by asking whether there existed a middle ground between war and reunification, such as a gradual re-absorption of the North. Dr. Lee replied that South Korea had no interest in "absorbing" North Korea, pointing to their over half-century of co-existence, the 1992 Joint Declaration and both countries' membership in the United Nations. The primary objective on the peninsula had to be peace but this, Dr. Lee continued, could be technically construed as maintaining the status quo, a situation that Koreans feel to be highly unusual and imposed upon them by the victors of World War II. "Peaceful reunification", rather than peace alone, was to be the goal. Because both countries needed to work together to reduce the danger of nuclear war, Dr. Lee argued that any reunification would take the form of a commonwealth or union, possibly modeled on the European Union. North Korea, he noted, withdrew from the 1992 Joint Declaration because it claimed that its security was threatened. If that were the case, then somehow ensuring North Korea's security, whether through the Six-Party Talks or some other means, should be a top priority, but North Korea needed to understand that its threats were counterproductive. Dr. Lee ended by expressing his hope that the 2012 Nuclear Security Summit and forums like the Asan Plenum would mobilize global opinion to persuade North Korea to return to the peace process.

Former Minister of Foreign Affairs Han Sung Joo began by referring to the Kissinger-Nunn-Perry-Shultz statement as well as President Barack Obama's 2009 speech in Prague expressing the United States' commitment to work toward global disarmament. He stressed that North Korea's nuclear weapons program not only poses a serious danger to regional peace and stability but also undermines the credibility and effectiveness of the Nuclear Non-Proliferation Treaty (NPT) regime. Proliferation by North Korea and others, he continued, "highlight[s] the fact that the world is now on the precipice of a new and dangerous nuclear era."

The majority of Dr. Han's presentation centered on a number of steps he set forth as essential to moving towards complete disarmament:

1. The international community must strengthen the NPT, emphasizing each of its three pillars: nuclear arms reduction, nonproliferation, and peaceful development of nuclear energy.
2. The United States and Russia, which possess the world's largest nuclear arsenals, must continue to accelerate their arms reduction initiatives, while other nuclear powers must join in the process. This would require "a new mindset on the utility of nuclear weapons and strong political will" on the part of leaders.
3. The 1996 Comprehensive Test Ban Treaty must be brought into force as soon as possible, with U.S. ratification being critical to bringing other states on board.
4. The production of weapons-grade fissile material must be halted. Dr. Han endorsed the role of the Conference on Disarmament here, as parties there seek to negotiate the Fissile Material Cut-Off Treaty.
5. Universal adherence to the NPT is necessary. Moreover, signatories should accept the International Atomic Energy Agency's (IAEA) comprehensive safeguards for all of their peaceful nuclear activity. North Korea should return to the NPT as soon as possible and comply with IAEA safeguards.
6. Dr. Han welcomed the communiqué and work plan of the 2010 Nuclear Security Summit in Washington, the decision to hold the 2012 Nuclear Security Summit in South Korea, and the recommendations adopted by the 2010 NPT Review Conference.
7. The right to peaceful use of nuclear energy must be upheld and special emphasis should be placed on developing countries to receive international support and IAEA technical cooperation.
8. Finally, the international community must redouble its efforts to solve regional conflicts that lead to proliferation. Here, Dr. Han cited the value of the Six-Party Talks in bringing North Korea back to the negotiating table.

Dr. Han acknowledged that the goals he listed are difficult, with apparent contradictions among them. For instance, the United Sates "nuclear umbrella" has dissuaded Japan and South Korea from pursuing their own programs and prevented the escalation of smaller conflicts, while simultaneously prompting North Korean proliferation and continued conventional provocation. Efforts from without to force regime change in Iraq

(which did not possess nuclear weapons) and Libya (which had relinquished nuclear weapons), have led failing states, including North Korean, to believe that possessing nuclear weapons would prevent similar action against them. Additionally, Dr. Han noted that a reduction in nuclear weapons by some states tends to increase their value to both existing nuclear powers and new proliferators. He also warned of the consequences of proliferation, such as an increased danger of nuclear accidents, the likelihood of materials being sold on the black market, and the increased activity in illegal networks (for instance, North Korea's links with Pakistan and Syria). In short, a nuclear-free world remained the best and safest option, and immensely preferable to the status quo.

Mr. Sanger then asked Dr. Han whether the United States' interventions in Libya and Iraq, by reinforcing the beliefs of North Korea and other states in the necessity of retaining a nuclear deterrence, were undercutting the United States' own nonproliferation and nuclear arms reduction efforts. Dr. Han responded that such beliefs and interpretations among such leaders should not influence decisions on whether to conduct humanitarian intervention. Refraining from intervention in countries that had given up nuclear weapons would simply give greater leverage to the proliferators, who would correctly believe that their actions had altered U.S. foreign policy. Moreover, refraining from such intervention would not necessarily encourage other nuclear powers to cease proliferation.

The last panelist, Dr. Edwin Feulner of the Heritage Foundation, started by noting South Korea's rise in world affairs with the ascension of Ban Ki-Moon to the position of United Nations Secretary-General and Seoul's hosting of the G-20 Summit and the upcoming 2012 Nuclear Security Summit. Referring to the vision of a nuclear-free world, he said that the message transcended political parties, includingin the United States. The desire to put the "genie back in the bottle" was even expressed by Ronald Reagan, who was president during arguably the most contentious era of the Cold War and a man more associated with missile defense and deterrence than disarmament.

At the same time, Dr. Feulner cautioned that the movement toward Global Zero could not come at the expense of security he spoke specifically of the need for the United States to maintain a credible nuclear deterrent. The vast number of global challenges in the world (including Iran, Syria, and North Korea) further underlines the need for prudence. In particular, he criticized as dangerous the assessment that states like Iran and Syria are merely trying to join the "nuclear club" when the international community is simultaneously warning North Korea that its behavior breaches international norms. Attempting to implement Global Zero risks destabilizing the global order, even if complete disarmament remains a worthy goal.

Mr. Sanger cited the ideology of the Bush administration in posing his question to Dr. Feulner. Why would the United States give up its nuclear superpower status and put itself on a level with other current or potential nuclear weapons states such as China, Pakistan or Iran? He suggested that the issue was one of sequencing—yes, all involved might desire a nuclear-weapons-free world, but how would it actually happen? Dr. Feulner admitted that that was the ultimate problem and professed he had no real solution to offer. Given the special role of the United States in providing security worldwide, and given that other parties have cheated, there seems to be little incentive for the United States to take concrete action. Moreover, the long-term goal of Global Zero is ultimately secondary to immediate concerns. After all, said Dr. Feulner, the "urgent inevitably overwhelms the important."

Before opening the floor for questions, Mr. Sanger posed a final question for Dr. Lee and Dr. Han. To what extent did South Korean officials feel that South Korea needed its own nuclear deterrent? After all, any implementation of President Obama's vision for nuclear disarmament would undermine the value—if not the very existence—of the U.S. nuclear umbrella. Dr. Han replied that the lack of progress in eliminating North Korea's nuclear program might indeed be fueling frustration and a subsequent desire among some for South Korea to develop its own programs. He also noted that there are some who believe that a South Korean nuclear deterrent would increase its bargaining leverage with the North, though he stated that such a program would be both impractical and tremendously counterproductive.

Dr. Lee agreed, saying that while a nuclear weapons program might seem a profitable strategy for smaller powers, South Korea has always preferred to use "soft power" over "hard power", especially given its status as a small state bordering three much more powerful ones (Russia, China and Japan). He also noted that the "frustration" Dr. Han spoke of was directed not only at North Korea, but also China. To the South Koreans, it seemed that China's policies toward North Korea implied an acceptance of its nuclear program. Moreover, Dr. Lee said that it seemed incomprehensible that China would be willing to tolerate the possibility that Japan and South Korea might develop nuclear weapons in response to the North Korean threat. Dr. Feulner jumped on this point, suggesting that China could potentially find itself surrounded by nuclear states including Russia, India, Pakistan, both Koreas, Japan and possibly even Taiwan. Dr. Lee concluded by remarking

that the upcoming bilateral nuclear summit between China and the United States would be a crucial indication of the two states' commitment to preventing the North Korean nuclear situation from spiraling out of control.

The questions that emerged during the Q&A covered a wide array of topics. The special "responsibility" of China to act on the crisis on the Korean Peninsula was further pursued. All panelists were in general agreement that China had arguably the most significant role to play. However, Mr. Sanger raised the possibility that China's influence may be overstated given that North Korea famously defied its requests not to conduct nuclear and missile tests in 2006 and 2009. Dr. Lee suggested that China was simply overwhelmed with domestic issues and was thus in a holding pattern with respect to North Korea. Moreover, Dr. Lee noted that China had invested a tremendous amount of blood to defend North Korea during the Korean War, which he suggested would make it hesitant to pursue any action that might lead to the North Korean regime's collapse. Dr. Feulner, however, noted the special influence that China should have over the North Korea, as it provides (by his rough estimate) 70 percent of North Korea's energy and food supplies.

A number of questions dealt with the specific nature of negotiations in the North Korean situation. One audience member wondered whether North Korea considered weapons of mass destruction to be primarily an issue of nuclear security or of internal politics and domestic regime security. He suggested that the real purpose of Kim Jong-Il's actions was not to prevent an invasion but to ensure the security of his successor. Dr. Lee did not disagree with that assessment but also added that the very nature of the North's totalitarian regime severely constrained its policy options. Thus, any change in its current policy trajectory would have to come from the outside rather than from within, creating an opportunity for China, the United States and other powers.

Another attendee asked what lessons the United States and South Korea have learned from their collaboration vis-à-vis North Korea. Dr. Feulner said that a key lesson is that Seoul and Washington must be absolutely unified in their policy toward Pyongyang. Another question concerned whether the parties would ever consider changing their strategy from one of seeking disarmament to one of containing North Korea and capping its nuclear arsenal. Dr. Han said that this was not a realistic step. While this may in fact be the reality, for South Korea to essentially accept the nuclear legitimacy of North Korea was unacceptable. The drastic actions taken by North Korea—in terms of testing, enrichment, production, and so forth—only underscored the danger of acquiescing in this manner.

Overall, the panelists provided a nuanced, complicated, and sober assessment of the crisis on the Korean Peninsula. Given the gravity of the situation, it was not surprising that all of them treated it as the primary obstacle to any vision of a world free of nuclear weapons. To borrow from Dr. Feulner, the panelists chose to focus on the urgent, rather than the important. In this case, however, the two might be one and the same. Ridding the world of the North Korean nuclear threat would be a seminal moment, preventing the fall of nuclear dominoes and making a nuclear-free world a much more attainable goal.



# Nuclear and Missile Commerce: The Cases of Iran, Myanmar, North Korea, and Syria

**Session 1 (Grand Ballroom)**

**June 13, 2011**

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| **Panel** | Leonard Spector (Moderator), Monterey Institute<br>Jeffrey Lewis, Center for Nonproliferation Studies, Monterey Institute<br>Joshua Pollack, Science Applications International Corporation |
| **Author** | Brian Rose, United States Institute of Peace |
| **Summary** | This panel took an in-depth look at trafficking and commerce in nuclear and ballistic missile technologies by and among North Korea, Iran, Syria, and Myanmar. Leonard Spector delivered an overview of collaboration to date among these states in nuclear and ballistic missile technologies as well as strategies to prevent such exchanges. Joshua Pollack discussed North Korea's missile supply relationship with Iran and Syria and implications for future policymaking. Jeffrey Lewis discussed Myanmar, which has attracted increased scrutiny and debate within the nuclear policy community because of its apparent nuclear and ballistic missile aspirations, its diplomatic and military ties to North Korea, and murky details concerning its acquisition of dual-use components and technology. |

Mr. Spector began by arguing that all of these countries (as well as Pakistan in a historical context) are special cases because they are either non-signatories to the Nuclear Non-Proliferation Treaty (NPT), or signatories who act in violation of it or in ways that are inconsistent with its tenets. In addition, he said, all of them have relied on outside assistance to advance their programs and there exists a history of mutual collaboration among them. The ongoing challenge, he said, is for the international community to manage the flow of nuclear and missile technology using a toolbox of diplomatic, economic, and military means.

Mr. Spector outlined several patterns of proliferation and how they were applied by the case countries. Patterns ranged from a country or actor transferring completed items to a second country (as was the case with the manufacture and transfer of completed Pakistani gas centrifuges to Iran via the Khan network) to the future possibility of a country providing services directly to another party (e.g. outsourcing uranium enrichment to a second country). Other patterns include the transfer of designs or component parts to a second country, which then manufactures the items on its own, and the illicit acquisition of items by one country to be transferred to another. Mr. Spector cited several examples of North Korean transfers of missile components and technology to Syria, Iran, and Myanmar, and pointed to North Korea's illicit procurement of reactor components, designs, and know-how and its subsequent support for the construction of the Al-Kibar reactor in Syria. He also highlighted the possibility of collaboration in the manufacture and testing of a

weapon, citing the simultaneous development and testing of the nearly identical Shahab-3 and Nodong missiles by Iran and North Korea, respectively.

Mr. Spector then discussed a number of means by which individual states and the international community can deter or control the export or transfer of nuclear and ballistic missile technologies. These ranged from the application of UN, multilateral, or unilateral sanctions to direct military action. In particular, he noted the potential utility of having a patron state apply diplomatic or economic pressures to a dependent state in order to curtail illicit exports. Fostering such a relationship between China and North Korea could be useful, though Mr. Spector noted that there is little evidence of this strategy's success to the extent that China may be doing this already. He also pointed to the unilateral or multilateral strategy of constraining shipping by denying a proliferating country access to airspace, ports, and financial institutions. This strategy was adopted by the Bush administration in programs such as the 2003 Proliferation Security Initiative (PSI) and has been further reinforced by the Obama administration. Finally, short of full-scale military action, Mr. Spector noted the possibility of cyber attacks and targeted assassinations as a means to slow down a country's progress on nuclear or missile programs. Intelligence is critical in all of these cases.

All of these strategies, Mr. Spector argued, have had some success. Sanctions have limited access to key materials and other dual-use components such as vacuum pumps. Initiatives such as the PSI and UN Security Council Resolutions (UNSCRs) 1540, 1718, and 1874 have clearly limited North Korean transfers and progress on the Iranian uranium enrichment program. However, he warned that these successes have been limited and, moreover, that current export control regimes, sanctions, and initiatives have not kept pace with the adaptability and tactics of the traffickers. He concluded by predicting that while more sustainable results would come from promoting universal compliance with export control regimes, further progress on preventing illicit shipping and improving the implementation of sanctions resolutions such as UNSCR 1540 could be expected in the near term.


Next, Joshua Pollack presented his research on North Korea's missile supply relationship with Iran and Syria. North Korea, he stated, is currently the world's single most important supplier of ballistic missile technology, though its role has declined over time. While North Korea supplied at least seven states throughout the 1980s and 1990s, global attempts to curtail nuclear and missile proliferation have forced it to develop more exclusive and collaborative ties.

Mr. Pollack described the North Korean missile trade as a funnel both in terms of how it acquires missile technology and components from a wide range of sources and then packages these technologies for a small group of customers, and in the declining number of exports, transfers, and joint development projects over time. He explained that North Korea is not self-sufficient and relies heavily on foreign missile technology, tools, parts, and materials for its own missile program. Evidence from seizures of North Korean cargo indicates that sources have ranged widely, including the former Soviet Union/Russia, China, Japan, and Egypt.

In terms of missile exports, technology transfers, and joint development, Mr. Pollack noted that while North Korea was very active in the export of whole missiles prior to 1994, this practice has declined substantially over time despitethe perception that North Korea continues to ship complete missiles to parties worldwide. Throughout the 1990s, missile deliveries gave way to technology transfers and services, as evidenced by data on seized shipments between and 1994 and 2000. Mr. Pollack argued that this indicates North Korea was increasingly open to technology transfers and that its customers were increasingly intent on developing and sustaining their own missile programs. As customers became more self-sufficient, North Korea's customer base nearly collapsed, with North Korean shipments almost exclusively consisting of conventional arms. However, Iran and Syria (and recent developments also point to Myanmar) still receive North Korean assistance on ballistic missile production, though the relationship is much more collaborative. Mr. Pollack pointed to evidence that North Korea employs various techniques in collaborating with others on missile development, including the exchange of scientists, technicians and data and through reciprocal participation in testing and evaluation. This, he said, has led to increasingly sophisticated ballistic missile arsenals with increasingly common designs.

Mr. Pollack then discussed four major policy efforts undertaken to prevent missile proliferation: export control diplomacy, sanctions and interdiction, pressure on buyers, and the development of ballistic missile defense capabilities. Mr. Pollack argued that pursuing export control diplomacy has been partially effective. In particular, the Missile Technology Control Regime has made it more difficult for states to obtain sophisticated Russian and Chinese ballistic missiles, forcing countries like North Korea, Iran, and Syria to rely on older technology, but on the other hand, negotiations between North Korea and Israel as well as the United States in the 1990s were largely inconclusive and North Korea and other proliferators still have access to myriad dual-use technologies from China and Japan.

Sanctions and interdictions, Mr. Pollack argued, have met with little success. The PSI has had no observable influence on missile proliferation interdictions that have taken place under the PSI, UNSCR 1718, and

UNSCR 1874 since 2009 have resulted primarily in the seizure of conventional weapons and some dual-use components. This, he said, is due to two factors. First, the market for North Korean missile trade seems to have largely concluded in the decade prior to the establishment of the PSI and other initiatives, shrinking North Korea's customer base. Second, North Korea appears to be shifting to air transit in order to avoid sea interdiction.

Mr. Pollack argued that applying international pressure to buyers has been partially effective in reducing demand for ballistic missile technologies and components. Egypt, Pakistan, Libya, the United Arab Emirates, and Yemen all appear to have discontinued their ties to North Korea for the acquisition of missile technology. Yemen came under heavy U.S. pressure following Spain's 2002 seizure of North Korean Scud missiles bound for its shores, while Libya gave up its nuclear weapons program in 2003. Mr. Pollack was uncertain as to why the other countries had curtailed their relationship with North Korea but suggested that it might be because they are all military partners of the United States and receive advanced U.S. weapons and technology. Such pressures have had little or no effect on Iran or Syria. Neither is a strong military partner of the United States or other western countries and international political dynamics have complicated the application of sanctions and the interdiction of weapons shipments.

Finally, Mr. Pollack argued that the development of ballistic missile defense systems, rather than reducing demand for ballistic missiles, has on the contrary stimulated it. Ballistic missile defense systems are intended in part to increase the cost to an adversary of possessing ballistic missiles. However, according the 2010 U.S. Ballistic Missile Defense Review Report, Iran, Syria, and North Korea are all amassing large ballistic missile arsenals with the increasingly sophisticated capacity to overcome defenses via missile defense countermeasures and other tactics such as a salvo launch that can overwhelm defense systems.

In conclusion, Mr. Pollack stated that efforts to counter ballistic missile proliferation have considerably diminished the missile problem but also made it more difficult to address the remaining issues. He argued that the effectiveness of the policies could be significantly enhanced by greater multilateral participation, especially by China. China's limited participation in counter-proliferation, he noted, has weakened existing policies and initiatives. He cited poor Chinese enforcement of export controls on dual-use technologies, a lack of control over the transit of North Korean shipments through Chinese seaports and airspace, and the continuing risk of technology transfers from more advanced countries (possibly including China), which could facilitate the proliferation of missile defense countermeasures.

Finally, Jeffrey Lewis focused on the case of Myanmar, which is suspected of developing a clandestine nuclear weapons program. Dr. Lewis suggested it is important to focus on Myanmar because we do not know what its true aspirations are and because it offers observers a means to study how patterns of nuclear commerce and proliferation have changed over the last few decades.

Dr. Lewis pointed out that the international community traditionally focused on disrupting the construction of plutonium weapons. Developing a plutonium bomb (the type that North Korea build and assisted Syria in constructing) requires a large reactor, a large reprocessing facility, and several other components that are easy to detect because they are large industrial undertakings. Because the international community was always successful in identifying when a country was developing this type of program, Dr. Lewis argued, it has become complacent in its ability to detect proliferation.

In contrast to plutonium enrichment, uranium enrichment requires a much smaller industrial base, making such processes easier to conceal. Dr. Lewis stated that the development of high-precision machine tools greatly enhanced aspiring nuclear powers' ability to build the gas centrifuges necessary to enrich uranium. Vitally, such machine tools constitute widely available dual-use technologies, enabling proliferation networks like the A.Q. Khan network to deal almost exclusively with dual-use suppliers. This further facilitated concealment and enabled states to produce components for a nuclear weapons program cheaply and in quantity.

With regard to Myanmar, Dr. Lewis argued, there are very few known facts and an abundance of circumstantial evidence. First, it is known that Myanmar openly sought a nuclear research reactor from the Russian Federation, which its leaders claimed was needed to create medical isotopes. The project was abandoned for reasons of cost. Second, it is known that Myanmar has been sending large numbers of students to Russia to study in highly technical fields traditionally out of place in the Myanmar economy, including plutonium and uranium processing. Third, Myanmar harbors close ties to North Korea, including the possibility of missile proliferation. Dr. Lewis pointed to a trip report from a 2008 Myanmar military delegation to North Korea, in which the delegation visited a North Korean Nodong missile production factory. Photographs from the trip report include meetings with Jong Byon-ho, a North Korean official highly involved in North Korean missile proliferation in Syria and Iran and a former contact of A.Q. Khan. Additionally, Myanmar has openly admitted to mining uranium and declared five uranium deposits, though Dr. Lewis noted that it is unclear as to whether mining operations have been successful.

Dr. Lewis also pointed to two facilities apparently outfitted with German and Swiss-supplied machine tools. He noted that large construction projects like this typically receive some sort of domestic public attention in Myanmar, but these did not. After outfitting the site, Germany expressed concern, noting a significant military presence in the area. In addition, several photos of the facility's interior were leaked by a dissident group. One photo in particular depicted several pieces of highly technical equipment, one of which is used in uranium enrichment. Moreover, pictures of senior military leaders at a large ore-processing facility have led to a much more vigorous debate regarding whether the facilities are related to an enrichment program. He suggested the possibility that the sites are related to the extraction of rare-earth metals and noted that there may be some credible evidence for this argument, but he also noted that India used a rare-earths extraction plant as cover for its uranium-extracting gas centrifuges.

So, Dr. Lewis asked, what should be done or can be done to resolve the situation? Without firm evidence pointing clearly to a nuclear weapons program, the situation is very complicated from a policy perspective.

First, he argued that Myanmar must take steps toward greater transparency on the issue. That a senior official recently told U.S. Senator John McCain that Myanmar was abandoning a nuclear program because the endeavor was too costly is a positive development, but not good enough. Dr. Lewis argued that the only real way to resolve the issue is for Myanmar to sign the IAEA Additional Protocol and allow the international community some kind of access to the facilities in question. Another possibility is for the Association of Southeast Asian Nations (ASEAN) to send a fact-finding mission to Myanmar under the terms of the Southeast Asian Nuclear Weapons-Free Zone Treaty, which all ASEAN members, including Myanmar, have signed.

Finally, Dr. Lewis asked how Myanmar fits into the world of proliferation networks, particularly in light of its relationship with North Korea. First, following Leonard Spector's prior analysis, he suggested that Myanmar may be a customer like Syria. He also pointed to the possible role of Myanmar as a transshipment point for North Korea as a plausible scenario. There are some examples of this, including the recent seizure of a shipment of magnetometers to Myanmar by a Hong Kong company. Magnetometers can be used for missile production or to enrich uranium. However, Dr. Lewis noted that it was also plausible that the company simply did not know that Myanmar had such sanctions placed upon it.

# Safety of Nuclear Facilities on the Korean Peninsula

**Session 1 (Orchid)**
**June 13, 2011**

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| **Panel** | Chang Soon Heung (Moderator), Korea Advanced Institute of Science and Technology (KAIST) |
| | Baek Won Pil, Korea Atomic Energy Research Institute (KAERI) |
| | Fujiie Yoichi, Tokyo Institute of Technology |
| | Kang Ki-Sig, International Atomic Energy Agency (IAEA) |
| | Lee Jong In, Korea Institute of Nuclear Safety |
| **Author** | Lee Jeong Ik, Khalifa University |

Professor Chang Soon Heung began the first session by asking Dr. Baek Won Pil from KAERI, what kind of knowledge is necessary to enhance nuclear safety. Dr. Baek stated that the goal of nuclear safety is to protect individuals, society, and the environment from nuclear facilities. He argued that, during the Fukushima accident, Japan was able to protect individuals but emergency response teams did not do a good job in protecting society and the environment from the accident.

There are two levels of safety: a minimum required level and a desired safety level. The minimum required level is addressed by regulatory requirements. Regulations require nuclear power plants not to introduce significant additional risk to the public due to nuclear energy, and the risk from the nuclear energy source should be comparable to other energy sources. The desired level of safety is higher than the minimum level and is bound by available technologies. The minimum required level of safety is achieved in South Korea however, further improvement is necessary to achieve the desired safety level. To reach this, South Koreans need to focus on: strengthening awareness of man-made hazards, mitigating the risk of severe accidents, accident response preparation, and communicating clearly and transparently in the event of crisis. Furthermore, he noted that the term "severe accident" is defined as severe damage or degradation of a nuclear reactor core, and it is not part of a "design-basis event".

Dr. Baek listed a number of areas of research and development that can improve a nuclear facility's safety levels including: designing advanced reactors with higher levels of safety maintaining a high level of knowledge about nuclear safety revising the design base for natural and man-made hazards; understanding the cooling mechanism providing a detailed explanation for severe accident propagation understanding the safety issues of long-term operation of nuclear power plants and understanding radioactive dispersion and its health effects. He concluded by stating that the design and related decisions should be based

on knowledge, not emotion. Furthermore, he stressed that nuclear power plants should seek to prevent accidents at all costs.

The second panelist, Professor Fujiie Yoichi, focused on the Fukushima accident itself and lessons learned from it. Dr. Yoichi provided a detailed analysis of the events surrounding the Fukushima accident; from the initial earthquake through to the degradation of the reactor core.

Dr. Yoichi stated that, in contrast to the Chernobyl accident, the Fukushima accident did not involve any casualties due to radiation exposure. He also believed that the Fukushima accident has had far less impact on the environment than the Chernobyl accident. Nevertheless, the Fukushima accident is considered as a major "social" accident because of the disruption to the livelihoods of many people around the site. For instance, many of the people who were evacuated from the site are still living in shelters.

He further said that the Fukushima accident initially had less impact than the Three Mile Island accident but eventually reached the level of the Chernobyl accident due to a high level of radioisotope release. However, he thought that the Fukushima accident is likely to have far fewer implications than the Chernobyl accident because only short-half-life radioisotopes were released. This is because radiation due to the release will only affect the surrounding environment for a limited amount of time unlike the Chernobyl accident.

Dr. Yoichi also discussed the question of whether the Fukushima power plant emergency reached a critical level again after the shutdown. If the criticality reoccurred, one could not say the reactor was safely shut down. However, he claimed that, as could be seen during the Three Mile Island and the Fukushima accident, once borated water is introduced to the core, the core cannot reach a critical level again. Dr. Yoichi identified a number of areas for further work such as: polluted water and soil need to be cleaned up, severe accident management procedures have to be revised, the inherent safety features have to be checked, and reactor parameters should be measured at all costs. He concluded by informing the audience that information regarding the accident will be provided to the international community with transparency.

Dr. Kang Ki-Sig of the IAEA began his presentation by discussing those lessons from the Fukushima accident that could be directly applied to a Korean nuclear facility. He mentioned that a successful operating history does not always guarantee the safety of a nuclear facility. For example, the unplanned nuclear power plant shut down rate per year is 0.2 times for Japan, which is one of the best records in the world. South Korea holds a record of 0.3 times per year. He briefly summarized the Fukushima accident as that began with a loss of offsite power, or a design-basis accident - to a total station blackout scenario, or a severe accident. He then explained two different types of accident management: on-site emergency management and off-site emergency management. An on-site emergency management team consists of a group of engineers and workers located at the nuclear power plant site. For instance, at the Fukushima nuclear power plant, 4,000 workers, along with 200 engineers divided into 15 groups, are currently involved in studying different aspects of the accident. The off-site management team is based at the Tokyo Electric Power Company head office and governs and makes major decisions about what to do on site.

Dr. Kang further explained that there was uncertainty as to who was responsible for managing the Fukushima accident, suggesting thatthe off-site management was not transparent. For example, the IAEA requested important information from Japan's Nuclear and Industrial Safety Agency (NISA) multiple times but received no answer from them during the accident. Moreover, NISA even sent out incorrect information, which damaged its credibility further. Dr. Kang especially emphasized that there needs to be a review of the off-site emergency management, since the communication between different stakeholders and chains of command was not well organized during the Fukushima accident. He also stressed that accurate radiation measurement outside the nuclear power plant has to take place, even during severe conditions. Finally, he ended his presentation by saying that the communication with the public during this type of event cannot be overlooked at any cost.

The fourth panelist, Dr. Lee Jong In, summarized the South Korean response to the Fukushima accident to demonstrate how the safety of South Korean nuclear facilities is managed. After the Fukushima accident, South Korea operated an emergency response team 24 hours a day to check and monitor the South Korean border regarding dispersion of radioisotopesfrom the Fukushima accident, to constantly review information released to the public, and to respond to the public's needs. He also mentioned that the recent investigation initiated by the South Korean president concluded that all nuclear facilities in South Korea are safe from earthquakes and tsunamis around the Korean Peninsula. Finally he summarized the points raised by other panelists that could improve the safety of nuclear facilities in South Korea. He further argued that the international credibility of South Korean nuclear facility safety has to be improved in the future by learning lessons from the Fukushima accident.

The question and answer session began with a question regarding the on-site storage of spent-fuel in South Korea. Since Unit 4 at the Fukushima Daiichi site had major problems, not with the reactor, but, with the liquid pool spent-fuel storage area, an audience member asked whether South Korea is reviewing its current practices due to the Fukushima accident. Dr. Chang responded that spent fuel generated by a CANDU-type reactor is not stored in a liquid pool but rather in dry casks. Dr. Yoichi further stated that the hydrogen explosion in Unit 4 of the Fukushima Daiichi site did not occur due to the spent fuel but rather due to hydrogen migration from Unit 3 after it had experienced an explosion.

Another question was raised regarding whether there is collaboration between South Korea, Japan, and China as in the European Union (EU). Dr. Kang and Dr. Chang both stressed that South Korea, Japan, and China are very different in how they regulate their nuclear power plants, unlike EU countries. Therefore, regional collaboration cannot take the same form as in the EU. However, in the future, the three Asian countries will need to cooperate/collaborate with each other to enhance nuclear safety.

Next, an audience member asked for examples of passive safety systems. Dr. Baek briefly mentioned the design of APR+, which is the upgraded version of APR1400. APR+ is an advanced South Korean light water reactor with a few passive safety systems added to the APR1400 design. The most significant passive safety system is the auxiliary feedwater system for the secondary side. By utilizing natural circulation and an isolation condenser, APR+ now has a passive means of supplying feedwater to the steam generator. This means that the decay heat from the primary side can be successfully removed by the passive system during most types of accidents without a loss-of-coolant event.

Finally, an audience member asked whether the accident sequence would have been any different if the emergency diesel generator at the Fukushima site had survived. Dr. Yoichi, Dr. Baek, and Dr. Kang all agreed that if the emergency diesel generator had survived the flooding due to the tsunami, the core would not have experienced thesevere degradation that resulted in the hydrogen explosion. However, since many supporting systems and essential equipment were damaged during the tsunami as well, it would not have been that easy to manage such a crisis, even if the emergency diesel generator had been operating.

The session concluded with Dr. Chang's statement that accidents should always be prevented as much as possible before we think about mitigation strategies. Therefore, future R&D efforts should focus on accident prevention. Dr. Yoichi added that information about the Fukushima accident will continue to be provided to the public and the international community with transparency so that many useful insights and lessons can be shared.

# Extended Deterrence and Assurance in Japan

**Session 1 (Cosmos/Violet)**
**June 13, 2011**

**Panel** Andrew Oros (Moderator), Washington College
Martin Fackler, *The New York Times*
Takahashi Sugio, National Institute for Defense Studies
Victoria Tuke, University of Warwick

**Author** Gordon Wyn Jones, King's College

**Summary** In the current era of nuclear arms reduction, constrained defense budgets, and steps toward a nuclear-weapons-free world, the concept of extended nuclear deterrence (END) is coming under increasing scrutiny. This session focused on issues of deterrent capability and credibility relating to Japan's evolving security and defense posture, in response to the rise of China and the changing security environment in Northeast Asia. Despite the enduring importance of the U.S.-Japan alliance, and the continued deterrent role of the U.S. nuclear umbrella in providing security assurance to a non-nuclear Japan,, there are doubts about the future of alliance commitment and deterrent resolve.

The moderator, Dr. Andrew Oros, began the session by briefly sketching out the region's security environment. Firstly, he described the global strategic context and the phenomena of ongoing reductions in the major power's nuclear arsenals, juxtaposed with an increase in the number of proliferating states, and associated issues of rogue risks and terrorist threats. Secondly, he noted that the United States has been de-emphasizing its nuclear posture and is again immersed in a period of defense rationalization and debate regarding overseas deployments, capabilities, and burden-sharing. Thirdly, he discussed the attendant issues of regional anxiety regarding the rise of China, the future of North Korea, the role of the United States in the Asia-Pacific, and questions about the overall credibility of the U.S. nuclear umbrella and ongoing strategic and tactical assurances to Japan.

Sugio Takahashi outlined the Japanese defense establishment's thinking behind Japan's new National Defense Program Guidelines (NDPG), issued in December 2010. He pointed out the shift to a more "dynamic," integrated, and flexible defense posture, and the needs and concerns for maintaining a credible END capability against direct threats to regional stability and the ongoing strategic probing by China, which is seeking to shape a new geopolitical balance in the Asia-Pacific. For Japan, END and security assurancesremain essential factors in an uncertain region, where the ultimate goal of nuclear disarmament remains desirable but distant.

Japan's new NDPG outlined a shift from the hitherto "basic defense concept" to a more "dynamic defense" posture, integrating Japan's own efforts with greater alliance cooperation and multi-layered security cooperation with the international community. Four elements fed into the new NDPG: the regional context and concerns (particularly China's military expansion and the North Korean proliferation threat), the regional security architecture and defense force mix, Japan's role in missile defense, and the nuclear component of extended deterrence. The NDPG emphasized that "as long as nuclear weapons exist, the extended deterrence of the United States, with nuclear deterrent as a vital element, will be indispensable."

The NDPG also highlighted Japanese intentions for closer cooperation to "maintain and improve the credibility of the extended deterrent"—reflecting elements of concern about the deterrent capability and resolve in the post-Prague world of New START deep cuts and de-emphasis on nuclear assets, as per the U.S. Nuclear Posture Review of April 2010. While reiterating the declared policy in support of extended deterrence coverage for key allies such as Japan, there are concerns about the reduction of U.S. nuclear infrastructure and weapons programs, which could adversely affect the credibility of extended deterrence in Northeast Asia.

Particular concern relates less to any actual threat of nuclear attack or blackmail, and more towards a "stability-instability paradox" situation, in which adjustments to the general strategic nuclear balance could lead to lower-level instability, such as China's territorial probing and attendant dangers for regional security and crisis management. Given the prevailing uncertainty in Northeast Asia, the assurance and credibility of the U.S. nuclear umbrella remain crucial to peace and stability. Appropriate efforts should be made to deepen and develop Japan-U.S. alliance coordination and to enhance strategic consultation for maintaining a credible and effective overall deterrent.

Martin Fackler provided an assessment of Japan's security environment and outlook, highlighting the various external and domestic factors shaping Japan's evolving security stance. He stated that the new NDPG reflects Japan's shifting thinking about conventional defense and confirmed Japan's shifting security orientation: geographically, from a northern focus toward southern threats; operationally, to a more flexible, well-rounded, multi-dimensional force structure. The role of the U.S. nuclear umbrella in the NDPG has remained a relatively static issue. While it is acknowledged as a cornerstone of the U.S.-Japan alliance, its status as a sensitive subject in Japan has caused it to receive little public attention.

The timing and content of the NDPG reflects a region in flux and Japan's specific concerns about China. From Japan's perspective, there are reasons for feeling less secure. North Korea's missile and nuclear tests highlighted Japan's geographical vulnerability. Japan's territorial issues with South Korea and especially Russia and China further highlight its geopolitical and diplomatic weakness. Coupled with these anxieties are concerns about the implications of a Japanese economy in relative regional and global decline, and attendant fears about U.S. abandonment and "Japan passing" amidst the focus on U.S.-China "G-2" economic and geopolitical priorities.

Japan's fiscal constraints and declining defense budgets stand in sharp contrast to Chinese military momentum and modernization, adding to its dilemmas about forward defense capabilities and preparedness, with or without the full commitment of the United States. Domestically, Japan's reflexive U.S.-centered defense policy was initially questioned by the new government led by the Democratic Party of Japan, with the Futenma base issue center stage and talk of rebalancing Japan's U.S. and Asian orientation. However, an incident involving the collision of a Chinese fishing boat with Japanese Coast Guard vessels off the Senkaku Islands in September 2010, as well as other Chinese actions, including its temporary embargo on rare-earth metals in September and October 2010, served to refocus attention on the centrality and vitality of the Japan-U.S. relationship, with both countries increasingly wary of China's motives.

The events of March 11 and the crisis response coordination provided by the U.S. military through "Operation Tomodachi" served to strengthen alliance coordination and public perceptions about the merits of the U.S. relationship and the ongoing military presence in Japan. Whether and to what extent prevailing events and regional threat perceptions are changing "strategic culture" in Japan, particularly with regard to nuclear issues, is unclear. Though there is more openness and debate regarding defense-related matters in general, there remains little public discussion about nuclear deterrent issues and options. Japan's "nuclear allergy" remains significant, particularly after Fukushima.

Overall, given Japan's current regional and domestic situation, the NDPG's shift to a more dynamic and multi-dimensional force concept represents a reasoned response to emerging security challenges and longer-term uncertainties regarding the Northeast Asian neighborhood and U.S. commitment to Japan.

Victoria Tuke discussed the changing dimensions of nuclear deterrence in the post-Cold War era of global terrorism, piracy, and other non-traditional and non-state actor threats to international security. In an increasingly multi-polar world, with diverse challenges and more resilient European and Asian allies, the rationale and relevance of U.S. extended nuclear deterrence is being questioned. While END remains explicitly in place between the United States and Japan, there are elements of divergence between both countries' threat perceptions and nuclear emphases. There are differences, for instance, over the U.S. decision to withdraw Tomahawk nuclear missiles and the question of sole purpose/no first use of nuclear weapons. Both subjects illustrate the important psychological dimensions of deterrence rhetoric, resolve, and credibility, which is so important for non-nuclear Japan.

Doubts about U.S. commitment, combined with regional nuclear proliferation, have fueled speculation about Japan developing its own independent deterrent. Such speculative scenarios have been around since the 1970s and, though it is widely acknowledged that Japan has the technical capability to cross the nuclear threshold, such a step would be highly unlikely, given Japan's domestic constraints and opposition, and the irreparable damage that such a move would inflict on Japan's international reputation and the Nuclear Non-Proliferation Treaty regime. From Japan's perspective, it has tremendous political capital to lose by pursuing an independent nuclear path, with little or no strategic benefit to gain by having its own nuclear capability.

Comparing the nuclear narratives of Japan and India provides a picture of "two states which have recently rediscovered each other diplomatically, due to common concerns and interests", most prominently, the growing challenge posed by China's military growth and maritime "muscle-flexing". Both countries share a concern about crisis stability and threats from their respective nuclear-armed neighbors (Pakistan and North Korea). Both India and Japan promote disarmament and deterrence, though only India has its own independent nuclear deterrent.

For India, security autonomy has been a paramount factor in its regional environment and rise to prominence on the world stage. Arguably, its nuclear status is part of the equation of pride, power, and purpose, which characterizes India's growth momentum and global standing. Maintaining a credible minimum deterrent capability remains a key strategic imperative for India and, while the merits of the 2005 India-U.S. nuclear deal continue to be hotly debated, it has enhanced India's nuclear status, as well as opening the door to more active diplomacy and trade between Japan and India. Though looking to benefit from stronger U.S. links and support, India has no intention to give up control of its indigenous nuclear forces through an END arrangement.

In contrast to India's nuclear position, Japan has gained in stature through its long-standing non-nuclear stance, backed by a somewhat contradictory reliance on the U.S. nuclear umbrella. With power and purpose on its side, India has good leverage to pursue conventional and nuclear avenues for its overall defense. Contrasting the nuclear stances of the two countries, it is clear that Japan's deterrent stance is more alliance-dependent and with less scope for regional autonomy. Under this condition, extended deterrence remains an important tool for stability in Northeast Asia, with appropriate consultative dialogue and assurances, to assuage anxieties and reinforce deterrent credibility.

Following the presentations, the panel discussed a wide range of issues, such as the new NDPG and the trajectory of Japan's "remilitarization" versus China's modernization and territorial probing; sources of anxiety regarding Japanese security policy and "strategic culture", including the role of public perception and pressure in driving Japan's enhanced security orientation and defense planning. It is a measure of the shift in China's own military profile, as well as in regional anxiety, that Japan's new NDPG garnered such a muted response both domestically and regionally. Similarly, the recent opening of Japan's Djibouti "center" for Japanese military participation in anti-piracy operations reflects the more dynamic approach to protecting the vital sea lanes of communication and commerce.

In a sense, the rise of China can be viewed as having changed the strategic script regarding Japan's own military posture and preparedness, to the extent of prompting direct military relations between Japan and South Korea in common areas of concern. The dangers of escalating territorial disputes remain significant and, with assurance and reassurance very much a two-way street in a potentially volatile region, there remains an important need for deeper alliance consultation and regional confidence-building measures with respect to nuclear and non-nuclear issues, threat perceptions, and effective deterrence for crisis and conflict avoidance.

# Reprocessing and Disposal of Spent Nuclear Fuel

Session 1 (Lilac/Tulip)
June 13, 2011

**Panel** Sharon Squassoni (Moderator), Center for Strategic and International Studies
Alan Hanson, Stanford University
Andrew Orrell, Sandia National Laboratory
Charles McCombie, Association for Regional International Underground Storage
Juhani Vira, Posiva Oy

**Author** Lance Kim, UC Berkeley

**Summary** The role of spent nuclear fuel (SNF) pools in the ongoing accident at the Fukushima Daiichi nuclear power plant has sharpened the focus on the management of SNF. The safety of Japanese reprocessing facilities has also received attention against the backdrop of general nuclear safety issues in the aftermath of the recent earthquake and tsunami in Japan. many of these concerns about the safety of reprocessing are likely driven by the proximity of the Rokkasho facility to Fukushima given that reprocessing poses similar safety issues to large onsite wet pool storage facilities, and closed fuel cycles may have lower life cycle environmental and public health impacts due to reductions in uranium mining and conversion. However, the long-term concern is that the decision to reprocess and/or directly dispose of SNF from once-through fuel cycles require states to confront frequently mischaracterized tradeoffs between hard and soft factors related to proliferation risk, repository performance, economics, safety, energy security, and resource sustainability.

Several assessments comparing alternative fuel cycles have produced ambiguous recommendations due to competing risks and benefits that are distributed temporally, including issues of intergenerational equity. Though reprocessing does not obviate the necessity of siting a long-term disposal facility, reprocessing may simplify waste management by improving repository performance (e.g., reductions in decay heat and radiotoxicity, waste from performance), increasing sustainability and energy security by improving natural resource utilization, improving safety by reducing front-end risks, and increasing stakeholder acceptance.

Views on technical performance measures also vary, with some states placing greater importance on the radiotoxicity of SNF in addition to public health risks that account for radionuclide transport and exposure. Comparisons of proliferation risk also produce mixed results. Though the consumption and denaturing of plutonium offers nonproliferation benefits, the potential to divert or steal fissile material and the potential misuse of separation facilities require extensive safeguards and security measures.

The large fixed costs and scaling issues for a geological repository and reprocessing may encourage states, particularly those with smaller nuclear energy programs, to form cooperative arrangements to manage the back end of the fuel cycle. Given the cost-scaling issues associated with typical reprocessing technologies and geological repositories, the why, how, when, and where of closing the fuel cycle will likely require a confluence of rationales that will be state specific and context dependent. In the case of reprocessing, the economic rationale for closing the fuel cycle is more demanding than the case for enrichment, probably requiring a fleet of 20 to 40 large nuclear power plants (NPPs) in comparison to 15 to 20 NPPs to justify enrichment. For example, though French reprocessing experience has tended to avoid many of the downsides of the U.S. and Russian experiences, which were largely driven by the exigencies of Cold War weapons programs, the French reprocessing facility at La Hague remains underutilized despite processing SNF from several countries. Nevertheless, some states with larger nuclear programs and limited uranium resources may be more willing to accept the cost premium of reprocessing in exchange for the energy security benefits of utilizing plutonium in SNF.

Advanced reprocessing technologies, such as pyroprocessing, may offer operational benefits in comparison to continuous aqueous processes (e.g., PUREX) due to batch operation, but require overcoming a number of technological hurdles (e.g., producing fuel with high actinide loading, fast reactor development), and costs are unclear. Similarly, facing costs associated with siting a geological repository that are on the order of a large NPP, states with smaller nuclear energy programs may pursue multinational arrangements to manage SNF that rely upon “big friendly” states or cooperative partnerships between like-minded states such as those in Europe, the Middle East, and Asia.

The waste management experiences in Finland and the United States are studies in contrast. Though initially preferring to reprocess foreign-origin SNF or return it to the Soviet Union, the Finnish direct disposal strategy was influenced by the U.S. decision to abandon reprocessing, low uranium prices that reduced the economic incentive to reprocess, and the network effects arising from the Swedish plan to directly dispose of SNF. A systematic, consistent, and participatory approach to repository siting is credited for the relative success of the Finnish nuclear waste management program. First focusing on geological and safety factors, the final siting decision was directed by a local and national response, with Finland ultimately choosing to site the repository on the site of an existing nuclear facility. Currently, Finland has spent roughly three billion Euros to manage several thousand tons of waste with the option to expand the repository in the future.

The more contentious U.S. experience in nuclear waste management reveals that it also struggles with the fundamental question of whether SNF should be viewed as an asset or a liability. Historically, changes in the regulatory climate, technical failures, and policy reversals stymied the development of reprocessing in the United States. Currently, the future of U.S. nuclear waste disposal is uncertain as the Obama administration reconsiders the national strategy for nuclear waste management. Efforts to cancel the Yucca Mountain project without credible alternatives have been met by opposition from an industry that has brought legal suits, as well as congressional investigations and a ruling by the Atomic Safety Licensing Board challenging the administration's authority to undermine legislation.

Recently released draft findings of the Blue Ribbon Commission subcommittees established to revisit these issues have shed some light on the future of U.S. nuclear waste policy, provisionally recommending a "Fedcorp" entity to take responsibility for SNF as well as the continued pursuit of a centralized storage repository and advanced fuel cycle concepts while recognizing the limited rationale for reprocessing in the near term. The de facto U.S. policy of interim and indefinite storage will likely require continuing funding, technology development, and siting efforts to constitute a credible waste management strategy. And while often pitched as an "all-or-nothing" proposition, a combination of once-through and closed fuel cycles may be desirable to manage the backlog of SNF, possibly incorporating an interim storage facility of fixed capacity as a strategic reserve of SNF to manage an uncertain future.

# Japan's Nuclear Program after Fukushima

**Session 2 (Grand Ballroom)**
**June 13, 2011**

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| **Panel** | Ahn Chak-hee (Moderator), jTBC<br>Iwata Shuichi, University of Tokyo<br>Furukawa Katsuhisa, Research Institute of Science and Technology for Society<br>Hwang Il Soon, Seoul National University<br>Suzuki Tatsujiro, Japan Atomic Energy Commission |
| **Author** | Yuma Kuwata, Keio University |
| **Summary** | Ms. Ahn Chak-hee provided the opening remarks. She first paid her condolences to the victims of the March 11 earthquake. The nuclear accident at the Fukushima Daiichi nuclear power plant had a grave impact on nuclear power policy all over the world. Ms. Ahn asked each panelist to say, in their view, what lessons were learned from this disaster. Dr. Iwata Shuichi stated that the nuclear disaster taught us the vital importance of organizing the massive amounts of data that was collected from this incident for the people of the next generation to use. Dr. Furukawa Katsuhisa pointed out that the lesson learned from this is that the manuals that were created for emergency situations only looked good on paper, but were flawed in reality. Dr. Hwang Il Soon focused on the lessons that the developing countries, such as the Republic of Korea (ROK), learned from the nuclear accident. Dr. Suzuki Tatsujiro gave his analysis of the short-term and long-term challenges that Japan will face. |

Dr. Iwata expressed his gratitude toward every country and organization that gave support to Japan in the time of crisis. He claimed that disasters like this should never be repeated again; if the goal is to gain sustainability through nuclear energy, experts must organize the massive amount of data that they have collected from this disaster, especially the accident in the Fukushima nuclear power plant, and share it with the world. Dr. Iwata suggested that it is also important to classify the data collected into six categories: observation science, experimental science, theoretical science, data science, societal science, and community science.

He also pointed out several reasons why authorities were not able to contain the nuclear disaster. One of those reasons was the nuclear power plant's lack of capability to cope with several threats simultaneously. The Fukushima nuclear power plant was able to stop the nuclear reaction inside the reactor right after the earthquake, but it was not able to cope with simultaneous threats such as the tsunami, power failure, and ventilation malfunction. This suggests experts' inability to think outside the box and their tendency to focus

on one theory and one situation rather than looking at multiple theories and multiple situations. Another reason why the authorities were not able to contain the damage of the nuclear disaster was their incapability to analyze and process the vast amount of information and data. The amount of data and varieties of data coming in to the command center was too enormous for the command center to go through it all. Dr. Iwata hopes that all the data gathered will be organized, shared, and used by everyone and the generations to come.

Dr. Furukawa stated that the earthquake that Japan suffered on March 11 was a "black swan". Earthquakes of this magnitude come only once in 1,200 years. This means that the Tokyo Electric Power Company is being criticized for not preparing for something that could happen once in 1,200 years. The most important lesson that experts have learned from this nuclear power plant disaster, Dr. Furukawa claimed, is that the manuals that they have created and prepared only looked good on paper and not on real occasions.

The local government, the national government, and the Tokyo Electric Power Company have upgraded their emergency manual seach year, but all the training and the risk assessments have been done assuming a disaster the size of Three Mile Island. Furthermore, the manual was not able to respond to multiple reactor problems, and all the planned countermeasures were based on the premise that the power plant would not lose power. Also, the manual said to make a command center near the disaster site and the information released to public should be unified to prevent public panic, but Prime Minister Kan decided to override the manual and made the command center in Tokyo, and both the government and Tokyo Electric Power Company held separate press conferences,which made the public panic. So not only was the manual flawed because it underestimated the size of the disaster and failed to accommodate unexpected situations, but also there were people who did not follow the pre-existing plan. The situation would have been contained better if authorities were able to dispatch Japan Self-Defense Forces and unmanned aerial vehicles sooner, but since their participation was not considered in advance, their dispatch was significantly delayed.

Dr. Furukawa suggested that experts must cooperate internationally and share what they have learned from this nuclear power plant disaster. He presented his idea of creating a new international organization that specializes in nuclear power safety regulation to oversee the world's nuclear power plants comprehensively.

Dr. Hwang Il Soon spoke from the point of view of South Korea and other developing nations that already have nuclear power plants or are planning to construct them. South Korea is paying close attention to the nuclear accident in Fukushima not only because the ROK is geographically close to Japan but also because its nuclear energy policy is similar to Japan's. South Korea, like Japan, has the issue of an energy shortage, as well as a heavy reliance on nuclear power, and the government is very supportive of the nuclear power industry. Not only is the government policy similar, but also characteristics such as bureaucracy's great influence and government's lack of transparency as well. Dr. Hwang said the South Korean people are concerned because a nuclear accident like the one in Japan could happen in Korea as well. Japan and South Korea chose to rely on nuclear power for the same reason, but the incident at Fukushima demonstrated the grave risk of overconfidence in technology. Many countries, including the ROK, look up to Japan, and Dr. Hwang believes that Japan should take the lead to fix this problem.

Out of the many lessons that South Korea learned from Japan's nuclear accident, Dr. Hwang highlighted five: (1) the government must be open and clear with its information (2) the government must be humble (3) South Korea must use this event to revitalize nuclear safety and responsibility in the nuclear industry (4) South Korea must share the lessons learned with other developing countries and (5) non-governmental organizations and multiple countries should cooperate and must meet on a timely basis to remind themselves of this incident.

Dr. Suzuki Tatsujiro briefly explained the present situation at the Fukushima nuclear power plant and the challenges that Japan is expecting in the short- and long-term. He first stated that the incident at the Fukushima nuclear power plant is not completely over and the containment process still needs priority attention.

Dr. Suzuki claimed that the most significant short-term challenge that Japan will face is going to be power shortages from the shutdown of multiple nuclear power plants all across Japan. This shutdown of nuclear power plants is due to emergency inspection and maintenance after the Fukushima nuclear power plant accident. Thirty-five nuclear power plants have been shut down recently, and only 19 out of 54 power plants are in operation. If the public and the local government do not accept the safety standards of the current power plants, all the nuclear power plants will be shut down by next year. That is 30% of all Japanese electricity generation taken off the grid. The government is currently trying to find a way to ensure the safety of current nuclear power plants that would satisfy an overly cautious public.

The long-term challenge that Japan will face will be to change energy security policy. The Kan administration identified nuclear power as one of the key industries for the growth of Japan before the earthquake; the administration even planned to increase Japan's dependency on nuclear power. But with the disaster of March 11, the expansion plan for nuclear power plants is back to square one and the Kan administration made a dramatic change in its energy security policy. Prime Minister Kan presented his idea of three new pillars for energy: high nuclear safety standards, renewable energy, and an energy- and fuel-efficient society. The drastic change in government policy is likely to affect Japan's economy.

There are many lessons to be learned from the disaster at the Fukushima nuclear power plant. Each panelist presented a different analysis, but all agreed that Japan must share what it has learned with both the public and the world to regain the public's trust in nuclear power and to upgrade the safety of its nuclear power plants.

# Nuclear Weapons States v. Non-Nuclear Weapons States

**Session 2 (Orchid)**
**June 13, 2011**

**Panel** Lee Jung Hoon (Moderator), Yonsei University
Etel Solingen, UC Irvine
Henry Sokolski, Nonproliferation Policy Education Center
James Walsh, Massachusetts Institute of Technology (MIT)

**Author** Melissa Hanham, Center for Nonproliferation Studies, Monterey Institute

**Summary** Session Two of the first Asan Plenum brought together three experts to discuss the competing interests of nuclear weapons states (NWS) and non-nuclear weapons states (NNWS): the two core groups represented in the Nuclear Non-Proliferation Treaty (NPT). The panel was moderated by Dr. Lee Jung Hoon, who currently serves as the Dean of International Education and Exchange at Yonsei University. He used his experience in international security and expertise on North Korea's nuclear program to highlight those issues that stand between the parties. Dr. Etel Solingen, the Chancellor's Professor at UC Irvine, drew on her book, Nuclear Logics: Contrasting Paths in East Asia and the Middle East, to highlight the different behaviors of NWS and NNWS. Mr. Henry Sokolski, Executive Director of the Nonproliferation Policy Education Center, followed with a discussion of his review of ten years of NPT history to highlight the ways in which the positions of both groups have evolved. Dr. James Walsh, a Research Associate with MIT's Security Studies Program, closed the session with his thoughts on ways NWS and NNWS can focus on areas of cooperation to ease the deadlock of contentious issues.

As moderator, Lee Jung Hoon laid a foundation for the discussion by defining the topic. While the title of the session focused on parties to the NPT, he cautioned that those outside the NPT should not be neglected. He gave an overview of the wide array of issues that set NWS apart from NNWS, ranging from the perspective of the Non-Aligned Movement to the prospects for a Middle East nuclear-weapon-free zone. He especially drew attention to NNWS' arguments that their right to the peaceful use of nuclear energy is being undermined and their belief that NWS are not meeting their obligation to disarm as the most contentious of the divisions.

Etel Solingen opened the discussion by examining why some states choose to seek a nuclear weapons program. She saw two dimensions to the issue: a demand side and a supply side. To ameliorate some of the demand issues, she advised NWS to make major moves in the direction of disarmament, because states seeking nuclear weapons programs often use it as a pretext for their own programs. Additionally, NWS should consider how their decisions affect the thinking of NNWS. She also recommended focusing on domestic political economy measures, which she found to have an impact on nuclear choices. She proffered that internationalizing states seeking favorable entry into the global economy are less likely to seek weapons, while inward-looking states are more prone to do so. She referenced North Korea as an example of a classic inward-looking state with its Juche philosophy that sees nuclear weapons as a tool of regime stability and a deterrent against external threat. She found that over-concentration on external threats and security imperatives was misleading for states, and could in fact become a self-fulfilling prophecy, as is the case with Iran.

On the supply side, Dr. Solingen examined the use of sanctions and inducements as a means to counter nuclear breakout. On this point, she found it important to highlight the significant divisions among and within NWS and NNWS. As an example, she noted earlier calls from conference participants for China to do more to comply with sanctions. However, despite its vacillations, Dr. Solingen found China's position to be greatly evolved from that of decades ago. She also commented on how difficult it is to organize and implement sanctions with consensus of all the relevant parties in a timely fashion when states such as Iran and North Korea can adapt at a quicker rate.

According to Dr. Solingen, both NWS and NNWS face a dilemma: autocratic, inward-looking states account for most of the cases of noncompliance, but they are also least susceptible to a remedy by sanctions or inducements. Despite the fact that sanctions are tailored specifically to the model of an inward-looking state, their very alienation makes them more resistant to any sticks or carrots the international community might offer. Additionally, both parties face what Dr. Solingen deems a "Goldilocks Dilemma", where designing sanctions that are too strong can have as dire an effect as those that are too weak, and thus can cause more divisiveness amongst and between both NWS and NNWS. Dr. Solingen also noted that violators of the NPT can share other attributes, such as human rights abuses and narcotics trafficking. She questioned whether linkages between the different compliance issues could or should be formed, asking whether there was a potential hierarchy of compliance. While states often refer to an external security threat as a justification for seeking a nuclear weapons program, in fact internal political dynamics are the main driver of these choices. She suggested the extension of negative security assurances as a way to combat the ease with which regimes employ the "rally around the flag" rhetoric of external security threats.

Dr. Solingen ended her talk by examining if it is possible to change an inward-looking state into an internationalizing state. On the one hand she saw a great deal of promise in promoting Chinese-style economic reforms in North Korea however, Kim Jong-Il remains reluctant. She questioned whether this reluctance is well founded, suggesting that the absence of such reforms could prove more dangerous to his regime as news spreads of the prosperity across North Korea's borders. In terms of the use of sanctions and inducements, Dr. Solingen argued that, despite the imperfections of such tactics, the use of sticks and carrots was better than no action at all, and that states should not make "perfect" the enemy of "good". While sanctions

have a mixed track record, there is evidence to suggest they were successful in ending the nuclear programs of Libya and Iraq. She also found room to improve the sanctions on Iran to include oil exports, without enfeebling the global economic recovery.

Henry Sokolski reviewed years of NPT documents and negotiations after he ended his government service to better understand the evolution of the opinions held by both NWS and NNWS. While he found that the two points of contention that Dr. Lee highlighted are deeply held today, they also represent a strong diversion from the original intent of the treaty. Neither the belief that NNWS have an "inalienable" right to nuclear energy, nor the opinion that if NWS do not disarm, the NPT becomes meaningless are optimal in his mind. Rather he found that these current positions, if taken to their logical conclusion, would lead to unintended side effects that would undermine the treaty. For example, as Dr. Solingen previously mentioned, states that sought to opt out of their obligations under the NPT were using the inertia on disarmament as a pretext to seek their own weapons programs. Similarly, if NNWS continue to demand their per se right to any form of nuclear energy so long as it was declared "for peaceful purposes" and only monitored occasionally by weak international institutions, the risks of another North Korea or Iran become apparent. Instead, Mr. Sokolski hopes that if there is a way to rediscover the original intent of the NPT, it may lead NWS and NNWS out of their current stalemate.

Mr. Sokolski asserts that when Irish Foreign Minister Frank Aiken first introduced the concept of a nuclear nonproliferation treaty, the slant on these contentious issues was entirely different. Mr. Aiken found that the value of stemming proliferation of nuclear weapons was greater for NNWS than NWS. To continue, since states with nuclear weapons had already "spooked" each other into a kind of balance, it was up to NNWS to prevent further horizontal proliferation and its related danger. Thus, in Mr. Sokolski's mind, Mr. Aiken saw ending horizontal proliferation as a kind of prerequisite to vertical disarmament. Mr. Sokolski argues that, if one assumes that as nuclear energy technology spreads so does the potential of nuclear weapons programs, NNWS should welcome intrusive inspections of their facilities. In fact, they should advocate it, if only to demonstrate the feasibility of verification models in a world completely disarmed of nuclear weapons.

Mr. Sokolski then tackled the question of turning back the clock on states' current assumptions about the NPT. He pointed out that Article V of the NPT has already been reinterpreted. When the NPT was first drafted, states believed that peaceful nuclear explosions had thousands of applications, such asbuilding canals, but in the end these turned out to be far too costly. Instead, countries like India performed "peaceful nuclear explosions" as a prelude to a weapons program. Thus, in Mr. Sokolski's opinion if the article was already reinterpreted, there is no reason it could not be reinterpreted once again. Similarly, he has two rebuttal propositions for Article IV's peaceful-use interpretation. First, if states cannot guarantee that their material would not be diverted, then maybe the use should not be considered peaceful at all. Second, peaceful use is not inalienable, but rather conditioned on compliance with Articles II and III. He cautioned that he was not crazy enough to actually think such a reinterpretation was possible with these two arguments, but rather wished to highlight that when one talks about "rights" one enters a diplomatic no man's land.

Next, Mr. Sokolski examined ways in which NNWS could potentially be dissuaded from their unqualified desire for nuclear energy. He suggested that an attempt to quantify the total cost of a civilian nuclear program—including power, medical isotopes, and agricultural applications—be made to show that the costs outweighs the benefits. Using the G20 or other international forums to measure the full expense of such programs, including government subsidies and time requirements, may change the minds of NNWS leaders. He also lobbied for states to be more open about what nuclear activities and resources the International Atomic Energy Agency (IAEA) should safeguard under Article III of the NPT. He wishes to both optimize the timely detection of diverted materials and make sure the criteria aretough enough. He commented that in his personal view they were not stringent enough, but welcomed the debate.

Mr. Sokolski closed by taking a final look at Article VI of the NPT, which addresses disarmament. While he recognized that there is unanimity that NWS need to do more, he lamented the timing overlapping with India and Pakistan—non-signatories to the NPT—who are building up their nuclear arsenals. He also noted that more states, such as Turkey and Saudi Arabia, are seeking civilian nuclear energy programs and predicted that there is too much hedging at this time to make headway.

James Walsh began his talk by drawing attention to the use of "versus" in the title of the session. He characterized the crux of the debate between NWS and NNWS as a bargain wherein NNWS pledge to forgo nuclear weapons in exchange for access to civilian nuclear technology and NWS pledge to disarm. While the bargain is at the very core of the NPT, it is also its greatest point of contention. Dr. Walsh feels that NWS attach greater value to nonproliferation than disarmament, while NNWS fear their access to promised nuclear technology is being undermined. This debate creates a stalemate between NWS and NNWS.

However, Dr. Walsh recommends that rather than focus entirely on the "versus" aspect of the relationship, states should look for areas of commonality to find a way out of the deadlock.

Dr. Walsh describes the NPT conflict as both inherently international and political, and thus it requires a multilateral and political solution. Like Dr. Solingen, he does not find nuclear breakout related to either technical or security arguments, but rather one related to internal politics. He argues that in order to move forward, the states will have to strike a new political bargain wherein each party gives up something to gain a new benefit. However, he said states have yet to realize this and instead are stuck in deadlocks, such as the one over the Fissile Material Cut-off Treaty, and use NPT Review Conferences (RevCons) as venues for NNWS to vent their frustration at NWS. Dr. Walsh believes that the election of American President Barack Obama brought a fresh face to the debate and may have spurred some progress at the 2010 RevCon however, when the members return to the next RevCon Obama's newness will have worn off and participants will return to their political games.

Dr. Walsh predicted an ongoing stalemate in part because of the loopholes he sees in the NPT. One such example is that enrichment and reprocessing technology—a major risk factor for proliferation—are not covered by the NPT and member states each treat it differently according to their strategic needs. Additionally, he saw the potential for loss of momentum as states turned their attention to safety issues after the accident at the Fukushima Daiichi Nuclear Power Plant in Japan.

Dr. Walsh recommended that there might be some benefit gained from refurbishing the nuclear bargain of the NPT. In the past, it has always been thought of as a "nuclear for nuclear" exchange however, if NNWS' end goal is truly an economic or technological benefit, why not suggest an alternative energy or cash equivalent? Additionally, he said that states could reassess the benefits of their participation in the NPT. He argued that, through this examination process, states might discover that they have far more in common than in contention. He suggested that all states could agree that terrorists should not have nuclear weapons programs, that nuclear power plants should be safe, and perhaps that the concept of a peaceful nuclear explosionis no longer appropriate. Additionally, new issues, such as climate change, have entered the arena since the original drafting of the NPT. In Dr. Walsh's opinion, if these issues are tackled first, the debate between NWS and NNWS can be redefined. In the meantime, he called on states to continue to build institutions—he reminded the audience that the IAEA was once inconceivable—and expand norms and understanding until a point where the conflict can be resolved.

# Intersection between Nuclear Safety and Nuclear Security

**Session 2 (Lilac/Tulip)**

**June 13, 2011**

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| **Panel** | Igor Khripunov (Moderator), University of Georgia<br>Ferenc Dalnoki-Veress, Monterey Institute<br>Trevor Findlay, Carleton University, Center for International Governance Innovation<br>Hahn Choong-hee, Ministry of Foreign Affairs and Trade, Korea<br>Roger Howsley, World Institute for Nuclear Security |
| **Author** | Mwita Chacha, Center for International Trade and Security |
| **Summary** | This panel focused on the rapidly evolving intersection between nuclear safety and nuclear security, and sought ways to bridge the gap between the two. Dr. Khripunov noted that this was not a new issue and had been brought to light following Three Mile Island, Chernobyl, and Fukushima. These crises have offered lessons on improving nuclear safety. However, there were yet to be any comparable disasters that bring attention to nuclear security matters. While nuclear security and safety have been discussed at various international forums, the focus on security has decreased with time. Indeed, experts at the G8 and the European Union focused more on safety matters, as security was viewed to be the prerogative of states, despite the fact that testing safety without security is meaningless. |

As moderator, Dr. Khripunov stated that the panel's objective was to offer ideas to optimize the interface of nuclear safety and security. This needed to be done vertically, from the highest levels of international legal frameworks, to national regulations and legislation, to the development of human resources. Each level has its own understanding of nuclear safety and security. Enabling them to work together can improve the intersection between the two. This is the main challenge of the 2012 Nuclear Security Summit in Seoul.

Ferenc Dalnoki-Veress further discussed the link between nuclear safety and nuclear security and the emergency response in the wake of the disaster in Fukushima. Fukushima demonstrated the vulnerability of nuclear spent fuel ponds and reactors to loss of cooling. This could be triggered by both intentional and unintentional events. For this reason, there is a need for an enhanced "Defense-in-Depth" approach that focuses on both nuclear safety and security with the aim of protecting critical reactor elements and securing nuclear material from sabotage. The changes suggested included secondary containment for spent fuel ponds, further redundancy in cooling mechanisms to decrease the risk of loss of cooling, and security for

these measures to prevent tampering.

Dr. Dalnoki-Veress then addressed the issue of emergency response to nuclear disasters by noting that there is an added level of complexity for intentional events as compared to unintentional events. In an intentional event, the principle motive for first responders, such as emergency medical personnel, is to save lives without posing risks to themselves. Law enforcement agents seek to preserve or secure the crime scene for investigation by forensic scientists. However, these two types of first responders can be at odds due to their different tasks and misunderstandings surrounding radiation. This can further exacerbate the accident. The Netherlands Forensic Institute presented a paper at the Sous Sherpa Meeting in March 2011 that suggested measures to bridge the gap between first responders, nuclear forensic scientists, and traditional forensic scientists to address the existing conflict between first responders. The paper suggested creating training and education programs for both first responders and traditional forensic scientists to educate them on the challenges nuclear forensic scientists face in gathering samples in a timely fashion.

The Fukushima disaster continues to dominate international forums, and a consensus among experts is that government transparency in the wake of such disasters is key. The public needs to be made aware of the facts despite the uncertainty that might surround such disasters. Providing information to the public contributes to building public trust, which is invaluable when responding to nuclear disasters. It is unfortunate, Dr. Dalnoki-Veress noted, that Japan did not heed the lessons from past disasters. Such communication is necessary to mitigate public fear and facilitate better emergency response plans. Health agencies, both national and international, need to be provided with such information to better respond to crises. Because radiation is unique, as the public cannot touch it or smell it, it is important to design emergency plans based on what people are likely to do rather than what they should do. However, no two nuclear safety accidents are similar and thus emergency response plans should be designed for multiple and unknown causes. Thus, Dr. Dalnoki-Veress advocated an "all-hazards approach" to address nuclear disasters.

Trevor Findlay also addressed global governance in the interface between safety and security. International regimes of nuclear safety and security are different and negotiated separately. Indeed, regimes that address nuclear safety issues are not only older but also more elaborate and much more established. This has been accomplished through the International Atomic Energy Agency (IAEA), which has managed to get states to agree on several legal instruments addressing nuclear safety matters. These include the Nuclear Safety Convention, the Joint Convention on the Safety of Spent Fuel and on the Management of Radioactive Waste, the Convention on Early Notification of Nuclear Accidents, and the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency. There are also several nuclear liability conventions that are relatively recent and still awaiting states' approval. Nuclear safety regimes are also much better funded than nuclear security regimes and have more staff dedicated to them.

Nuclear security regimes are newer and less elaborate. One observable difference between nuclear safety and nuclear security that Dr. Findlay noted is their source of origin: nuclear safety regimes originate from the IAEA, while nuclear security regimes come from various international organizations.

These two types of regimes have evolved differently as a result of different needs and as a response to different kinds of crises. While there have been windows of opportunity for the international community to evolve, amend, and progress these two types of regimes, these opportunities occur under different circumstances. This makes it difficult to create an intersection between nuclear safety and nuclear security. Moreover, these two types of regimes also come from different international agencies, contributing to the challenge of finding an intersection between the two.

One thing that these two regimes have in common is the role of the IAEA. According to Dr. Findlay, the IAEA's mandate only mentions safeguards and safety provisions. However, over the years it has come to include security in its mandate. But the IAEA's programs on safety for states are more elaborate than programs on security. Indeed, some states have yet to decide if what the IAEA proposes on security matters is acceptable.

The first challenge facing the intersection of security and safety is the attitude of states towards these two areas. States treat some elements of safety and security confidentially due to sovereignty concerns. This is especially true with regard to security issues. Second, there is a divide between developed and developing states. Developing states tend to perceive nuclear security matters as a western imposition. Third, the IAEA suffers from bureaucratic stovepiping of safety and security issues, that is, the selective presentation of information. Information on both nuclear safety and nuclear security is not readily available from the IAEA due

to this stovepiping. Fourth, international stakeholders of these two areas are also different. Industries and regulators dominate nuclear safety, while law enforcement agencies, such as Interpol and state authorities, dominate nuclear security. Thus bringing these two together is difficult.

Dr. Findlay concluded with ideas on how to facilitate an intersection between safety and security. First, raising awareness through discussion is crucial to bringing about a better understanding of the need for such an intersection. Second, high-level meetings, such as the 2012 Nuclear Security Summit, are also crucial in generating interest in bridging the gap between nuclear safety and security. Third, the IAEA should seek to embed the issues of nuclear security and safety in its programs and should seek to divulge more information to states. Fourth, the nuclear security regime needs to emulate aspects of the nuclear safety regime and make the two look more like each other in order to facilitate an interface.

In a brief discussion between Dr. Findlay and the moderator, the issue of the safety standards that the G8 had previously discussed was raised, with Dr. Findlay noting that making these standards mandatory would be helpful but difficult. Additionally, combining safety and security issues for newcomers to nuclear energy could be beneficial in facilitating an interface between nuclear safety and nuclear security in the future.

To discuss the role of the 2012 Nuclear Security Summit in security and safety, Hahn Choong-hee, covered its agenda. At the 2010 summit in Washington, there was little discussion of radiological security, although there was some mention of it in the context of non-state actors. Since Fukushima, however, opinions on nuclear security have changed substantially. The Fukushima disaster demonstrated that sabotage through acquiring fissile materials and causing nuclear power plants to malfunction was feasible for terrorist groups. Indeed, such groups are able to gain information on nuclear technology from various public sources in order to widen their future terror activities.

Part of the 2012 summit will address the nuclear renaissance and stress the need to show the public that nuclear safety and security systems could be established as more states seek nuclear technology. The summit will lay the groundwork that will help facilitate such an interface while also discussing nuclear security issues, including nuclear terrorism.

The panel discussion included the need for guidelines on what can be considered confidential in the eyes of states if an interface between safety and security is to be attained. It was noted that handling information on nuclear programs has been challenging. While acknowledging the need to give some information to the public, the panelists noted the need to withhold certain information for the sake of security.

Dr. Roger Howsley of the World Institute of Nuclear Security, who was in the audience, noted the work of his institute and how it has been seeking to facilitate such an interface through industrial outreach. He noted that, as host of the 2012 Nuclear Security Summit, South Korea is well positioned to further discuss the challenges and the need for an intersection of security and safety. He also stated that an interface between safety and security could not be attained through the current bureaucratic setting of the IAEA. Instead, the actual practitioners within the nuclear industry had to be approached.

In closing, Dr. Khripunov focused on three scenarios of multiple-effect disasters. The consequences of such a disaster are beyond the existing nuclear safety and security practices and would require a new conceptual and organizational approach involving an integrated management of nuclear safety and security. These scenarios included accidents triggered by natural disasters such as at Fukushima, intentional man-made disasters caused by individuals with malevolent intent, and a combination of these two scenarios. A consolidated risk assessment methodology is necessary in order to address these multiple-effect scenarios. There is also a need for training on flexible and fast ways of addressing emergencies resulting from these scenarios for both safety and security staff. For an interface between safety and security to be successful, safety and security cultures must coexist and reinforce each other.

# Missile Defense

Session 2 (Cosmos / Violet)
June 13, 2011

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| **Panel** | Paul Davis (Moderator), Pardee RAND Graduate School<br>James Bonomo, Pardee RAND Graduate School<br>Kim Taewoo, Korea Institute for Defense Analyses |
| **Author** | Crispin Rovere, Australia National University |
| **Summary** | This panel discussed the development of missile defense systems and whether they constitute a proliferation risk. If a country believes its nuclear deterrent has been undermined by an adversary's missile defense system, it may be encouraged to expand and improve its own nuclear arsenal as a countermeasure. Stopping a nuclear attack was the stated aim of President Reagan's Ballistic Missile Defense Shield, and anxieties persist among states about the risks of ballistic missile defense today. In recent years, there has been considerable debate in South Korea regarding the utility of acquiring a missile defense system. This panel discussed the potential costs and benefits of this idea, the advantages and risks of current missile defense systems, and whether the perception accurately reflects reality. |

The moderator, Paul Davis, pointed out that during World War II and into the 1950s, nuclear-armed missiles were not yet a problem. Later, during the Cold War, defending against long-range ballistic missiles seemed very difficult, particularly as developing countermeasures seemed very easy. Although there were concerns about a possible surprise attack, the United States did not entertain the idea of ballistic missile defense itself. This changed in the 1980s when President Reagan decided to pursue the Strategic Defense Initiative. Nevertheless, Dr. Davis noted that, from an engineer's perspective, given a choice between designing the missile defenses or countermeasures, one would probably choose the latter. In the 1990s, there was little progress in missile defense except research and development. In the late 1990s, a commission chaired by Donald Rumsfeld concluded that aside from Russia and China, a number of other countries would soon possess long-range missiles. The risk that the United States could be vulnerable to a North Korean or Iranian attack created a new push to deploy ballistic missile defense systems. Dr. Davis said that there was a dual rationale for this push: first, that technology had improved, and second, it was it was no longer sufficient to build defense platforms on paper because states could potentially make new discoveries if they deployed new systems.

The first ballistic missile defense system became operational with little testing but was surprisingly effective. This included a naval-based missile defense system capable of shooting down a Chinese satellite that was falling to Earth.

For U.S. allies in Northeast Asia, namely the Republic of Korea (ROK) and Japan, ballistic missile defenses are feasible to a degree. Here the ranges are much shorter, countermeasures are more difficult, and ballistic missile defense are not as expensive.

Yet, in deciding whetherto procure missile defense systems, countries face certain dilemmas:

1. Given the uncertainty as to whether the system will work, are there other things the government might want to purchase instead?

2. Cheaper missile defense systems are much less capable and are often deployed as a deterrent rather than a system that delivers tangible defense advantages. A real ballistic missile defense system also requires investment in command-and-control systems and intelligence to deliver a high-end capability.

Where the issue becomes more nuanced is how it raises barriers to conflict, Mr. Davis said. A massive all-out attack would be overwhelming, and no ballistic missile defense system would be of much use, but such an attack guarantees retaliation. Yet a ballistic missile defense system may deter limited attacks, though there are other ways of dealing with limited attacks and incursions.

When examining the options that are available to political leaders in dealing with limited attacks, incursions, and so on, what should receive government investment? Mr. Davis said that the best answer is for ballistic missile defense systems to be evaluated and examined like any other new defense procurement or capability. Will the new system do what it is intended for at the best possible price? Will it deliver a higher yield benefit than its alternatives?

For the handling of limited wars, ballistic missile defense is simply another tool in the toolbox. Mr. Davis pointed out that limited wars are proportional and rely on greater resilience, more economic weapons, and so forth. He noted that states seek to deter or defend against attackin a credible way. For South Korea in particular, ballistic missile defense, in cooperation and competition with other mechanisms, may be a useful tool in an environment in which there is little incentive for a preemptive attack on North Korea .

Dr. James Bonomo stated that offensive ballistic missiles and their related missile defenses are often conflated with nuclear weapons and weapons of mass destruction (WMD)

He pointed out that South Korea's situation is somewhat rare in that it faces a hostile neighbor with both ballistic missiles and nuclear weapons. U.S. ballistic missile defense is about defending the American continent against nuclear weapons. For America, national missile defense focuses on intercontinental ballistic

missiles being fired from North Korea or Iran, yet this connection is then generalized much too broadly.

Ballistic missile defense systems remain very costly, technically risky, and, unreliable. Moreover, a South Korean missile defense shield could be provocative to other nations that worry that missile defense may blunt their own forces. Ultimately, missile defenses are not too important to South Korea because North Korean artillery could still inflict substantial damage on Seoul, and the subsequent loss of life would still be very great.

However, one significant aspect of missile defense is political. Missile defense systems deployed by major powers to third countries are seen as a way of strengthening ties to those countries and undermining the military influence of others. Patriot ATM2 missiles can be reassuring even if they are ineffective. This feature of missile defense systems exists quite apart from any nuclear relevancy.

Mr. Bonomo pointed out that there are also a range of factors that complicate the perceived advantages of missile defense for South Korea. First, nuclear weapons can be delivered in other ways. This is not very practical for an attack on the United States, but very significant in the Northeast Asian region. Second, in the event of an invasion of the North by South Korea, North Korea may still detonate nuclear weapons on its own territory. Third, North Korea's arsenal consists of between 600and 1,000 short-range missiles with conventional warheads. This is more threatening to Japan than South Korea.

Missile defense systems are not suited to, or designed for, meeting nuclear threats, but could find utility in more conservative capacities. Ballistic missile systems can minimize the damage of an attack, working in conjunction with other passive defenses. They can also be more cost-effectively used to protect important targets or to reduce damage to cities.

Mr. Bonomo noted that the cost and availability of ballistic missile defense systems also needs to be consideredgiven that improvements in their development have allowed smaller states to also field such systems Ultimately missile defense should not become a high-risk, long-term debt, procured independently of military needs.

Mr. Bonomo argued that the concerns of China and Russia about missile defense are not credible. Both of those nations are able to threaten all missile defense systems currently fielded with longer-range, faster missiles. North Korea would be the one with the most to lose with an effective South Korean missile defense system its sense of invulnerability would be eroded, along with its ability to terrorize. For this purpose, a PAK-3 system, which is small and agile, might well be suitable.

As for whether or not the vulnerability of Seoul to artillery should impact a decision to acquire missile defense, Mr. Bonomo said that the reality is that this vulnerability is going to remain, no matter what defense South Korea purchases. Ballistic missile defense is simply another capability measure. It could deter the use of weapons of mass destruction, and any such use would galvanize U.S. support for South Korea and surrender any bargaining tool of the North. Such a system may intercept short-range weapons, such as Israel's limited success  at intercepting rockets. Missile defense can also provide decision-making space by limiting damage from a first strike.

Mr. Bonomo concluded by listing four key points. First he noted that there would be significant defense integration issues between the United States and South Korea. For instance, Command, control and radar could interfere with one another. Similarly, sharing of information and target identification would have to occur very rapidly for a missile defense system to have a chance at interception. Second, because the scale of the missile defense system increases with the size of the theatre, THAD, AEGIS, and SM6 weapons systemsmust be bought in sufficient quantities. As Mr. Bonomo pointed out, the current Forty-eight PAC-2 surface-to-air guided missiles do not offer a nation any significant strategic weight. Third, it is also critical to match the deployments with operational objectives. PAK2s can degrade accuracy, and PAK3s can intercept warheads. It is important to think of missile defense as just another system to put into the calculation of cost-benefit analysis. If it is intended for some quasi-nuclear linkage, it may not be helpful.

Kim Taewoo observed that there are four main differences governing increased ROK-U.S. cooperation in missile defense technical issues, political issues, force differences, and civilian leadership.

First Mr. Kim highlighted the differing opinions regarding technical details such as whether nuclear attack Is really separable? Is a bio-attack defendable? Can you really contain damage from North Korea? Who can contain this damage? Is conventional missile attack defendable? How many interceptors are required for increasing numbers of missiles? Over 1,000 missiles are targeting the ROK, and what can defend against that? Can it defend against artillery? North Korea can fire 500,000 shells per hour! Missile defense is being constructed by the ROK, but is it sufficient to defend against North Korean attack? So far there is no clear answer. Second, he noted political limits on ROK-US cooperation. South Korea is concerned with its deteriorating relationship with China. Is a missile defense system acceptable to China? Why should the ROK invite enmity from China by pursuing ballistic missile defense? Many South Koreans still believe the ROK should not increase its military cooperation with the United States. Third, he discussed the priority of force construction. The ROK has a limited budget. National goals do not necessarily coincide with each service, or even within the service. Which service should ballistic missile defense be invested in? Should it guard against theatre weapons or strategic weapons? In the Army, some officers want more missiles; some want more tanks, mortars, and helicopters. It is the same with the Air Force—some want more precision-guided missiles, some want more stealth fighters—and in the Navy, with submarines or surface ships. How will South Korea prioritize demand?

Finally, Mr. Kim talked about the capability of the civilian leadership. Fighting over votes, populism, how much will the civilian leadership try to understand the strategic issues? Not all generals are capable of defending the nation's security. If South Korea cannot defend against the North Korean threat, how will it

effectively deter, which does not contain damages but threatens massive retaliation? A more aggressive posture demonstrates potential for ruthless response to provocation, but a move to missile defense may not.

The best posture, in Mr. Kim's view, is one of mutual vulnerability. The ROK is very vulnerable, but not vice versa. What South Korea needs is first to share vulnerability, then negotiate. It is presently unclear how deeply ROK planners are thinking about this vulnerability question, or how useful ballistic missile defense will be in stabilizing North-South relations.

South Korea does not have to exaggerate China's reaction, said Mr. Kim. If the ROK wants to strengthen its relationship with the United States, it should accept a deteriorating relationship with China. For the ROK, there is no difference between short- and long-range missiles, everything is within range. South Korea can still try to improve its relationship with China in other areas, such as economic interdependence. If the goal is to defend the ROK in a post-North Korean world, then the ROK should strengthen its alliances as much as possible.

During the question-and-answer session, an audience member asked what the implications for the ROK's force structure were and the issue of defining vulnerability. Mr. Kim responded that the ROK needs both defense and deterrence. The question is how to allocate money and effort to both of them. Second, how does South Korea assess its threat? When South Koreans talk about threats, the largest possibility is all-out attack, but the lesson from the Cheonan and Yeonpyeong Island incidents suggest that the more serious threat is provocations. Mr. Kim argued that, if South Korea allows North Korea to continue with provocations, it will eventually lose its right to respond. With North Korea possessing weapons of mass destruction, South Koreans are more afraid, and it incentivizes them to tolerate attacks. If more ROK voters feel that way, maybe North Korea can decide who the next South Korean government is. South Korea needs to prevent provocations, said Mr. Kim. Therefore it should invest more money in deterrence, rather than strengthen defenses against provocations that means more stealth fighters, submarines, and the like.

Another audience member asked, Whether the transfer of ballistic missile defense technology to third countries would enhance the regional and global arms race, and to what extent will this transfer enhance the security of recipient states. Mr. Bonomo responded by pointing out that the potential of theater missile defense is unlikely to provide defense in a nuclear environment. It is not going to affect the ability of India or Pakistan to place the other side at risk. However, it might prevent very small attacks from succeeding and deter them from being undertaken.


Day 2

Tuesday, June
14, 2011

# OUR **NUCLEAR** FUTURE

# Spent Nuclear Fuel Issues in Korea

**Session 3 (Orchid)**
**June 14, 2011**


**Panel** Charles McCombie (Moderator), Association for Regional International Underground Storage
Jorshan Choi, Berkeley Nuclear Research Center
Hwang Yongsoo, Korea Atomic Energy Research Institute (KAERI)
Miles Pomper, Monterey Institute

**Author** Lee Jeong Ik, Khalifa University



**Summary** Spent nuclear fuel is one of the key issues that has to be resolved for nuclear energy to be sustainable. This session's main focus was to discuss how South Korea would like to deal with increases in spent nuclear fuel and at the same time to emphasize how international collaboration regarding this issue is relevant.


Dr. Hwang from KAERI began his speech by saying that even though other countries, such as Italy, have given up the nuclear option, it is not practical to do so in South Korea. Like many other products and technologies, electricity has become an essential part of human society, and it is impossible for South Koreans to imagine a world without cheap electricity. Moreover, Dr. Hwang argued that South Koreans think of electricity bills as taxes, meaning that they think electricity is not something that you buy from the market but instead something that is so essential that the price of electricity feels like taxes. This reflects how cheap and reliable electricity generation is very important in South Korea. South Korea has looked at various renewable energy supplies, including solar power, wind power, and hydroelectricity, but none of them came close to the nuclear option in terms of economy.

The current South Korean nuclear program is very cost-effective. However, to make nuclear energy sustainable and secure, the issue of spent nuclear fuel has to be resolved. In other words, South Korea requires an ultimate solution for spent fuel. Without a practical and final solution for spent fuel, nuclear energy cannot be sustainable. As part of this ultimate solution, South Korea has to develop spent-fuel recycling technology. However, this recycling technology should be very resistant to proliferation and at the same time it should be affordable. The background of South Korean research and development (R&D) on pyroprocessing is thus straightforward. South Korea wants to develop a highly nonproliferative and economic spent-fuel recycling technology to ensure that nuclear energy is a sustainable and secure energy source.

Dr. Hwang also stressed the importance of not only technology development but also communication between experts and the public. He concluded his remarks by stressing three points that are important for communication: "scientific evidence," which demonstrates the reliability and feasibility of advanced reactor concepts that can reuse recycled spent nuclear fuel "authenticity", which justifies the recycling of spent nuclear fuel and makes the whole process transparent and "fairness", which is required when experts are to compare spent-fuel management options.

The second panelist, Professor Jorshan Choi, first summarized why the spent-fuel issue has to be resolved soon in South Korea. There are 21 nuclear power plants operating in South Korea and, except for 4 CANDU-type reactors, where the spent fuel can be stored in dry casks, 17 pressurized water reactors (PWR) are all generating spent nuclear fuels. Furthermore, the amount of spent fuel that is produced in South Korea will be increasing, since the South Korean nuclear sector is expanding; there are 8 more PWR-type nuclear reactors planned or under construction.

So far, the recycling of spent nuclear fuel has relied on a chemical reprocessing process called PUREX. Plutonium and uranium recovered from the reprocessing process are reused in light water reactor systems in the form of MOX fuel. This is an old technology, and the proliferation issue is quite salient with this method. Therefore, the necessity of developing better recycling technology to resolve South Korean issues with spent nuclear fuel is self-evident.

Dr. Choi mentioned two reasons why South Korea should develop the recycling technology. First, South Korea is becoming a world leader in nuclear technology, since it is building more nuclear reactors domestically and is even exporting the technology to other countries. Therefore, South Korea has to take responsibility on the issue of spent fuel and has to become a world leader on standards. Second, only 0.5% of total spent fuel requires long-term attention thus, separating this 0.5% makes sense for reducing the volume and the cost for managing nuclear waste. The 0.5% consists of problematic isotopes: I-131, Tc-99, Cs, and Sr. The

first two radioisotopes are toxic, and the last two are mainly responsible for long-term decay heat. If the heat-generating isotopes are part of nuclear waste, securing a reliable ultimate heat sink for a very long time becomes a very difficult task. Therefore, once the toxic or long-term heat-generating radioisotopes are removed from the spent fuel through a process like pyroprocessing, the spent nuclear fuel becomes easier to handle. Even a solution like deep-bore hole storage can be a viable option if the fast reactor technology is not available to reuse separated plutonium or uranium.

Dr. Choi summarized his talk by saying that pyroprocessing can successfully separate this small amount of radioisotopes responsible for long-term management with limited proliferation issues compared to the other existing technologies. Therefore, in order to resolve the issue of spent nuclear fuel in South Korea and elsewhere, it is essential to develop the technology.

The third panelist, Mr. Pomper, focused on the political side of South Korea developing the spent-fuel recycling technology. Historically, managing spent nuclear fuel involved multinational participation, primarily because as more countries are involved, more transparency is promised. South Korean spent nuclear fuel management also involves a multinational effort because South Korea has to consider its relationships with other countries, especially the United States. A recent issue with revising the South Korea-U.S. nuclear agreement is that South Korea wants to develop spent nuclear fuel recycling technology while the United States wants to discourage such efforts. This is because the United States views pyroprocessing as a reprocessing technology that cannot be free from nuclear proliferation issues. In other words, the United States is never supportive of reprocessing technology and therefore it is not supportive of pyroprocessing as well. However, spent nuclear fuel is a growing domestic problem for South Korea since its nuclear fleet is expanding, as discussed by other panelists.

1. Mr. Pomper suggested four potential solutions to the spent nuclear fuel problem: Interim storage overseas without reprocessing. Transporting the spent nuclear fuel to a remote place such as Mongolia from Taiwan or South Korea was considered. After the spent nuclear fuel cooled down during interim storage in a remote place, it would be transported back to its origin and go to an ultimate final storage area. However, this plan was never realized or discussed seriously. But there is always the possibility of sending the spent nuclear fuel elsewhere to resolve the issue.
2. Storage of high-level waste after it was reprocessed in a country with reprocessing capability. The case of the United Arab Emirates (UAE) falls into this category. The UAE receives nuclear fuel from the United States and, after it is burned in a nuclear power plant, the spent nuclear fuel is shipped back to the United States or transported to France for reprocessing. However, this solution is not an option for South Korea, since no neighboring country would like to take the spent nuclear fuel, and coming up with secure transportation is a very difficult task as well.
3. Utilize more nonproliferative and advanced reprocessing technology. This approach involves developing an advanced fuel cycle technology. However, this option takes a very long time compared to the time available to deal with the spent nuclear fuel issue.
4. Try to set up a multinational demonstration facility in South Korea and build interim storage nearby. The last option is to build a demonstration facility that utilizes pyroprocessing with multinational participation and to construct interim storage nearby to transport and store the spent nuclear fuel.

After Mr. Pomper's talk, there was an active discussion about this issue. The first question from the audience was about storing reprocessed nuclear materials. Since fast reactor technology is not mature enough, the audience member wanted to know if it is possible to store plutonium or uranium above ground, just like what the United Kingdom and France are doing. Dr. Hwang and Dr. Choi answered this question. Dr. Hwang said that he is more in favor of direct disposal than recycling reprocessed fuel. But the problem with direct disposal is that it cannot be the final solution. Direct disposal can be a working platform. In South Korea, early introduction of spent-fuel storage and an expanding nuclear fleet are two main nuclear policies. In order to reduce the spent-fuel volume and lower the level of radiation and toxicity, the final solution should include reprocessing. South Korean R&D is underway to develop an advanced fuel cycle with advanced nuclear reactor technology. He understands that there are some technical problems with sodium-cooled fast reactors. The Japanese already spent US$100 billion, and French and U.S. fast reactors spent similar amounts of money, but they all have failed to commercialize the technology so far. However, he thinks that South Korea learned lessons from others and it can build cheaper and safer fast reactors using these learned lessons. He also emphasized that South Korea will be transparent during the whole process, and in the meantime a deep bore hole repository can be also another option. Dr. Choi added to the discussion by stating that the fast reactor technology is not a mature technology. Thus, R&D efforts are needed, especially to better manage the doubling time of plutonium production in the fast reactor.

The second question was regarding the current South Korea-U.S. relationship and their agreement on the nuclear sector. Dr. Hwang and Mr. Pomper answered the question. Dr. Hwang said that the first U.S. recommendation is to construct an interim storage facility for the spent nuclear fuel. However, the United States is also focusing on the development of an advanced fuel cycle as part of the R&D effort. He further stressed that the development of pyroprocessing technology in South Korea is not going to resolve the spent nuclear fuel problem by tomorrow. Rather, it is a long-term effort to create the final and ultimate solution to the problem. Mr. Pomper further argued that pyroprocessing and fast reactor technology are among many options. There are more options to resolve the spent nuclear fuel issue, and South Korea has to take cautious steps to resolve the issue by carefully considering other options.

The next question was about the effect of the Fukushima accident on the South Korean nuclear industry as well as the change in South Korean public opinion towards nuclear issues such as spent nuclear fuel storage. Dr. Hwang started his answer by reassuring the audience that South Korea will never give up the nuclear option regardless of other issues such as the Fukushima accident, and South Koreans know that. The spent nuclear fuel issue has to be dealt with, and he thinks that pyroprocessing offers an option that can have significant environmental implications. He further stated that each country has its own way of dealing with the spent nuclear fuel issue, and it is never too much to emphasize the importance of communica-

tion internationally and domestically.

This was followed by a comment from an audience member about Mr. Pomper's statement. The first two options that Mr. Pomper mentioned are nowhere close to the real solution, said the audience member. Sending the spent nuclear fuel to other countries is highly improbable, and they do not even have to be mentioned as alternatives to resolve the spent nuclear fuel issue. Recently South Korea and the United States agreed to perform a feasibility study on pyroprocessing. Pyroprocessing has many advantages compared to old technologies, and therefore South Korea thinks that pyroprocessing can be an ultimate solution to the growing spent nuclear fuel problem. However, Mr. Pomper argued that the United States wants to discourage South Korea from developing pyroprocessing technology through a Korea-U.S. feasibility study, not to encourage it. Therefore, the purpose of the joint feasibility study is different for the two nations.

One audience member commented on Dr. Choi's statement. The audience member agreed that South Korea is playing a major role as a nuclear technology exporter but said that cannot be the reason why South Korea should develop reprocessing technology, since South Korea does not want the reprocessing technology to spread around the world. Dr. Choi agreed on this point by clarifying that his original intention was to stress that a nuclear technology customer should have a spent-fuel solution when it imports the technology. South Korea should be able to provide options for spent fuel. But this does not necessarily mean that South Korea should export reprocessing technology to customers. The reason why many countries do not undertake reprocessing is because of the high price. If South Korea makes the process too cheap then all sorts of countries will try to do the reprocessing, which is not an ideal situation.

The next question was about the self-protection capability of spent nuclear fuel. The spent nuclear fuel is usually recognized to have an ability to protect itself from the proliferators due to high radiation levels. However, recent studies performed by Oak Ridge National Laboratory show that spent nuclear fuel loses this capability after a short period of time. An audience member asked what countries should do with the spent fuel that does not have self-protecting capability. Dr. Hwang said that is the reason why a lot of R&D efforts are needed. The self-protection capability of spent nuclear fuel is not a reliable technical solution. He further argued that nations should rather rely on a safety culture by emphasizing safety, security, and safeguards to protect the spent nuclear fuel from potential proliferators.

Finally, an audience member asked whether the reprocessing technology can be a part of an export package, for instance in a deal between South Korea and the UAE. Dr. Hwang clarified that pyroprocessing is a R&D effort. It has nothing to do with the UAE or the commercial sector so far. South Korea will try to be the nuclear leader and will try to develop a solution. However, the R&D effort of pyroprocessing is for a long-term solution.

# Fissile Material

**Session 3 (Lilac/Tulip)**
**June 14, 2011**

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|---|---|
| **Panel** | William Tobey (Moderator), Belfer Center, Harvard University<br>John Carlson, Lowy Institute<br>Chaim Braun, Stanford University<br>Tom LaTourrette, RAND Corporation |
| **Author** | Ryan Costello, Connect U.S. Fund |
| **Summary** | This session, dealing with fissile material, was deemed to be the most important session of the conference by the moderator, William Tobey. After all, without fissile material there is no nuclear future, as it is necessary for the creation of nuclear weapons. However, fissile material is a physical fact, not a policy choice or challenge. Thus, the discussion was broad, with varying perspectives. John Carlson first addressed the definition of fissile material. It is not a technical term that is used in the nonproliferation or disarmament field. The definition used in the Fissile Material Cutoff Treaty (FMCT) is material used in the creation of nuclear weapons—highly enriched uranium, which is 20% or more u-235, or plutonium separated through reprocessing. Uranium enriched to a lower level will not produce the chain reaction that leads to a nuclear explosion. |

Of course, possessing fissile materials or the means to produce them through enrichment and reprocessing represents a proliferation risk. This danger has been recognized by international programs that seek to minimize highly enriched uranium in civilian efforts. Beginning in April 2010, the Nuclear Security Summit, held in Washington DC, spurred international action to secure loose fissile material so as to prevent nuclear terrorism. But has enough been done to minimize the risks posed by separated plutonium?

A number of countries at the summit were reluctant to engage in talks on plutonium issues. Some countries believed that the creation of an effective plutonium-based nuclear weapon would be too great a challenge for terrorist groups to accomplish. However, this is an incorrect and dangerous assumption has been too much complacency in the securing of plutonium produced in civilian programs.

For the future, the fast breeder reactor represents a serious risk for proliferation and terrorism, particularly if the highly fissile material is separated and it circulates in civilian programs. There is a need for technical measures to build proliferation resistance into programs that reprocess spent fuel into plutonium. One

important way to address this problem is to look for technologies that reduce the possibility of misuse of fissile material. For plutonium, technologies that avoid purification could create a barrier to its misuse.

In addition to technological solutions, Mr. Carlson asserted that there is a strong need for institutional measures to address enrichment and plutonium challenges. States with reprocessing technology have the potential to produce nuclear weapons. In the future, Mr. Carlson argued, alternatives to national fissile material production programs must be considered. This is obvious in the case of Iran. Iran is the subject of international sanctions because its leaders tried to run an enrichment program in secret. Iran and its supporters have made a very big deal out of the assertion that Iran is entitled to run whatever nuclear program it wishes. If Iran had run the program openly at the outset, there would have been nothing that the international community could have done about the pursuit of a robust enrichment capability. This means that we need to rethink what the Nuclear Non-Proliferation Treaty (NPT) actually means. Is it a correct interpretation of the NPT that any country can operate any fuel cycle technology, regardless of the proliferation risks and regardless of the intent behind the program?

To say that Iran cannot have an enrichment program will not win international acceptance. A decision must be made that national enrichment programs are undesirable in any nation and the world must move toward an alternative to nationally controlled programs. Fissile production capabilities represent a threat to both nonproliferation and disarmament. The FMCT would prohibit fissile material production for use in nuclear weapons. It will be an important first step, but in the longer term, national enrichment programs should be abandoned. Enrichment should be under the control of a multilateral system. As long as nations retain their enrichment capability, they could re-nuclearize quickly. This will become increasingly important in the future.In order to persuade states that they do not need their own fissile material production capabilities, thematerial for their energy production needs to be guaranteed.

A continuation of the nuclear energy field in its current form is not sustainable. If proliferation-capable programs run on a wholly national basis continue to exist, the application of safeguards alone will not be sufficient to eliminate proliferation risk.The subject of fissile material is really at the heart of the proliferation problem and it is also at the heart of the wish to eliminate nuclear weapons. New approaches that go as far as possible to eliminate the misuse of these technologies need to be investigated.

The moderator asked Mr. Carlson directly if he believed that pyroprocessing offered greater proliferation resistance than traditional reprocessing methods. And if not, did he believe that there was a prospect for this technology in the future?

Mr. Carlson replied that was a fan of pyroprocessing, but did not believe pyroprocessing to be proliferation proof. Proliferation resistance involved incorporating barriers to the misuse of technology. If technology is being misused, there needs to be a warning system and the international community needs to be capable of intervention. Pyroprocessing is capable of misuse. There is no doubt that pyroprocessing can be used to purify plutonium. Claims to the contrary are incorrect. Because pyroprocessing is more complicated than traditional reprocessing, there would be warning time. But that might not be enough. Warning time is only useful if the international community can act effectively. This is one of the issues that the situation in Iran has presented. There has been ample warning time to prevent Iran from developing weapons, but intervention has been ineffective. Mr. Carlson argued that pyroprocessing, while less of a proliferation risk on the surface, should still be operated on a multilateral basis rather than as a wholly national program.

Dr. Braun agreed with Mr. Carlson that pyroprocessing would not necessarily prevent proliferation. It all depends on how the technology is used, and what barriers are established against misuse. Dr. Braun's talk, however, focused on uranium enrichment, where he saw two trends: the development of national enrichment plants and the development of multilateral enrichment plants.

The push for multinational enrichment plants was initiated by the Bush administration, when the United States sought to limit enrichment and reprocessing to nations that already had the technology in place. Thus, there was a corresponding rush among countries with dormant reprocessing capabilities to reestablish them and "grandfather them in" before restrictions eliminated this possibility. National reprocessing is allowed, however, assuming that it is done under the right conditions. This is not always the case. Plants have been reactivated in Brazil, Argentina, and South Africa. South Korea has experimented, Iran has developed an enrichment capability and is upgrading its capabilities, India is upgrading its centrifuges, and Pakistan is rapidly expanding its enrichment capacities and plutonium production. Even Saudi Arabia is not excluding the possibility of including an enrichment component in its nuclear program.

Additionally, there are several examples of multilateral enrichment initiatives. There are French plants that have cooperation and participation from international partners. The United States partnerswith Great Britain and France. The Russians established an international enrichment center. Finally, Germany and countries in the Middle East have explored the possibility of multilateral facilities.

Dr. Braun believed that regional or multilateral enrichment centers were better than national ones. How could a regional or multilateral center be facilitated? The least resistant path would likely be through regional cooperation. In order to operate nuclear power plants, regional neighbors would cooperate on obtaining uranium from suppliers. This would offer the opportunity for savings by buying in bulk. These regional centers could expand to include conversion services, fabrication services, and if successful, enrichment.

There are several conditions and constraints on the operation of such a plant. Technical operations would have to be controlled by a technological provider so as to prevent the transfer of sensitive technologies to countries benefiting from the regional plant. These facilities could also go to partial enrichment, which would fulfill the requirements of nuclear power plants. Enrichment plants could provide slightly enriched uranium, and international sites would enrich the rest of the way. It is possible to disclose or not disclose much of the information on centrifuge technology and the operation of the enrichment plant. Some infor-

mation will be shared more than others in a multinational enrichment facility.

There are two possible ways to expand enrichment capacity: national enrichment plants or multinational plants. National enrichment plants could be used more easily for illegitimate processes, including latent nuclear weapons programs. This could prove difficult for the International Atomic Energy Agency (IAEA) and NPT safeguards. This might create what Dr. Braun referred to as “a cafeteria-style NPT”, in which some countries pick and choose the safeguards to which they adhere.

Multilateral approaches are better. Countries would control each other and supervise the plant to ensure that no nuclear proliferation attempts are made. The future will likely be a mix of both the national and multilateral options, however. The impact on the nonproliferation regime is yet to be determined.

Mr. Tobey asked if there were any lessons to be drawn from the experience of the original multinational enrichment facility, URENCO, which was the source of what led to the greatest nonproliferation disaster, the A.Q. Khan network. Dr. Braun replied that the technology had to be better controlled. That was the major lesson. URENCO allowed A.Q. Khan and some of his colleagues walk away with centrifuge technologies, and the consequences were severe. Also, retired engineers trying to supplement their income could do a lot of harm. Mr. Tobey then asserted that one of the most important aspects of fissile material is keeping it under authorized control. A study during the Cold War found that although terrorists could probably detonate a weapon if they gained access to enough fissile material, they were unlikely to do so because it would defeat their political objectives. Today’s security environment is different. Today’s terrorists are remorseless

and bent on causing as much destruction as possible. Al-Qaeda has an avowed nuclear intent. Although Al-Qaeda was weakened recently, the struggle may not be over.

This is also a time of greater access to nuclear technology. Computers are much more powerful and give nations and facilities access to precision machining. There is more computing technology in an iPhone than the computers that designed many of the nuclear weapons during the Cold War.
Unfortunately, the record for maintaining fissile material under authorized control is somewhat shocking. The IAEA has documented 20 cases of loss or theft of fissile material. These cases range over two decades, involving between a few grams and a few kilograms of fissile material. The latest case was disclosed just last year, so there is clearly a problem. The scale is not known because of the shocking failure of governments toinvestigate these incidents thoroughly. However, no case to date has involved sufficient material to make a weapon, and security measures are improving.

On the other hand, in all but one of the cases, we are ignorant of most or all of the key details: where the material came from, how it got out, who removed it, who abetted the theft, where the material was headed, and whether more material was stolen. To date, there has not been a case wherein a government has acknowledged a loss of control of fissile material that was later found. In all but one cases of seizure, the governments had not reported the missing material as losses. National investigations are beset by secrecy, national pride, and perhaps corruption. International efforts depend on national efforts, and to some extent, have their own flaws. For example, Interpol’s investigative unit on fissile material theft focuses on radiological source theft or loss, and has only a few full-time individuals to handle the thousands of cases that need to be addressed. What is to be done?

First of all, governments must not be afraid to come forward and acknowledge loss of control of fissile material. They should move forward on acknowledging incidents and getting to the bottom of them. Second, investigations to ascertain how the security breach occurred have to be conducted. Until past cases are understood, current security cannot be certain. This is not a matter of history, but of present-day security. One lesson is already clear: material in bulk form presents a special risk. All but one of the losses or seizures of fissile material involved bulk materials. Their physical security design, control and accounting system, and personnel security should be looked at carefully.

Dr. LaTourrette stated that intact spent fuel is the best, most proliferation-resistant material. It is very chemically and physically hard to get at, and it is extremely radioactive, making it nearly impossible to transport without protective shielding. How can proliferation resistance be increased? There are intrinsic and extrinsic approaches, and the line can be fuzzy. Intrinsic approaches do not involve an expectation that people will act in certain ways they are built into the process. They involve techniques like pyroprocessing and other forms of separation technologies that do not isolate plutonium. Advanced inventory monitoring and instrumentation is an important area that should be emphasized. If these atoms can be tracked as they are moving through the line, the warning signs will be earlier than if those received via routine inspections. It is impor-

tant to remember that these processes cannot be developed in isolation. It is a complicated process. Separation, fuel fabrication, and reactor design have to be developed as a holistic package. None of these processes—PUREX and pyroprocessing—even exist at this point.

There is not a compelling case for reprocessing spent fuel at this point. Given the great proliferation resistance of intact spent fuel, this case should be made more forcefully.

# NATO and Extended Deterrence

**Session 3 (Cosmos/Violet)**
**June 14, 2011**

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| **Panel** | Michael Lekson (Moderator), United States Institute of Peace |
| | Jennifer Laurendeau, U.S. State Department |
| | Paul Schulte, Carnegie Endowment |
| | Elaine Bunn, National Defense University |
| **Author** | Mark Bell, Massachusetts Institute of Technology |
| **Summary** | This panel considered a number of important matters surrounding NATO and its nuclear weapons policy, including its institutional development, the role of nuclear weapons in the alliance, the matter of consultation within NATO, and its current and future nuclear posture. |

Moderator Michael Lekson began by tracing the history of NATO's development from its founding to the end of the Cold War. He began by noting the uncertainty of a post-World War II world in which it was clear there would not be a global solution to the problem of nuclear weapons, in which Europe had not pulled itself together out of the wreckage of World War II in any meaningful sense, and in which the Soviet Union possessed significant conventional military superiority over Western Europe. This uncertainty was exacerbated after the Soviet Union tested its first nuclear weapon and the Communists emerged victorious in the Chinese civil war. This led to the signing of the North Atlantic Treaty in April 1949. During the 1950s, NATO started to develop institutions as an organization responsible for Europe's defense. These trans-Atlantic institutions have grown and strengthened over the years in parallel with European institutions that have gradually come to unify Europe.

Mr. Lekson also discussed the evolving role of nuclear weapons in NATO. Nuclear guarantees, he argued, have always been an important part of the NATO commitment. Nuclear weapons were deployed in Europe in 1954 and at the time were viewed as a central part of NATO's war-fighting strategy: the "massive retaliation" strategy favored by Eisenhower. Moreover, given Eisenhower's increasing concern about the size of U.S. military budgets and the role of the military industrial complex more broadly, nuclear weapons were also seen as a cheaper way to signal U.S. seriousness about maintaining the balance of power in Europe given that conventional force targets were generally not met. This role changed somewhat in the 1960s. NATO's posture became more oriented to the "flexible response" doctrine favored by the Kennedy administration, which sought a way to fight a conflict with the Soviet Union in Europe without automatically escalat-

ing to an exchange of strategic nuclear weapons. Mr. Lekson also outlined the timeline of nuclear missile deployments, with intermediate-range ballistic missiles deployed in 1958 and intercontinental ballistic missiles deployed in the late 1950s and 1960s. He argued that the 1960s opened the door to an era of arms control but noted that strategic arms agreements did not address tactical weapons in Europe. He also discussed the Intermediate-Range Nuclear Forces (INF) Treaty signed between the United States and the Soviet Union in 1987, arguing that it was a traumatic experience for NATO, but that the eventual agreement represented a very important and positive step.

Jennifer Laurendeau continued Mr. Lekson's narrative, describing NATO's progression since the end of the Cold War. She began by noting that the Strategic Arms Limitation Treaty (SALT) and the INF Treaty established a downward trend in the number and variety of nuclear weapons, but pointed out that those agreements should nonetheless be seen in the context of a superpower rivalry in which each side perceived nuclear weapons to be a critical component of effective deterrence against the other.

The collapse of the Warsaw Pact precipitated a change in threat perception. The nuclear threat agenda now included not only deliberate use but also the security and custody of the vast nuclear arsenal in Europe from both sides, as well as the proliferation threat posed by "loose nukes", unsecured materials, and new states (such as the Ukraine) that had inherited nuclear weapons from the Soviet Union. Ms. Laurendeau also described the Presidential Nuclear Initiatives, announced by President George Bush in 1991, which were designed to address some of these concerns. Under the Initiatives, Washington and Moscow undertook reciprocal commitments to dramatically reduce both the number and variety of tactical nuclear weapons in Europe until only one type of weapon remained (simple gravity or "dumb" bombs). This was combined with a gradual reduction in the readiness of NATO forces: in the late 1990s, the readiness of NATO nuclear forces was significantly reduced from minutes to weeks, and this was further diminished in 2002. NATO also announced for the first time that its nuclear weapons were no longer aimed at a specific threat. In this new environment, however, there remains a key debate within NATO as to precisely what role nuclear weapons can and should play within the alliance, and an active review of its defense and deterrence posture is currently underway.

Elaine Bunn spoke about the nature and significance of consultation within NATO on nuclear issues. Ms. Bunn made four key points. First, consultations among NATO members on nuclear issues have occurred constantly, at various levels, and have included personnel from both defense and foreign ministries (for example, ambassador level, secretary of defense level, etc.). The numerous institutional groupings—including the Nuclear Planning Group, the High Level Group, and the Special Consultative Group—reflect this fact. Second, Ms. Bunn emphasized that all NATO states—including those without nuclear weapons deployed in their territory—participate in consultations on nuclear weapons. The only exception to this rule is France, which has chosen to exclude itself from such consultations as a symbolic demonstration of the independence of the force de frappe. Third, the intensity of these consultations has waxed and waned over time (for example, they were particularly active during the late 1970s and 1980s), and she made the important point that NATO consultations do not merely serve the purpose of increasing understanding between the governments of NATO regarding their positions on nuclear issues. Rather, consultations also fulfill a very important public diplomacy function, helping governments to communicate with the public about nuclear policy and demonstrate to domestic audiences that U.S. nuclear policy is not being imposed unilaterally upon them. Fourth, consultations on nuclear issues have expanded over time and consequently have begun to include consultations on issues relating to missile defense and various nonproliferation endeavors. As one example of this, Ms. Bunn noted that the Reagan administration's invitation to NATO members to contribute to research into the Strategic Defense Initiative was initially distributed through the High Level Group.

Peter Schulte argued that in the aftermath of the Cold War, NATO has been forced to seriously reconsider the role of nuclear deterrence in its strategy, given the legitimate question of whether NATO has any "rational enemies" left (he noted in an aside that NATO is constrained from mentioning Iran as a potential reason for maintaining a deterrence posture due to Turkish sensitivities.) Mr. Schulte said that if NATO does indeed face no rational nuclear-armed adversaries, there is a very serious question as to what purpose is served by NATO's nuclear weapons. He argued that there is a growing unwillingness to accept nuclear deterrence merely as a permanent hedge against the emergence of potential future threats, and an increasingly strong belief among many NATO members that NATO should commit itself to displaying leadership and supporting the goal of global nuclear disarmament. While NATO's nuclear posture remains an elite issue with relatively little resonance among mass publics, Mr. Schulte argued that this could potentially change very quickly. For example, issues such as modernizing the aging nuclear bombers currently deployed in Europe could prove to be a trigger for greater public opposition to nuclear weapons in Europe, and may therefore prove politically challenging for the alliance.

Mr. Schulte also argued that the role of nuclear weapons may begin to divide countries within NATO and thus pose increasingly significant political problems for the alliance. More strategically exposed states—such as the Balkan states, Poland, and Turkey—are likely to continue to see a need for a robust deterrence postureand a concomitant role for nuclear weapons in NATO: Mr. Schulte noted that "where you stand depends on who sat on you last." By contrast, more strategically sheltered countries such as Germany tend to be more inclined towards further (and in some cases complete) denuclearization within Europe. A second point of division relates to the wisdom (or otherwise) of attempting to move from a strategy of deterrence to one of denial throughmissile defense. A third potential fissure in the alliance relates to changes in the credibility of U.S. security guarantees, and the appropriate response of NATO to such changes, particularly in an age of austerity in which the United States may seek to retrench from areas previously considered strategically important. Mr. Schulte arguedthat divisions over these questions may make it increasingly difficult to maintain alliance unity the current Deterrence and Defense Posture Review has to be able to redefine NATO's posture while maintaining alliance solidarity.

Mr. Schulte concluded with some lessons that might be relevant to Asia. The main lesson he drew from the experience of NATO was that military alliances that are united, have some element of a common culture,

face a credible threat, and are willing to be explicit about the identity of their adversaries are better able to communicate credible commitments and sustain them over long periods of time.

The question-and-answer session ranged over a wide variety of topics. The first question noted that the Presidential Nuclear Initiatives unilaterally removed U.S. nuclear weapons from South Korea, and asked whether a U.S. unilateral decisionto remove nuclear weapons from Europe without an agreement for some sort of reciprocity from Russia would be politically feasible. Ms. Laurendeau answered that the U.S. position was that decisions about NATO's nuclear posture should be made with NATO allies and that it would therefore have to be up to NATO to reach a common position on the conditions that would make such a withdrawal possible.

The second question was whether increased U.S. frustration over perceived failures by European states to sufficiently share the burdens of European defense would increasingly lead to U.S. unilateralism within the alliance. The reply from the panel was that it was too early to say whether or not this would occur.

The third question was whether there was any possibility of a successful deal with Russia providing for limitations (or even greater transparency) on conventional arms in Europe. There was general skepticism among the panelists regarding the feasibility of such a "grand bargain". However, one panelist noted the current trajectory toward lower numbers of nuclear weapons, arguing that once nuclear weapons are removed from a territory it is often politically very difficult to bring them back—the implication being that this trend might make a deal on conventional forces more plausible in the future.

Finally, an audience member noted that U.S. extended deterrence does not depend on the few nuclear weapons in Europe and asked about the implications of this for the potential removal of U.S. nuclear weapons in Europe. The panelists replied that effective extended deterrence is as much about reassuring allies as it is about deterring adversaries, pointing out that nuclear weapons may play a role in the former even if they do not play a particularly significant role in the latter. Ms. Bunn offered a metaphor to illuminate the significance of nuclear weapons even when they play a limited role in extended deterrence: nuclear weapons are like a wedding band—they are the symbol of the U.S. commitment rather than the commitment itself. It would be perfectly possible to have a strong U.S. commitment to Europe without nuclear weapons deployed in Europe, just as it would be perfectly possible to have a non-credible commitment with nuclear weapons. Nonetheless, once nuclear weapons are deployed in Europe, the symbol is in place and being used. Consequently, even if nuclear weapons are purely symbolic, one should not underestimate the significance of removing them.

# The Six-Party Talks as a Viable Mechanism for Denuclearization

**Session 4 (Grand Ballroom)**

**June 14, 2011**

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| **Panel** | Bruce Klingner (Moderator), The Heritage Foundation<br>Burwell B. Bell, Former Commander, UNC/CFC/USFK<br>Larry M. Wortzel,U.S.-China Economic and Security Review Commission<br>Sue Mi Terry, Council on Foreign Relations |
| **Author** | A. Greer Meisels, Sasakawa Peace Foundation |
| **Summary** | The panelists examined the ongoing challenges and opportunities for forward momentum on the Six-Party Talks as the principle forum for seeking denuclearization on the Korean peninsula. While most of the panelists expressed skepticism regarding the likelihood of any immediate progress on North Korean denuclearization, there was nevertheless a general acceptance that the talks remained the only viable forum for the foreseeable future. In addition, there was general support for the continuation of sanctions and pressure on the North Korean regime whilst seeking dialogue across a range of fronts. |

Ms. Sue Mi Terry began her presentation by stating that the 6PTs were a dismal failure when it came to North Korea's denuclearization; however, if we believe that dialogue with North Korea is important, then it is difficult to think of an alternative to the 6PTs. She continued that she was in agreement with the so-called "sticks" approach, which may include a variety of efforts such as economic sanctions, being vigilant in stopping counter-proliferation activities, and limiting North Korea's other illicit behaviors such as money laundering and counterfeiting. However, she conceded that sanctions will not necessarily persuade North Korea to give up its nuclear weapons.

With that being said, they could have a very important psychological impact on North Korean elites, who are critical for regime survival. Ms. Terry argued that current sanctions need to be kept in place and strengthened with certain actions such as joint South Korean? United States military exercises. However, it is still important to leave open the option of resuming talks given that relying only on these so-called "sticks" is unrealistic. Furthermore, the Obama administration may need to, from a tactical standpoint, show that it is interested in some sort of future dialogue with the North.

Yet Ms. Terry did not want this idea of dialogue to be conflated with a call to rush back to the Six-Party talks. She agreed with the current Obama administration approach, termed "strategic patience". Before

returning to the 6PTs, there needs to be improvement in North-South relations, and North Korea's uranium enrichment program must become part of the discussions. If this were to occur, bilateral talks within a Six-Party framework would become at least somewhat more acceptable.

Mr. Klingner asked whether the Six-Party talks should be revitalized, noting that it was important to determine what caused their failure in the first place; North Korea's failure to comply with its commitments and its continued hostile provocations. He also pointed out that North Korea had miscalculated its strategic outlook by engaging in provocative and hostile activities in 2009 and 2010, during the initial period of the Obama administration. In doing so, North Korea became its own worst enemy by forcing the Obama administration to take a much harder line than it had originally intended to take. He noted that the United States and its allies are now far less amenable to dialogue since there is a perceived "cost" associated with keeping talks going.

Like many people who have grown frustrated with or weary of the 6PTs, Mr. Klingner stressed that they should always be viewed as a means to an end, not as an end in and of itself. Therefore, we should maintain pressure even while engaged in dialogue. He argued that allied policy has suffered from a "binary debate", the question of either sticks (pressure) or carrots (inducements), and instead we need to recognize the necessity of doing both. He asserted that diplomacy without pressure is useless, and sanctions are not chips to be bargained away.

For Mr. Klingner, this also means that we need to maintain a strong defense, which includes missile defense systems, and need to strengthen the U.S. alliances with the ROK and Japan. In terms of maintaining pressure, it is imperative to target both ends of the proliferation pipeline. The United States and the UN should target international businesses, banks, and individuals engaged in illicit activities. He recommended that South Korea should augment what has been seen as its "post-Cheonan" economic tightening. He also called for Kaesong to be closed, since he believes it is only putting money into the elites' coffers.

However, Klingner also recognized that it is important to hold out prospects for dialogue since, it is not a question of whether to engage, but more correctly, how to engage. He then enumerated some of the actions Pyongyang would need to take before the parties should come back to the negotiating table, such as allowing International Atomic Energy Agency officials to come back to Yongbyon, providing a complete and accurate verification of all of its nuclear and uranium enrichment programs, and living up to its commitments as spelled out in previous agreements. Ultimately, he believed that the time is not ripe for dialogue and that there is little optimism in Washington, D.C., that the 6PTs will ever be fruitful.

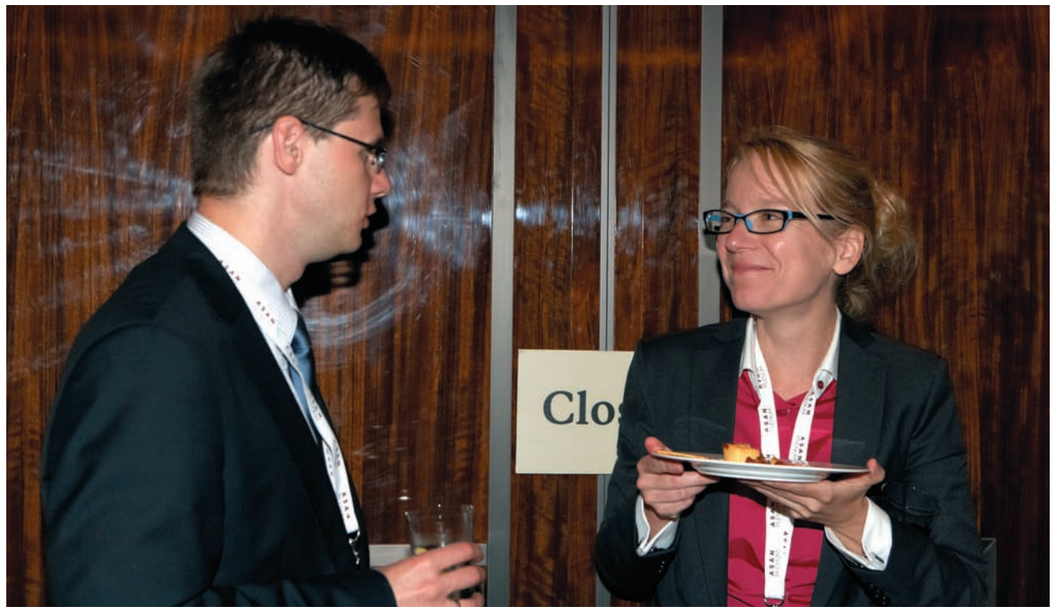
Next, Dr. Larry M. Wortzel began by stating that China still values stability above all else, and that it would not engage in activities that could lead to North Korea's collapse. Also, in his estimation, China believes that small states should have a minimum nuclear deterrent to fend off potential aggression by larger and more powerful states. Using this as a foundation, he believed that Chinese behavior has been generally consistent, and it is unlikely that China wants a nuclear-free world. His analysis suggested that China actually desires a multi-polar international system comprised of several nuclear states.

For these reasons, China does not have any incentive to advance the 6PTs to a final conclusion. He also echoed the refrain that China is the only country that can bring North Korea back to the negotiating table, but it will not actively do this because forcing the issue could lead to North Korea's collapse. Therefore, he suggested, it might be time to move the negotiations out of Beijing and to talk about finally replacing the armistice agreement. This may be a truly "game-changing" approach. Lastly, he concurred with the other panelists by emphasizing the need for truly close coordination between Washington, D.C., Seoul, and Tokyo.

General Burwell B. Bell noted that the vision of the 6PTs was admirable, but that they are not viable for achieving denuclearization. He noted that from its inception, it had been hampered by three broad, fundamental flaws. First, North Korea has been dishonest throughout the process; second, the other five parties have had divergent objectives; and third, there have been instances of insincerity on all sides. Because of these flaws, there has never been a mutual agreement on process, objectives, or outcomes.

Regarding the issue of divergent objectives, General Bell provided a brief assessment of each country's objectives. The core U.S. objectives, in addition to achieving North Korea's denuclearization, have been to protect its homeland from nuclear intercontinental ballistic missiles (ICBMs), to prevent North Korea's proliferation activities, and to see the eventual peaceful reunification of the Korean Peninsula under Seoul's leadership. In contrast, he viewed China's principal objectives as maintaining the status quo on the Korean Peninsula and preventing unification. General Bell felt that Russia's objectives were compatible with China's, namely, to preserve the military status quo and to prevent unification. Interestingly, he defined Japan's objectives as first to protect the country from any airborne North Korean attacks, but second to maintain a divided Korean Peninsula that could potentially preserve its regional supremacy vis-à-vis South Korea. Lastly, he believed that South Korea intends to maintain the potential for a future iteration of the "Sunshine Policy", seeks to deter war, and wants to achieve peaceful reunification under the democratic South. Therefore, given this divergent set of objectives, there has never been a unified sense of resolve amongst the major parties. This has led to North Korea effectively controlling the negotiating process.

General Bell also surmised that during the remaining days of the Kim Jong-Il regime it is unlikely that there will be a reasonable North-South dialogue. He also felt that without improvements in inter-Korean relations and without the necessary apology for the attacks on the Cheonan and Yeonpyeong Island, the idea of talking with North Korea should be shelved. In light of this fact, he placed a major emphasis on the United States, the ROK, and Japan effectively and aggressively engaging in economic and military containment of North Korea, and he highlighted the need to have an integrated missile defense system that would protect against North Korean missile attacks and nuclear brinkmanship. Without it he believes the allies are extremely vulnerable.



After the panelists made their opening remarks, the question-and-answer period picked up on a few key threads. For example, one individual suggested that perhaps the international community should find an "outsider" to serve as a facilitator in future negotiations with North Korea. The suggestion was that the Shanghai Cooperation Organization could become a sort of "honest broker". Not only do they have a security mandate, but they have both Russia and China as major members. However, Mr. Klingner quickly answered that he did not feel as if the answer to the North Korean nuclear situation was "to add more chairs to the table". It was not the number of participants in the dialogue, but rather it was the lack of will on the part of North Korea to live up to its denuclearization commitments that was the fundamental problem.

Since several of the panelists mentioned the importance of sanctions, one participant noted sanctions' inherent complexities; namely that while getting tougher sanctions is desirable, it is difficult to get countries to fully comply with the sanctions that are currently on the books. His question related to what could be done to enhance compliance. The panelists acknowledged these complexities and suggested that the best way to enhance compliance was to call on other countries to match the United States' actions, but there was a general recognition that the United States could also be more energetic in its implementation of existing laws and sanctions. On the United Nations side, there was agreement that some of the existing loopholes needed to be closed.

Additionally, throughout a large portion of the Q&A period, most of the panelists agreed that there needs to be a strong North Korea containment strategy that stresses aggressive containment among "like-minded allies". However, another participant from the European Union picked up on this containment policy discussion and asked how, in a democratic society not under an existential threat, a containment policy could be sustained until a potential North Korean collapse. Mr. Klingner cited North Korea's hostile actions during 2009 and 2010 and said that these have engendered more domestic U.S. support for containment.

Finally, there was consensus that the United States needs to continue to provide the ROK and Japan with a credible nuclear deterrent since it pledges a nuclear umbrella to its allies. But when pushed by some participants about the notion of bringing tactical nuclear weapons back onto the Korean Peninsula's shores, the panelists did not see this as necessary. The real issue is the credibility of U.S. policy and the strength of its commitment.

# Japan's Nuclear Disaster and the U.S.-Japan Alliance

Session 4 (Orchid)

June 14, 2011

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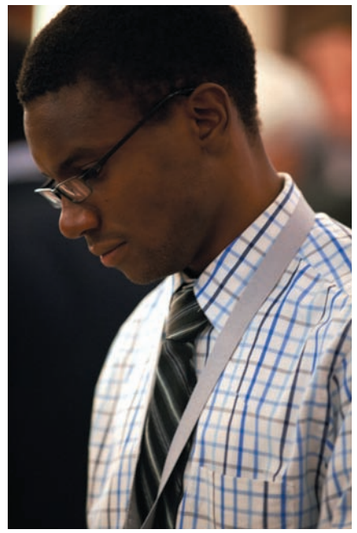
| **Panel** | Patrick Cronin (Moderator), Center for a New American Security |
| | Chaim Braun, Stanford University |
| | Zachary Hosford, Center for a New American Security |
| | Kotani Tetsuo, The Okazaki Institute |
| | Yamaguchi Noboru, National Defense Academy of Japan |
| **Author** | Gordon Wyn Jones, King's College |
| **Summary** | In the wake of Japan's triple disaster, this panel session addressed the significance of the events and nuclear crisis and their impact on the U.S.-Japan alliance. |

Patrick Cronin provided an introductory overview of the breadth of issues intersected by the recent nuclear crisis, ranging from issues of nuclear safety and oversight, as well as crisis response and international cooperation, to post-Fukushima reassessment of future energy supply strategy and security, the economic and political impact of crisis management and recovery, and the immediate and longer-term implications for the U.S.-Japan alliance and security cooperation, toward the forthcoming 2+2 joint ministerial meeting and the path beyond.

Noboru Yamaguchi provided a high-level perspective on the post-March 11 disaster response, emphasizing the prompt, positive, and supportive international reaction, including rapid and appreciated support from the Republic of Korea. Though the Japanese government and people appreciated all levels of international support and solidarity, it was the formidable actions, assets, and attitude of the U.S. military forces, which proved pivotal in the immediate aftermath of the quake and tsunami destruction. Three aspects of the "Operation Tomodachi" coordinated military response merit emphasis. Firstly, the rapid deployment of sea- and land-based forces to the disaster zone was a difficult undertaking, given the scale of destruction to land, coastlines, and harbors. The ability to mobilize more than one hundred thousand Japanese Self-Defense Forces (JSDF) members within three to fourdays and get them into the remote affected areas was facilitated by the use of forward bases and logistical centers. Secondly, U.S. military assistance, which provided crucial logistical capacity and response, initially through sea-based operations centered around the carrier USS Ronald Reagan and then through provision of vital logistical assistance to reopen Sendai's airport and regional supply points, was important and had a significant impact. With their on-station proximity and knowledge of coastal waters and terrain, the U.S. Forces Japan (USFJ) were best positioned and able to provide practical support to the overall Japanese relief effort. The Japanese people were touched by the tremendous effort and attendant cultural awareness and sensitivity displayed by the U.S. forces. Thirdly, "Operation Tomodachi" highlighted the overall effectiveness of joint Japan-U.S. coordination at all levels, with the JSDF and USFJ joint task force's performance very much proving the worth of ongoing efforts to enhance bilateral logistic planning since 1997, and the positive, practical aspects of continued close cooperation between Japan and the United States.



Tetsuo Kotani elaborated on the actions, impact, and implications of "Operation Tomodachi" for the U.S.-Japan alliance, highlighting the positive and some negative aspects of the March crisis and response. On a positive level, the rapid response of the U.S. government and USFJ special team provided reassurance and valuable support to the Japanese people and relief effort, demonstrating the alliance's visibility and contribution. The experience created a positive public perception about the U.S. presence and strengthened respective government views about the utility of cooperative endeavors, which has tremendous implications for deepening alliance relations. For example, Defense Minister Kitazawa, visiting the USS Ronald Reagan on 4 April 2011, commented, "I have never been more encouraged by and proud of the fact that the United States is our ally." (Source: Kyodo News, "Japanese defense chief thanks U.S. military for humanitarian efforts", 4 April 2011.) It is likely that the forthcoming 2+2 discussions and joint statement will endorse further bilateral cooperation. Some negative aspects of the crisis response can also be identified, such as the

initial communication issues relating to the nuclear situation at Fukushima Daiichi, especially during the first four to five days of the crisis. The U.S. decision to move the USS George Washington out of range was initially interpreted as an evacuation, but had more to do with sensitivity to removing any possible public issue of a nuclear-powered carrier (a "mobile nuclear power plant") in port at a time of national unease. Indeed, it is possible that the Fukushima issue might yet reignite Japanese opposition to nuclear power issues relating to military maritime movement (which was very much a Cold War phenomenon of civil protest against nuclear propulsion and tactical nuclear weapons conveyance associated with port calls and homeporting of U.S. Navy vessels). There is a danger that renewed anti-nuclear sentiment and activism might have a disruptive impact on U.S. naval movements (and consideration about Japan's own SSM nuclear attack submarine), which, at a time of rising tensions in the South China Sea, could have negative implications for regional stability and crisis management.

Zachary Hosford focused on the challenges and opportunities resulting from the March crisis. While the crisis was a vivid demonstration of the benefits of Japan-U.S. interoperability, it did not fundamentally change the overall alliance orientation. The primary security emphases on North Korea, China, and sea-lanes of communication remain, as does the need and opportunities for closer coordination to enhance regional stability. On the other hand, the events of March 11 brought to the fore new, substantial challenges for Japan's economy and security planning. Japan's dependence on nuclear power has been seriously challenged by the Fukushima crisis and the subsequent stated government intent to revise future energy plans away from increased reliance on nuclear energy. The issue for Japan is its near total dependence on oil and gas imports, and its lack of commercially viable energy-sourcing alternatives, particularly "renewables". With 19 of its 54 nuclear reactors currently closed, the electricity supply disruption has been deeply felt by Japanese industry and consumers. Associated energy and infrastructure replacement costs will be significant, as will be the overall economic impact of the crisis disruption and massive recovery costs, estimated to be in the range of $200-$300 billion. It remains to be seen whether these factors of heightened energy insecurity, resource constraints, and priority focus on domestic recovery will have any significant impact on Japan's defense posture, such as a shift away from the more externally-focused goal of the National Defense Program Guidelines.

On a more positive level, there are opportunities for enhanced alliance collaboration in areas such as intelligence gathering. As regards the nuclear industry, there is scope for cooperative endeavor to address expected requirements for improvements in plant safety and security, utilizing new technology and know-how, and a pressing need for tighter regulatory control, with a fully independent regulatory agency, in order to ensure greater governance and regain public confidence in the government and energy industry.

Chaim Braun provided an overview of technical, regulatory, and institutional issues associated with the Fukushima nuclear crisis, drawing tentative lessons and highlighting areas of concern and action for Japan's nuclear future. Foremost among the emerging insights and lessons from the Fukushima crisis is the fundamental requirement for strengthening plant safety standards. Fukushima clearly demonstrated the dictum that "safe operations are good economics." Though the events on March 11 did reflect exceptional circumstances, there were areas of deficiency and possible liability in safety levels and crisis response: for instance, the hesitation to use seawater to cool the reactor sites because of economic concerns. Other key lessons for improving safety include measures to prevent station blackout (i.e., the critical issue of power loss at Fukushima, due to the low elevationpositioning of backup generators) and dispersal of multiple reactors away from single, disaster-prone sites. Though the latter has technical merit, there are obviously big situational barriers in Japan, because of geography and "not in my back-yard" opposition to nuclear plants. The crisis also highlighted the issue of spent-fuel management, storage, and reprocessing in Japan, including the uncertain future of the Rokkasho facility in northern Japan. Already blighted by cost issues and delays, its fate now lies in the balance. One option is to convert Rokkasho into a regional spent-fuel storage and reprocessing center for Northeast Asia, under the joint supervision of Japan, regional partners, and the International Atomic Energy Agency (IAEA). Such collaboration could combine regional needs and cost sharing, as well as address concerns about Japan's plutonium future, but may not be politically acceptable to individual sovereign authorities.

Despite a fundamental case for Japanese nuclear energy, in terms of economy, diversity, and security of supply, the Fukushima crisis is affecting the global nuclear industry. In consequence it will likely increase pressure for super-safe nuclear plants (at increased cost for developers in Asia, where most of the expansion will occur). On a regulatory level, there is a need for more stringent and harmonized international safety standards between countries and across all nuclear plants. The IAEA has a key role to play, as well as organizations such as the Institute of Nuclear Power Operations and the World Association of Nuclear Operator. Maximum safety also requires greater industry self-responsibility and control measures. In this regard, countries such as France and Japan have been rather less active, and there is perhaps value to be gained from naming and shaming deficient cases, and considering an increased role for insurance companies in promoting safer operations.

Panel group discussion included questions and comments regarding the effect of the crisis on Japanese public perception of the JSDF (almost overwhelmingly positive, as a force for domestic good),the Okinawa/Futenma base issue (specifically the Okinawa media's concern that the U.S. role in the crisis has further legitimated the rationale for U.S. forward bases), and whether the crisis and domestic recovery will lead to a more inward-or outward-looking Japan. On the latter point, Noboru Yamaguchi proffered the comment that an inward-looking Japan "cannot be!" and that the crisis should be viewed as an opportunity to change Japan's global outlook. The overall opinion was that the crisis has strengthened U.S.-Japan alliance relations, demonstrated the value of bilateral coordination,and stimulated new initiatives, such as the decision to create a permanent, joint emergency response force.

# Europe's Response to Fukushima

Session 4 (Lilac/Tulip)
June 14, 2011

**Panel** Dominique Grenêche (Moderator), Nuclear Consulting
Hans-Joachim Schmidt, Peace Research Institute Frankfurt
Barthélémy Courmont, Institute for International and Strategic Relations

**Author** Eduardo Diez, Argentine Council for International Relations

**Summary** The panel discussed the diverse reactions that European states have had to the Fukushima accident and the impact it has had on their domestic nuclear energy production industries, ranging from total reversal of policy to ongoing support for nuclear energy. The case of Germany's abandonment of nuclear energy was of particular discussion, with the speakers suggesting that it represents a case study of the likely future of European engagement with nuclear reactors. The panellists also noted the general shift against nuclear power in European public opinion polls yet the overall reluctance of the general public to accept higher energy prices and economist costs to compensate for this shift.

Dominique Grenêche opened the panel by noting that since the advent of nuclear power, there have been ongoing debates about its use that have been extremely politicized and often affected by national and international security concerns as well as economic arguments. He stated that it is vital to consider the consequences of the Fukushima accident in the context of other national nuclear programs, especially in Europe. He said that experts need to differentiate among three aspects: the impact on public opinion; energy supply strategies and their political consequences, and the safety of nuclear power plants.

Barthélémy Courmont, from the Institute for International and Strategic Relations, said that Fukushima an end to nuclear energy, even more so than Chernobyl, mostly because it took place in a very advanced democracy. At the very least, the accident will affect the "nuclear renaissance" of recent years. In the European Union (EU), where 14 of the 27 members utilize nuclear energy, it is clear that the impact of Fukushima should be studied more carefully. Mr. Courmont pointed out that France has 58 reactors in operation and another 2 planned, the United Kingdom has 19 with another 8 planned to come on-stream, and Germany currently has 17 reactors. Other states with reactors include: Sweden (10), Spain (8), Belgium (7), the Czech Republic (6), Finland (4), Hungary (4), Slovakia (4), Bulgaria (2), Romania (2), the Netherlands (1), and Slovenia (1). Switzerland, whose government recommends phasing out nuclear power by 2034, still has 5 reactors, to which must be added 32 in Russia, 15 in the Ukraine, and another also being built in Belarus.

Mr. Courmont surveyed the media reaction to Fukushima by various European publications, such as France's Le Figaro; Germany's Die Welt, Der Spiegel, and Der Standard; the Czech Republic's Hospodárskénoviny; Italy's Corriere della Sera; and Belgium's De Standard. Each revealed to some extent the influence of public opinion over political leadership. He also analyzed political responses to Fukushima in several countries, noting how they depended on the national culture and perception of nuclear energy in each state. He discussed the potential impact of Fukushima in coming electoral campaigns, especially considering the advances of the Green Party in Germany and France and the possibility of having a socialist government in France next year that is allied with the Greens.

According to Mr. Courmont, Europe's divisions over nuclear power have deepened since Fukushima, with Britain and France remaining resolute supporters until now, Italy putting off plans to build new plants (after its cessation in 1987 following the Chernobyl disaster), and Germany calling for a phase-out. With respect to Germany, Mr. Courmont described Angela Merkel's decision last year to extend the working life of Germany's 17 nuclear plants—which reversed a 2001 deal between the Social Democratic-Green government and the energy producers for an exit by 2021—as the most significant proof of a nuclear renaissance in Europe. For the same reason, he indicated, the German reversal of opinion appears to be proof of its necessary revision.

In France, the government favors nuclear energy and has repeatedly emphasized the differences between the French and Japanese nuclear practices in response to the public's fears. It even sees a business opportunity in the closure of the German program because it will be able to sell energy to Germany. An opinion poll published on June 4 found that just over three-quarters of those surveyed support a gradual withdrawal from nuclear technology over the next 25 to 30 years. Considering that 80% of the energy consumed in France comes from nuclear sources, the candidates for the primaries of the Green Party hold that although France cannot give up its nuclear potential in the near future, political measures have to be taken to focus on renewable energies, and have even called for a referendum on the issue. They also made the nuclear issue a condition of a possible alliance with the Socialist Party, bearing in mind the 2012 presidential election.

Mr. Grenêche and Mr. Courmont both pointed out that according to the polls, many people support the possibility of moving away from nuclear energy, but at the same time they oppose paying more for non-nuclear energy. There is also uncertainty about the possibility of replacing nuclear power with renewable power. This insecurity, according to Mr. Courmont, leads the European nuclear powers to take a position where they will be unlikely to follow the German example.

Mr. Courmont ended his presentation with several unsolved questions that EU political leaders may have to face in the near future. First, what will be the EU position if more countries decide to follow the German example? At what point shall EU leaders consider that the nuclear renaissance is disputed in Europe? Second, what are the chances for success in Germany's search for renewable energies? And what will be the

German position if the change does not work as efficiently as planned? Third, how solid is the agreement on stress tests? Are some countries likely to call for a revised agreement in order to push harder or, alternatively, reduce it? Forth, what will be France's position if the Green Party gains a large number of seats in 2012 and pressures a potential socialist government? And what if a referendum on nuclear power confirms the public's fears, like in Italy in 1987? Finally, is the divergence on nuclear energy symptomatic of broader problems the EU members face, or an isolated and specific case?

Hans-Joachim Schmidt from the Peace Research Institute Frankfurt explained the evolution of the German nuclear program, the ensuing debates and demonstrations, and how the Green Party increased its influence as a result of the controversy. Germany began its civilian nuclear program during the 1950s. The first important debate about its future occurred in the 1970s with protests by non-governmental organizations and the emergence of the Green Party. Then, during the 1980s and 1990s, the Green Party gained strength in light of the Chernobyl disaster and problems related to nuclear residues.

Currently, the majority of the German population opposes nuclear energy and supports the progressive abandonment of nuclear power. In 2002, Germany decided to discontinue its nuclear power program by 2021, but Chancellor Merkel later canceled that decision. However, public outcries in the wake of the Fukushima disaster forced her to reestablish the progressive retirement of Germany's nuclear power plants with a 2021 and 2022 target. Mr. Schmidt thought that was a definitive decision and said that the regional elections showed the liberals and the conservatives that there was no support to prolong the civilian nuclear program. He also believed that it will be possible for Germany to replace nuclear energy with other technologies, but accepted that at the beginning that will imply the increased use of carbon and gas, as well as an increased dependence on Russia.

However, he felt that the last point will not be a long-lasting problem, given good relations between the two countries and new technologies that will allow that dependency to decrease relatively quickly. In the meantime, both sides will need to work on the safety of the Russian gas stations. If the switch away from nuclear power works in Germany, Mr. Schmidt stated that it will be a good example to other European countries and other regions to demonstrate the feasibility of renouncing nuclear energy without incurring major economic costs. If Germany ends its nuclear program in 2022, more than half of the EU will be non-nuclear and perhaps also anti-nuclear. What will happen in that case is an open question.

Finally, the speakers discussed the fact that the EU reached a technical consensus about the safety of the power plants and also agreed on the need to reinforce the nuclear safety role of the International Atomic Energy Agency. However, it looks to be almost impossible to achieve a similar consensus on the political side of the nuclear energy issue, with many differences between the countries (e.g., France and Germany).

# China's Nuclear Weapons

**Session 4 (Cosmos/Violet)**
**June 14, 2011**

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| **Panel** | Scott Snyder (Moderator), Council on Foreign Relations<br>Jeffrey Lewis, Center for Nonproliferation Studies, Monterey Institute<br>Jingdong Yuan, University of Sydney<br>Wang Jun, Chinese Head of Delegation, Comprehensive Test Ban Treaty |
| **Author** | Chris Jones, Center for Strategic and International Studies |
| **Summary** | The panel discussed overall distinctiveness, modesty, ambiguity, and consistency of the Chinese nuclear policy and force structure. They noted that there were perceived contradictions in China's nuclear weapons posture given its overall strategic power, and that it had maintained a very small nuclear force compared to the United States and Russia. This discrepancy, evident in its declared No-First Use(NFU) policy, could be attributed to a range of factors, historical, cultural, political and strategic. |

Dr. Lewis began the panel by discussing the relatively small size of the Chinese nuclear arsenal compared with those of the United States and Russia. China's arsenal has always been small, approximately 100 nuclear weapons, and very vulnerable. The Chinese also keep their missiles and warheads separated, which means they would technically have zero nuclear weapons under the counting rules of the New START Treaty. For the Chinese, however, deterrence is achieved easily and early with very low numbers of nuclear weapons given the sharply diminishing returns that can exist after the initial deployments of nuclear weapons. Dr. Lewis noted that there appears to be a collective bias in the Chinese planning system toward a less detail-oriented nuclear strategy. Some possible reasons for this view include China's experience in the Korean War when it did not have nuclear weapons, the Maoist idea that people are more important than weapons, and some cultural and linguistic differences in how some words and concepts are understood.

The question remained whether this Chinese bias will continue into the future. China is beginning to field new capabilities that include a soft-fueled ballistic missile and the real prospect of a ballistic missile submarine. Moreover, China's Second Artillery Corps has become vastly more professional, and there are ongoing efforts to develop plausible concepts of operations within the political guidance of constraints like No First Use (NFU). In the context of the U.S.-China relationship, he noted that there are two interesting questions. First, the Chinese appeared perplexed by American fears of a nuclear parity between the two states. At the same time, many Chinese think that U.S. missile defense and "Prompt Global Strike" assets will be used coercively against China, but Americans generally find this very odd. He suggested that these examples highlight two fundamentally different ways of looking at deterrence.

Dr. Yuan began by arguing that he has also been puzzled by China's small arsenal but to some extent also understands China's view on the role of nuclear weapons in its defense posture. Overall, the Chinese arsenal is characterized by modesty given its nuclear capabilities remain very vulnerable to a first strike. Over the past 25 years, Chinese nuclear modernization has been to enhance the survivability and reliability of the arsenal so that China can have assured retaliation to counter any extreme scenarios. This leads to China's NFU policy, which has prompted a lot of questions, particularly in the last few years. Analysts, including military planners, have been debating about the credibility and practical implications of China's NFU pledge.

Despite these difficulties, it nonetheless makes sense for China to stick to a NFU policy. If China is threatened by a non-nuclear state, it should be able to adequately respond by conventional retaliation. Only the United States, and to a much lesser extent Russia, would have the capability to threaten China with nuclear weapons. Even if China was subject to a conventional strike, retaliation with nuclear weapons invites the United States to respond with a massive use of nuclear weapons, which will lead to very severe consequences. According to this rationale, if you are a great power then you need to have nuclear weapons. The Korea and Taiwan crises in 1954 and 1958 showed that China needed to have some nuclear weapons to repel nuclear coercion, but those weapons have never been integrated into its war-fighting defense doctrine. This is evidenced by the very concentrated command and control system, the lack of a nuclear submarine,

and the safety and supply of the nuclear arsenal. The targeting distinction between counterforce and countervalue also has not been spelled out.

Dr. Yuan also highlighted a number of constraints that would undermine a Chinese "sprint to parity". After ratification of the New START Treaty, the United States has approximately 1,500 warheads whereas China has a little more than 10% of that number. There is still a huge gap between the two arsenals. Moreover, according to Chinese planning, there is little incentive to increase the number of nuclear weapons. At a certain point there are diminishing returns, especially if nuclear weapons are considered a political weapon rather than a military instrument. China also stopped production of weapons-grade fissile material long ago; it only goes up to a certain level.

There are many critical variables, however, that could change China's calculations. The U.S.-China political and strategic relationship will be critical. China was perceived as vulnerable in the 1970s and 1980s, but that was a time when China and the United States were quasi-aligned against the Soviet Union. During that time, China was less concerned about a U.S. surprise attack. Missile defense is also a critical variable. If China believes the United States can put up a very robust missile defense, then China will need to retain a certain number of nuclear weapons that can survive a first strike. A very critical element of deterrence is the message conveyed and then believed by the other side. Many Chinese scientists, military planners, and policy analysts are worried about U.S. intelligence, surveillance, and reconnaissance capabilities, which could undermine the whole Chinese posture. These considerations will play a significant role in determining the scope and willingness of Chinese participation in multilateral disarmament discussions.

Mr. Wang Jun's remarks emphasized the consistency of China's nuclear arsenal. He observed that the physical state and the basic elements of China's nuclear policy are there for all to see. Therefore, he directed his remarks towards introducing and explaining the Chinese perspective of its capabilities. China did not acquire nuclear weapons yesterday or last year, he observed, but rather in 1964. China chose to acquire nuclear weapons in 1964, a few years before the Nuclear Non-Proliferation Treaty, for some historical and realistic reasons. China did not acquire nuclear weapons to join the club, which came later, but from the viewpoint of Chinese leadership in the 1950s and 1960s, if you did not have nuclear weapons, you would not be counted. Therefore, from the inception, nuclear weapons for China were very much a political factor or one element that is counted into aggregate national capability. Even from the inception, there was no intention to reach parity, qualitatively or quantitatively, except to have the full range of capability. From the very beginning, China adopted a NFU pledge in a public forum. This policy has not changed despite worrisome developments in the security situation in Asia.

These factors influence how China views other strategic developments. Arms control treaties like START, SORT, and New START serve as a background. China's nuclear policy did not change, because it is defensive in nature and the Chinese are comfortable with it. He suggested that China welcomes the New START Treaty, but it clearly does not welcome developments like the abolition of the Anti-Ballistic Missile Treaty.

Ultimately, China really does want to see a nuclear-free world because it believes that would enhance safety and security for everyone. Yet despite reductions made over the past couple of decades, China would like to see more, including moving from reduction to destruction and tackling the issue of tactical nuclear weapons. Unless reductions are made irreversible, weapons could be re-introduced if the situation called for it.

In terms of the transparency of China's nuclear stockpile, He noted that China has not announced its number of nuclear weapons, but transparency should not be viewed in absolute terms. For China, NFU is a set policy that has been there for all to see for the past 40 years. Moreover, the Chinese have not really been physically expanding their nuclear arsenal. If China chose to do so, it would be noticed. Expansion of the arsenal would not involve just one or two more weapons but rather a multiplication of weapons levels that would be physically obvious. These actions would be detected and seen, making them transparent. Mr. Jun went on to point out that the nuclear "haves" have a long list of issues that they could cooperate on. There should be a consistent pursuit of nonproliferation, not a case-by-case policy. The biggest issues for the P5 are nonproliferation, peaceful use of nuclear energy, security, and safety.

Dr. Lewis stated that it is easy to say "talk more" when disconnects about the role of nuclear weapons are identified. The problem, however, is that China and the United States talk a lot but talk past one another. He argued that the two countries need the equivalent of the Shanghai Communique, on Taiwan for strategic stability, where the countries lay out what they agree on and establish the set of principles that would define the status quo. This might include statements that establish that the United States does not seek to negate China's deterrent and that China does not seek numerical parity and recognizes the legitimate value of extended deterrence in East Asia. This would not solve problems like missile defense, but it would at least allow the sides to begin to define a status quo that everyone could live with.

Dr. Yuan, meanwhile, argued that the last 40 years indicate that China has not been trying to achieve parity. A lot of people would question China's complete oblivion to the vulnerability of its arsenal in the 1970s and 1980s. Perhaps it could have been due to the lack of resources or technological capability but that cannot be said today. China has not been dramatically increasing its arsenal, but rather ensuring that its limited number of weapons can survive a potential first strike. This makes it difficult for China to fully embrace the Western notion of transparency. With regards to U.S.-China strategic dialogue, other political constraints in the relationship, such as Taiwan and the occasional crisis, have derailed whatever little progress was made before the crisis occurred. Somehow, Beijing and Washington need to create a mechanism to develop a dialogue, not on quantitative but qualitative issues, that will be protected from other political issues.

Mr. Jun pointed out that parity is far more than a game of numbers. Even quantitatively speaking, there is a need for definitions that are shared by both parties. The idea of "parity" runs the risk of simplifying the whole issue. Parity is very relevant to the deterrence factor; it relies not just on quantitative but also on qualitative strategies and so many other things. If, for instance, we boil everything down to "parity", the whole

issue is oversimplified. There is currently a process between the United States and China, at the Track 1.5 or Track 2 level, where a healthy conversation is happening about issues such as terminology. Participants from both sides can ask, what do you mean by this? What do I mean by that? That is a healthy effort. There has to be a starting point. It is true that China is very busy with other things and it really wants to see the whole economic problem solved, but at the same time, it also wants to see more security and safety assurance so it can concentrate even further on its domestic issues. If that is recognized, clearly, it could really help the conversation process.

During the question and answer session, one participant asked for the reason why the United States failed to adapt to the face that the Cold War is over, further adding that its whole nuclear posture is on the hair-trigger alter yet has good relations with Russia and China. Also the United States still has a hair-trigger superpower military kind of expectation that wants to cast China in a Cold War light while China has been trying to maintain a more consistent posture. Dr. Lewis began by noting he does not accept the premise of "hair-trigger alert". He believe, nonetheless, that there are prudent things that could be done to ease the day-to-day readiness of U.S. nuclear forces. Regarding the congressional backlash to a strategic communiqu? with China, Dr. Lewis noted that the United States has to think carefully about the right phrasing. For instance, the wording of mutual vulnerability in the Scowcroft/Perry report could be a place to start. The important thing is that the United States has a legitimate extended deterrence role to play in East Asia. In respect to a leak-proof missile shield, Dr. Lewis said the entire reason that he worries about strategic stability is the effects of arms racing. He cannot imagine a scenario in which the United States would be able to build a missile defense system that would provide the American president with that level of confidence.

In response to a question about Russia's role and its partnership with China, Dr. Yuan pointed out that China faces a wide range of threats around its periphery (Russia, North Korea, U.S. forces in Japan, India, and Pakistan) that have to be considered within the whole range of nuclear arsenal and doctrine. With respect to Russia, China thinks about how to maintain a stable relationship and how to access oil and natural gas. Mr. Jun noted that he can only provide China's views of Russia but that the China-Russia relationship is much different than the U.S.-China relationship.

Other questions of interest regarded the future trend of China's policy and its transparency. Despite limited knowledge of such trends, Mr. Jun noted that there is a strong drive from the public to say no more. China has been unwilling to undertake commitments such as a fissile material moratorium because it takes committing to something very seriously. With respect to transparency, Dr. Yuan observed that the other countries, such as the United States and many throughout Europe, would find demands to produce a complete shopping list unacceptable.

With respect to interactions with Taiwan, Mr. Jun said that the dialogue on Taiwan is moving. Discussions about the safety of Taiwanese food and the safety of Chinese tourists in Taiwan are two of the major drivers. Dr. Yuan agreed that there are many interactions but U.S. arms sales to Taiwan remain a significant impediment. They are very difficult for China to swallow and its responses have been escalating over time.

Another participant highlighted that India is developing missiles to strike China and missile defenses, while China reportedly had a successful missile defense test. He asked about the odds that China considers deployment of a limited missile defense. Dr. Yuan argued that a robust Chinese missile defense would cause India some concerns. He noted, however, that both programs are in an experimental stage.

With regards to the big factors that would cause change, Dr. Lewis closed the session by noting that all of the different bureaucratic, cultural, and ideological drivers mean that change is probably drive by domestic considerations. Despite being someone who thinks that details do not matter that much, one exception is the case of developing large and alert forces that interact with one another. There is not a great history of U.S.-China crisis management.

# Peaceful Use of Nuclear Energy

**Session 5 (Grand Ballroom)**
**June 14, 2011**

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| **Panel** | Miles Pomper (Moderator), Monterey Institute<br>Trevor Findlay, Carleton University, The Center for International Governance Innovation<br>Tom LaTourrette, RAND Corporation<br>Leonard Spector, Monterey Institute<br>Sharon Squassoni, Center for Strategic and International Studies |
| **Author** | Kenta Horio, University of Tokyo |
| **Summary** | This panel touched on the various aspects of peaceful use of nuclear energy, including the future of nuclear energy, international and domestic governance, nuclear nonproliferation, and spent nuclear fuel. |

Sharon Squassoni presented an overview of the current expansion of nuclear energy. The three drivers for the expansion of nuclear energy that are mentioned most often are electricity growth, climate change, and energy security. Assumptions about electricity growth are often based on assumptions about GDP growth. But as economies become increasingly advanced, the electricity density actually decreases. The accuracy of forecasts is significant because leaders are looking decades into the future when planning for nuclear energy, despite the fact that economic forecasts can only be accurate for a few years. Particularly for newcomers to nuclear energy, where electricity growth is forecast to increase the most, it will be at least 15 years before nuclear power plants come online.

According to Ms. Squassoni, there are five traditional challenges to nuclear energy: cost, safety, waste, proliferation, and nuclear security. Cost varies widely among countries, but in many countries nuclear energy requires significant government subsidies. The most effective way to make nuclear energy competitive is to introduce a carbon tax. Safety will be given greater attention since Fukushima, and this is certain to increase the cost of operating existing nuclear power plants. Newer designs incorporate more passive features, especially Gen III+ reactors, but they could be more expensive. Of course, cost factors into a country's decision about which types of nuclear power plants it will buy.

Some of the risks of leaving spent nuclear fuel in pools are now clear, and countries need to consider the cost of dry storage as an alternative to spent-fuel pools. If more attention to waste spurs action on cradle-to-grave fuel supplies, that will be a good thing, but this could change competitiveness in the industry.

Nuclear power plants themselves are not widely considered to create nonproliferation risks. The really sensitive nuclear fuel facilities are those for uranium enrichment and spent-fuel reprocessing. If a country's nuclear energy is significantly expanded—that would be doubling, tripling, or quadrupling current capacity—the country would need to seek additional capacity for enrichment and a way to treat waste.

Ms. Squassoni mentioned that some countries would build new nuclear power plants in spite of the Fukushima accident, especially in Asia, where most of the construction is occurring now. Nuclear governance has two components: domestic and international. The time is right for countries to act together to ensure that all nuclear energy is safe, secure, and more proliferation-resistant. There is an opportunity now for more regional and international collaboration to ensure that if enrichment or reprocessing does expand, those processes will not create nuclear security, safety, waste, and proliferation concerns.

Dr. Trevor Findlay defined the components of governance as the various treaties, agreements, institutional arrangements, activities,and norms about how one should perceive nuclear energy. It is important to strengthen three categories of global governance: safety, security, and nonproliferation. All three are interrelated and essential for ensuring nuclear energy's survival. He pointed out that global governance of safety, security, and nonproliferation has traditionally been strengthened only after a crisis; examples include the Gulf War, Three Mile Island, Chernobyl, and 9/11. Whole areas of global governance tend to be crisis-driven rather than approached day-by-day. The Fukushima tragedy can be used to further strengthen global governance, because there is a real need to do so.

One of the threats to global governance is emerging states that are not ready to have nuclear energy for the first time, since they often do not have institutional arrangements and regulations for safety, security, safeguards, and personnel training. All of these are required for states that are beginning to consider nuclear energy, and the International Atomic Energy Agency (IAEA) estimates that it takes at least 10 years to put these elements in place. The IAEA cautions states not to rush in but rather to carefully consider the implications, and in fact deters some states from proceeding with their plans. The IAEA is a global governance agency for nuclear energy and plays a key role in advising and assisting states.

For strengthening global governance, Dr. Findlay suggested five approaches. First, universalization of treaties is essential. There is a whole group of treaties designed to increase international cooperation in safety, security, and safeguards, but surprisingly some key states considering nuclear energy for the first time are not party to these agreements. Second, for further strengthening of safeguards, the IAEA needs advanced technologies and financial support. Third, a mandatory system of checks for nuclear safety, including on-site inspections, will be needed rather than the current peer-review system. Fourth, there is no peer-review system for nuclear security. Though nuclear security is a much more sensitive topic than safety, it might be possible for states to be more transparent and to share more information about nuclear security policies and arrangements without revealing site-specific details. Finally, there should be a system in place for states seeking to use nuclear energy for the first time. The IAEA will play a very important role in this and needs

more resources to advise and assist states with their far-reaching energy policies and to provide integrated advice about safety, security,and safeguards based on its expertise.

The third speaker, Mr. Leonard Spector, started by introducing the word “nudge”, which means to gently encourage and is familiar in the United States in terms of regulatory style. This term has a lot of applications in reinforcing rules for nuclear commerce beyond what they are today. He focused on rules for the nuclear supply, which have to be reinforced, and the methodology to bring about that change. There are five areas in which improvement might be needed: nonproliferation control, safety, security, liability, and nonproliferation credentials. There are two ways to achieve improvement. The first is the basic approach that technology holders sell reactors only when a buyer meets all requirements. Since there are just seven enterprises around the world that actually sell nuclear power reactors, it will not be difficult for technology holders to take this strict approach, but that is not a “nudge” approach. A much more flexible approach would be to encourage, not to demand, adoption of many of the required agreements and treaties, some of which have already become almost universal. In addition, several countries have voluntarily accepted additional restriction of enrichment and reprocessing. There is already a lot of international consensus in many areas and major rules among a core group, and these can be upgraded.

The last speaker, Tom LaTourrette, discussed spent-fuel management. First, he provided a brief overview of the history of U.S. disposal of nuclear waste. He claimed that political and social decisions are much more important than technical differences when choosing an option for spent-fuel management. He listed four strategies. The first is the status quo, which is to expect proceeding with the Yucca Mountain repository while maintaining on-site storage. The second is a so-called two-stage strategy, to develop centralized interim storage and restart the site-selection process for a final repository. Third, there is an option to pursue aggressively the development of advanced fuel-cycle technologies that can reduce the heat and volume of spent fuel and the capacity requirements for a repository, and to postpone disposal until that program is up and running. The final strategy is just to wait and see.

To distinguish among these strategies, nations have to examine the contexts of key social priorities. One priority is a quick solution for spent-fuel management. Another priority is the need to create a way to remove spent fuel from nuclear power plants. In addition, confidence in the governmental decision-making process for site selection and uncertainty, which is hard to manage, are also priorities. Political decisions should be made with these priorities in mind.

The panel discussed nuclear governance and restrictions on enrichment and reprocessing. Regarding the matrix of treaties and states that Mr. Spector provided, which represented states’ ratification, Ms. Squassoni commented that these requirements are all important but box-checking on the matrix is just a starting point and states need to follow best practices. On the restriction of enrichment and reprocessing, one participant commented that control of technology itself may not be good step to improving the security environment Mr. Spector pointed out that this area is unresolved.

# Disarmament

Session 5 (Orchid)
June 14, 2011

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| **Panel** | Bruce MacDonald (Moderator), United States Institute of Peace<br>Corey Hinderstein, Nuclear Threat Initiative<br>Masood Khan, Ministry of Foreign Affairs, Pakistan<br>Andrew Pierre, United States Institute of Peace<br>John Park, United States Institute of Peace |
| **Author** | Sarah Bessell, United States Institute of Peace |
| **Summary** | This is a time of renewed interest in disarmament, not just because of the situation in North Korea and Iran, but also because the international community must now look beyond the New START Treaty towards new steps in the arms control process. The panel participants discussed and identified the next steps beyond the New START Treaty and how the international community can move closer to achieving Global Zero. |

Mr. MacDonald opened the panel by stressing that when thinking of the challenges to disarmament, it is important to keep in mind that the desire to acquire nuclear warheads comes from insecurity and fear. In order for reductions to be possible, the fears motivating the political need for weapons need to be assuaged. Thus, in order to reach Global Zero, a significant transformation in the atmosphere of international relations is needed.

Mr. MacDonald described his take on the process toward Global Zero:

1. Twilight of bilateral nuclear arms control: The next stage beyond the New START Treaty, wherein the international community will shift from bilateral to multilateral arms control.
2. Dawn of multilateral arms control: This will include fully comprehensive limits, involving the whole range of nuclear weapons and not just strategic weapons.
3. End of the world levels of nuclear weapons: At this point, due to fewer nuclear weapons, a nuclear war would not mean the "end of the world".
4. Zero: This stage cannot be reached without an absolute transformation of the international relations environment. Maintaining this Zero stage in a way that countries would feel secure will be a real challenge.

Nuclear reductions need to be in sync political conditions. Other potential challenges include missile defense systems, non-deployed weapons, the problem of other nuclear powers, verification alliance dynamics, and regional security issues.

Corey Hinderstein of the Nuclear Threat Initiative focused her remarks on the disarmament verification process and addressed why discussions on this topic are helpful in thinking about whether or not verification is credible and desirable. In their 2007 op-ed in the Wall Street Journal, the Four Wise Men laid out concrete threat-reduction steps towards a nuclear-free world, and these remain the guiding principles behind their work. Today, the Nuclear Threat Initiative coordinates the work of the Four Wise Men. Early on in that op-ed, verification was identified as an area where meaningful work is to be done. Robust verification is essential to ensure confidence in the process, and Ms. Hinderstein emphasized that there will never be movement toward Global Zero unless all states have confidence in verification. Because it requires the longest lead time, it is necessary to begin planning far in advance. In cultivating confidence, it is encouraging that the international community knows how to do verification. However, opponents still rally behind the lack in ability to actually carry out verification, as there are still many technical and policy issues to be explored. But it is important to note that the research and work of the last several decades has a direct bearing on the future ability for credible verification.

All states have a stake in the progression of disarmament, and there is a need to recognize that non-nuclear-weapons states can no longer be relegated to the sidelines. In addition to their own assurance needs, non-nuclear-weapons states can also contribute technical expertise to the verification process. It is also time to rethink the classified nature of information on, and implementation of, verification. This thinking rests on outdated assumptions about the nature of the value of information. This is not to say that there is not a need for protection however, there should be a review of the underlying assumptions of what information should and should not be labeled critical.

There is a need for a systems-based approach to verification. While no verification process is infallible, the verification system that will have political acceptance will be informed by the knowledge of defined risks. A "system of systems" will maximize the opportunity for the weaknesses of one system to be compensated by the strengths of another. Not all solutions to problems are technical. The only way to determine an acceptable system is to leverage all the tools available: legal, political, public knowledge, insider knowledge, incentives for compliance, qualitative and quantitative measures, acceptance of risk, etc. Nontraditional approaches should also be explored. What is the role of those stakeholders with no legal obligation to report? What public and private partnerships can be made? Nontraditional methods require more rigorous analysis in order to determine their value to the verification process.

In identifying challenges, Ms. Hinderstein noted that there is still uncertainty regarding the quantities of existing stockpiles and inventories are still growing. While verification agreements will be complex and challenging, establishing confidence in verification is key. It is also important to grapple with current questions

regarding verification in preparation for when policy catches up. The robust body of knowledge and support of very capable technical and policy leaders focusing on the issue are positive signs for the future of verification.

Ambassador Masood Khan began by noting that while Global Zero is important, it is evident that there will be no shortcuts. There has been a renewed international commitment to Global Zero. Mr. Khan cited Obama's Prague speech as a bold step that provided fresh impetus to the disarmament discussion and the focus on Global Zero. He reaffirmed Pakistan's commitment to the goal of complete disarmament. Likewise, the G21 is also committed to the same goal and has initiated an ad hoc committee to start negotiations on a program for the complete elimination of nuclear weapons within a specified timeframe.

However, Mr. Khan cautioned that this progress is tempered by several factors. Disarmament is not up for serious negotiations at the United Nations, and the proposed Fissile Missile Cutoff Treaty is not an instrument of disarmament. Countries with the largest stockpiles are reluctant to start substantive engagement on disarmament. Newer and more sophisticated devices are currently being theorized and developed. The geographical scope for nuclear weapons has expanded in nuclear alliances and the increasing prominence of nuclear weapons in national security doctrines undercuts disarmament efforts. Even at drastically reduced levels, nuclear weapons states will still retain their arsenals against unforeseen threats. The principles of transparency and verification are not being observed.

Mr. Khan outlined several steps toward disarmament:

- the convening of a special UN conference on consensus on disarmament;
- the development of confidence-building measures;
- moving past stalemates in the Conference on Disarmament and placing it under international control within a specified time period;
- increased efforts to remove drivers of conflict and steer regions toward strategic restraint;
- maintenance of nuclear weapons on de-alert status;
- the creation of a global regime on missiles; and
- no operational deployment of nuclear ballistic missiles.

Global Zero captures the majority of the international community's aspirations to move forward on disarmament. It will require an elaborate institutional framework that is currently not in place, but the recent political surge in support for disarmament should be taken advantage of in progressing toward disarmament.

Echoing Mr. Khan's remarks, Andrew Pierre noted that the plenum was meeting at a time of renewed interest in disarmament, not just because of the situation in North Korea and Iran, but because the international community has achieved a certain point in the arms control process with the New START Treaty. The next question, according to Dr. Pierre, is where to go now? While there is a need to deal with many difficult issues in the arms control field, Dr. Pierre focused his remarks on two issues: theater missile defense in Europe (and how it fits into the next round of arms control negotiations) and multilateral strategic arms control that involves countries in addition to the United States and Russia.

Theater missile defense in Europe has become central to the arms control dialogue between Russia and the United States and Russia and NATO. More than ever, the United States and its European allies want to find ways to counter the growing missile threat from Iran. In dealing with the Iranian missile threat, U.S. leaders are seriously thinking about a cover for Europe as a whole. Obama is not ejecting the Bush plan, but is revising it to strengthen and widen effective missile defense for Europe as a whole.

However, Russia has indicated its discomfort with this proposal. Ever since the Strategic Defense Initiative(Star Wars), Russia has been concerned about strategic missile defense and the overall security of the country. To the Russians, theater missile defense poses potential risks and threats to Russia. There are concerns that any new system deployed in Europe might undermine Russian security, part of fears that missile defense systems could eventually develop to the point that they could counter Russian ICBMs. While Russia understands that the initial phase of the system is not a threat, it remains concerned about later phases.

Dr. Pierre characterized these concerns as deep and understandable and cautioned that they should not be perceived as a mere negotiating ploy to eradicate the missile defense system. The Russian foreign minister has stated that he would like to see a written guarantee, not quite a treaty, that any missiles developed by the United States and its European allies will not threaten Russia. While the United States favors bringing the Russian interception system in line with a separate U.S.-NATO system, the Russians would prefer to integrate the NATO system with theirs.

Opportunities for mitigating the impacts of missile defense systems would be to develop a method for sharing missile launch information between the United States, NATO, and Russia, perhaps via the creation of a joint information center. While the United States is not likely to be keen on an integrated system, it would be open to sharing data. Information sharing would not only be good for missile defense in and of itself, but it has the potential to unlock the door to dealing with tactical nuclear weapons. Russia believes that it needs a large number of tactical nuclear weapons in order to counter perceived NATO conventional superiority. Although there is no real military or strategic need for these systems, they are an important part of psychological reassurance for some European countries.

Multilateral strategic arms control is an area that countries are just beginning to think about, and Dr. Pierre commented that the international community is at a point where it is thinking through the possibility of multilateral strategic arms control. However, this may be more symbolic than real, as it does not look like some countries will negotiate down, e.g., Pakistan and India. Likely leaders of multilateral arms control would be Britain and France.

John Park noted that disarmament is a concept with origins in a bilateral world that now exists in a multilateral world. Dr. Park presented key findings from several Track 1.5 dialogues on Northeast Asia. A key advantage of these Track 1.5 dialogues is that, because of the nature of the proceedings, the participants come to the table with their guards down and engage in robust discussions. Dr. Park discussed the Korean Peninsula as a case study in the impact of arsenal reductions on alliance dynamics and how spoilers like North Korea can stymie the movement toward disarmament.

North Korea's sinking of the Cheonan in March 2010 and the shelling of Yeonpyeong Island are stark reminders of the danger that North Korea still poses to South Korea and the region as a whole. Public opinion is shifting and hardening in South Korea after the provocations of 2010, and there has been a push for controlled escalation. However, Dr. Park stressed that there really is no such thing, as any actions toward controlled escalation will result in a spiral. While the U.S. reaffirmation of the nuclear umbrella was quick, China's reaction to North Korean provocations has been disappointing. China's lack of condemnation and attempts to encourage all parties to restrain their actions and engage in negotiations signaled to Pyongyang that China would not deviate from its support. China's response has been particularly frustrating for South Korea.

# Nuclear Deterrence and Conventional Deterrence

**Session 5 (Lilac/Tulip)**
**June 14, 2011**

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| **Panel** | Scott Snyder (Moderator), Council on Foreign Relations<br>Elaine Bunn, National Defense University<br>Brad Glosserman, Pacific Forum CSIS<br>Clark Murdock, Center for Strategic and International Studies |
| **Author** | Chad Peltier, National Defense University |
| **Summary** | Clark Murdock, in speaking about U.S. nonproliferation goals and the attempt to maintain credible deterrent and assurance capabilities while still reducing arms overall, emphasized the importance of perception and what he calls "the third audience". Dr. Murdock noted that official U.S. policy is one of nuclear nonproliferation and disarmament with the long-term goal of a world without nuclear weapons. However, Dr. Murdock quoted President Barack Obama as saying in Prague in April 2009, "The United States would continue to provide deterrence and to extend its nuclear guarantee to its allies as long as nuclear weapons exist by maintain[ing] a safe, secure,and effective [nuclear] arsenal. The issue is how can the United States do this credibly at the same time it says it wants to reduce its nuclear weapons on a path to their elimination". |

One of the keys to this question is the recognition of the importance of perception to credibility and the acknowledgment of "the third audience for national security commitments", namely, the American public, Congress, the military, and U.S. government officials. Dr. Murdock reinforced the conclusion of the Perry-Schlesinger Commission, which noted that extended deterrence and assurance is in the eyes of beholder, that is others' understanding of U.S. capabilities and intentions. He noted that both allies and potential aggressors look to the third audience to understand U.S. deterrence commitments. Their perception of the U.S. commitment and actual U.S. policy might differ. For instance, Dr. Murdock noted that many Arab states such as those in the Gulf Cooperation Council feel far more assured of a U.S. commitment to their security "than seems warranted by U.S. extended deterrence". He then underscored the importance of the United States maintaining a "reputation for action" as long as nuclear weapons exist so that its extended deterrence commitments are credible and recipient states are assured.

Furthermore, Dr. Murdock noted that extended deterrence differs by region—specifically between East Asia and Europe—as illustrated in Secretary Gates' speeches to each region. He paraphrased Secretary Gates' speeches, in which the former Secretary of Defense discussed the importance of East Asia to U.S. security

goals and praised the extended deterrence relationship there. He then contrasted East Asia and Europe, where he was almost upset with the Europeans' lack of commitment to mutual security goals. According to Dr. Murdock, Secretary Gates lambasted the Europeans for not bearing their fair share in NATO security commitments. According to Secretary Gates, the Europeans were demonstrating their inability to sustain even modest operations. NATO's future will be dim if NATO Europe will not bear its fair share of the burden.

In contrast, Asian allies are carrying their weight. This relationship will be enduring, even though the potential threat (for instance, from nuclear-armed North Korea) is more intense than the waning threat posed by Russia. Dr. Murdock noted that, "For both Japan and South Korea, the strength of their security relationship with the United States is more important to their security than is the possession of nuclear weapons. In recent years, the United States has stated repeatedly that its extended deterrent to non-nuclear-weapons allies and friends is a powerful nonproliferation tool." However, he recognized that Japan and South Korea might seek additional assurance from the United States that nuclear weapons are still on the table for their protection. He noted that the East Asian allies of the United States might increasingly desire explicit nuclear extended deterrence capabilities; even if the U.S. deterrent capability is credible in aggressors' eyes, the United States might have an assurance problem. Allies want the biggest bundle of capabilities because a greater deterrent capability is seen as more credible. Dr. Murdock then questioned how the United States might balance perceptions of its conventional and nuclear arms so that it might increase credibility in both Europe and East Asia.

Brad Glosserman began by noting that while the United States is committed to the Global Zero goal for nonproliferation and disarmament, the United States will of course keep its nuclear weapons until its enemies disarm. In particular, the United States is worried about the nuclear threat from states instead of nonstate actors. Mr. Glosserman then urged the United States to use a broad array of tools, not just its military capabilities, for extended deterrence and assurance. He questioned whether or not nuclear weapons are in fact still more important than conventional weapons with regard to these goals. As the United States moves away from simply relying on nuclear weapons for its extended deterrence commitments, the United States must integrate more and reinforce the credibility of its conventional weapons. He echoed Dr. Murdock by claiming that the U.S. allies could do more for their alliances with the United States. Finally, Mr. Glosserman emphasized the lack of strategic understanding for changing global capabilities and doctrines.

The majority of the panelists' comments, as well as the subsequent question-and-answer discussion period, centered around Elaine Bunn's presentation on the U.S. Conventional Prompt Global Strike (CPGS) concept. CPGS calls for a U.S. capability to deliver conventional strikes almost anywhere in the world in approximately an hour. This would be for scenarios in which existing conventional systems would be insufficient, but the use of nuclear weapons would be inappropriate or lack credibility. As Ms. Bunn noted, "The United States might need to strike a time-sensitive target protected by formidable air defenses or located deep inside enemy territory. Small, high-value targets might pop up without warning in remote or sensitive areas, potentially precluding the United States from responding to the situation by employing other conventional weapons systems, deploying Special Operations Forces, or relying on the host country." Current conventional capabilities may be too slow to reach time-sensitive targets that arise in remote locations. Additionally, the 2010 Quadrennial Defense Report notes that the threat of enemy anti-access capabilities is increasing and the United States must be prepared to engage against ballistic missiles, anti-ship cruise missiles, or anti-satellite weapons. Some advocates of CPGS argue that these capabilities blunt the conventional credibility of the United States and create a "credibility gap" because bombers, aircraft, and surface ships with cruise missiles might not be able to get within striking distance of an enemy, nor reach the enemy, in a narrow time window. Proponents argue that CPGS would fill this credibility gap by possessing the speed, range, and penetration ability of nuclear intercontinental ballistic missiles or submarine-launched ballistic missiles. In particular, advocates point to four scenarios that might be met most effectively by a new CPGS capability: when locating terrorist leaders, where transfers of weapons of mass destruction (WMD) are suspected, when missile launches are imminent, or when high-value targets are identified in larger military campaigns.

Ms. Bunn argued that CPGS is worthy of debate because it has been pursued as a concept across multiple administrations, even though it has taken multiple forms throughout its development. During the subsequent discussion, one participant questioned the actual popularity of CPGS across administrations and suggested that a small number of proponents spanned both the Bush and Obama administrations, rather than broader bipartisan support. Ms. Bunn responded to this comment by noting that the CPGS concept has received support even at the presidential and Nuclear Posture Review levels. The Obama administration in particular acknowledges the importance of dealing with time-urgent regional threats and studying CPGS as one potential element of a broader portfolio of nonnuclear long-range strike assets.

The CPGS concept recognizes the diverse threats to the United States, including terrorist leaders, WMD transfers, imminent missile launches, and high-value targets in the context of a larger military campaign. Such a capability might enhance deterrence and assurance by providing an effective and usable (and thus more credible) strike option. However, concerns about future strategic stability as a result of CPGS capabilities create a need for a discussion about the role of consultations in NATO with regard to assurance and extended deterrence. The Russians and Chinese in particular fear that such a capability would actually give the United States conventional superiority and a first-strike capability. These states fear that U.S. attempts at nuclear nonproliferation and disarmament are actually strategies for "making the world safe for U.S. conventional superiority." CPGS would not degrade Chinese or Russian capabilities, even though these states claim that this capability would undermine stability. Launch notifications would be a good starting point for future discussions of CPGS. The United States needs mechanisms for confidence-building measures and mechanisms for picking up the phone—notification mechanisms regardless of the actual capability. Confidence-building measures for notification are important such that the parties have experience with conventional operations systems too.

Some participants during the question-and-answer discussion echoed Russian and Chinese fears, noting that CPGS would be a huge threat to decades of stability and understanding, especially for a state such as China,

which does not approve of its airspace being violated. Even if CPGS weapons might be useful in a war with a near-peer in national power, Ms. Bunn noted that this does not mean that the United States would develop such a capability specifically for this purpose. The overall health of any alliance is more important than any specific capability. Consultations with Japan and Korea will be essential as stability dialogues with China move forward. Mr. Glosserman reinforced this point during the discussion by arguing that, from this point forward, the United States must consult its Asian allies first when strategically planning.

Other critics further noted that CPGS missiles would be ineffective, unnecessary, or infeasible. For instance, it is possible that "the time required to gather the information necessary to execute a CPGS strike would create alternative options for fulfilling U.S. objectives. Alternatively, some targets might be so mobile that the United States might be unable to reposition strike assets in time to hit fast-moving targets." However, Ms. Bunn addressed these concerns by noting that "the speed of CPGS missiles should increase the deliberation time available to the president because the time between a strike order and target impact would be shorter."

While earlier forms of the concept included conventional warhead-armed ballistic missiles, these designs were scrapped because of the potential for misinterpretation during launch as a nuclear missile launch; all future research is pursued with a boost-glide launch concept in mind. Ms. Bunn noted that "concerns about CPGS ambiguity focus primarily on Russia because it possesses a massive nuclear arsenal and is capable of detecting and tracking long-range missile launches." Furthermore, "neither Russian nor Chinese officials would have strong incentives to employ nuclear force in response to a small, ambiguous U.S. missile launch."

Ms. Bunn repeatedly emphasized that CPGS is currently just in research and development and is not a system that is deployed or even in acquisition. This is an important distinction, as many current critics, both domestic and abroad, treat the concept as if it were currently owned or in acquisition by the United States. Many participants during the question-and-answer period echoed these fears. In fact, the delivery capability currently under discussion—the so-called "boost glide" technology—is a technological challenge that will likely be insurmountable for at least the next five to ten years.

Scott Snyder summarized the three commentators' opinions and offered several comments of his own. Mr. Snyder affirmed Obama's commitment to disarmament as based on his 2009 Prague speech and then argued that the CPGS concept could enhance deterrence and be more credible than nuclear weapons because it might be used more often. He recognized that while CPGS might initially worry Russia and China, it is too premature to worry about such a concept while it is this early in development. He closed by noting the difficulty of reassuring multiple audiences, but posited that the United States must take extraordinary efforts to reassure its Asian allies specifically.

# Nuclear Programs: Iran and Pakistan

**Session 5 (Cosmos/Violet)**
**June 14, 2011**

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| **Panel** | Ellen Laipson (Moderator), Stimson Center<br>Emile Hokayem, International Institute for Strategic Studies<br>Feroz Khan, Naval Postgraduate School<br>Jeffrey Lewis, Center for Nonproliferation Studies, Monterey Institute |
| **Author** | Nicholas Hamisevicz, Korea Economic Institute |
| **Summary** | This panel focused on the current status of and overall approach to nuclear weapons in Iran and Pakistan. Ellen Laipson noted the differences between the history and focus of the nuclear programs for Iran and Pakistan, but highlighted the potential and actual instability in these countries that often puts them together in a similar conversation on nuclear issues. The panel had a unique discussion about the intents and purposes of the respective countries' nuclear weapons and the response from the international community on how to handle these programs. |

Emile Hokayem pointed out that there is uncertainty about whether Iran is slowly building a nuclear program or rapidly trying to reach nuclear status. This uncertainty also extends to Iran's purpose for pursuing nuclear weapons. Mr. Hokayem noted that Iran had sought nuclear weapons long before recent public statements by Israel regarding its need to have all options open to prevent Iran from gaining nuclear weapons. Israel is used as a justification for Iran's nuclear program, but it was not the initial reason for Iran's development of nuclear weapons.

Mr. Hokayem believes there are real tensions between how the West and the Middle East view Iran. The West usually focuses on tensions and how to ease concerns in the region. The other countries in the Persian Gulf see Iran as driven by a sense of purpose and intent on building nuclear weapons. Other countries in the Middle East do not doubt Iran is after nuclear weapons; consequently, this feeling drives the perception within these countries of the importance of internal dynamics in Iran. Ms. Laipson added that Arabs would be relieved if Iran had a setback with its nuclear weapons program, but they cannot express this sentiment for political reasons.

Mr. Hokayem contended that if Iran actually developed nuclear weapons, it would not necessarily be sufficient for big Arab countries in the region to go nuclear. Moreover, a nuclear Iran would not cause those countries to ask for extended deterrence. He believes the most important relationship in the region is with

the United States. It is important for countries in the Middle East to understand where the United States is headed with its Middle East policy. Confidence in the United States among countries in the Middle East is at its lowest point ever. Although Mr. Hokayem did not say it was related to these factors, he noted that the level of chatter on the Saudi Arabia-Pakistan nuclear relationship has grown.

With regard to Pakistan, Feroz Khan argued that the calculation for Pakistan's nuclear weapons is connected to its dynamics with India. Pakistan's overall nuclear program has to balance the need for energy with the need for deterrence; however, General Khan noted that Pakistan is the only country that pursued nuclear technology for the purpose of building nuclear weapons. Now, fears about preemptive strikes and sabotage are the motivators for Pakistan's nuclear weapons program. Yet, General Khan worryingly suggested the killing of Osama bin Laden by American forces might actually cause Pakistan to focus more on external threats to its nuclear weapons rather than on internal threats such as terrorists stealing the weapons or information.

The killing of Osama bin Laden has increased the level of scrutiny of the U.S.-Pakistan relationship and the disconnect between the United States and Pakistan. For fear of anti-American protests, riots, and attacks, the Pakistan government often does not inform its citizens about it slevels of interaction with the United States. Often for similar reasons, the U.S. government is not willing to inform citizens in Pakistan about U.S. work and aid assistance there. This leads to the idea that the United States is always asking Pakistan to sacrifice for the United States, while Pakistan gets nothing in return. However, this is not the case, and in this panel, U.S. work in helping Pakistan with its nuclear safety was mentioned. General Khan described how, shortly after the terrorist attacks in the United States on September 11, 2001, the U.S. Department of Energy began cooperating with the Pakistan; government on nuclear safety issues, particularly the protection of nuclear materials. This assistance helped Pakistan enhance its nuclear safety and security procedures. Jeffrey Lewis interjected that he could not see the United States helping Iran with nuclear safety and security issues.

Dr. Lewis argued that the international community should not make exceptions or excuse countries for building nuclear weapons because of geopolitical concerns. He believes that the international community made a mistake by allowing Pakistan to build nuclear weapons because of its geopolitical rivalry with India. Excusing countries allows for addibonal exceptions and leads to more countries developing weapons rather than eliminating them. He further stated that Israel having nuclear weapons does not excuse Iran from violating the Nuclear Non-Proliferation Treaty (NPT) safeguards. Iran's nuclear program threatens other NPT safeguards. This argument is important for dealing with North Korea. North Korea signed the NPT but later withdrew. Countries must continue to push North Korea to give up its nuclear weapons and return to the NPT, despite evidence that at the current time, North Korea is not likely to give up its weapons. North Korean officials have suggested in private that they could be like Israel with regards to nuclear weapons. Most countries do not like a nuclear North Korea, and especially would not like one that follows the Israel model.

General Khan made an interesting point about Pakistan feeling uncomfortable sandwiched between nuclear India and Iran pursuing nuclear weapons. He mentioned that there is some pressure within Pakistan for providing extended deterrence for Iran, yet geopolitically, Pakistan is wary of Iran possessing nuclear weapons. With this uneasiness about a closeness in proximity to states with nuclear weapons, does China's relationship with Pakistan help ease some of these concerns? The China-Pakistan security relationship would have been fascinating to discuss with regard to Pakistan's insecurities about the region. Yet, China was not mentioned during this panel.

Iran and Pakistan leave the international community in a tough position regarding nuclear weapons. The panelists discussed how negotiations and dialogue about Iran's nuclear weapons have been unsuccessful. Moreover, with Pakistan, U.S. efforts to bring India into export-control regimes and other nuclear-related groups further emphasizes the exceptional nature of the U.S.-India civil nuclear deal, which make an international rules-based system for nonproliferation issues more difficult. Thus, the panel provided an interesting conversation about the intention and purpose of nuclear weapons programs in Iran and Pakistan and the proper response from the international community to encourage more countries to give up nuclear weapons rather than pursue them.

# Japan's Nuclear Crisis

**Session 6 (Grand Ballroom)**
**June 14, 2011**

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| **Panel** | Abe Nobuyasu (Moderator), Japan Institute of International Affairs<br>Ota Masakatsu, Kyodo News<br>Sharon Squassoni, Center for Strategic and International Studies<br>Nakagome Yoshihiro, Japan Nuclear Energy Safety Organization<br>Suzuki Tatsujiro, Japan Atomic Energy Commission |
| **Author** | Chung Kee Hoon, Johns Hopkins University |
| **Summary** | The panel on Japan's nuclear crisis examined implications of the crisis from different perspectives. The first speaker, Dr. Suzuki, looked at what happened in the Fukushima accident, and what that meant for the future of Japan's nuclear energy. The second speaker, Sharon Squassoni, laid out the U.S. government's reactions to the crisis, and the next speaker, Nakagome Yoshihiro, criticized the Japanese government's mishandling of the crisis. The final speaker, Suzuki Tatsujiro, identified the need for mutual understanding of nuclear security in Asia and how that came to light after Fukushima. |

Dr. Suzuki's presentation explained three things: what happened in the Fukushima accident, what can be done to help, and implications for the future of Japan's nuclear energy. According to Dr. Suzuki, the tsunami was one of the biggest and most destructive in Japan's history. All power in the area was cut off, including nuclear reactors in the Fukushima Plant. Power recovery efforts failed, mainly because the efforts came only after 14 hours, providing more than enough time for the core reactor to melt and expose itself.

Dr. Suzuki said the crisis is not over yet, as the rescue team is still in the process of cooling down the reactor. One concern he had was that the building in which the nuclear plant was located was fragile. With more than 100 tons of contaminated water currently inside, if another tsunami were to hit the plant before the plant recovered, it would cause radioactive materials to spread. The current plan is to contain everything within six to nine months.

The Fukushima accident has brought grave consequences for Japan and the citizens living near the plant. Currently the contaminated area remains highly active and dangerous. One of the issues the Japanese government will have to consider for the next few months is the welfare of the evacuated citizens. The government has to provide ways for these citizens to recover and find places to which they can return to. Overall, Dr. Suzuki emphasized that the welfare of the citizens was one of the most important priorities for the government to consider.

Dr. Suzuki then went on to explain why such an accident happened. Drawing from the reports published by the Japanese government and the International Atomic Energy Agency (IAEA), he explored the question in five categories. First, could we have prevented the accident? Second, after the accident, was management adequate to contain the accident? Third, were safety regulations adequate? Fourth, what can we learn from the government's emergency response? Fifth, what can we learn from industrial safety culture?

In total, there were 28 items listed and reported by the government. Dr. Suzuki explained some of the items he considered important. Regarding the preventive measures, he found that both the government and the IAEA underestimated the damages of the tsunami. According to the report, when the accident initially took place, both the Japanese government and the IAEA stated that they were not legally required to manage the crisis. Hence one can ask whether making government response a legal requirement is recommended.

Regarding safety regulation, both the IAEA and the government emphasized the need for independence between the regulators and the industry. Regarding the emergency response, both the IAEA and the government agreed and evaluated the performance to be well done. However, Dr. Suzuki pointed out some unsatisfactory cases, such as not releasing complete information, that led the public to lose trust in the government. He also pointed out that improvements could be made in the communication and coordination between different actors. Another point for improvement was logistics, where the utilities and the government could not cooperate effectively to turn on the emergency power shortly after the accident.

In the final section of his presentation, Dr. Suzuki discussed the future of Japan's nuclear energy policy. The current prime minister has already stated that the existing nuclear energy policy—planning to build 14 additional nuclear reactors by 2030—is likely to be scrapped. Shortly after the Fukushima accident, the prime minister introduced four pillars of energy policy: first, implementation of nuclear energy with the highest safety standard; second, efficient use of fossil fuel; third, expansion of renewable energy; and fourth, efficiency improvement in the household and commercial sectors. It should be noted that the first pillar implies that the nuclear energy option is still not completely off the table. However, any government effort to build an additional nuclear reactor will likely face steep opposition from the public, which has lost trust in the government. According to the latest public opinion poll just released yesterday, 47 percent of the public wants to reduce nuclear power dependence, and more than 50 percent wants an immediate reduction of nuclear power.

Such public attitudes towards nuclear energy will impact nuclear power operation. Currently Japan has 54 reactors, and only 19 are operating at this moment. Dr. Suzuki concluded that if the public continues to mis-

trust the government, then all reactors would be shut down within a couple of months, creating a serious energy problem.

Sharon Squassoni discussed the U.S. reaction to the Fukushima incident and the implications the accident has for U.S. nuclear policy. She began by sharing her remarks based on close observation of media coverage and industry reaction to the crisis. She first pointed out the tremendous media coverage the Fukushima crisis received as the first nuclear crisis in the 21st century. The Fukushima incident reminded her of 9/11—horrified fascination, whether correct or not. Such a crisis generates unrealistic expectations about what is known and what can be done. The media tend to magnify the gaps between reality and expectations.

Luckily, the crisis in Libya diverted media attention from Fukushima. Ms. Squassoni used the term "luckily" because not all media coverage was helpful. She went on to discuss several reactions from the U.S. political arena. First, President Obama reiterated his support for nuclear power. Second, the Nuclear Regulatory Commission (NRC) reiterated that U.S. reactors are safe. This mattered, because 23 U.S.-operated GE boiling water reactors are similar in design to the reactors in Fukushima.

Ms. Squassoni went on to discuss the different reactions from different political branches. President Obama said, "Our reactors are safe, but when we see an accident, we have responsibility to learn." Congress appeared most interested, introducing safety-related bills within a few weeks. One of the bills introduced was the Nuclear Power Licensing Act, which enforced high safety standards for renewing licenses. Congress also held a number of different testimonies related to a variety of nuclear issues, such as on the spent-fuel pool, ocean contamination, and MOX fuel. Congressman Edward Markey went on to state that all spent fuel should be moved to dry cask as soon as possible. Overall, there was great anticipation that Congress would act.

Ms. Squassoni shared her experience of participating in a session with 20 congressmen in Vienna. Essentially what she gathered from the experience was the frustration Congress had with the international community. They asked why the IAEA is not doing more, for example, via safety inspections. However, she did not hear much discussion about how the United States would react to a crisis that is similar to the Fukushima incident. Shortly after the Fukushima accident, the NRC announced a task force that would conduct 90 days of review. This was the initial review, and after that time span, the NRC would decide on a long-term solution.

The review asked whether U.S. citizens are prepared for a blackout, and then discussed emergency preparedness by looking at several accident possibilities. While the review process probably had some shortcomings, Ms. Squassoni pointed out that, for the first time in many years, the NRC's independence was criticized.

Ms. Squassoni concluded her presentation by looking at the commercial industry. She made a point that the U.S. nuclear industry has been struggling not from Fukushima, but from the lack of financial assistance. Ms. Squassoni advocated for favorable measures, such as imposing a carbon tax that would alleviate the industry's financial burden.

Dr. Ota focused on two main points. First, he provided a brief account of Japan's nuclear history and how that affected Japan's nuclear policy. Second, he said that the Japanese government's mishandling of the containment process in Fukushima has led Japanese citizens to mistrust the government. In his brief history of Japan's nuclear policy, he pointed out that Japan is the only state to survive a nuclear attack and the only state to be attacked with a nuclear bomb. Hence there was modification and reconstruction of its society and its perspective on nuclear policy. Japan will not develop nuclear weapons and will not allow others to bring nuclear weapons onto Japans soil. In a nutshell, peaceful use of nuclear power is Japan's national and international nuclear policy.

Then Dr. Ota shared the results of an opinion poll conducted on March 27, 16 days after the accident. According to this poll, 39.5 percent of respondents want a reduction of nuclear power plants, 7.2 percent want the elimination of nuclear power plants, 40 percent want to maintain the status quo, and 6.5 percent want to increase the number of nuclear power plants. Merging these data, he explained that approximately 46.7 percent want a reduction of nuclear power plants, while 46.5 percent want to support nuclear power.

But more recent polls suggest different opinions. In the previously mentioned poll, taken two months ago, the responses for reducing nuclear versus maintaining nuclear were about the same at 46.7 percent and 46.5 percent respectively. However, a more recent poll taken on May 15 and 16 suggests that 47.5 percent of respondents want a reduction of nuclear power plants, 6 percent want the elimination of nuclear power plants, and only 38.5 percent want the status quo. In total, 53.5 percent want a reduction of nuclear power plants, and only 38.5 percent support nuclear power.

Dr. Ota probed into why the support has dropped within a few months. He identified mishandling of the Fukushima crisis by the Japanese government as the source. He pointed out that the prime minister, the commander in chief, only visited the accident site the day after the accident. Another group that should have visited the site at the earliest possible time was an influential advisory group of 45 specialists from the Nuclear Safety Commission. However, Dr. Ota pointed out that, like the prime minister, the group was not present at the onset of the accident to evaluate the situation and assess the damage. Finally, Dr. Ota also criticized the media and the government for not checking the safety of nuclear power in the past when ample opportunities existed.

Dr. Nakagome's presentation focused on the nuclear security sense in Japan and the necessity for mutual security understanding in Asia. Dr. Nakagome opened his statements by pointing out that the Fukushima accident has provided nuclear terrorists with valuable information. But in Japan, news media and nuclear scholars were deliberating and framing the issue only from a safety perspective, citing breach of safety management.

In Dr. Nakagome's opinion, the Fukushima accident cannot be considered from a security viewpoint because there was no difference between the concepts of safety and security in Japan. He explained that the Japanese safety concept ultimately includes the security concept. For instance, after the use of dangerous radioactive materials, Japan stores them in a box and ships them with the same box. Usually, radioactive materials that are considered to be dangerous are stored in safety, and greater measures are taken during transportation. In Dr. Nakagome's view, Japanese common sense is not the common sense of the world. He calls Japanese common sense idealistic. Ten years ago, he asked Western friends about the difference between nuclear security and safety, and he learned that they have obvious differences.

In the IAEA, the differences between nuclear security, safety, and safeguards are "three synergies of S". However, we should not forget that safety and security issues have quite different meanings. For example, barred windows are important for security, but with regard to safety, they can prevent us from escaping during a disaster.

"Three S" combination concepts should be considered when Japan develops nuclear power. Actual nuclear security implies guarded security. Perhaps because Japan lacks confidence in guarded security, it may emphasize it less in practical and conceptual terms. Recently, Dr. Nakagome learned from Chinese friends that there is no difference between general security and safety, and not much difference between nuclear security and safety. He also found that Japanese concepts of safety and security are quite different from Chinese concepts. In China, safety is incorporated into security, but this is quite different in Japan. Dr. Nakagome acknowledged that he does not know the general differences between the meanings of security and safety in Korea. He made a final point that as nuclear programs grow in Asia, there is a greater necessity to develop a mutual understanding on nuclear security by sorting out cultural differences. In this pursuit, he identified education as a key vehicle.

In conclusion, the panelists discussed many implications—from the impact on U.S. nuclear policy to the lessons learned for the Japanese government and Japan's nuclear future.

# Extended Deterrence and Assurance in Korea

**Session 6 (Orchid)**
**June 14, 2011**

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| **Panel** | Ralph Cossa (Moderator), Pacific Forum CSIS<br>Scott Snyder, Council on Foreign Relations<br>Brad Glosserman, Pacific Forum CSIS<br>Cheon Seong-Whun, Korea Institute for National Unification |
| **Author** | Leif-Eric Easley, Shorenstein Asia-Pacific Research Center |
| **Summary** | This panel focused on South Korean concerns about extended deterrence and especially on issues regarding the credibility of the U.S. nuclear umbrella. Three of the four panelists are affiliated with the Pacific Forum CSIS, a policy think tank active in both public diplomacy efforts regarding nuclear policy and in organizing U.S.-ROK strategic dialogues about extended deterrence. |

Mr. Glosserman pointed to a growing sense of threat in South Korea after recent North Korean provocations (the Cheonan and Yeonpyeong-do attacks). This leads to concern among analysts about the rise of a "new Cold War structure" in East Asia. However, U.S. and ROK officials have somewhat different perceptions of the security environment. Americans may be more concerned about non-state actors whereas South Koreans are worried about a state-based threat. In regards to China, U.S. officials are concerned about China's military modernization whereas South Koreans are more concerned about China's "economic threat" and its increasing stake in North Korea's economy. Meanwhile, the U.S. government is looking to reduce the role of nuclear weapons in its security strategy; this raises issues about U.S. extended deterrence commitments to allies. Mr. Glosserman proceeded to list issue areas on which U.S.-ROK efforts at reassurance are needed, including an updated bilateral nuclear agreement addressing pyroprocessing, as well as progress on the transfer of wartime operational control (OPCON). While there may be little fear in South Korea that North Korea will actually use nuclear weapons, South Koreans are concerned about nuclear blackmail and conventional adventurism by a nuclear North Korea.

Cheon Seong-Whun advanced an argument for the redeployment of U.S. tactical nuclear weapons on South Korean soil. Dr. Cheon outlined what he says are the major reasons for South Korean concerns about a decline in the U.S. extended deterrence commitment since the end of the Cold War. He cited:

- the pull-back of U.S. troops away from the demilitarized zone and redeployment out of the ROK;
- the reduced scale of U.S.-ROK military exercises;
- the expansion of roles and missions for U.S. forces in Korea (strategic flexibility) so that U.S. Forces are no

longer exclusively focused on North Korea;
- the dismantlement of the unified U.S.-ROK wartime command with OPCON transfer;
- U.S. willingness to offer security commitments to North Korea that might impinge on ROK security; and
- the danger that limited U.S. resources may be drained while American attention is focused on conflicts in other parts of the world.

Scott Snyder provided historical background for South Korean fears of abandonment. He argued that demand for U.S. reassurance for the ROK goes back to the early days of the alliance when Seoul needed to be reassured after the Korean War and North Korea needed to be deterred. Changes in U.S. foreign policy over various U.S. administrations were sometimes worrying and at other times reassuring to Seoul. South Koreans were apprehensive about the U.S. shift from massive retaliation to flexible response and especially about the Carter administration's desire for troop withdrawals. In contrast, the Reagan administration offered doctrinal reassurances, more high-level contacts, advanced weapons systems, and the inauguration of Team Spirit exercises. After the Cold War, the United States began direct engagement with North Korea, and this raised doubts in Seoul about the U.S. defense commitment. Most recently, the Obama administration provided written reassurance about the U.S. nuclear umbrella at President Lee Myung-bak's request. Presently, relations between the leaders are excellent and U.S.-ROK military exercises have increased in response to North Korean provocations.

Ralph Cossa commented that there is a daily need for practicing reassurance to keep the alliance strong. Many in Asia still have an image of helicopters taking off from a roof in Vietnam and feel uncertain as to whether the United States will stay in Asia. But the United States has demonstrated its staying power in words and deeds over the decades, and concerns about a decline in U.S. capabilities are exaggerated. The issue for the credibility of extended deterrence is that while the Obama administration's commitment to nuclear zero is laudable and attracts support, moving toward zero and getting to zero are different things, and no one has figured out how to do the latter. That being said, U.S.-ROK relations are better today than ever, so it is surprising that South Korean desires for nuclear weapons may be at an all-time high. That tells Americans that relations are not good or that the United States is not considered credible. While this may not be what South Koreans believe or intend to convey, such perceptions are problematic for the alliance.

The discussion with the audience largely focused on the idea of redeploying tactical nuclear weapons in the ROK. South Koreans were said to be concerned about sending a tough signal to North Korea and pressuring China. There are also concerns in the ROK that the United States is more interested in containment than with rolling back North Korean nuclear capabilities. Several American participants argued that reintroducing tactical nuclear weapons would have no operational value, would be destabilizing in the region, and would be unhelpful to global nonproliferation and disarmament efforts. However, South Koreans were said to be frustrated that other initiatives have not worked in dealing with North Korea and thus want "an equalizer" in order to negotiate with Pyongyang about denuclearization of the Korean Peninsula on equal footing. The argument was made by Dr. Cheon that while returning U.S. tactical nuclear weapons to South Korean soil would involve other difficulties, such a policy would be more desirable and stabilizing than the ROK developing nuclear weapons itself or adopting an aggressive or preemptive conventional doctrine against North Korea. Most experts in the room remained opposed to the idea, but there was general agreement that reassurance is a two-way conversation. Rather than just saying no to or dismissing South Korean voices calling for nuclear weapons, it is important to have robust alliance consultation and to expand public diplomacy on nuclear issues.

# Comprehensive Test Ban Treaty

**Session 6 (Lilac/Tulip)**
**June 14, 2011**

**Panel** Jenifer Mackby (Moderator), Center for Strategic and International Studies
Hossam Eldeen Aly, Ministry of Foreign Affairs, Egypt
Ola Dahlman, Verification Group, Comprehensive Test Ban Treaty
Lee Dong Myung, Korea Institute of Nuclear Safety
David McCormack, Hazards Information Service, Geological Survey of Canada
Wang Jun, Chinese Head of Delegation, Comprehensive Test Ban Treaty

**Author** Nadezda A. Larsen, Department of Defense

**Summary** The panelists for the session on the Comprehensive Test Ban Treaty (CTBT) focused primarily on the verification mechanisms, particularly on the status of the International Monitoring System (IMS). Jenifer Mackby began by pointing out that the IMS is considered highly credible. The data it acquires is routinely analyzed and regularly provided in a standard format by countries all over the world. Data analyses and data mining have also been recentlyintroduced to the IMS. The Comprehensive Nuclear Test Ban Treaty Organization (CTBTO) is completing an upgrade of its computer systems. The newest computers at the International Data Centre (IDC) are now more than 50 times faster at processing and analyzing IMS monitoring data than the original ones installed in 1997. This additional capacity enables the IDC to keep up efficiently with further increases in IMS data, which double every few years, as well as add new capabilities.

The United States has conducted extensive discussions on the scope of the CTBT. On 13 October, 1999, the U.S. Senate decided not to ratify the CTBT. The reason for non-ratification was that it would not stop other-nations from acquiring nuclear weapons and therefore would not be in the interests of U.S. national security. However, due to the global nonproliferation movement, the prospects of the United States ratifying the CTBT are higher than ever. The prospect of U.S. ratification has already led Indonesia's foreign minister to pledge in May 2009 Jakarta's support for ratification if the United States goes forward. There are speculations that China will follow the United States in CTBT ratification. India has also been having internal debates on the prospects of ratification of the CTBT.

Ms. Mackby concluded by stating that the five permanent Security Council member states of the United Nations had agreed that the CTBT should be "zero yield." Unfortunately, however, there is no agreed-upon definition of "zero yield." Therefore, states like Russia and China do not apply the U.S. definition of absolutely "zero yield", which allows them to benefit from such tests.

Ola Dahlman began his presentation by stating that the main benefit of the CTBT is the fact that it allows the international community to focus on specific issues rather than talking in general terms. This helps with both detection and location capabilities. He noted that there are three main steps in the verification of the CTBT that have proven to be very effective. The first step is the IMS, which consists of 321 monitoring stations and 16 radio nuclear laboratories in 89 countries around the globe. The second is data collection by the IMS, which is transferred via six geostationary satellites to the IDC in Vienna. The third is the on-site inspection regime, which provides a clear, up-to-date picture of the event recorded by the IMS and the IDC. According to Ola Dahlman, these three elements of the global alarm system have proven to be very effective and accurate.

David McCormack discussed the challenges that the CTBTO faces. Although significant progress has been made in detection systems among states through various types of detection capabilities, there is a concern about the data flow from some large states. Another challenge is to keep the organization focused on its central functions and avoid expanding its scope. Also, the CTBTO has become democratized; it has created a second-generation CTBT from a broad spectrum of scientists' term-limits in Vienna, which contributed to the shift from the original treaty.

Lee Dong Myung concentrated on the idea of strengthening regional cooperation. He noted a proposal to create centers that could be points of regional cooperation. Hossam Eldeen Aly continued the discussion of the idea of regional cooperation on the CTBT and stated that there should be a promotion of regional centers such as training centers and scientific exchanges. Also, the Conference on Disarmament should be activated and led by the CTBTO, which could lead to progress in regional cooperation. He emphasized that the CTBT, by definition, is a regime or instrument to consolidate the Nuclear Non-Proliferation Treaty (NPT) and is thus not only a nonproliferation tool, but also a disarmament tool. Therefore, the international community needs to use the success of the 2010 NPT Review Conference and the "lessons learned" to move forward with the CTBT process.

Wang Jun discussed some of the financial concerns that China has in relation to further regional cooperation. Some local monitoring stations are not a part of the CTBT, which means that there is a significant gap between regional views on the CTBT and the CTBT in general. He stated that China's policy toward the CTBT proceeds from its basic philosophy on nuclear armament: that is, to refrain from a nuclear arms race for parity, an unconditional no-first-use policy, a negative nuclear security assurance, NPT-based nonproliferation commitments, and strict observance of the nuclear test moratorium. China has yet to ratify the CTBT, but the government has submitted it to the People's Congress. Meanwhile, China actively participates in and contributes to developing the CTBT regime. The most recent action was the feeding of radionuclide and noble gas data from all three IMS stations in China (Beijing, Lanzhou, and Guangzhou) to the IDC as requested to assist with the nuclear release situation in Fukushima. (Wang Jun, "Silence Is Louder Than the

Bang: Significance of CTBT," synopsis for Asan Plenum.)

During the question and answer session, Dr. Jun contrasted the Chinese position on the CTBT, with the Russian position. During the discussions between the United States and Russia in 2000, there was opposition to the CTBT due to geographical tensions, as the United States placed its stations on the territories of its allies such as Australia, Japan, and Europe, and not in Russia or China. The CTBT is also considered a problem among Russian military officials when it comes to Russian military modernization (particularly modernization of its nuclear forces, as the testing of the Bulava sea-based ballistic missile has shown). In addition, Dr. Jun pointed out that Russia has not seen any comparable commitments from other states when it comes to a moratorium on nuclear testing. Given the failure of other NWS to fully ratify and declare a moratorium on nuclear testing, there are speculations that Russia might withdraw from the CTBT, which might trigger the withdrawal of other countries and a nuclear arms race.

In conclusion, the panelists all agreed that there is an urgent need for regional cooperation on the CTBT. Although the three elements of the CTBT are effective, the treaty remains a political tool. A false assumption exists—that the United States should take the lead in the CTBTO. Instead, there should be a mutual global interest in the future of the CTBT.

# Europe and Nuclear Security

**Session 6 (Cosmos/Violet)**
**June 14, 2011**

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| **Panel** | Benjamin Hautecouverture (Moderator), Foundation for Strategic Research<br>Henry Sokolski, Nonproliferation Policy Education Center<br>Hans-Joachim Schmidt, Peace Research Institute Frankfurt<br>Vicente Garrido Rebolledo, International Affairs and Foreign Policy Foundation |
| **Author** | Kelsey Hartigan, National Security Network |
| **Summary** | The panelists on the "Europe and Nuclear Security"panel discussed a wide range of issues related to nuclear security. From a technical standpoint, they noted that states generally accept the International Atomic Energy Agency's definition of nuclear security. At the political and diplomatic level, however, states tend to define nuclear security differently, complicating efforts to construct a global nuclear security regime. This panel focused on the European view of nuclear security as well as a wide range of additional issues, including nuclear terrorism and trafficking, tactical nuclear weapons, NATO alliance dynamics, missile defense, the Fukushima accident, and other tangential topics like the Arab Spring and the potential impact of the Stuxnet attack on Iran's centrifuge program. |

As Benjamin Hautecouverture, the panel moderator, noted, the International Atomic Energy Agency (IAEA) defines nuclear security as the prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer, or other malicious acts involving nuclear material, other radioactive substances, or their associated facilities. Nuclear safety, on the other hand, involves the achievement of proper operating conditions, prevention of accidents, and mitigation of accident consequences, resulting in protection of workers, the public, and the environment from undue radiation hazards. While these IAEA definitions are widely accepted, states tend to define nuclear security differently and have varying opinions as to what nuclear security does and does not entail.

In this context, he described the European approach as pragmatic and functional. According to Mr. Hautecouverture: European actors are not particularly nervous about nuclear security since, for Europe, it is by no means a new phenomenon. One of the generic missions of the Euratom Treaty adopted in 1958 was "to implement uniform security norms" among member states. It is also difficult to discern whether the European Union (EU) deems the potential dangers to nuclear security to be a risk or a threat. Furthermore, the most recent European decisions in this domain demonstrate a willingness to promote both nuclear secu-

rity and nuclear safeguard activities, which are officially two different pillars within the IAEA. This is part of the holistic approach the agency has towards considering non-proliferation and nuclear security as interrelated, and which therefore believes in the need to promote the development of nuclear energy for peaceful purposes in ideal security conditions, whatever the nature of security risks.

Mr. Hautecouverture then discussed how European states tend to favor using existing instruments and provisions, rather than creating new strategies or structures to manage non-proliferation and nuclear security issues. States generally promote effective implementation of existing instruments in a coordinated and coherent fashion. This is the core of what Europeans term "effective multilateralism", which is promoted by the EU Strategy Against Proliferation of Weapons of Mass Destruction of December 2003. Finally, Mr. Hautecouverture highlighted how the "all-risks' approach", or "the all hazards approach" (dealing simultaneously with intentional and natural risks) is an approach that links safety and security on the ground, and has driven the most recent EU initiatives in the realm. This is true of the "NRBC package"of 133 practical measures adopted in November 2009 by the European Commission and also for the Critical Infrastructure Protection directive adopted in December 2008.

Vicente Garrido Rebolledo of the International Affairs and Foreign Policy Foundation (IAFPF) began by talking about the Global Initiative to Combat Nuclear Terrorism (GICNT) and many in Europe viewed nuclear security in terms of nuclear terrorism. He described how the mission of the GICNT is to strengthen the global capacity to prevent, detect, and respond to nuclear terrorism by conducting multilateral activities that strengthen the plans, policies, procedures, and interoperability of partner nations. According to the GICNT mission statement, the group seeks to share, through multilateral activities and exercises, best practices and lessons learned in order to strengthen both individual and collective capabilities to combat the threat of nuclear terrorism. The strong European involvement in the GICNT was evident in the fact that Spain serves as Coordinator of the Implementation and Assessment Group and is a regional leader for implementing the GICNT framework.

Mr. Rebolledo noted that the GICNT specifically aims to: Improve accounting, control, and protection of nuclear/radiological material; Enhance security of civilian nuclear facilities; Detect and suppress illicit trafficking of nuclear/radiological material; Improve the ability to search for, confiscate, and establish safe control of nuclear/radiological material; Ensure denial of safe haven and resources for terrorists seeking to acquire or use nuclear/radiological material; Ensure adequate legal frameworks to combat activity related to nuclear terrorism; Respond to and mitigate the consequences of nuclear terrorism; and Promote information sharing to prevent and respond to acts of nuclear terrorism. While various working groups focus on specific areas related to nuclear security, Mr. Rebolledo outlined the main areas of concentration for the GICNT, which include: Illicit material trafficking New and emerging detection technologies; Legal issues associated with illicit trafficking; Nuclear forensics; Material control and security; Physical protection measures; Emergency response and mitigation procedures; and Law enforcement cooperation.

Hans-Joachim Schmidt of the Peace Research Institute Frankfurt defined nuclear security predominately in terms of both the tactical and strategic nuclear weapons deployed in Europe and their security. He traced Europe's approach to nuclear security back to the end of the Cold War when nuclear security was enhanced by the total disarmament of all U.S. and Soviet intermediate-range weapon delivery systems. Dr. Schmidt noted that the subsequent reductions by the United States and the Soviet Union were supported by Germany, France, and others, which unilaterally dismantled their land-based short-range nuclear delivery systems. He also suggested that President George H. W. Bush and General Secretary Mikhail Gorbachev bolstered European nuclear security in 1991, when each made unilateral declarations on tactical nuclear weapons. Recent improvements in U.S.-Russian relations, as well as the ratification of the New START Treaty, have also improved the general trend in nuclear security.

Despite the general unity among NATO members, perceptions of security challenges in Europe vary because of different historical experiences. According to Dr. Schmidt, constructs of nuclear security in Europe have also likely shifted with the expansion of both NATO and the EU. Prospects for NATO-Russia missile defense cooperation have improved, but any agreement in this area will have an impact on a future bilateral arms control agreement as well as conventional and nuclear forces in Europe. Dr. Schmidt suggested that in addition to these talks, the timing will be particularly interesting. The year 2012 will likely be eventful given the elections in the United States and Russia and the leadership changes in China and elsewhere. Going forward, Europe's nuclear security will be determined, in part, by the success of NATO-Russian relations, as well as bilateral U.S.-Russian relations. Challenges in this area will likely spill over and impact the nonproliferation regime, the Nuclear Non-Proliferation Treaty, and the prospects for conventional and nuclear disarmament in Europe.

Henry Sokolski of the Nonproliferation Policy Education Center posited that a discussion of Europe and nuclear security is incomplete without focusing on events that have unfolded over the past six months. He noted that the Fukushima Daiichi incident in Japan, the Arab Spring, and the Stuxnet computer attacks in Iran all have security implications for Europeans. Calling Turkey Europe's "least integrated state", Mr. Sokolski suggested that Turkey's reaction to the discussion surrounding the possible removal of tactical nuclear weapons from Europe is important to monitor given the ambiguity surrounding Turkey's ambitions for its nuclear program. Turkey could stand to benefit and significantly bolster its regional status, Mr. Sokolski reasoned, if it pursued a nuclear weapons program at the same time that tactical nuclear weapons were withdrawn from Europe.

Discussions surrounding Europe's nuclear security must account for the lessons learned in the wake of the Fukushima nuclear incident. Designs for civilian nuclear plants must be able to withstand both natural and man-made disasters, and more attention needs to be paid to the vulnerability of such plants to terrorists or other hostile actors. According to Mr. Sokolski, Insufficient cooling for one or two hours of the nuclear core of Europe's most popular nuclear power design—the light water reactor—can result in massive fuel failures, followed by possible radiological releases. Also, these systems' spent fuel rods and that of other reactors and

reprocessing facilities could potentially lose coolant and release major amounts of radioactivity. Natural disasters, and terrorist and hostile states' attacks, could induce such coolant losses by forcing the failure of critical electrical lines, plant software, transformers, back-up diesels, key valves, coolant pumps, pond structures, etc. Such vulnerabilities put a premium on sound operation, design, and safe plant location.

Given the wide range of topics that each panelist covered, it is clear that there is no set definition or construct of nuclear security throughout Europe. While there appears to be general agreement as to what constitutes the nuclear security regime among most NATO and EU members in a technical sense, some variations exist, particularly in the political and diplomatic realm. More important than agreeing to a set definition, however, is how Europeans deal with these pressing issues going forward. The protection of nuclear materials, safe working conditions at nuclear facilities, tactical nuclear weapons, missile defense cooperation, and other such issues are all intrinsically linked to state security and will impact national, regional, and global security constructs for years to come.

# Prospects for the 2012 Nuclear Security Summit

**Session 7 (Grand Ballroom)**
**June 14, 2011**

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| **Panel** | Jun Bong-Geun (Moderator), Institute of Foreign Affairs and National Security<br>Hahn Choong-hee, Ministry of Foreign Affairs and Trade<br>Alexandra Toma, The Connect U.S. Fund and Fissile Materials Working Group<br>Yoo Hosik, Korea Institute of Nuclear Nonproliferation and Control |
| **Author** | Ryan Costello, The Connect U.S. Fund |
| **Summary** | This panel discussed the upcoming 2012 Nuclear Security Summit to be held in Seoul from March 26 through March 29. The summit is expected to bring together more than fifty world leaders to discuss how their countries can work to improve the global nuclear security regime. Hahn Choong-hee, Deputy Director-General for Nuclear Affairs at the South Korean Ministry of Foreign Affairs and Trade (MOFAT), discussed the agenda of the upcoming summit and stressed the need to address emerging issues of nuclear safety. Alexandra Toma, Executive Director of the Connect U.S. Fund and Founder and Co-Chair of the Fissile Materials Working Group (FMWG), discussed the importance of engaging and informing the public on matters of nuclear security. Finally, Yoo Hosik, who directs the Nuclear Security Planning Division at the Korea Institute of Nuclear Nonproliferation and Control, discussed the need to link issues of nuclear safety and security. |

Mr. Hahn began by highlighting the vital importance of the 2010 Nuclear Security Summit in Washington, D.C. While there exist numerous international norms and mechanisms aimed at preventing nuclear terrorism, such as UN Security Council Resolution 1540 and the G-8 Global Partnership, the Nuclear Security Summit was a historic event because it mobilized heads of state to collectively tackle nuclear terrorism for the first time. The summit process is also important because it will increase public awareness of nuclear security issues. Mr. Hahn noted that the potential global repercussions of a nuclear terrorist attack have not been widely recognized. An attack in one country, for instance, could affect numerous other countries by causing a dramatic slowdown in global trade. Furthermore, nuclear experts need to communicate clearly with the public about nuclear safety and security, particularly if civilian nuclear power is to continue its renaissance in the wake of the disaster at Japan's Fukushima Daiichi power plant.

Mr. Hahn expressed his hope that the 2012 summit will build upon the success of the 2010 summit and mark another victory for the nonproliferation/nuclear security/arms control field. Such victories have been rare; although the New START Treaty between Russia and the United States has been a success, progress on

the Fissile Materials Cutoff Treaty and the Comprehensive Test Ban Treaty has been slow or nonexistent. The fact that the Nuclear Security Summit process includes non-signatories to the Nuclear Non-Proliferation Treaty—such as India, Israel and Pakistan—inspires confidence that it could potentially facilitate future progress in nonproliferation.

The 2012 summit will cover a wide range of issues. One of its chief objectives will be to secure what are colloquially called "house gifts", which are commitments from countries to strengthen their nuclear security, such as returning highly enriched uranium or converting reactors to low enriched uranium. New to the 2012 summit agenda is an effort to develop consensus around policies to reduce the threat of terrorist attacks using radiological dispersion devices or "dirty bombs". Such an attack would be less deadly than a typical nuclear weapon but far more plausible. Another major issue will be the intersection between nuclear safety and security. While the matter of nuclear safety has been brought into sharp relief by the Fukushima disaster, many countries have not linked it to nuclear security, despite the risk that the disaster may have stimulated interest among terrorist groups in attacking civilian nuclear facilities. In response, stated Mr. Hahn, experts need to identify the common ground between nuclear safety and security so that strengthening one will also strengthen the other.

Mr. Hahn emphasized that coordination is highly important. The 2012 summit should boost momentum for the ratification of the Convention on the Physical Protection of Nuclear Materials. Regional cooperation is also needed to counter illicit trafficking in nuclear materials and other related materials since terrorist groups are not easily confined by national borders. South Korea, Japan, and China can cooperate on establishing


"centers of excellence" devoted to nuclear security but need to determine how they will divide the training.

Mr. Hahn stated that South Korea will seek to encourage countries in transition because many do not have experts on technical nuclear issues or on nuclear safety and security. Here, he said, South Korea can serve as an example of a country that has successfully transitioned from a developing country into a developed one, is committed to nonproliferation and denuclearization while relying heavily on peaceful nuclear energy, and maintains an excellent safety and security record. Thus, South Korea can offer a consensus-building voice that bridges the divides between advanced and developing countries.

Lastly, Mr. Hahn expressed South Korean officials' hope that the summit will focus more attention on the North Korean issue and the challenges of denuclearization on the Korean Peninsula. While this will not be a core focus of the summit, South Korea hopes to take advantage of the opportunity to send a political message to North Korea in the hopes that it will choose to engage the international community and eventually abandon its nuclear arsenal. Such engagement, he said, does not seek to blame, corner, or condemn the North's government but is rather intended to encourage discussion on the North Korean issue and move toward a resolution.

Dr. Jun asked how Mr. Hahn would measure the success of the 2012 Nuclear Security Summit. Mr. Hahn responded that the issue of nuclear security cannot be resolved at a single summit. It is a long-term issue requiring investment through the development of international regimes and detection systems. He said that he would like the 2012 summit to present a practical vision to the world. This vision would comprise "two stones": the first being a stepping stone from commitment to implementation and the second being a cornerstone insofar as the gains of the summit would be consolidated over the long term.

Next, Ms. Toma presented her remarks on the importance of nuclear security and public engagement. She noted that global publics often ask why nuclear security is so important and that few people understand the Nuclear Security Summit process. For example, South Koreans often hear only that the upcoming summit in Seoul will not address the denuclearization of the peninsula and subsequently wonder why leaders are getting together to talk about nuclear issues. In the Middle East, the proposed nuclear-weapon-free zone is the only topic that most people want to discuss. So it is clear that there needs to be substantial public engagement on this issue.

Ms. Toma pointed to the terrorist attacks of September 11, 2001 as a turning point in perceptions about nuclear weapons. Whereas during the Cold War, nuclear weapons had been regarded as necessary for deterrence, 9/11 raised the specter of terrorism and the proliferation of weapons of mass destruction. Bipartisan commissions in the United States declared that al-Qaeda continues to pursue a nuclear weapon to use against America and its allies. Many former Cold Warriors who had previously defended the need for nuclear weapons, such as Henry Kissinger, quickly changed their stance in light of the 9/11 attacks and began to advocate for the elimination of nuclear weapons to reduce the chance that a terrorist could acquire one.

Ms. Toma then discussed what might happen in the event of a nuclear terrorist attack. According to the RAND Corporation study, a nuclear terrorist attack on the port of Los Angeles/Long Beach could result in 60,000 deaths before radiation took its full toll on the population. Additionally, the economic fallout could result in a trillion-dollar loss in global trade. In the United States and elsewhere, there would be an accompanying clampdown on civil liberties, as happened in the wake of the September 11 attacks.

In order to build a nuclear weapon, Ms. Toma continued, terrorists need fissile material and technical expertise. By far the most important piece of the puzzle for terrorist groups (and rogue states) is the acquisition of fissile material, which makes nuclear security a critical consideration. Fortunately, acquiring fissile material is difficult, though certainly not impossible. There have been eighteen confirmed cases of theft or loss of fissile material to date. Enough fissile material currently exists in the world to create another 100,000 nuclear weapons. The chances that terrorists could acquire the material necessary to fashion a nuclear device are far too high to sit idly by.

The Nuclear Security Summit is crucial, Ms. Toma asserted, because it focuses international attention on this issue. As it is a global issue, the Nuclear Security Summit needs to stimulate action from all corners of the globe. Civil society and the expert community were heavily involved in the first Nuclear Security Summit in 2010. Connecting experts with the public raised awareness of nuclear security, which in turn helped world leaders to make bold policy decisions to move the nuclear security regime forward. Ms. Toma said that for the 2012 Nuclear Security Summit, there is a strong need to draw from international perspectives on nuclear security and why it is important. For example, why should Malaysia care about nuclear security? By making this case, Ms. Toma stated, the participants will create political space so that world leaders can make bold policy decisions at the Nuclear Security Summit.

Ms. Toma then introduced her organization, the Fissile Materials Working Group (FMWG), which is a coalition of over fifty organizations seeking to provide innovative policy recommendations to world leaders, connect nuclear experts with the public, and raise awareness of nuclear security issues through engagement with the media. Ms. Toma emphasized the necessity of having an informed and engaged media given its central role in informing public opinion. Prior to the 2010 Nuclear Security Summit, the FMWG organized a two-hour question-and-answer session on nuclear security with journalists. This set the stage so that journalists could ask educated questions at the Nuclear Security Summit. The FMWG hopes to replicate a similar event in support of the 2012 summit.

Dr. Jun pointed out that the FMWG used to be an American-based organization and asked Ms. Toma whether it is expanding internationally. Ms. Toma replied that the FMWG has over twenty international partners and has conducted international outreach with conferences in Cairo and Vienna. She said the FMWG hopes to arrange a similar conference in Asia.

Lastly, Dr. Yoo spoke about the dilemma of how to harmonize measures to facilitate nuclear security, nuclear safety, and nuclear detection. Safeguards are needed to ensure that countries live up to their responsibility not to develop nuclear weapons—the International Atomic Energy Agency is critically important in this regard—and to prevent fissile material from falling into the wrong hands. UN Security Council Resolutions 1540 and 1373 offer measures to thwart terrorists seeking to acquire fissile materials. Likewise, nuclear safety measures exist to ensure that radiation is not accidentally released into the environment.

Dr. Yoo noted that synergies exist among these three challenges, particularly between nuclear safety and security. For example, a terrorist could seek to sabotage a nuclear power plant's cooling system, which could instigate a meltdown and release harmful radiation, much like the Fukushima disaster. Therefore, strengthening a nuclear power plant's cooling systems and backup power sources can reduce multiple threats to public safety. It is these synergies that we must search for, he said.

On a related note, Dr. Yoo announced that the Korea Institute of Nuclear Nonproliferation and Control and the Institute of Foreign Affairs and National Security from South Korea will be organizing an experts/policy conference and an industry conference in preparation for the 2012 Nuclear Security Summit. Both Dr. Jun and Dr. Yoo are taking a leading role in this initiative, and 100 individuals from 30 countries are expected to be in attendance.

# New START II

Session 7 (Orchid)
June 14, 2011

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| **Panel** | Paul Hughes (Moderator), U.S. Institute of Peace<br>Leonid Ryabikhin, Committee of Scientists for Global Security and Arms Control<br>Elbridge Colby, Center for Naval Analyses<br>Feroz Khan, Naval Postgraduate School |
| **Author** | Talitha Dowds, Center for Strategic and International Studies |
| **Summary** | This panel on 'New START II' addressed the different perspectives of the United States, Russia,and Pakistan in relation to the treaty. Mr. Hughes began by providing a brief overview of arms control today and its current role in providing global security. He expressed his belief that arms control has to be grounded upon realistic assessments, expectations, and objectives. For the United States and Russia, which have both possessed nuclear weapons for over 50 years, there are existing flash points, the acceptance of political primacy over their militaries, and they both seek cooperation in common interests. Arms control and potential arms control in general, Mr. Hughes explained, create assurances between each side about their intentions regarding their modernization efforts, lead to better relationships, and benefit the allies of the United States and Russia. Arms control also serves as a tool for strengthening the Nuclear Non-Proliferation Treaty (NPT). |

Mr. Hughes further stated that progress on arms control is not synonymous with arms reduction and that the main point of arms control is to provide stability, security, verification, and compliance. He then gave a brief overview of the New START Treaty and explained that both sides are limited to having no more than 800 deployed and non-deployed intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missile (SLBM) launchers, and heavy bombers. Of that number, the two states should possess no more than 700 deployed ICBMs, SLBMs, and deployed heavy bombers. The limits within the treaty include no more than 1,550 deployed warheads, and the treaty provides detailed definitions to help calculate the number of warheads under its limits. He pointed out that the verification aspect of the New START treaty is less costly and complex than its predecessor, the original Strategic Arms Reduction Treaty, since it does not include provisions to curb U.S. missile defense, while offering for strategic stability, and enhancing the national security interests of each country.

Leonid Ryabikhin began by stating that from a Russian viewpoint the New START I reaty was a great change not only in relation to arms control as a process within Russia but also in terms of Russia's strategic relationship with the United States. This was because, for a time, arms control had been forgotten under the George W. Bush administration, and perhaps during this time the bilateral relationship had been more of a priority. Mr. Ryabikhin added that this may not be the time for multilateral agreements. These agreements must be legally binding and must continue to be so despite potential leadership changes. With regard to the New START Treaty, he said that while the Russian government was happy with the agreement due to the short time frame in which it was created but felt that it was "not enough". He suggested that the United States was "lucky" because the Russian position was quite soft, due to Russia's lack of insistence on including ballistic missile defense within the treaty provisions. The biggest hurdles of the treaty, according to Mr. Ryabikhin, are the implementation of policy and the follow-up progress.

Mr. Ryabikhin also discussed how renewed efforts at arms control by both the United States and Russia posed problems for various Russian government departments due to the lack of specialists who could, for example, understand the full scope of the problem and the complexities of such an agreement. Going forward, he noted that it will be important to take multilateral steps to include states such as France, the United Kingdom, China, Pakistan, and India in future agreement negotiations.

Elbridge Colby focused on the U.S. perspective and how the New START Treaty fits into broader U.S. policy. He explained that when considering the treaty, many in the U.S. Senate argued that it represented a sharp break with past U.S. policy—a fundamentally new approach on Washington's part towards nuclear weapons policy. In Mr. Colby's opinion, however, the treaty strengthened rather than undermined the traditional U.S. policy of pursuing practical, modest arms control efforts while maintaining a firm and modern deterrent. He illustrated this by discussing the original Strategic Arms Reduction Treaty. That treaty, he explained, provided an architecture through which the two powers achieved improved transparency with regard to each other's forces, made stabilizing cuts in the huge strategic forces that each nation had built up, and demonstrated to the world a commitment to the cessation of the Cold War arms race.

Following the policies of the George H. W. Bush administration, Mr. Colby explained that the Clinton administration had adopted a "lead but hedge" policy in its 1994 Nuclear Posture Review and pursued continued arms control initiatives with Moscow while generally focusing on other areas. Under the George W. Bush administration, nuclear issues took a back seat as the administration focused on non-nuclear military capabilities and sought to move away from arms control as a tool. Subsequently, by the end of that decade, the nuclear enterprise was aging and in serious need of updating. This was highlighted by the accidental transport of nuclear weapons from Minot to Barksdale Air Force Base, the inadvertent shipment of nuclear components to Taiwan, growing reports of malaise in the U.S. nuclear community, and the impending expiration of the START I Treaty.

While a number of important commissions were chartered to look into how best to move forward, of these, Mr. Colby discussed the Strategic Posture Commission. This commission was tasked with designing a roadmap forward for the U.S. nuclear posture and developing a consensus among the defense policy com-

munity that could help Congress and the Obama administration. In this respect it succeeded, as its recommendations represented an agreement of representative leaders across the substantive spectrum on a way forward that was based on the traditional American dual approach of a strong deterrent and a vigorous arms control agenda. This meant that the commission endorsed a package to maintain the nuclear triad and invest in the nuclear weapons stockpile and complex while pursuing arms control with Russia it ultimately endorsed the pursuit of a follow-on agreement to the START Treaty.

The New START Treaty was signed in April 2010, and extended — in modified form — the inspection and date-exchange regimes of the previous treaty. The new agreement also included limits on launch vehicles and warheads, but was not focused on the classic issue of strategic stability like START I. The new pact also required modest reductions in the parties' delivery systems and deployed warhead totals. At the political level, the treaty also helped to provide an opportunity to "reset" relations between Washington and Moscow, which could also be helpful in eliciting Russian assistance in dealing with the Iranian nuclear issue. The treaty also helped both nations' efforts at the NPT Review Conference in 2010 to offer concrete evidence of their commitment to meeting the requirements of Article VI, to cease the arms race.

Mr. Colby concluded that the treaty went beyond limited bilateral negotiations and offered a new path for the U.S. nuclear posture. He detailed how the parameters of discussion about New START moved beyond the pure confines of the treaty to encompass U.S. strategic posture as a whole, including the vitality of the nuclear enterprise, development and deployment programs for missile defense and conventional prompt global strike, extended deterrence policy, and Washington's understanding of the nature of strategic stability with Russia and other key states. It ended up forging a new coalition—albeit a fragile one that must be tended to—willing to invest the resources and energy necessary to maintain the U.S. strategic force as second to none through most of the 21st century. He asserted that the United States is still actively committed to the nuclear policy that it has embraced for half a century and that this commitment has been redoubled after a long period of relative neglect. For allies, especially those in more volatile regions, he reassured them that the U.S. is committed to reducing tensions, nuclear or otherwise, through practical arms control while remaining firmly committed to maintaining a peerless nuclear deterrent.

The last panelist, Feroz Khan, discussed the perspectives of developing countries, specifically India and Pakistan, and the challenges they face regarding strategic stability, survivability, and vulnerability. Mr. Khan discussed Stephen Cohen's analysis of Pakistan, which determined that arms control is necessary in order to enhance security. He briefly discussed the recent history between the two states, firstly with an explanation of a strategic-restraint regime that formed between Pakistan and India following the 1998 nuclear tests and, subsequently, the creation of the Lahore Declaration. He next explained how the conflict between the two states over Kashmir had increased tensions in the region and that extended deterrence continued to dominate both Indian and Pakistani strategic calculations. For India, the possession of nuclear weapons creates a direct deterrent against Pakistan and China, and the same applies to Pakistan with regard to India and China.

Mr. Khan pointed out that the recent U.S.-India nuclear deal has inhibited any possible future arms control within the region. India and Pakistan both reject the Comprehensive Nuclear-Test Ban Treaty, and the obstacles faced by the U.S.-Russian arms reduction, such as missile defense, conventional strike capability, and lack of transparency, also prevent cooperation and collaboration between the two states. He also discussed in detail the important relationship between conventional and nuclear weapons and how the imbalances between the two pose problems for the future of arms control and the pursuit of total nuclear disarmament. Lastly, he stressed the need for multilateral cooperation and approaches to nuclear disarmament.

At the conclusion of the discussion, Mr. Hughes posed a final question about the implications of further reductions by Russia and the United States and asked if the reductions would encourage a break out of proliferation. All panelists acknowledged that, going forward steps would need to be taken to reduce numbers multilaterally.

# Treaty of Tlatelolco: Evaluating the Establishment and the Efficacy of a Nuclear Weapons Free Zone

Session 7 (Lilac/Tulip)
June 14, 2011

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| **Panel** | Ricardo Lagorio (Moderator), Ministry of Foreign Affairs, Argentina<br>John Carlson, Lowy Institute<br>Sonia Fernandez Moreno, Nuclear Regulatory Authority of Argentina<br>Leonardo Sobehart, Nuclear Group, Argentine Council for International Relations |
| **Author** | Tomas Pico, National Ministry of Foreign Affairs, Argentina |
| **Summary** | Ambassador Ricardo Lagorio began the session on the 'Treaty of Tlatelolco: Evaluating the Establishment and the Efficacy of a Nuclear Weapons Free Zone' by focusing on the political and diplomatic underpinnings that led Latin American countries to commit to a nuclear-weapon-free zone (NWFZ) arrangement, the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, commonly known as the Treaty of Tlatelolco, in February 1967. |

Mr. Lagorio asserted that the evolution of the Inter-American System explains the adoption of Treaty of Tlatelolco, as well as other key regional institutions such as the Zone of Peace (the bilateral nuclear safeguards agreement between Argentina and Brazil) the quadrilateral nuclear safeguards agreement between Argentina, Brazil, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), and the International Atomic Energy Agency (IAEA); the Declaration of Cartagena of the Presidents of the Andean Group; the Declaration of Guadalajara; the 1991 Declaration of Mendoza; and the widespread regional adherence to the Biological Weapons Convention, the Chemical Weapons Convention, and the Nuclear Non-Proliferation Treaty (NPT).

The Inter-American System was developed by its members over a period of 20 years and is based on the principles of peaceful resolution of conflicts, democracy, regional integration, and a common juridical framework, as well as respect for international law and obligations derived from treaties, respect for the sovereignty and territorial integrity of states, non-interference in other states'international affairs, good neighborliness, goodwill, and cooperation. This joint evolution, involving a certain degree of trust and political made the Tlatelolco NWFZ treaty possible. As a result, the risk of nuclear proliferation in Latin America and the Caribbean was successfully avoided before the establishment of the NPT.

Mr. Lagorio mentioned some of Tlatelolco's antecedents, such as the South American Anti-War Pact of 1934, as well as common juridical instruments like the Drago Doctrine (1902), the Tobar Doctrine (1907), the Estrada Doctrine (1930), the American Treaty on Peaceful Solutions (The Bogota Agreement of 1948), and the Inter-American Treaty of Reciprocal Assistance (The Rio Treaty of 1947). This Latin American juridical framework has played an important role in the safe and stable evolution of the region, with reduced levels of force and military expenditure. Mr. Lagorio also spoke of Argentina's commitment to democracy, peace, human rights, regional integration, multilateralism, and peaceful solution of its conflicts. Concerning nuclear energy, Argentina chose to limit the use of its technology solely to peaceful purposes, as can be seen by its 1967 signing and 1994 ratifying of Tlatelolco, its ratification of the NPT in 1995, its membership tothe Nuclear Suppliers Group, the Nuclear Safeguards Agreement with the IAEA in 1997, and the Missile Technology Control regime in 1991.

Another key issue was the development of an innovative model of "Neighbour-to-Neighbour Control" between Argentina and Brazil. This model has been in effect since 1991, when both countries jointly developed the Common System for Accounting and Control of Nuclear Materials (SCCC). Mr. Lagorio explained that the SCCC is a set of safeguard procedures applicable to all the nuclear materials used in all the nuclear activities performed by both states, and also the bilateral agency responsible for its implementation, the ABACC, which is responsible for verifying that the nuclear materials existing in both countries are being used for exclusively peaceful purposes. Mr. Lagorio concluded by stating that Tlatelolco is more than a nuclear nonproliferation initiative or a regional NPT. Rather it reflects the political and diplomatic traditions of the countries in the region and is an assertion of regional commonality, shared values, and shared interests.

Dr. Leonardo Juan Sobehart next discussed some of the challenges in the establishment of a regional agenda without nuclear weapons. He argued that the Tlatelolco Treaty proves the common will of the Latin American countries to resolve disputes through peaceful means or, if unable to do so, to limit the degree of mutual aggression. This voluntary limitation acknowledges that conflict between neighboring nations poses no risk to their survival, which in turn renders the use of weapons of mass destruction unjustifiable. It also represents a way to avoid wasting resources on arms and a guarantee that countries will not engage in a nuclear conflict as long as there is an institutionally solid international system through the actions of the United Nations and the observance of its charter.

Ultimately, the motivation for the implementation of a NWFZ is the belief that union and cooperation and self-restraint facilitate regional growth and development, Dr. Sobehart illustrated this by explaining the relationship between Argentina and Brazil, which has evolved from a decades-long competition to the establishment of a strategic development alliance. This was possible on the basis of a strong and explicit international self-limitation declaration, sustained by the acceptance of mutual verification through the bilateral ABACC. The democratic processes that took place in both countries were prerequisites to this self-limitation and the search for union. Once mutual mistrust was replaced with a strategic alliance, the two states could provide common guarantees to the world community through the IAEA, the Four-Party Agreement (the 1991 agreement between Argentina, Brazil, the ABACC, and the IAEA for the application of safeguards), and the ratifi-

cation of the Tlatelolco and Non-Proliferation Treaties.

Dr. Sobehart concluded by mentioning that the evolution from dialogue and cooperation to economic and cultural integration was gradual. Cooperation principles were first established, and then came commercial and industrial desegregation, followed by the integration of transport, energy, and communications infrastructures, and, more recently cooperation on nuclear and aerospace science and technology. All of this was made possible because of a democratic environment, based on the conviction that cooperation, not confrontation, improves people's standard of living.

Sonia Fernández Moreno spoke of the relationship between Argentina and Brazil and how it reinforces Tlatelolco. The creation of the ABACC, which verifies the peaceful use of nuclear energy in both countries, and the SCCC, a safeguards verification system, is the outcome of a confidence-building process conducted transparently by the leaders of Argentina and Brazil. This endeavor constitutes a unique contribution to peaceful nuclear energy and to nonproliferation and disarmament.

Convinced of the importance of deepening the integration process between Argentina and Brazil and the peaceful use of nuclear energy for scientific, technological, economic, and social development, both countries reaffirmed their decision to provide mutual transparency regarding their nuclear programs in the 1980s. This led to the establishment of bilateral safeguards to control and verify each other's nuclear activities. During the 1990s, Latin America resolved a number of pending issues in the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean. Argentina and Brazil contributed in a substantial way to the process to ensure its full enforcement. She concluded by stating that the successful application of the SCCC for almost twenty years in an atmosphere of cooperation between the countries, affirms the effective contribution to peace and security of this initiative.

Lastly, John Carlson highlighted the importance of the Treaty of Tlatelolco as the first of four other regional NWFZ treaties including: Raratonga (South Pacific), Bangkok (Southeast Asia), Pelindaba (Africa), and Semipalatinsk (Central Asia). Mr. Carlson also mentioned three treaties that prohibit nuclear weapons in particular geographic areas (Antarctica, outer space, and the seabed) and the case of Mongolia, which has declared itself a single-state NWFZ.

All of the states included in NWFZ treaties are party to the NPT and are thus prohibited from acquiring nuclear weapons. But the NWFZ treaties additionally prohibit the stationing and testing of nuclear weapons on their territory, consequently helping to reinforce the moratorium on nuclear testing pending entry-into-force of the Comprehensive Nuclear Test Ban Treaty. Finally, Dr. Carlson concluded by highlighting that NWFZ treaties also have an important transparency and confidence-building function in that current NWFZ treaties provide a substantial body of experience to draw on for similar treaties in other regions like the Middle East, South Asia, and the Korean Peninsula.

# Engaging China and Russia on Nuclear Disarmament

**Session 7 (Cosmos/Violet)**
**June 14, 2011**

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| Panel | Patrick Cronin (Moderator), Center for a New American Security<br>Alexey Fenenko, Institute of International Security Studies<br>Jeffrey Lewis, Center for Nonproliferation Studies, Monterey Institute<br>Lora Saalman, Carnegie Endowment and Carnegie Tsinghua Center for Global Policy |
| Author | Hayoun Jessie Ryou, George Washington University |
| Summary | Chinese and Russian specialists tend to have different concepts of nuclear disarmament than those of their American counterparts, and these contrasting approaches should be taken into consideration when courting Chinese and Russian cooperation, according to experts on this panel. Perhaps most fundamentally, Chinese and Russians do not separate America's nuclear arsenal from its conventional military superiority. This basic disagreement over deterrence and disarmament guarantees that an agreement on significant nuclear reductions will be difficult to achieve. Increasing mutual understanding of these different perspectives is a necessary—if not sufficient—step towardmore successful cooperation on nuclear disarmament in the future. |

Dr. Alexey Fenenko described the basic Russian outlook on nuclear disarmament by addressing three questions. First, how does the Russian government understand the principle of strategic stability? Second, how does Russia view the challenge of further nuclear disarmament (beyond the New START Treaty)? Third, what is the role of Russian-Chinese dialogue in Russian arms control policy?

How does the Russian government understand the principle of strategic stability?

Dr. Fenenko pointed out that the question of arms control has always played an important role in Russian foreign policy. Given that the Soviet Union and the United States essentially created the vocabulary of nuclear security, it is not surprising that Russians have long held a fairly consistent position about disarmament and what constitutes "strategic stability". At a famous 1989 meeting in Wyoming, then-Soviet Foreign Minister Eduard Shevardnadze and U.S. Secretary of State James Baker reached a compromise based on delinking cuts in offensive nuclear weapons from missile defense and space. Since 1991, in talks on the Strategic Arms Reduction Treaty (START), Russia adhered to the principles of the 1989 "Wyoming compromise". These principles embraced the priority of reducing heavy intercontinental ballistic missiles whileconducting separate negotiations on strategic offensive and defensive weapons and the possible elimination of high-precision,non-nuclear weapons. In this sense, Dr. Fenenko said, Russia has followed the American understanding of strategic stability founded in the latter half of the 1970s. In 2009, President Dmitry Medvedev announced that Russia would like to change the key principles of the "Wyoming compromise". In two speeches in Helsinki and Amsterdam, President Medvedev said that negotiations on START-III should be based on new principles: 1.) joint discussions on strategic defensive and offensive weapons 2.) the acceptance of non-nuclear precision weapons in the strategic balance, and 3.) permitting Russia and the United States to determine the composition of their strategic triad. The 2010 New START Treaty (which went into effect in January 2011) made relatively modest reductions in nuclear weapons, and even this agreement was only made possible by a Russian and American compromise on missile defenses in Europe. For Russia, the negotiations on missile defense are part and parcel of ensuring a renewed (and shared) understanding about strategic stability. The absence of Russian and American consensus about the role of missile defenses continues to hamper deeper reductions in both countries' offensive strategic nuclear weapons.

How does Russia view the challenge of further nuclear disarmament?

After the New START Treaty's entry into force, Russia said that its next priority is to reduce non-strategic weapons essentially America's high-precision conventional weapons, which have strategic implications for Russia in Europe as well as with China and in East Asia more generally. In Europe, the contention is between Russia's desire to reduce advanced conventional weapons and the U.S.-European desire to eliminate tactical nuclear weapons. Russia is trying to move the debate on the reduction of tactical nuclear weapons in the "Euro-Atlantic security initiative". The U.S. proposal to eliminate tactical nuclear weapons is unacceptable to Russia because of NATO's superiority in conventional forces. However, Dr. Fenenko noted that Russia would like to deal with the question of reducing tactical nuclear weapons in three steps: 1.) engaging Britain in the context of Russian-American talks on reducing strategic offensive arms (as a British nuclear arsenal from 1962 is included in the U.S. nuclear planning system); 2.) the accession of Britain and France to the Intermediate-Range Nuclear Forces Treaty of 1987 (by which the Soviet Union and the United States eliminated all nuclear-armed ground-launched ballistic and cruise missiles with ranges between 500 and 5,500 kilometers and their infrastructure), and 3.) renewed discussion about the creation of a nuclear-weapon-free zone in Central and Eastern Europe.

Dr. Fenenko added that Russia would also like to discuss the future of Article VII of the Nuclear Non-Proliferation Treaty, which stipulates that, "Nothing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories." Russia has accommodated the existence or potential introduction of tactical nuclear weapons on the territory of third countries (today, namely, Germany) and according to Dr. Fenenko, Russia would not further nuclear arms reductions without addressing this issue. Presumably, this would involve striking a new accord with Germany and neighboring countries about the deployment of nuclear weapons there.

What is the role of Russian-Chinese dialogue in Russian arms control policy?

Dr. Fenenko said Russia deems arms control with China to be in the Russian national interest for three reasons. First, China has a potential advantage in mobilizing resources should a nuclear arms race ever ensue. Second, China possesses many missiles with a range greater than 300 kilometers but does not participate in the 1987 Missile Technology Control Regime that regulates them (though its application for admission has been under review). Third, China is actively developing its related military space capabilities. For all of these reasons, over the last twenty years, Russia has begun to construct a strategic dialogue with China.

Russia and China have three types of agreements: 1.) a 1996 agreement regarding the mutual de-targeting of strategic nuclear forces; 2.) agreements made in 1990 and 1996 concerning the withdrawal of tactical nuclear weapons from border areas, and 3.) agreements made in 1996 and 2007 about cooperation in space activities. In 1996, Russia was also trying to engage China in talks on reducing intermediate-range missiles. Beijing, however, opposed Russia's attempts to limit China's medium-range missiles since those missiles are the foundation of China's missile forces.

The basic focus of Russian-Chinese dialogue in the coming years will likely be outer space. In 2007 and 2008, Russia and China tabled a draft treaty banning all weapons in space, but the measure was rejected at the United Nations Conference on Disarmament in Geneva. Now Russia and China are working together again to renew support for this effort. Dr. Fenenko sees this as a promising future direction for Russian-Chinese and Russian-American interaction. Russia is trying to mediate the negotiations on China's accession to the MTCR. Dr. Fenenko observed that this issue should be important to the United States because of China's ability to create anti-satellite weapons that could threaten U.S. systems. In conclusion, Dr. Fenenko expressed his hopes that Russia will build on its experience in cooperating with China over nuclear disarmament-related issues.

According to Dr. Saalman, China's views of disarmament and American policy might be dubbed "old wine in new bottles". That is, the concept of disarmament itself is not new, but the U.S. framework regarding nuclear disarmament has evolved. China has internalized the concept of what nuclear deterrence and arms control amounted to before the 1980s, when then-President Ronald Reagan endorsed serious missile defenses (the so-called Star Wars project). Dr. Saalman has surveyed hundreds of Chinese scholarly articles and conducted dozens of interviews regarding nuclear disarmament and related issues. A consistent theme running through Chinese perceptions is that the United States holds contradictory goals of advancing nuclear disarmament while underwriting American hegemony.

First, Dr. Saalman discussed the meaning of nuclear weapons from a Chinese perspective. The Chinese view of nuclear weapons is related to maintaining a strategic balance and strategic stability. China feels that if a state loses nuclear weapons, it would lose the ability to counter one's opponent and thus maintain the balance in security stability, a concept often described in Chinese sources as shiheng (先衡) or a loss of balance. China has been focused on Russia in the past, but its current focus has expanded to understanding what shiheng means for China and other small-to mid-level nuclear-weapon states, as well as countries like Iran, North Korea, and others.

Second, regarding ballistic missile defenses and conventional weapons, China embraces an absolute security (juedui anquan, 絕對安全) framework. The term is not new, but its rhetoric, as well as the term "hegemony", have become increasingly common since the United States released its 2010 Nuclear Posture Review. Ballistic missile defense and the U.S. program to build a "Prompt Global Strike" capability with high-precision conventional systems pose major problems for China. In this regard, the Chinese perception mirrors Russia's strategic perspective because defenses and advanced conventional systems potentially erode the strategic balance.

Third, there is an aversion to the idea of transparency in China. This is the most difficult part of engaging China in disarmament talks. China views itself as transparent in terms of strategy and intent but not numbers, and it relies on secrecy to bolster its security. When it comes to disarmament, transparency in numbers is necessary, according to Dr. Saalman. Considering Chinese feelings about transparency with respect to the number of its nuclear forces, diplomatic and other efforts will be needed to address this sensitivity when engaging China in nuclear disarmament talks.

Chinese writers tend to believe that it is the United States that benefits the most from nuclear disarmament. Even if Prompt Global Strike remains just a concept, it is still a matter of concern for Chinese planners. Thus, it is premature to expect China to see arms control or disarmament as being in its national interest, because the Chinese believe the Americans want to lock China into a permanent state of strategic inferiority. Considering all three of the aforementioned elements together, China's basic response is to delay participation in serious arms control and disarmament talks. Again, nuclear weapons are an essential equalizer for China. Thus, if further nuclear reductions depend on China's cooperation, this is likely only to result in a further delay in nuclear disarmament.

Dr. Jeffrey Lewis acknowledged Russian and Chinese fears that missile defense might serve as a "mopping up" capability in the aftermath of a surprise U.S. first strike. Russia and China are concerned about the United States' nuclear disarmament agenda since both countries believe that it would only give the United States an even better military advantage owing to its superiority in conventional combat systems. Dr. Lewis noted that the view that conventional capabilities can replace nuclear deterrence is surprising given their different missions. The U.S. focus on defenses and advanced conventional systems alike are designed against small "rogue" states, not to negate Russia's or China's nuclear deterrence. But he clearly sees Russian and Chinese concerns about these issues. Regarding Prompt Global Strike, Dr. Lewis noted that this remains only a concept rather than an actual system under development; nonetheless, strong Russian and Chinese opposition is evident. Even if missile defense and conventional strikes stay in the concept phase and there is no threat in the near term, there is a possibility that these capabilities will start to blur that area of conventional

strike and missile defense eventually. Therefore, even if these have not reached that point yet, they still might serve as a type of constraint.

In the near term, Dr. Lewis observed that the prospects for Russia-U.S. cooperation over missile defense do not seem encouraging. Chances for a space treaty are equally slim. Though there are efforts to address Russian concerns, there seems to be no likelihood of consensus on these issues with China. On the issue of an advanced conventional strike, there are questions for which the United States does not have answers. Which systems are to be included (not to mention problems of verification) needs to be addressed in the future. For these and other reasons, further reductions in U.S.-Russian nuclear forces will be difficult to achieve. And since there is no equivalent set of discussions between the United States and China, achieving cooperation with China is likely to be an even longer-term proposition.

One comment from the floor suggested that under President Obama, the United States had agreed to deploy a Phased Adaptive Approach missile defense system in Europe to deal with the Iranian nuclear program and, as a result, shelved the more elaborate missile defense system planned for deployment under the George W. Bush administration. Even so, said the participant, Russia has given President Obama nothing in exchange for this concession. Instead, Russia and China both complain about American conventional forces as though somehow what would amount to unilateral disarmament is now being sought as part of an arms control bargain. Dr. Lewis thus concluded that the outlook for deeper reductions in strategic forces is grim.

At the same time, when asked what would be the most useful possible agreement, Dr. Lewis, along with Dr. Saalman, answered by talking about limits on missile defenses. Dr. Lewis pointed out that the United States and China could have a strategic dialogue on strategic stability that could begin a process of codifying the status quo. He likened the challenge to achieving understanding and predictability on the Taiwan Strait—a core interest that nonetheless has been met with diplomatic compromises and agreements over the decades.

In conclusion, as Dr. Lewis put it, Russia and China have no interest in disarmament that makes the world safe for American conventional dominance, let alone its hegemony. Thus, a future START Treaty will have to deal with parity across a wider range of systems, including British nuclear weapons, tactical nuclear weapons and perhaps advanced conventional weapons. The future common use of space should be of interest to the United States, although Dr. Lewis indicated that some see Russia-China space cooperation as a potential means to indirectly restrict America's missile defense capabilities.

# Evaluating the 2010 NPT Review Conference

**Session 8 (Grand Ballroom)**
**June 14, 2011**

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| Panel | Sharon Squassoni (Moderator), Center for Strategic and International Studies<br>Abe Nobuyasu, Japan Institute of International Affairs<br>Hossam Eldeen Aly, Ministry of Foreign Affairs, Egypt<br>Scott Davis, U.S. State Department<br>Peter Crail, Arms Control Association |
| Author | Mark Bell, Massachusetts Institute of Technology |
| Summary | The session on the 2010 NPT Review Conference addressed the successes and disappointments of the conference, and drew out lessons learned from the conference and critical opportunities and actions that should be taken going forward. The general view of the panelists was that the conference had been a success. Despite the modest language of the final consensus document, the panelists argued that merely achieving such a document was itself a significant success. Several panelists noted the role of the new U.S. administration under President Obama in providing momentum and leadership, which contributed to the success of the conference, as well as the value of vigorous and thorough preparatory work prior to the conference. There was greater disagreement among the panelists regarding what should be considered the key disappointments of the review conference. For example, U.S. State Department official, Scott Davis, argued that the failure to explicitly name Iran and Syria as being in non-compliance was a disappointment, while Egyptian Foreign Ministry official Hossam Eldeen Aly, argued that this omission was positive. Looking ahead, the panelists agreed that substantive progress on the various action plans from the 2010 conference would be needed in order to build on the successes of 2010 in 2015. In particular, the panel highlighted progress on disarmament, the Comprehensive Test Ban Treaty (CTBT), the Additional Protocol, and—perhaps most challenging—movement toward the establishment of a nuclear-weapon-free zone (NWFZ) in the Middle East, as being essential over the coming years. |

Moderator Sharon Squassoni opened the session by noting that the 2010 NPT Review Conference was widely perceived as successful, but she raised the question of whether this perception was largely due to the dismal failure of the 2005 conference. She also proposed a framework under which the panelists could discuss the success (or otherwise) of the conference: she suggested that panelists discuss the achievements of the conference, the disappointments of the conference, the lessons to be learned from the conference, and finally, the key actions that need to be taken to ensure that the 2015 conference builds on the

achievements of 2010.

Hossam Eldeen Aly began by arguing that the conference was "not perfect", but should nonetheless be considered to have been a moderate success. In particular, he argued that the achievement of a consensus document was an important success following the failure to do so in 2005. He argued that this achievement was not automatic and that even close to the end of the conference there were doubts as to whether it could be achieved. That a consensus document was achieved was in part due to the significant and serious preparatory work undertaken in advance of the conference. Dr. Aly argued that there were also successes in the action plans that were agreed to in the final document. The nuclear disarmament action plan was substantive in a number of important ways. First, it explicitly identified for the first time a nuclear weapons-free world as the end goal of disarmament. Second, it reaffirmed the 13 steps toward disarmament that were agreed upon in 1995. Third, it required the Perlmanent five members of the UNSC(P5). to report to the preparatory conference for the 2015 review conference on their progress toward disarmament. Fourth, it noted the UN Secretary General's five-point plan toward disarmament. Finally, for the first time, the agreement made reference to the catastrophic humanitarian consequences of nuclear use and made reference to international law in doing so, perhaps hinting for the first time that the use of nuclear weapons might itself be illegal under international law. Successes in the nonproliferation action plan included support for strengthening the International Atomic Energy Agency (IAEA) and encouragement of accession to the Additional Protocol. Dr. Aly noted that the agreement did not specify particular instances of noncompliance, but argued that this was positive. An additional action plan moved forward on the implementation of the 1995 review conference,including supporting a 2012 conference on the creation of a NWFZ in the Middle East.

From Dr. Aly's perspective, the first major disappointment was that the review itself was merely a "chairman's note", and not agreed to by the state parties. A second disappointment was that there was little progress on negative assurances protecting non-nuclear states from nuclear attack or coercion by nuclear-weapon states. Further, a key Non-Aligned Movement demand—that a nuclear weapons convention be agreed to as a path forward to disarmament—was not met.

Dr. Aly argued that the successes of the review showed the value of thorough preparatory work and of flexibility on the part of all parties to accept compromises in the final document. He argued that neither of these had been present in 2005. The conference also benefited from greater U.S. leadership under President Obama. He argued that the primary challenges in the years ahead were to move forward on implementing the 2010 action plans and—of particular importance—to make substantive progress on the Middle East NWFZ. The moderator questioned whether it was reasonable to expect a substantive conference on such a thorny question in the aftermath of the Arab Spring. Dr. Aly argued that the Arab Spring actually improved the likelihood of a substantive conference but accepted that such a conference would have to include both Israel and Iran to be viewed as a meaningful success.

Scott Davis began by noting his agreement with many of the comments made by Dr. Aly and by acknowledging some dissatisfaction with the notion that achieving a consensus document should automatically render the review conference a success. Nonetheless, he argued that, given the failure of the review conference in 2005, a second consecutive failure to achieve a consensus document would have been a devastating blow to the NPT and the nonproliferation regime more broadly and that as a result, the 2010 review conference should be viewed as a success.

Mr. Davis agreed with Dr. Aly on many of the substantive achievements in the action plans. Key successes for the United States included the reflection and endorsement of President Obama's vision of a nuclear weapons-free world in the disarmament action plan, and discussion of a Fissile Material Cutoff Treaty (FMCT) and the CTBT. Mr. Davis noted that, for the first time, the P5 have been called on to engage with each other on accelerating disarmament. He pointed out that this has already happened (and will happen again in Paris in June) with a focus on making progress on verification and transparency on disarmament. Further successes included the endorsement of a multilateral fuel cycle, the call for states to sign the Additional Protocol, and the agreement to pursue a NWFZ in the Middle East.

Important disappointments for the United States included the failure to name Iran and Syria as being in noncompliance with the NPT, despite the agreement expressing concern over noncompliance more generally. Mr. Davis was also disappointed over the failure to reach consensus on expressing concern over potential abuse of the withdrawal clause in the NPT.

Mr. Davis argued that, moving forward, it is important to view the review conference not as an end in itself but as a milestone on a road and that continued progress is essential. Mr. Davis highlighted a number of key areas in which the United States would seek to make progress: 1.) to ensure the success of the New START Treaty 2.) to seek negotiations on a FMCT 3.) to continue negotiations and engagement among the P5 on various aspects of disarmament; 4.) to make progress on cases of noncompliance; 5.) to continue to promote universal compliance with the Additional Protocol; 6.) to increase the IAEA's budget and resources; 7.) to pursue multilateral fuel efforts (he noted the IAEA Board of Governors' recent approval in reference to this); and 8.) to pursue a substantive and successful conference on the establishment of a NWFZ in the Middle East.

Abe Nobuyasu argued that the key success of the review conference was the adoption of a consensus document with comprehensive action plans, but that the language of the consensus document was in many places very weak—here, he made particular reference to the section encouraging accession to the Additional Protocol. Mr. Abe argued that this represented a modest success, but that the importance of consensus meant that this was the best that could have realistically been hoped for. He said that we should therefore not overemphasize the review conference as an institution, noting also that much work can be undertaken outside the framework of the NPT that would nonetheless strengthen it. An example of this would be efforts to overcome technical obstacles to the CTBT's entry into force.

Ambassador Abe argued that a substantive conference on establishing a NWFZ in the Middle East is critical to the success of the 2015 review conference and predicted that if it fails, 2015 may be "stormy". He also stated that beginning negotiations on a FMCT and U.S. ratification of the CTBT are also critical going forward. He was optimistic that all of these objectives could be achieved prior to the 2015 review conference.

Peter Crail argued that the NPT is stronger today than it was prior to the review conference and that the review conference should therefore be considered a success. He viewed the final consensus document as modest but forward-looking. He argued that, moving forward to 2015, progress in three areas is necessary. First, there is a need to maintain progress on disarmament. He argued that current U.S. capabilities are well beyond the levels required for deterrence in the post-Cold War environment and can be reduced further. U.S. ratification of the CTBT should also be viewed as a priority. The Obama administration has begun laying the groundwork on Capitol Hill for ratification, but much remains to be done. The P5 as a whole also have obligations to engage each other more broadly on disarmament—for example, by pursuing measures to increase the transparency of disarmament efforts. This would represent substantive progress and build confidence that would enable further reductions at a later date. Second, he argued that progress on detecting and dealing with instances of noncompliance is essential, highlighting Iran and Syria. On nonproliferation, Mr. Crail argued that the safeguards regime needs to be strengthened. In particular, he stated that ratification of the Additional Protocol should come to be viewed as a new "minimum standard" for state nuclear programs. The 1995 review conference statement that, the right to peaceful use of nuclear power can only be exercised in conjunction with obligations under Articles 1, 2, and 3 of the NPT, should be reaffirmed in the preparatory conferences prior to the 2015 review.

Third, Mr. Crail argued that making progress on establishing a NWFZ in the Middle East is of great importance. The agreement to hold a conference on establishing a NWFZ was critical to the success of the 2010 review conference, and progress toward it will be important to the outcome in 2015. He argued that merely holding a conference will not be sufficient to demonstrate progress. Equally, however, he held that we should not be so optimistic as to think a single conference will succeed in charting a path to NWFZ establishment. Nonetheless, between these two extremes there is plenty of opportunity to achieve a successful outcome. More specifically, Mr. Crail suggested the initiation of a process with identified follow-on steps, to further discuss definitional issues regarding elements of the zone and confidence-building measures, such as ratification of the CTBT. However, he argued that the challenges to even holding a conference will be substantial, especially given that the attendance of all relevant countries will be crucial to a positive outcome, and that participants will need to engage in a constructive manner. He particularly noted that a conference in which most participants sought merely to isolate Israel would not be successful.

The question-and-answer session ranged widely over a number of topics. Sharon Squassoni began by questioning the assumption by the entire panel that the outcome of the conference was a success and highlighted the weakness of the language of the Additional Protocol as an example of this. Scott Davis argued that significant progress had been made on the Additional Protocol. For example, the United States had had a goal that 100 countries would have signed the Additional Protocol by the time of the conference, and this was achieved. Peter Crail acknowledged that the final document included a lot of "hedging language" but argued that the parties should now seek gradually to remove that hedging language to achieve more substantive agreements in the future.

Several questions concerned ongoing U.S. preparations for the conference on weapons of mass destruction in the Middle East and realistic prospects for the outcome of such a conference. Scott Davis stated that the United States is actively supporting efforts to convene the conference. Hossam Eldeen Aly stated that he still believed a conference could be held in 2012 and that the first steps toward holding it should be to appoint a facilitator and select a venue. He argued that a successful conference would answer questions such as whether a NWFZ would require a role for the IAEA and whether there would be verification of any sort. But merely getting all the relevant countries to sit around the same table would be a major achievement.

Other questions tackled the prospects for the review conference to be held in 2015. Several panelists argued that the goal for the 2015 conference should be more than simply achieving a mild-mannered final consensus document progress on the 2010 goals will need to have been made, then examined and updated in light of intervening events.

# Russia's Nuclear Energy

**Session 8 (Lilac/Tulip)**
**June 14, 2011**

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| **Panel** | Leonid Ryabikhin (Moderator), Committee of Scientists for Global Security and Arms Control<br>Mikhail Kobrinskiy, Nuclear Safety Institute of the Russian Academy of Sciences<br>Viacheslav Amirov, Institute of World Economy and International Relations<br>Jonathan George, Lawrence Livermore National Laboratory |
| **Author** | Crispin Rovere, Australian National University |
| **Summary** | The ending of the Cold War and the collapse of the Soviet Union resulted in a massive reduction in government patronage of Russia's nuclear energy industry. The unregulated transition to a market economy seriously disrupted Russia's nuclear apparatus, producing a sudden oversupply of nuclear expertise. Throughout the 1990s, Russia struggled to develop a competitive energy industry that was sustained by export-driven growth. At the same time, anxieties persist about the proliferation potential of Russia's latent nuclear capacity, both in terms of fissile material and underemployed nuclear scientists. Over the past decades, Russia's nuclear energy industry has been expanding. In the quest to combat climate change, the so-called "second nuclear age" meant that many nations were considering civil nuclear programs for the purposes of producing nuclear energy. Recently, Russia's industry has suffered a series of major setbacks. The global financial crisis weakened investment both domestically and abroad, sanctions on countries like Iran have increased pressure and tightened export controls, and the disaster at Fukushima has devastated public confidence in the safety of nuclear energy, prompting a serious rethink in countries considering expanding their nuclear programs. It is in this environment of commercial and security uncertainty that four experts—three Russian energy veterans and one retired U.S. Air Force general—discussed the issues, both present and future, impacting Russia's nuclear energy industry. |

Viacheslav Amirov pointed out that the Soviet Union was a pioneer of nuclear energy, producing the world's first fissile electricity generation in 1954. Unfortunately, the Chernobyl accident and the upheavals in the 1990s following the collapse of the Soviet Union caused Russia numerous problems, particularly economically with regard to the nuclear industry and related machinery. In the last decade, Russia has started to revive its nuclear industry. Currently, Russia has 32 reactors in operation. Nuclear energy provides 15-16% of domestic electricity production and also provides around 5% of Russia's heating requirements. According to Dr. Amirov, the government hopes the industry will develop further, making the economy less dependent on mineral resources.

In support of this agenda, the Russian government announced the "Platform for Nuclear Development 2030". Dr. Amirov said that the program was intended to greatly increase the percentage of nuclear energy in overall energy production; however, in the wake of the global financial crisis, these objectives have been revised. By 2020, the percentage of nuclear power generation in Russia's electricity grid will be 23%, but both consumption and production will differ from projections. Russia also intends to upgrade its reactors and equipment. According to Dr. Amirov, Rosatom, Russia's state nuclear energy corporation, is eager to participate in the reactor upgrade market, as it is one of the most profitable dimensions of the nuclear energy business.

Mikhail Kobrinskiy observed that in the wake of the Fukushima disaster, it is important to discuss the evolution of nuclear safety concepts in the nuclear power industry. This process began after the Three-Mile Island accident, which resulted in a partial meltdown. Even without a significant radiation leak into the environment or negative human consequences, safety was much more carefully considered and the process of introducing greater safety and control systems began. Dr. Kobrinskiy said that as a result, the nuclear energy industry is governed by a "culture of safety" unlike that in any other industry in the world. This culture of safety has given overriding priority to nuclear safety issues and ensured that they receive the attention warranted by their significance.

According to Dr. Kobrinskiy, further analysis confirms that many accidents are caused by human error or poor attitudes toward safety. Insofar as such accidents can be prevented or mitigated, anthropogenic acci-

dents can be compared with natural disasters in the modern world. But doing so requires that the culture of safety evolve into an overall philosophy of safety, which considers safety as human wellbeing and the feeling of safety as well as its reality. Yet there is a major difference between actual safety and the perception of safety. Individual and collective perceptions of hazards are not simple issues and stereotyping of dangers can inhibit practical and measured responses. Therefore, mechanisms for governing the conception of acceptable safety levels need to be developed. From an objective perspective, an acceptable level of safety has been attained when day-to-day operations do not cause large-scale social disruptions. From there, engineering is employed to measure risk, without considering human attitude, based on the mathematical expectations of integral damage. This, said Dr. Kobrinskiy, is the rational assessment of risk.

However, the image of safety in the minds of the public demonstrates quite the opposite picture. Compared with motor vehicle accidents, for example, which kill over 1 million people each year and leave 25 million injured, the risk from radiological accidentsis negligible. Nevertheless, the public's anxieties about nuclear power plants greatly exceed anxieties about motor vehicle accidents. Unlike nuclear power plants, no one is suggesting the prohibition of motor vehicles. Public opinion considers their safety acceptable. In stark contrast to motor vehicles, the objective risk of severe accidents at nuclear power plants is one accident per power plant per 10 million years. Still, this does not impress the public.

Dr. Kobrinskiy pointed out that this was reinforced by the recent earthquake in Japan and the subsequent accident at the Fukushima power plant. The tsunami cost approximately 27,000 lives and caused damage to the tune of $200-300 billion. On the other hand, two workers died from a hydrogen explosion and 11 were injured, no one was exposed to dangerous radiation levels, and the Fukushima power plant accident has an overall total damage bill of around $2 billion. Nevertheless, the mass media framed the disaster as primarily a nuclear accident rather than a natural disaster.

This phenomenon is known as radiophobia, said Dr. Kobrinskiy. For the nuclear industry, it is a dangerous human factor in that radiophobia in itself can be harmful. In 2004, there was a training exercise at a nuclear power plant in Russia. The training simulated a significant accident and the leaking of radioactivity into the environment. During the training exercise, the emergency system was triggered by insignificant leakage into a steam pipeline. However, pictures of people near the plant were published in the news for three full days. As a result, approximately 25 million people were alarmed and all medical iodine sold out in two days. Excessive alcohol consumption was also observed since spirits are seen in Russia as a cure for inhaled poisons. This example shows profound risks stemming from social reaction to the mere rumor of an accident, let alone an actual one. Dr. Kobrinskiy argued that this poses a serious challenge for further development of the nuclear power industry and offered three examples of persistent myths about nuclear power. First, he rejected the notion that normal power plant operation harms the environment, arguing that on the contrary it is cleaner than other means of power production. Second, he rejected the claim that radiation levels near nuclear power plants exceed the level found in nature, pointing to evidence that in Finland the average radiation received by people in the natural environment is 5.5 mSv while the average in nuclear power plants is 2.4 mSv. Third, he argued against the claim that the nuclear industry is a byproduct of nuclear weapons development, arguing that fissile material from dismantled nuclear weapons is being blended to produce reactor fuel.

Dr. Kobrinskiy said that he believed that it is impossible to eliminate these myths and stereotypes. All that can be done is to provide education, from primary school and through adulthood.

Yet, Dr. Kobrinskiy pointed out that there are significant consequences of using nuclear energy as a power source. Some factors can be reduced; however, some cannot and must be recognized as potential hazards:

1. There is a huge energy concentration in nuclear fuel. One kilogram of uranium-235 releases huge amounts of energy in the fission process.
2. Nuclear power plants cannot be instantly switched off. Residual heat can cause a meltdown in the event of a failure of the cooling system.
3. Proper design solutions should be applied to prevent Chernobyl-like disasters, particularly with respect to fast neutron reactors,which are rapidly developing.
4. Nuclear power plants create waste, and therefore measures should be introduced to isolate this waste from the environment.

Nevertheless, said Dr. Kobrinskiy, the nuclear power industry is one of the safest forms of power production. When comparing accidents from various different types of plants, nuclear power is less hazardous than both thermal and coal plants. Moreover, next-generation reactors can either eliminate the risks that do exist or at least substantially reduce them.

Jonathan George pointed out that alot of discussions have been taking place with respect to how smaller nuclear powers interrelate and the impact this has on the disarmament agenda and nonproliferation. At the same time, there are only two nuclear superpowers, the United States and Russia, and almost no progress can be made on any nuclear issue without close cooperation between these two states in meeting nuclear challenges.

Since the Obama administration "reset" U.S. relations with the Russian Federation, the two countries have reached a number of agreements with benefits to both nuclear energy and security. The U.S.-Russia deals remove 70 tons of weapons-grade plutonium, increase nuclear sales, improve nuclear storage, and have culminated in the signing of the New START Treaty and the 123 Agreement. In addition, Mr. George pointed out. That we are seeing the establishment of nuclear fuel banks, improved forensic analysis, and a more coordinated response to Iran's nuclear intransigence.

Cooperation continues to improve in other areas. Greater collaborative efforts are now underway toward understanding the intent and strategy behind nuclear weapons and terrorism, as well as developing better

legal frameworks for the peaceful use of nuclear energy. Mr. George said that these new steps forward are important, not just for the United States and Russia, but for the world. Understanding China's nuclear ambitions; extended deterrence; the future of the Nuclear Non-Proliferation Treaty; and managing hotspots like Iran, North Korea, and the ongoing tension between India and Pakistan, are all dependent on improving U.S.-Russia relations.

One question during the Q&A session asked why the chain reaction that caused the Chernobyl disaster could not have been halted. Dr. Kobrinskiy responded that during the final stages of the disaster, operators removed the graphite control rods that moderated the fission from the reactor core in order to avoid a shutdown of the reactor due to accumulated xenon. In an effort to control the surging power, the operators then attempted to lower the control rods back into the active zone. The graphite construction of the control rods caused them to displace coolant into the core, leading to an increase in reactivity that overwhelmed the control rods' ability to absorb the neutrons. According to Kobrinskiy's model, the reactor subsequently went critical in 0.3 seconds, lost all coolant and led to a thermal explosion in the steam vessel (as opposed to a hydrogen explosion at Fukushima).

Another audience member pointed out that Russia had plans to export nuclear-powered ice-breakers, despite the fact that the designs for those reactors are quite old, and asked the panel about the intended future of this project in light of the Fukushima disaster.

Dr. Kobrinskiy replied that the Russian Federation operates ten light water boiler reactors of the same type as Chernobyl. Following Chernobyl, a close analysis of these reactors by the International Atomic Energy Agency, under very tight regulations, saw no breach being observed. Nevertheless, Russia will not construct any new light water boiler reactors. All future projects will now be pressurized water reactors or fast neutron reactors. Another audience member pointed out that the partially completed Unit 5 of the Kursk power plant is a Chernobyl-type reactor, though he suggested that it might be abandoned or revised in the wake of Fukushima.

By way of conclusion, Dr. Ryabikhin asserted that while the world is in the midst of a "nuclear renaissance," humanity's future will depend upon how we can preserve security and safety in nuclear technology. Mankind, he said, still does not understand the full power of nuclear energy and should thus proceed very carefully. In particular, he called for greater investment in fundamental research on nuclear technology and nuclear safety.

# Nuclear Safeguards System

**Session 8 (Cosmos/Violet)**
**June 14, 2011**

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| Panel | Kim Byung Koo (Moderator), Konyang University<br>Ahn June Ho, Seoul National University<br>John Carlson, Lowy Institute<br>Chaim Braun, Stanford University<br>Min Gyungsik, Korea Institute of Nuclear Nonproliferation and Control |
| Author | Tomas Pico, National Ministry of Foreign Affairs, Argentina |
| Summary | Professor Kim Byung Koo began the session on the 'Nuclear Safeguards System' by discussing the need for a new approach in nuclear governance. In light of the special safety, proliferation, and security challenges that Asia faces as a nuclear "renaissance" region, there are issues ranging from the widespread construction of nuclear power plants in China and India to the nuclear safety situation in Fukushima and the North Korean proliferation situation. |

Professor Ahn June Ho spoke of the safeguards system of the International Atomic Energy Agency (IAEA), its evolution since 1957, and the issues it currently faces. He began by talking about the legal background of the IAEA safeguards system, in particular the IAEA statute, which authorizes the agency to examine and approve the design of member states' nuclear plants and to send inspectors to nuclear technology "recipient" states. He also discussed the Nuclear Non-Proliferation Treaty (NPT), which establishes that non-nuclear-weapons states that are party to the treaty shall conclude safeguards agreements with the IAEA. According to the safeguards agreement, the IAEA can inspect all nuclear material and nuclear facilities within these states.

The IAEA safeguards system was thus based on nuclear-material accountancy, with containment and surveillance as complementary measures. Nuclear facilities maintain the account book-keeping system for their possessed nuclear material and should report to the IAEA periodically. Until the 1980s, this traditional quantitative material accountancy system worked without major difficulties. However, in light of major events throughout the 1990s (e.g., the discovery of Iraq's clandestine nuclear program, North Korea's challenge to IAEA inspections, the dissolution of the former Soviet Union, and nuclear weapon development in South Africa), an international consensus emerged around the need to strengthen the IAEA safeguards system. This led to the introduction of the Additional Protocols to the IAEA Safeguards Agreements in 1997, shifting the traditional accountancy control on declared nuclear material towards information-driven safeguards.

Under the Additional Protocol, more information is required from states regarding nuclear development programs and their research activities, such as broad nuclear research and development program information, the production and export of nuclear-sensitive equipment, complementary access to any suspicious locations, and wide-area environmental sampling. In this sense, while traditional safeguards were implemented based on the amount of nuclear material (a quantitative approach), the information-driven safeguards are based on information provided by a state along with various types of open-source information such as published scientific journals, online information, and media articles (a qualitative approach).

Although the introduction of the Additional Protocol in 1997 implemented new kinds of safeguards, only 89 of the 163 countries that have concluded a safeguards agreement with the IAEA have agreed to make the Additional Protocol enter into force. This means that there are still two safeguards systems that currently exist within the IAEA: traditional safeguards and information-driven safeguards. As a result, Dr. Ahn cited a number of issues and challenges involved in achieving more effective and efficient information-driven IAEA safeguards, including: widespread acceptance of the Additional Protocol by all NPT parties; a clear definition of the information-driven safeguards terms by the agency so as to avoid conflicting interpretations; and the introduction of new safeguards technology as verification tools.

Dr. John Carlson began his presentation by stating that the current priorities of IAEA safeguards is to strengthen detection capabilities for undeclared nuclear activities through the improvement of safeguards technology and methodology, the further development of information treatment, and universalization of the Additional Protocol. Another priority is foreseeing the expansion of nuclear programs and the introduction of new fuel-cycle technologies. Dr. Carlson pointed out that states could help the IAEA achieve greater effectiveness and efficiency in safeguards implementation through stronger partnerships with national authorities, and to support safeguards conclusions by establishing additional transparency and confidence-building mechanisms. In addition, regional safeguard systems such as Euratom and the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) are a good way to achieve both goals. He noted that there was potential for similar regional arrangements in areas such as the Middle East, South Asia, and the Korean Peninsula, where the implementation of further confidence-building measures in addition to IAEA safeguards might be useful. In relation to safeguards implementation, he stated that a practical step had been taken through the establishment of the Asia-Pacific Safeguards Network in 2009.

In his discussion of safeguarding dual-use nuclear technologies, Chaim Braun began by considering safeguarding in its broadest definition, as an integrated system of controls, including traditional IAEA safeguards, the Additional Protocol, Nuclear Suppliers Group supply guidelines and export controls, national conditions of supply (U.S. 123 Agreements), the implementation of UN Security Council (UNSC) Resolution requirements, regional arrangements such as ABACC and other nuclear-weapon-free zones (NWFZs), corporate export restraints, and complementary supply assurance measures, such as “cradle to grave” fuel supply, which ameliorate supply restraints inherent in safeguarding. In all, the effectiveness of safeguarding systems depends on applying the right mix of specific incentives and restraints applicable to each national situation.

Regarding possible IAEA improvements, Dr. Braun mentioned the implementation of technical enhancements to the Additional Protocol (such as faster access to suspect sites and environmental sampling), the need to bypass politicization of decision-making processes, the use of criteria-based scheduling and risk-informed safeguards prioritization, the development of additional funding sources for the IAEA Safeguards Department, a criteria-based approach for referrals to UNSC, to support BOG ultimate decisions in cases of significant breaches of state safeguards obligations, and the development of enhancements to IAEA technical support for member states in good standing, which are compliant with safeguards requirements and the improvement of nuclear export control regimes. For example, the use of both criteria-based scheduling and a risk-informed safeguard prioritization methodology could help overcome political objections and politically motivated budget limitations. Even if neither approach will completely substitute for the political decision-making process, they might provide a more objective way to overcome political deadlocks.

Another key issue that Dr. Braun discussed is the additional tightening of the export control regime, which could be achieved by upgrading and expanding the dual-use items trigger list, as well as increasing information exchange regarding suspect exporters, third-party intermediaries, and the identification of bogus end-use certificates. The establishment of formal supply criteria should include signing and ratifying the NPT or assuming similar obligations. Dr. Braun also mentioned the prospective role of regional safeguards organizations which could perform functions such as safeguard nuclear power plants and fuel-cycle facilities in member states in cooperation with the IAEA; monitor state and regional borders to prevent nuclear trafficking; act as a nucleusfor future fuel-cycle collaboration and act as an executive organization for regional

NWFZs, if they exist.

Another issue is the funding of international safeguards activities, with additional funding needed for the IAEA, as well as state and regional counter-proliferation organizations. Special funding campaigns for the IAEA Safeguards Department might not succeed without commensurate increases in the budget for the Nuclear Energy and Technical Support Departments. Another additional funding source might be obtained by adding a surcharge tax to the price of uranium mined for nuclear energy projects, or by applying an assembly tax that covers all fuel-cycle activities leading to fabricated fuel assemblies for nuclear power plants.

Dr Min Gyungsik addressed the evolving safeguards system and its impact on systems of accounting for-and control of-nuclear material (SSAC), whose primary role is reporting regularly on states' nuclear material and providing support for the IAEA's verification activities. The search for greater effectiveness and efficiency has led the IAEA to apply the Integrated Safeguards to each state that accepted its strengthened safeguards system (Additional Protocol). The three key elements in the successful implementation of the Integrated Safeguards are: a broader application of obtainable information, the introduction of new technology for material accountancy, and enhanced cooperation with the SSAC. Although the new safeguards system of the IAEA may be interpreted as a new burden on the SSAC, it also gives the SSAC a chance to increase the transparency of the nuclear activities and to strengthen the control of nuclear material in a state in terms of national security. At the same time, it may also expand the role of the SSAC in the international community.

# Crisis Management on the Korean Peninsula

**Plenary Session 2 (Grand Ballroom)**
**June 14, 2011**

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| Panel | David Sanger (Moderator), *The New York Times* |
| | Burwell B. Bell, Former Commander, UNC/CFC/USFK |
| | Gary Samore, Special Assistant to the President, WMD |
| | Larry Welch, Institute for Defense Analyses |
| | Hahm Chaibong, The Asan Institute for Policy Studies |
| Author | John Warden, Center for Strategic and International Studies |

The session began with Dr. Samore outlining the three principles that the Obama administration has applied in dealing with North Korea. North Korea would like the United States to recognize and accept it as a nuclear power, though it continues to pose a direct security threat to the United States and to U.S. allies in the region. North Korea's nuclear and missile programs threaten to undermine stability in East Asia and weaken the global system of treaties and regimes that President Obama wants to strengthen in order to move towards a world without nuclear weapons. Therefore, Dr. Samore stated, the first principle is the complete denuclearization of the Korean Peninsula.

Second, the United States is committed to working with its allies and partners in East Asia to address nuclear and missile issues as progress requires its involvement. The Obama administration has gone out of its way to consult with allies and to increase not only diplomatic leverage but also military cooperation, including missile defense co-development with Japan and military exercises with South Korea. The United States recognizes it must also work with China and Russia. Though each country has slightly different interests, they share a stake in stability, conflict avoidance, and the denuclearization of the peninsula. In addition, Dr. Samore argued, the broader community must implement United Nations Security Council sanctions to prevent North Korea from selling military commodities. Working together can produce results, as demonstrated by the recent success of turning back the MV Light, which was likely carrying prohibited materials from North Korea.

The third principle is that the United States will continue to match action with action. North Korea must receive good for good and bad for bad. If North Korea carries out provocations or violates United Nations Security Council resolutions, the United States will respond with political isolation and increased sanctions, through both multilateral and unilateral efforts. At the same time, the United States remains open to engag-

ing with the North Koreans if they show that they are committed to more responsible behavior. Sanctions cannot work unless North Korea is offered a path to greater prosperity. The United States is willing to resume the Six-Party Talks once North Korea has demonstrated that it is ready to improve North-South relations. Until such a breakthrough occurs, however, the United States and South Korea must strengthen defenses and remain vigilant in preparation for future North Korean provocations.

Mr. Sanger followed with a few questions. First, he asked whether North Korea might look at the examples of India and Pakistan and conclude that the United States would eventually accept a nuclear North Korea as well. Dr. Samore said he thought that might be the case, as evidenced by North Korea's pursuit of a nuclear capability for over 25 years. However, the difference, he argued, is in terms of the overall relationship. The United States is still technically at war with North Korea, so it is hard to see how the United States would accommodate the country having nuclear weapons. Second, Mr. Sanger asked about the change in policy between the Bush administration, which was quite hard-line at the beginning before shifting to a policy of increased engagement with North Korea, and the Obama administration, which has so far taken a tougher line. Dr. Samore said that unless North Korea has resolved its enrichment program the nuclear issue cannot be solved. North Korea's claim of having a nuclear program complicates any potential solution. Mr. Sanger followed up, asking whether there was any way the United States would be satisfied without full access to the country. Dr. Samore acknowledged that a solution would be difficult and must begin with a declaration, and then a mechanism for verifying that. Such a solution will of course be subject to negotiation. The goal is to find an arrangement that satisfies the United States but is also acceptable to North Korea.

General Welch followed with a fairly pessimistic assessment. He argued that there is a menu of possible crises on the peninsula, the two most obvious being (1) the prospect of the economic and political collapse of North Korea, and (2) greatly escalated belligerence with nuclear weapons in the mix. It is also possible that the two scenarios are connected in some way. The two possibilities for reacting are variants of the theme of reunification. The United States' preference is for an orderly, peaceful, and gradual reunification, while the alternative would be a more unstable reunification, potentially including North Korean collapse.

While U.S. analysts are good at predicting eventual outcomes, they are bad at predicting timing. In 1985 there were predictions that the Soviet system would bury itself, but no one predicted that it would happen in 1991 or that its demise would be peaceful. More recently, many expected that regimes in North Africa and the Middle East would collapse, but did not predict it would happen when it did. The lesson, according to General Welch, is that rapid and unpredictable change is more likely than any of our predictions, and we have to be able to deal with it. The United States might be right that the North Korean regime will eventually collapse, but it cannot say with high confidence when that will occur. The greatest obstacle to orderly unification is the economic disparity between the North and the South, which puts a high premium on planning and preparation.

In the meantime, the United States and the Republic of Korea (ROK) must find a way to deal with North

Korean behavior for the foreseeable future while also planning for the difficulties of eventual Korean unification. General Welch argued that while the United States should continue to talk with North Korea, it should avoid negotiations—in which both sides actually try to resolve issues—until there are signs that the North is serious. In the past, North Korea has used negotiations as a cover for the continued development of its nuclear program.

Unfortunately, according to General Welch, there is little hope of immediate progress. Sanctions have had limited impact on the leadership in North Korea, and the population is tolerant of hardship. Trade with China and the humanitarian response to food problems have undermined the bite of sanctions. It is also clear that Kim Jong-Il has calculated, probably correctly, that preserving North Korea's nuclear weapons program is in the regime's interest. Until this perception changes, it is difficult to see much progress being made in ending the program.

Following General Welch's opening remarks, Mr. Sanger asked about possible preparations for a sudden and violent North Korean collapse and inquired about whether it might be in the interest of the United States to reach an agreement with China on this matter. General Welch agreed that it would be valuable to talk to China as long as the discussions focused on discrete problems that could be solved. On certain issues, such as the dismantling of North Korea's nuclear weapons, the United States and China have shared interests and might be able to reach an understanding. Mr. Sanger followed up by asking whether there was anything the United States could do to persuade China that denuclearization is more important than stability.

General Welch said that there is no way to change Chinese perceptions, nor is it surprising that China's main motivation is to prevent a collapse. Therefore, a better U.S. tactic could be to tell China that its strategy for producing stability is unsustainable.

General Bell spoke third, discussing the importance of crisis management and the U.S.-ROK alliance. He emphasized that the two allies, along with Japan, have very formal and effective standard operating procedures for crisis management however, the situation remains dangerous. According to General Bell, North Korea has outmaneuvered both China and the United States in developing its own nuclear capability. Unfortunately, the North Koreans think this allows them to conduct provocations short of a major invasion with little fear of initiating a significant confrontation. And if North Korea develops the capacity to hit the U.S. homeland with a nuclear weapon, future crises could quickly escalate on a global scale.

General Bell also argued that the political and diplomatic community in the United States needs to refocus its attention on East Asia, and on the Korean Peninsula in particular. To manage the crisis effectively, General Bell argued, the United Sates must quickly disengage from unproductive nation-building in Iraq and Afghanistan and shift to quick-strike counter-terrorism operations that would enable the United States to refocus on East Asia and reenergize its commitment to the region. To effectively deter North Korea, the United States must make clear that any use of a nuclear weapon will immediately result in North Korea's immediate destruction with all elements of military power, including nuclear weapons. If U.S. declaratory policy is successful, it will place the country in a position to diffuse and manage a future crisis. In addition, the United States must work with its allies to create an integrated system oftactical, operational, and regional missile defense capabilities against North Korean missiles. Effective missile defense, according to General Bell, can be a powerful crisis management tool.

Mr. Sanger followed with a couple of questions that shifted the discussion to the ways in which South Korean domestic politics might influence the crisis. According to General Bell, the South Korean Sunshine Policy was a mistake. South Korea gave money to the North, hoping to improve relations, but the money was funneled to the military. When the most recent South Korean government was elected, North Korea knew the game was up and adopted a more confrontational policy. In the next South Korean election, General Bell argued, we should hope for a government that is skeptical of North Korea and seeks to strengthen South Korea's alliance with the United States.

Dr. Hahm spoke last, arguing that the United States and the ROK must be prepared to manage a permanent crisis on the peninsula. The collapse of North Korea, as difficult as it might be to cope with, could produce favorable results. The problem, according to Dr. Hahm, is that if we keep thinking about a distant and uncertain collapse, we will get tricked into thinking that the crisis may be over. Recent North Korean actions have taught us many important lessons. First, North Korea will not give up its nuclear program anytime soon. In South Korea the realization is starting to sink in that we might have to live with a nuclear North Korea. For that reason, extended deterrence and assurance have returned as alliance issues. The ROK government and public are asking for assurance, and there is even talk of South Korea building its own arsenal or having the United States reintroduce tactical nuclear weapons. These are signs, according to Dr. Hahm, that South Koreans are starting to realize the gravity of the situation.

Second, North Korean nuclear developments are not the result of bad or inconsistent policies by South Korea or the United States. Instead, it is now clear that it has been North Korea's intention all along to develop nuclear weapons. As a result, there have been changes in the debate in South Korea. There is no longer a debate over sofe-line vs. hard-line. Instead, there is talk of a stronger alliance with the United States and even some discussions of a military relationship with Japan, something that would have been unimaginable a year or two ago.

Third, China will not side with South Korea, at least on security issues. As a result of the normalization of

relations with China in 1992 and the growth in trade between the two countries, many in South Korea believed that China would eventually have to see things from the South Korean perspective. Such hopes were shattered in the aftermath of the Cheonan and Yeonpyeong Island incidents when China again sided with North Korea. Now, many in South Korea, according to Dr. Hahm, are starting to question whether China's rise will be as peaceful as they previously thought.

Fourth, North Korea will not collapse any time soon. The regime is more resilient than observers have given them credit for in the past. And if North Korea does run into trouble, China will provide whatever assistance it needs in the interest of preserving stability.

And finally, tension on the peninsula will persist, which is why we should consider this a perpetual crisis. As a result, the alliance system is as important as ever. There is no question that U.S. troops should remain in South Korea and that the U.S.-South Korean alliance should be strengthened. South Korea should also pursue an alliance with Japan and to strengthen South Korea-China relations as well. At the same time, South Korea must get over its illusions about both North Korea and China.

The session closed with additional questions from Mr. Sanger as well as the audience. To begin, Mr. Sanger asked Dr. Samore whether the United States should consider reintroducing tactical nuclear weapons in South Korea. Dr. Samore said that he does not think we should get distracted by that debate. Tactical nuclear weapons do not carry any military utility and serve only as political symbols. If the U.S.-South Korea alliance is strong enough, Dr. Samore argued, there is no need for the weapons. Moreover, such weapons would have no effect on North Korea but would anger Russia and China.

Prompted by a question from the audience, the discussion shifted to the potential for North Korea to develop a miniaturized nuclear device. According to Dr. Samore, the United States does not have much confidence in its assessment of how far North Korea has progressed in developing a miniature weapon and long-range delivery systems. The U.S. response, according to Dr. Samore, should be to increase missile defense cooperation. This will show North Korea that our response to proliferation and provocations will be an increased military presence in the region. This will also send a message to China in particular that its national interest is being harmed by North Korea's provocations.

Another question from the audience inquires about the transfer of war-time operational control from the United States to South Korea. According to General Bell, operational control is a crucial issue for South Korea. The United States has held the command of the combined forces since the Korean War, and there is a belief that as long as the United States is involved, it will be committed. Therefore, the question is, how can the United States reassure its allies? General Bell argued that the United States should continue to station troops in South Korea. It is an inexpensive deal for the United States because of the material support it receives from South Korea. He said that it would behoove experts to educate U.S. senators about the true costs and benefits of U.S. troops in South Korea.

The session closed with questions about the strategy that should be pursued going forward. General Welch argued that the United States does not have a disarming strike option. Any attempt to physically disarm North Korea carries too many risks, making it unlikely that any American leader would pursue it. Dr. Samore argued that the United States cannot recognize North Korea as a nuclear power and focus on containment. If the United States said it was giving up on disarmament, it would be devastating for the region and would incentivizeon others to develop nuclear weapons. Instead, the United States should continue to stand for denuclearization, showing North Korea that it cannot have a normal relationship with the United States or South Korea as long as it has nuclear weapons. Dr. Hahm agreed, reiterating his point that what we are facing is the management of a permanent crisis.

Day 3

Wednesday, June 15, 2011

# OUR **NUCLEAR** FUTURE

# North Korea's Nuclear Program

Session 9 (Grand Ballroom)
June 15, 2011

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| **Panel** | Alan D. Romberg (Moderator), Stimson Center<br>Kim Sung-han, Korea University<br>Liu Ming, Shanghai Academy of Social Science<br>Yuki Tatsumi, Stimson Center |
| **Author** | Greer Meisels, Sasakawa Peace Foundation |
| **Summary** | Professor Kim Sung-han began the session by acknowledging that North Korea's response to the Obama administration's initial friendly gesture marked the beginning of a serious decline with respect to U.S.-North Korea relations. He explained that there are three elements to North Korea's current security dilemma: concerns about Kim Jong-Il's health the issue of succession and the need to maintain a military-first policy. Given these factors, Dr. Kim noted that during the early period of the Obama administration, Kim Jong-Il did not have "sufficient room" to accept U.S. calls for direct talks. |

Dr. Kim then described theso-called "three-step process" promoted by China to have North Korea return to the Six-Party Talks (6PTs). This process would first entail inter-Korean talks, then the United States and North Korea would hold bilateral discussions, and finally this would lead to North Korea's eventual return to the 6PTs. However, he added that recent headlines suggest North Korea does not appear to be interested in inter-Korean dialogue, though it is most likely still interested in bilateral talks with the United States. Therefore, he stressed that the United States and China are critically important if the parties want to return to negotiations.

Nevertheless, Dr. Kim pointed out that the 6PT are not a panacea to resolving the nuclear standoff. He acknowledged that there are important limitations to the talks given its gradualist approach and North Korea's use of "salami tactics" however, he saw no alternative to this mechanism. Finally, he emphasized the fact that North Korea needed to show its sincerity to denuclearize in order to get things back on track. Additionally, North Korea needed to respect the armistice agreement, which means that it must stop its military provocations. However, he emphasized that the Lee Myung-bak administration is not demanding an apology before inter-Korean dialogue can occur. He also cited recent polls about inter-Korean relations that showed that 67% of those surveyed support the government's position of insisting that North Korea exhibit "responsible behavior", which is different from a direct apology. In this regard, President Lee's current

actions are reflective of public opinion.

Next, Dr. Liu Ming offered a Chinese perspective on the latest developments in the North Korea nuclear issue. First, he noted that this issue had become protracted and that denuclearization at least in the near-term - was highly unlikely, if not impossible. Therefore, he suggested that the international community exercise patience. He discussed the need to adopt a two-pronged approach one that offers inducements as well as conditions. Dr. Liu noted that while the 6PT admittedly suffer from many problems, he found it difficult to conceive of a mechanism to replace them.

He then discussed the debate over why North Korea developed nuclear weapons in the first place. While some people in China believe the North feels it needs some measure of security in the post-Cold War environment, Dr. Liu asserted that this was an excuse given that North Korea has always acted provocatively towards South Korea. In fact, he believed that North Korea is modeling its behavior on China, and that North Korea's nuclear weapons are more symbolically important as a sign of prestige than of tactical use. Furthermore, North Korea's nuclear weapons represent an attempt to offset the South's economic superiority.

Dr. Liu then noted that North Korea's nuclear weapons program was a more of a burden than a blessing because North Korea is held hostage by it, and has become diplomatically isolated. His next point was that North Korea knew where the "red line" of provocations was and knew not to go beyond it. His final point

elaborated on Sino-North Korean relations and the factors that influence China's thinking. His view was that China does not have confidence that North Korea will denuclearize in the near future; China has already invested so many resources in the Six-Party process, which has yielded embarrassing results; and, because Kim Jong-Il has experienced some health problems, there is a fear of instability. He reinforced the position that China craves stability in North Korea, and its major fear is that there will be chaos on the Korean Peninsula.

Ms. Yuki Tatsumi offered a Japanese perspective on North Korea's nuclear program. In her opinion, the North Korea nuclear issue represents the most tangible short-term security threat to Japan. That is why North Korea has served as the main driver for deepening Japan's military-to-military relations with the United States and to strengthen Japan's own defense capabilities. In addition, Japan and North Korea do not have diplomatic relations; therefore, the interactions between the two countries are scant or nonexistent. She also thinks that North Korea is only interested in engaging with Japan in an effort to drive a wedge between the two allies. Ms. Tatsumi also noted that because of historical issues and continuing territorial disputes, Japan does not want to seem too vigorous in its engagement in issues related to the Korean Peninsula's future.

Ms. Tatsumi also underscored the point that the abduction issue is still politically sensitive in Japan, which adds further layers of complexity to Japan's participation within the Six-Party mechanism. She explained that when potential incentives or inducements for North Korea are brought up within the Six-Party context, it isvery difficult for the Japanese government to agree to these so-called 'carrots' without appearing soft on the abduction issue. And yet, as every other panelist also concluded, despite the 6PTs' shortcomings and challenges, Japan sees them as the only feasible venue for addressing the North Korean nuclear issue. Ms.

Tatsumi's presentation concluded with a discussion about Japan's present-day realities and its near-term future. Since the "March 11th triple disaster," Japan's paramount concern and most serious fiscal burden will be the post-Fukushima reconstruction. Moreover, since Japan's political landscape remains uncertain, she feels as if Japan will become even more introverted. This could become an issue with regard to Japan's potentially substantial aid commitment to North Korea in the event of denuclearization.

The final panelist was Mr. Alan Romberg, who outlined several U.S. goals in relation to the North Korean nuclear issue including: total irreversible denuclearization, preventing proliferation, maintaining peace and stability on the Korean Peninsula the region, and closely coordinatingwith its allies and with China. He noted, however, that these goals exist on very different time horizons, and that the answers to some of these issues sometimes lie within the policies of other actors. The United States, in other words, can try to influence policies; however, it is not able to determine other countries' policies. He also emphasized that while regime change in North Korea was not the goal of the U.S., behavioral change was important.

Mr. Romberg noted that the American commitment to support South Korea and to strengthen the U.S.-ROK alliance remains a high priority for the Obama administration. In conjunction with this, the administration is also focused on stopping any further proliferation. Potential reinstatement of humanitarian food aid might have some influence on the overall atmosphere and could also be a possible source of friction between Washington and Seoul, so it should be closely monitored. Finally, though Mr. Romberg acknowledged China's constructive behavior in recent months, he felt that it must do more than just stop North Korea from "doing bad things". Rather, China must be more proactive in shaping North Korea's behavior and take more responsibility for trying to solve this problem. With that being said, he noted that he has not seen any wavering in China's backing of North Korea, given its own strategic interests.

During the question and answer session, Dr. Liu was asked whether there was anything North Korea could do that would make China cut off economic aid. Dr. Liu replied that if North Korea engaged in further provocative actions or conducted a third nuclear test, China could consider taking a more hard-line stance to minimize assistance. However, he did not think China would cut off all fuel or food assistance as this would be a humanitarian issue and might lead to chaos. In addition, Dr. Kim stated that he hoped China would cut off aid if North Korea conducted a third test, but that it was also important to distinguish aid from cooperation. He suggested that this might be one of the reasons why Kim Jong-Il's most recent visit to Beijing was not as successfulhe wanted more economic assistance whereas China wanted to encourage more market-based economic cooperation.

Regarding North Korea's economy, Dr. Liu said that to ensure regime survival and the leadership succession, it was necessary for Kim Jong-Il to leave a legacy of a strong national economy which currently in extremely bad shape. He saw this as one of the possible reasons why Kim Jong-Il has made so many trips to China lately—not only to sign some agreements and to attract more investment to some Special Economic Zones, but also to solidify his relationship with the "Fifth Generation" of Chinese leaders. These efforts will hopeful-

ly help him shore up his son's power base.

Next, a participant from the European Union asked whether or not President Lee's concept of a "grand bargain" would survive the next presidential election. Dr. Kim answered that even domestic public opinion shows increasing pessimism about the future of the 6PTs. However, no one wants a war on the peninsula or any sort of ratcheting up of tensions. Therefore, Dr. Kim believes that the potential crop of presidential hopefuls will try to widen their appeal becoming more centrist. This may coincide with a North Korea policy that seeks to find a happy medium between a President Kim/President Roh-style "Sunshine Policy" and President Lee's more hard-line approach.

A question was also raised by one of the Japanese participants as to what lessons there might be for other countries seeking nuclear weapons vis-à-vis the North Korean experience. Ms. Tatsumi suggested that she thought North Korea's experience illustrated that acquiring nuclear capabilities is a long and tough road and one that requires a nation to be determined to overcome sanctions, hardships, isolation, and the like.

A journalist from The New York Times also sought the panelists' prognostications, specifically Dr. Liu's, by asking whether or not China could tolerate a unified Korean Peninsula under Seoul's auspices, allied with the United States. Liu Ming began by stating that he believes China's policy toward the Korean peninsula would be based upon the changing situation, instead of working against them. In other words, if North Korea collapsed and the government failed, he did not think that China would actively try to prop up the regime. He also felt that China would supportany kind of unification scenario that is supported by the two states. Mr. Romberg added that China would nonetheless not want to be strategically disadvantaged when it comes to Korean unification. Therefore, even though it is acknowledged that the process will be gradual, and most likely drawn out, he believed that conversations between the United States and China on this subject need to begin now, understanding that they are quite sensitive in nature. The United States is amenable to doing this, but China has been obviously wary.

# U.S. Nuclear Posture Review

**Session 9 (Lilac/Tulip)**
**June 15, 2011**

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| **Panel** | Clark Murdock (Moderator), Center for Strategic and International Studies<br>Lora Saalman, Carnegie Endowment and Carnegie Tsinghua Center for Global Policy<br>Walt Slocombe, former U.S. Undersecretary of Defense for Policy |
| **Author** | John Warden,Center for Strategic and International Studies |
| **Summary** | This session on the 'U.S. Nuclear Posture Review' discussed the new review and the perspectives and reactions of the United States, China, and Russia. Moderator Clark Murdock began with a brief introduction to the main issues in the 2010 Nuclear Posture Review (NPR) report. He began by outlining the main takeaways. Among other things, the NPR report: identifies nuclear terrorism and proliferation as the top priorities for the United States; expresses an interest in maintaining strategic stability with Russia and China; updates the U.S. understanding of its Negative Security Assurance, specifying that it only applies to countries in compliance with their nonproliferation obligations; argues that the United States should maintain the triad during the ten-year duration of the New START Treaty commitsto limiting silo-based intercontinental ballistic missiles (ICBMs) to a single warhead; pledges to retire the Tomahawk Land Attack Cruise Missile/Nuclear (TLAM/N); and rejects the de-alerting of ICBMs and submarine-launched ballistic missiles (SLBMs). |

Dr. Murdock went on to note that the NPR report is just one of many activities that the Obama administration has pursued in its nuclear agenda. A second element is the New START Treaty, which was signed in April 2010 and ratified in February 2011. The New START Treaty limits the number of U.S. and Russian deployed strategic warheads to 1,550 (under itscounting rules) and total delivery vehicles to 800, with a separate limit of 700 deployed delivery vehicles. The treaty also includes a non-binding preamble that acknowledges the relationship between offensive and defensive strategic systems. However, the Obama administration has consistently argued that the New START Treatyin no way constrains current or planned missile defense deployments.

A third part of the Obama administration's nuclear agenda is the Ballistic Missile Defense Review (BMDR), which includes the Phased Adaptive Approach (PAA). The PAA reorients U.S. strategy to counter the more immediate threat of short- and medium-range missiles, while maintaining the flexibility to respond as future threats develop. It is divided into four phases; the third will include defenses against intermediate-range ballistic missiles, while the fourth will include defenses against intercontinental ballistic missiles. The BMDR

links missile defense to reductions in the role of U.S. nuclear weapons, highlights the importance of missile defense within regional security architectures in East Asia and elsewhere, and also advocates expanding strategic stability dialogues with China.

The final part of the agenda, according to Dr. Murdock, is the Fiscal Year 2011 Budget. The proposed budget requested $11.2 billion for the National Nuclear Security Administration (NNSA), which would have been a 13% increase. After congressional debate, the NNSA received a 7% increase. Of the approved funds, the president committed $85 billion to sustaining and modernizing the nuclear weapons complex, including the construction of a new uranium processing facility and chemistry and metallurgy research facility, the execution of the B-61 and W-76 life extension programs, and the study of W-78 life extension options. The budget also included substantial funding for delivery system modernization, missile defense, and Conventional Prompt Global Strike (CPGS). According to Dr. Murdock, the totality of these undertakings demonstrates that the Obama administration is committed both to the eventual elimination of nuclear weapons and, as long as nuclear weapons exist, to the maintenance of a safe, secure, and effective nuclear deterrent.

Dr. Saalman followed with a discussion of China's reaction to the U.S. NPR. Like many other audiences, strategic thinkers in China saw both positive and negative aspects in the NPR. After all, China was mentioned 19 times in the NPR, often alongside Russia. On the positive side, the NPR shifted its focus to terrorism and proliferation and did not explicitly list China as a threat. Many in China also see the NPR as a policy document, not a posture, and recognize that it includes a great deal of compromise. However, analysts also argued that the document contains a number of contradictions and uncertainties. For example, the NPR argues that high-tech conventional weapons, such as CPG Sand ballistic missile defenses, might substitute for roles currently assigned to nuclear weapons. Many in China feel that the United States is trying to lock in its conventional advantage and worry that advancing U.S. conventional capabilities could trigger an arms race.

Others believe that the softer rhetoric in the NPR conceals America's true hostile intentions, which can be seen in U.S. discussions of extended deterrence and in the fiscal year 2011 budget. These people fear that the United States sees China as a small Russia. China has no interest in an arms race, but remains concerned that the United States is locked in a Cold War mindset. As a result, Chinese analysts are worried that their country is an implicit target of U.S. nuclear weapons. In particular, many are troubled by the possibility that the "extreme circumstances" in which the United States might use nuclear weapons could involve conflicts with China.

According to Dr. Saalman, many in China formed their understanding of the NPR based on news reports and speculation, rather than reading the full text, which has created some misperceptions. Therefore, the United States might still have an opportunity to change China's view of the NPR by sitting down with officials and analysts and explaining the document paragraph by paragraph.

Mr. Slocombe spoke last, discussing the Russian reaction to the U.S. NPR. Mr. Slocombe began by reviewing Russia's general thinking about nuclear weapons. He argued that Russian strategic thinkers see an enduring role for nuclear weapons, which they see as a key symbol of their status in international affairs and a central component of Russia's relationship with the United States. However, the role of nuclear weapons is not entirely symbolic. Russia also relies heavily on nuclear weapons in instances where the existence of the state is threatened. This is clearly stated in Russia's most recent military doctrine.

He continued that Russia remains concerned about U.S. technical advantages, and in particular about U.S. missile defense plans. While many in Russia might acknowledge that they are an improvement over the Bush-era configuration, they still dislike the PAA and, more generally, fear U.S. technological advancements in missile defenses and precision-strike weapons. For this reason, Russia objects to U.S. plans to build radars in the Czech Republic, Poland, and possibly other places in Eastern Europe.

Disparities in capabilities, Mr. Slocombe argued, might create problems for future arms control agreements. While the United States would like to focus further reductions on strategic weapons and delivery vehicles, as well as on tactical nuclear weapons, Russia is more concerned with conventional arms reductions. Both sides face domestic political constraints, and in the United States, conventional arms reductions or limitations areout of the question. He also noted that, in general, Russia sees the NPR as fairly conservative. While it takes modest steps to address Russian concerns, it reveals that the United States sees an enduring role for missile defense and CPGS, which Russia identifies as threats to strategic stability. And unlike the United States, Russia has a clear definition of strategic stability: a condition in which both sides have survivable and effective nuclear second-strike capabilities.

During the question and answer session, a Russian analyst in the audience said that the United States does not seriously consider Russia's concerns, making progress on these issues difficult. The analyst argued that discussing these issues with more candor and seriousness could make collaboration more likely. The panel agreed, and Mr. Slocombe said he had no intention of disrespecting Russia in any way. Another member of the audience asked about transparency in China. The panel generally agreed that China could do more on transparency and that the lack of transparency remains a key sticking point in U.S.-China relations. Dr. Saalman argued that, for China, transparency is mostly an issue of domestic politics and regime control. There is not much pressure for nuclear transparency, but there has been some discussion about China's involvement in future arms control. She said that, in her experience, it is fairly easy to conduct research in China and that she rarely faces limited access on the Internet or from current and retired military leaders. This demonstrates that there is some degree of transparency in China.

# New START I

**Session 9 (Cosmos/Violet)**
**June 15, 2011**

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| **Panel** | Leonid Ryabikhin (Moderator), Committee of Scientists for Global Security and Arms Control<br>Vladimir Ivanov, East West Institute Moscow Branch<br>Eldridge Colby, Center for Naval Analyses<br>Jonathan George, Lawrence Livermore National Laboratory |
| **Author** | Dawn Verdugo, Center for Nonproliferation Studies, Monterey Institute |
| **Summary** | Dr. Vladimir Ivanov opened the session on 'New START I' with a discussion on Russian perspectives of the New START treaty. He began by noting that the treaty highlights the general evolution of Russian strategic thinking beyond a posture of mutually assured destruction. This evolution is based on a growing gap between the nuclear weapon (NW) capabilities of the United States, NATO countries, and the Russian Federation. He asserted that numerical parity is now less important to the Russian leadership than the benefits obtained through structural advances in Russia's nuclear potential. |

Dr. Ivanov noted that Russia emphasized three specific concerns throughout negotiations for the New START Treaty. First, the possible deployment of a U.S. global missile defense system heightened Russian concerns, and as a result, the New START Treaty includes text that establishes a link between missile defense and strategic offensive arms. Second, Russia expressed concerns about the United States' reloading capacities. Russia would certainly like a means to limit these capacities. The third Russian concern centered upon the potential U.S. deployment of conventionally equipped strategic launchers. To address this particular concern, language was included in the New START Treaty's preamble stating equivalencies between conventional and nuclear strategic arms.

Dr. Ivanov then elaborated upon how the parameters of the New START Treaty demonstrate the complexity of Russia's approach to a strategic balance. First, launchers for intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs) are taken into account under the treaty,and this applies not only to those that are operationally ready, but also to those intended for training as well. Second, limits and accounting measures cover all types of ICBMs and SLBMs, regardless of whether they have conventional or nuclear warheads. Third, heavy bombers can be converted to conventional bombers through stipulations within the treaty, and there are special procedures available to make sure these bombers cannot be converted back. Finally, the limits of 1,550 deployed strategic nuclear warheads encompass conventional- and nuclear-armed SLBMs, ICBMs,and heavy bombers. Interesting, however, is the potential for an increased number of deployed warheads beyond this limit. This is because, under the New START Treaty, one heavy bomber counts for only one warhead however, a heavy bomber could potentially carry more than one warhead and therefore stretch beyond the treaty limits.

Most significant, according to Dr. Ivanov, is that under the New START Treaty, each party has the right to define the structure of its nuclear forces as long as these forces abide by the treaty's limits. This means that Russia has now been freed from the burdens of the START I treaty. However, it is important to consider whetherRussia can maintain strategic parity given the new and different counting rules. For instance, Russia has fewer launchers than established by the treaty (700 are established in the treaty, whereas Russia, in 2010, had 560 launchers). Russia will need to replace aging launchers, potentially increasing the total number of launchers by 140. Both activities would be at considerable expense, and it is not clear if Russia will see the need to raise these numbers or come to terms with the disparity. Many specialists think it is possible that Russia will indeed decide not to raise the number of launchers in order to reach the upper limits set forth in the New START Treaty.

Finally, to have further progress on strategic arms control, the United States and the Russian Federation, as well as other willing countries, need to consider the complexity of strategic forces and also where tactical NWs fit into these forces. Dr. Ivanov noted that currently the parties involved do not have transparent model calculations of what numbers are needed to keep the level of strategic forces at a level of minimum deterrence. This is due to the fact that such models and calculations are classified by both sides. Additionally, each side may have completely different approaches to these calculations. He stated that the United States and Russia may need toopenly publish these calculations, in order to have a more transparent definition of what they mean by minimum deterrence.

Dr. Ivanov ended by commenting on the continuing lack of discussions regarding tactical NWs. It is important to recognize Russia's continuing reluctance to discuss tactical NWs, as it hints towards its desire to keep its tactical NW superiority. Dr. Ivanov believes that Russia will likely continue to refrain from discussing this issue until U.S. tactical NWs are removed from Western Europe. He noted that in future strategic arms control negotiations, a multinational effort will likely become appropriate, and tactical NWs will need to be discussed.

General Jonathan George postulated that the New START Treaty is more symbolic than substantive, and that the United States and Russia were both going to naturally settle on the course of action that was undertaken in the treaty. For instance, he noted that the counting limits established by the treaty are not especially surprising. Rather, they reflect the realities of what both sides already had, or what each side projected it would be going towards in the near future. Funding and budget constraints have impacted the sizes of each side's nuclear forces. He noted that the treaty did succeed in moving beyond past treaties' counting rules that have become antiquated. Beyond this, he described the New START Treaty's critical role as being its symbolic nature. It reveals a mutual goal that the United States and Russia (who areowners of over 90% of the world's

nuclear war-fighting capabilities) are seeking to achieve a prosperous and secure global future. More specifically, it demonstrates that the United States and Russia are intent on working together in addressing the sizes of their nuclear stockpiles and delivery systems. Thistask is critical to improving global security.

General George then reflected on the differences between two concepts: capabilities and intent. From a military perspective, he noted that intent is easily changed, whereas capabilities are not.Militaries therefore typically prepare to address capabilities rather than intent. In light of this, he considered the dramatic changes in relations that have occurred over the past 30 years between Russia and the United States. Unlike 30 years ago, the United States and Russia are no longer immediate threats to each other. While they may see a more optimistic future, they cannot blindly disregard their continuing shared capabilities. He likened this situation to that of wearing a seatbelt in a car: one has a logical intent to drive somewhere without an accident occurring. However, one needs to be prepared for uncertainties, which is why we put our seatbelts on. In light of this disjuncture between capabilities and intent, General George sympathized with Russian concerns over the deployment of U.S. missile defenses, in spite of the fact that the United States has no intent to use them against the Russian Federation. Indeed, both sides would be mistaken not to consider the potential capabilities of each other.

It is the United States' responsibility to work through frustrations and to increase transparency in order for Russia to understand in what circumstances U.S. missile defenses are intended. On the other hand, the United States must try to understand Russia's perceived need for and reliance upon tactical NWs. The United States needs to be careful and understand that Russia might have a reliance on tactical NWs that the United States does not share. But, as with missile defenses, while the United States does not perceive that Russia intends to use tactical NWs, the United States needs Russia's help to understand its leaders' exact reasoning for relying upon them. Increased transparency of the intent for both systems—missile defense and tactical NWs—could allay each side's concerns. Like Dr. Ivanov, General George concluded that future treaty negotiations must adopt a more multinational approach. He added that the next round of negotiations must also consider non-deployed stockpile NWs and those awaiting dismantlement. Dr. Ryabikhin also noted that sea-launched cruise missiles will also need to be considered in future negotiations.

Eldridge Colby concluded the session by exploring possible issues in future arms control negotiations between the United States and Russia. He predicted that the near-term negotiations will continue to be bilateral, as multilateral candidates are not yet ready to come to the table. He believes that the objectives for future arms control negotiations should not be nuclear abolition per se, because it perhaps is not feasible or desirable. He continued by saying that at least in the near term, nuclear abolition should not drive arms control, as it is distinct from disarmament. In the future, goals of strategic stability and the security of NWs and nuclear materials should be the biggest objectives, along with steady reductions in numbers. He maintained that each side should be encouraged, through arms control, to have postures with an assured, devastating second-strike capability in order to maintain deterrence. For instance, the United States is in a good position with its ICBMs and Ohio-class nuclear submarines. Additionally, the United States could put heavy bombers back on alert if it saw the need. Alternatively, Russia's traditional reliance on silo-based ICBMs puts it in a less stable position. Russia is trying to address this issue by moving to more road-mobile ICBMs (such as the RS-24). Under the New START Treaty, the United States has now been able to see this new system by exhibition. Another mechanism for increasing stability lies in the U.S. Nuclear Posture Review, which included comments on potentially making all ICBMs single warhead-armed. This situation would be more stabilizing from a Russian perspective. However, he notes that while the United States can take such steps that demonstrate good faith in not trying to hinder Russia's deterrent (for example, with proposed missile defense programs), it is ultimately Russia's responsibility to increase its survivability. Russia, for instance, might consider strengthening its early-warning capabilities.

Mr. Colby concluded, like the other panelists, that theater-range NWs will need to be considered in future arms control negotiations. Increased transparency in the security of nuclear materials could also help increase mutual confidence building (perhaps through future cooperative threat-reduction initiatives). He believed that the parties' continued overarching goals should be to move forward with new arms control activities, but in doing so each side will need to maintain and ensure that they have an effective deterrent. To achieve this, the United States, for instance, will need to increase its funding for the weapons complex, the National Nuclear Security Administration, and further develop conventional strike capabilities. This conventional strike capability will not only maintain conventional deterrence, but also provide adequate conventional options for the United States. He also considered whether the United States should explore rebuilding theater-range weapons, as it could lend support to allies in limited, regional situations. He concluded by noting that the overarching goals for future arms control activities should include theater-range NWs, improved security of nuclear materials, and maintaining an effective deterrent.

During the question and answer session, Dr. Ryabikhin asked Dr. Khrupinov what he saw as the main differences between START I and New START, and additionally, what issues he felt still remain untouched. Dr. Khrupinov began by noting that future arms control negotiations should not dwell on the technicalities. Hereflected on his experiences in the Soviet Union from the 1980s through to 1992, and noted that what was striking between that period and today was that nothing had changed; the same issues remain on each side. For instance, the concerns about first-strike capabilities and the resulting dangers they present for each country are the same concerns from past arms control negotiations.

Dr. Khrupinov also responded by asking why there were still lingering stereotypes and a hidden sense of hostilities between the United States and Russia. To him, it appeared that the only difference from Cold War sentiments is that the United States and the Russian Federation have become benign adversaries. Each seemspoised still to annihilate the other, only today under different conditions and circumstances. Cheating, questions of intent and transparency—all of these issues remain the same as in the past. But he remarked that even at the earliest stages of arms control negotiations between the United States and the Soviet Union, there were many fruitful discussions on confidence-building measures. For instance, the United States placed a priority on confidence-building measures above arms control. But Dr. Khrupinov thought it would be

more feasible to think in terms of the reverse—to first build trust somehow. While many of today's negotiators and experts discuss transparency rather than confidence-building, he thought it was time to seek new visions and break old stereotypes. He provided two past success stories that might illuminate this shift. The first was the Bush-Gorbachev unilateral withdrawal of tactical weapons under the Presidential Nuclear Initiatives of 1991. The second success was the implementation of the INF Treaty. Dr. Khrupinov insisted that we must not dwell on the technicalities of arms control but rather consider fresh perspectives on new confidence-building measures.

An audience member then asked the panel to comment on the nature of the political relationship between the United States and Russia today. General George claimed that there is a genuine, large amount of respect between the presidents of each country. Notably, these two presidents are not as bound by the Cold War sentiments that previous presidents had to contend with. He also stated that there appears to be a growing, healthy relationship between the immediate staff of each president. But beyond this, he does note that there remains some reticence in "warming up" at the government level. However, he remarked that forums such as the Asan Plenum, where people are more comfortable speaking freely and not on behalf of their governments are significantly helping to build relationships.



# Nuclear Energy and Our Green Future

**Plenary Session 3 (Grand Ballroom)**
**June 15, 2011**

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| **Panel** | Simon Long, *The Economist* |
| | Abdelmajid Mahjoub, Arab Atomic Energy Agency |
| | Ellen Laipson, The Stimson Center |
| | Chang Soon Heung, Korea Advanced Institute of Science and Technology |
| | Suzuki Tatsujiro, Japan Atomic Energy Commission |
| **Author** | Jason Portner, Northeastern University |
| **Summary** | The session "Nuclear Energy and Our Green Future" closed the Asan Plenum 2011 with an analysis of the future of nuclear energy as a part of the world's clean-energy portfolio. The panel particularly focused on the viability and challenges of nuclear energy in a post-Fukushima environment. |

Dr. Suzuki began with three points regarding the future of nuclear energy. First, he looked at the definition of a "green future". He argued that although many see a green future as a way to respond to climate change, he would like to broaden this definition to include the promotion of nuclear technology and energy in their own right in a transparent, peaceful, and democratic way. Secondly, he discussed the assessment of nuclear energy after Fukushima. He argued that, in a post-Fukushima world, governments must reassess nuclear energy programs in order to gain the public's trust. This reassessment, according to Dr. Suzuki, should include a review of regulations and safeguards. It should also include all aspects of the cost of nuclear energy, such as nuclear waste.

Dr. Suzuki argued that the lesson from the Fukushima accident is that there should be no nuclear energy without satisfactory safeguards. In response to a statement by Dr. Suzuki that the Japanese parliament has already initiated such a review, moderator Simon Long asked whether Japan's reassessment includes a review of the regulatory framework, which has been criticized as inadequate after the Fukushima disaster. Dr. Suzuki responded that Japan's goal is to set up an independent regulatory framework, although this will take time given the enormity of the task. Finally, Dr. Suzuki argued that although Fukushima was a crisis situation, it could also be a great opportunity tomove toward a green future. For example, one of Japan's goals is to build an eco-friendly area in the earthquake-devastated region.

Dr. Chang then expanded upon Dr. Suzuki's look at the definition of a green future. Dr. Chang included "green growth" as another element, arguing that clean energy will be an important aspect of future econom-

ic growth. Nuclear energy in particular is needed as part of a low-carbon energy portfolio because it is cheaper than other forms of renewable energy, such as solar power. He identified South Korea's nuclear energy as the reason South Korea is able to maintain relatively low electricity prices. Dr. Chang contrasted South Korea's successful energy portfolio with North Korea's inability to provide cheap and abundant electricity. He argued that North Korea would be able to provide electricity for its citizens if it did not spend its resources on nuclear technology for less peaceful means. Finally, promptedby Mr. Long, Dr. Chang joined Dr. Suzuki in his call to take a second look at regulations in moving forward post-Fukushima. Dr. Chang concluded that the Fukushima accident has impacted the attitudes of South Koreans toward nuclear energy by highlighting the need to emphasize nuclear safety when looking at the future of nuclear energy as part of South Korea's clean-energy portfolio.

Ellen Laipson focused on the Persian Gulf region, a region that inmany ways represents the energy resources of the 20th century. She explained that despite the fact that many of the Gulf States are currently able to provide all their energy domestically with fossil fuels, they increasingly need nuclear energy for domestic use. Nuclear energy is necessary because many of the Gulf States made a strategic decision that it is better to deplete their fossil resources more gradually for export while diversifying domestically. Diversification of energy sources is especially important given that the region's resources, such as water, are increasingly scarce and will push energy costs up drastically in the next 30 years.

Ms. Laipson then continued with the theme of the previous speakers in defining a green future. She argued that "green future" is a subjective term and means differentthings for different regions. To many in the Gulf region, it means the ability to sustain their increasingly energy-intensive lifestyles in the long run and provide for the region's deficit in natural resources. This image differs from that in the United States, where a green future is often defined by the daily activities that make one's lifestyle green, such as recycling.

Finally, she predicted that nuclear energy will be a key component of the Gulf's energy portfolio in the future. Saudi Arabia in particular is leading the switch to nuclear energy, although it is still seen as a long-term transition. Even though there is nuclear cooperation at the regional level, Saudi Arabia sees the transition as a national goal and is already enriching uranium itself, an activity which makes the United States nervous given the extremists in the region actively searching for fissile material. Despite the challenges, Ms. Laipson sees nuclear energy, hydrocarbon, and solar poweras the primary sources of renewable energy in the Persian Gulf, a region that is increasingly recognizing the need to include renewables as part of its energy portfolio.

The final speaker, Dr. Mahjoub, began by outlining the future of nuclear energy in the broader Arab world. He agreed with Ms. Laipson that although Arab countries have resisted the development of nuclear energy in the past, the increasing scarcity of resources in the region, coupled with rapid industrial development, necessitate an expansion of nuclear energy. He explained that the extent and cost of climate change in the region will depend on the availability of technologies for green development. Nuclear technology is especially needed to power water desalination as the region finds a means to sustain the population in a way that is less carbon intensive than fossil fuels. The need to desalinate water, he argued, is a particularly salient reason to develop nuclear energy, since the region is expanding agricultural production at a time when the population is rapidly rising and water is becoming increasingly scarce for agriculture, human consumption, and industry.

Although he hopes that solar technology will make a breakthrough so that it can be used year-round, Dr. Mahjoub said that in the meantime, the region needs nuclear power in order to transition from fossil-fuel energy to renewable sources and maintain a stable production of electricity. He concluded with a note of caution regarding the intersection of nuclear energy and efforts to control the proliferation of nuclear weapons. He argued that stopping the proliferation of nuclear weapons should not be a reason to deny the region nuclear technology, especially given the region's strong need for effective disposal of nuclear waste.

The panelists all expressed a positive outlook on the future of nuclear energy, to the point that some were questioned by audience members about their seemingly uncritical optimism. During the question-and-answer session, one audience member, noting that human error was involved in every nuclear disaster, asked Dr. Chang how human error can be minimized to prevent future catastrophes. Dr. Chang responded that the best way to reduce human error is to create the best possible safety manual and educate operators on the use of that manual.

Another audience member asked Dr. Mahjoub how he would guarantee the security of a peaceful nuclear reactor in the future, noting that Israel has no civil nuclear program because of the fear of a terrorist attack. Dr. Mahjoub suggested that there is no security problem in the Arab countries, stating that all Arab countries have signed agreements and ratified all treaties with the International Atomic Energy Agency (IAEA) with regard to regulation and the fulfillment of national safety standards. The IAEA's role, he explained, is to regulate and inspect uranium resources within user and producer countries. Dr. Mahjoub concluded that all Arab countries are carrying out nuclear safety and security programs under close cooperation with each other.

Despite their optimism, the panelists agreed that there are obstacles to nuclear energy, such as disagreements over cost projections and safety concerns. They agreed that, especially in a post-Fukushima world, a renewed look at regulations, safety, and security is needed to secure the public's trust in nuclear energy as we move toward our nuclear future.

## Participant Biographies

### Abe Nobuyasu

**Director, CPDNP, Japan Institute for International Affairs (JIIA)**

Ambassador Abe is currently the director of the Center for the Promotion of Disarmament and Non-Proliferation (CPDNP) at JIIA. He has served as consul-general in Boston, and as ambassador to Austria and Saudi Arabia. Between 2003 and 2006, he was undersecretary-general of the UN for Disarmament Affairs, and was a member of the advisory board to the International Commission on Nuclear Non-proliferation and Disarmament (ICNND).

### Arabinda Acharya

**Research Fellow, International Centre for Political Violence and Terrorism Research,**
**Nanyang Technological University**

Dr. Acharya is a research fellow and the head of Strategic Projects at the International Centre for Political Violence and Terrorism Research in the School of International Studies at Nanyang Technological University in Singapore. He is a visiting professor at the department of geo-politics at Manipal University and the deputy director of the Centre for Peace and Development Studies in India. Dr. Arabinda is listed in the UN Alliance of Civilizations' Roster of Experts for expertise on regionalism, human security, and terrorism.

### Naeem Ahmed

**Assistant Professor, Department of International Relations, University of Karachi**

Dr. Ahmed is an assistant professor in the Department of International Relations at the University of Karachi. He received his Ph.D. there in 2007. Professor Ahmed is also a member of the Council of Social Sciences in Pakistan and the president of the Fulbright Alumni Association. He specializes in the domestic and regional security of South Asia with special focus on religious extremism and terrorism, nuclear issues, and Kashmir. Professor Ahmed is one of the first two South Asians to be selected for the Hansard Society's Research Scholar Program at the London School of Economics.

### Ahn Chak-hee

**Deputy General Manager, jTBC**

Ahn Chak-hee is currently a deputy general manager in jTBC. She worked for Arirang as a main anchor from 1998 to 2011. She was also nominated as chief director for the broadcasting product department in 2004. She is the first woman to be appointed as head director of a Korean broadcasting center. Prior to this, she worked for YTN broadcasting station, and Korea Report news, the first Korean news to be reported in English. She continued her career as the Blue House correspondent. She graduated from the Department of English and English Literature at Yonsei University.

### Ahn June Ho

**Research Advisor, KINAC**

Mr. Ahn worked at the IAEA from 1980 to 2010 as a senior inspector in the safeguards department. During his 30 years of service at the IAEA, he was appointed as alternative to the head of Toronto regional office, IAEA safeguards project manager at the Darlington Nuclear Generating Station in Canada, as well as a member of the Technical Review Committee. Prior to his work at the IAEA, he was the assistant section head of the Nuclear Cooperation and Safeguards Directorate of the Atomic Energy Bureau at the Ministry of Science and Technology from 1977 to 1980.

### Hossam Eldeen Aly

**Counsellor, Permanent Mission of Egypt to the United Nations, Ministry of Foreign Affairs, Egypt**

Dr. Aly has been the disarmament and international security counselor of the Permanent Mission of Egypt to the UN since 2007. For over two decades, his diplomatic career centered on disarmament, non-proliferation, and arms control. From 2005, he served as director for disarmament affairs in the Ministry of Foreign Affairs of Egypt after serving for over five years as a senior international cooperation officer at the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in Vienna. He holds a Ph.D. in political science from the University of Vienna.

### Viacheslav Amirov

**Director, Center for Asia Pacific Studies, Institute of World Economy And World Economy (IMEMO)**

Dr. Amirov is the director for research at the Center for Asia Pacific Studies. He is also a member of the Committee of Scientists for Global Security and Arms Control. Dr. Amirov is currently focusing on Russia's posture in the Asia Pacific region, Trans-Pacific security issues, and U.S.-China relations. Some of his most recent publications include Twentieth Anniversary of Diplomatic Relations between Moscow and Seoul, and Russia's Posture in Policy towards Northeast Asia. Dr. Amirov holds a Ph.D. in economics.

### Baek Won Pil

**Vice President, Department of Nuclear Safety Research, Korea Atomic Energy Research Institute (KAERI)**

Mr. Baek is the vice president of the Department of Nuclear Safety Research at KAERI. He is also the head of the Thermal-hydraulic Safety Research Center of KAERI. His areas of research include physical integrity, system behavior, risk management, and environmental protection.

### Peter M. Beck

**Research Fellow, Council on Foreign Relations-Hitachi Fellowship**

Professor Beck is a research fellow in the Council on Foreign Relations-Hitachi at Keio University. He is also a visiting POSCO fellow at the East-West Center in Honolulu. He teaches at American University in Washington, D.C. and Ewha University in Seoul. Previously, he was the 2009-10 Pantech research fellow at Stanford University. He has served as the executive director for the U.S. Committee for Human Rights in North Korea and directed the International Crisis Group's Northeast Asia Project in Seoul. He was also the director of Research and Academic Affairs at the Korea Economic Institute in Washington DC.

### Burwell B. Bell

**Former Commander, U.S. Forces Korea**

General Bell retired from the U.S. Army in 2008. As a four-star general, he commanded the U.S. Army in Europe, as well as NATO's Land Component Headquarters in Heidelberg, Germany. Subsequently, he served as the commander of U.S. Forces Korea, U.S.-ROK Combined Forces Command, and UN Command. A member of the Council on Foreign Relations, General Bell has a master's degree from the University of Southern California, and holds three honorary doctorate degrees. He speaks, writes, and lectures frequently on Northeast Asian Security matters, including the North Korean nuclear problem.

### Edward Blandford

**Science Fellow, Center for International Security and Cooperation (CISAC), Stanford**

Mr. Blandford is a postdoctoral science fellow at CISAC. His research focuses on nuclear reactor design at the system level as it impacts security and safety issues for nuclear infrastructure. He received his Ph.D. in nuclear engineering at UC, Berkeley. Prior to pursuing graduate work, he worked at the Electric Power Research Institute as a project manager where he managed all steam generator thermal-hydraulics related research activity.

### Szymon Bochenski

**Sous-sherpa, Ministry of Foreign Affairs, Republic of Poland**

Mr. Bocheński is the Polish sous-sherpa for the 2012 Nuclear Security Summit to be held in Seoul. Since 2004 he has been responsible for nuclear nonproliferation and disarmament issues in the Ministry of Foreign Affairs of the Republic of Poland. He is an alumnus of the International Training Course at the Geneva Center for Security Policy, and did his postgraduate work in national security at the University of Warsaw.

### James Bonomo

**Senior Physical Scientist, RAND Corporation**

Mr. Bonomo is a senior physical scientist at RAND. His recent projects include planning of research and development within the national security agencies of the federal government, most recently for the Missile Defense Agency and analysis of the potential terrorist use of advanced conventional weapons and how to counter such use. Mr. Bonomo's many publications include Stealing the Sword: Limiting Terrorist Use of Advanced Conventional Weapons, Suggestions for Strategic Planning for the Office of Nonproliferation Research and Engineering, and Monitoring and Controlling the International Transfer of Technology.

### Chaim Braun

**Consultant Professor, Center for International Security and Cooperation (CISAC), Stanford**

Dr. Braun has thirty-three years of management and consulting experience in the electric and nuclear power industry. He is now a consulting professor at CISAC where he conducts studies related to international nuclear energy and fuel cycle developments, and the related possible spread of nuclear proliferation. He has coined the term 'Proliferation Rings' to denote states synergistically supporting each other in enhancing their WMD proliferation potential. He received his education in chemical and nuclear engineering, nuclear chemistry and in operations research in the Technion and in the Weizmann Institute in Israel, and in Cornell University.

### Linda Briza

**Director, Security Studies in the Ministry of Foreign Affairs, Algeria; Sous-Sherpa, Algeria**

Ms. Briza is the director of Security Studies in the Ministry of Foreign Affairs, Algeria. She is also the Algerian sous-sherpa for the preparation of the Second Nuclear Security Summit slated to be held in Seoul in 2012. Ms. Briza is a post-graduate of political science from the University of Algiers. She joined the Algerian diplomatic service in 1995 and has been in charge of several assignments including as a nuclear affairs officer and deputy director for security and disarmament affairs before becoming a member of the Foreign Ministry cabinet.

### Elaine Bunn

**Distinguished Research Fellow, National Defense University (NDU)**

Ms. Bunn is a distinguished research fellow at the Center for Strategic Research at NDU. She has worked for 20 years in international security policy. From 1993 to 1998 she served as the principal director for Nuclear Forces and Missile Defense Policy, and in 1994, she was the executive director of the Nuclear Posture Review. She has written widely on strategic planning, nuclear policy, missile defense, preemption, and deterrence.

### John Carlson

**Visiting Fellow, Lowy Institute**

Mr. Carlson was the director general of the Australian Safeguards and Non-Proliferation Office from 1989 to 2010, and chairman of Standing Advisory Group on Safeguard Implementation (SAGSI) from 2001 to 2006. He is the founding chair of the Asia-Pacific Safeguards Network. He is also a fellow of the Institute of Nuclear Materials Management, and recipient of the institute's Distinguished Service Award.

### Chang Soon Heung

**Professor, Nuclear and Quantum Engineering, Korea Advanced Institute of Science and Technology (KAIST)**

Dr. Chang received his Ph.D. in nuclear engineering from MIT in 1981. He is a professor at KAIST and sits on OECD's NEA (Nuclear Energy Agency) Committee on the Safety of Nuclear Installations (CSNI). His research interests are in nuclear safety assessment, including critical heat flux phenomena, sodium-cooled fast reactor safety analysis and design, thermal-hydraulic characteristic research on nano-fluids, spent nuclear fuel repository and storage, and gas-cooled reactor safety analysis

### Cheon Seong-Whun

**Senior Research Fellow, Korea Institute for National Unification (KINU)**

Dr. Cheon is a senior research fellow at KINU. He received his Ph.D. in management sciences from the University of Waterloo, Canada. Currently, he is a member of the Foreign Affairs and Security Bureau at the Presidential Council for Future and Vision as well as the Policy Advisory Committees for the Ministry of Unification. Previously, he was a member of the Policy Advisory Committee for the Ministry of National Defense as well as the Advisory Commission for the Foreign Affairs, Trade and Unification Committee in the National Assembly of Korea.

### Alvin Chew

**Adjunct Fellow, Centre for Non-Traditional Security Studies at the S. Rajaratnam School of International Studies, Nanyang Technological University**

Mr. Chew is an adjunct fellow in the Centre for Non-Traditional Security (NTS) Studies at the S. Rajaratnam School of International Studies (RSIS) at Nanyang Technological University. His research interests include

nuclear energy developments for the region, with particular focus on energy cooperation. He has worked in the areas of Revolution in Military Affairs (RMA) and military transformation, and also taught at the Singapore Armed Forces Military Institute. Prior to joining RSIS, he was employed at the Defence Science and Technology Agency (DSTA).

### Jorshan Choi

**Berkeley Nuclear Research Center (BNRC)**

Dr. Choi, before joining BNRC, was most recently a project professor at the University of Tokyo. His areas of teaching and research interests include non-proliferation, nuclear fuel cycle, and proliferation-resistant technologies, as well as international and regional cooperation of peaceful use of nuclear energy. Previously, Dr. Choi worked for the Lawrence Livermore National Laboratory for 21 years, developing corrosion-resistant material for long-term spent fuel containers, and pursuing various initiatives in nuclear non-proliferation and proliferation-resistant fuel cycle technologies. He also worked at the IAEA from 1998 to 2001.

### Elbridge Colby

**Research Analyst, Center for Naval Analyses**

Mr. Colby is a research analyst at the Center for Naval Analyses. From 2009 to 2010, he served as policy advisor to the Secretary of Defense's representative to the New START talks, serving both on the delegation in Geneva and then as point man for the treaty ratification effort. A term member of the Council on Foreign Relations and a member of the International Institute for Strategic Studies (IISS), Mr. Colby is a graduate of Harvard College and Yale Law School.

### Ralph Cossa

**President, Pacific Forum CSIS**

Mr. Cossa is the president of the Pacific Forum CSIS in Honolulu. He is a board member of the Council on U.S.-Korean Security Studies and the National Committee on U.S.-China Relations, as well as a member of the International Institute for Strategic Studies (IISS), the ASEAN Regional Forum Experts and Eminent Persons Group, and a founding member of the Steering Committee of the Council for Security Cooperation in the Asia Pacific (CSCAP). He is a political, military affairs, and national security specialist with more than 30 years of experience in formulating and implementing U.S. security policy in the Asia-Pacific and Near East-South Asia regions.

### Barthélémy Courmont

**Research Fellow, Institute for International and Strategic Relations (IRIS)**

Mr. Courmont is a professor in the political science department at Hallym University, in Korea. In addition, he is an associate-research fellow at the Paris-based IRIS and associate director of security and defense. He is also the Raoul-Dandurand Chair in strategic and diplomatic relations at the Université du Québec à Montréal. His fields of studies cover nuclear issues, U.S. foreign policy, and Northeast Asian politics.

### Peter Crail

**Research Analyst, Arms Control Association (ACA)**

Mr. Crail has been a research analyst on nuclear and missile proliferation at ACA since 2007. Prior to that, he worked as a research assistant with the Center for Nonproliferation Studies and as a consultant for the UN Department for Disarmament Affairs. At the association, he is responsible for monitoring, researching, and reporting on weapons of mass destruction developments in the Middle East, South Asia, and Northeast Asia, as well as developments at the IAEA. Now his primary area of research includes international non-proliferation regimes, counter-proliferation, Iran, and North Korea.

### Patrick Cronin

**Senior Advisor and Senior Director, Asia Program, Center for a New American Security (CNAS)**

Dr. Cronin is a senior advisor and director of the Asia-Pacific Security Program at CNAS. Previously, he was the director of the Institute for National Strategic Studies at the National Defense University and has had a 25-year career inside government and academic research centers, spanning defense affairs, foreign policy, and development assistance. Dr. Cronin also served at the International Institute for Strategic Studies (IISS), CSIS, and the U.S. Agency for International Development. Dr. Cronin has taught at several universities, including Georgetown University, Johns Hopkins University, and the University of Virginia.

### Victoria Curzon-Price

**Professor, University of Geneva**

Dr. Curzon Price is a professor of economics at the University of Geneva. She was previously director of the European Institute (1994-1998), member of the Governing Council of the University of Geneva (2003-2007), president of the Mont Pelerin Society (2004-2006), and a deputy of the Parliament of Canton of Geneva (2008-2009). She is a member or of the board of many research institutes including the Institute of Economic Affairs (IEA), London; the Centre d'Etudes et de Recherches sur le Monde Arabe et Méditerranéen (CERMAM) Geneva; and the Asan Institute of Policy Studies.

### Ola Dahlman

**Chair, Working Group on Verification, CTBT**

Dr. Dahlman has been engaged in arms control negotiations for over 30 years. He chaired the Group of Scientific Experts (GSE) before and during the negotiations of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) from 1982 to 1996. He headed the Working Group on verification issues at the Preparatory Commission for the CTBT Organization from 1996 to 2006. Dr. Dahlman spent his entire professional career at the Swedish Research Defense Institute (FOI) in Stockholm, ending in 2000 as the deputy director general.

### Ferenc Dalnoki-Veress

**Research Scientist, Center for Nonproliferation Studies (CNS), Monterey Institute**

Dr. Dalnoki-Veress joined CNS in April 2009 as a research scientist to work on issues of nuclear disarmament and on aspects of global proliferation of fissile materials. He holds a Ph.D. in high energy physics from Carleton University, specializing in ultra-low radioactivity background detectors. He has professional experience in the field of astroparticle physics and has focused primarily on fundamental research in neutrino physics.

### Paul Davis

**Senior Principal Researcher, RAND Corporation**

**Professor, Pardee RAND Graduate School**

Dr. Davis is a senior principal researcher at RAND and a professor of policy analysis in the Pardee RAND Graduate School. His most recent publications include Looming Discontinuities in U.S. Military Strategy and Defense Planning, Social Science for Counterterrorism: Putting the Pieces Together, and Developing Resource-Informed Strategic Assessments and Recommendations. Dr. Davis holds a bachelor's degree from the University of Michigan and a Ph.D. in chemical physics from MIT.

### M. Scott Davis

**Deputy Director, Office of Multilateral Nuclear and Security Affairs, U.S. Department of State**

M. Scott Davis' area of responsibility is nuclear nonproliferation, primarily the Nuclear Nonproliferation Treaty and International Atomic Energy Agency issues. Prior to moving to the State Department, he was Deputy Director in the Office of Nonproliferation Policy at the Department of Energy. Mr. Davis has also worked as an expert on nuclear safeguards issues at the International Atomic Energy Agency, an action officer on a range of nonproliferation issues — particularly nuclear export controls — at the Arms Control and Disarmament Agency, and an analyst on a variety of international security issues at the Carnegie Endowment for International Peace, the Woodrow Wilson International Center for Scholars, and the Roosevelt Center for American Policy Studies. He is a Distinguished Graduate of the U.S. National War College, and holds a Masters Degree from the Fletcher School of Law and Diplomacy and a Bachelors Degree from the University of North Carolina at Chapel Hill.

### Martin Fackler

**Tokyo Bureau Chief, *The New York Times***

Mr. Fackler is the Tokyo bureau chief for The New York Times. He has masters' degrees from the University of Illinois at Urbana Champaign and the University of California, Berkeley. He has also worked in Tokyo for The Wall Street Journal, The Far Eastern Economic Review, The Associated Press, and Bloomberg News. He joined The New York Times in 2005. He covers Japan and the Korean Peninsula.

### Nicholas Fang

**Director, Singapore Institute of International Affairs**

Nicholas graduated from Oxford University with a master's in politics, philosophy, and economics. He has been a journalist for 11 years, and spent nine of those years at Singapore's national daily newspaper, The Straits Times. There he reported on financial and sports news, and also wrote lifestyle columns and special reports. He rose to the post of Senior Correspondent. He then spent two years as business desk editor at national broadcaster MediaCorp's News Asia. A former national athlete, Nicholas also hosted the International Olympic Committee meeting in Singapore in 2005. He joined the Singapore Institute of International Affairs in 2010 where he is currently director.

### Rick Fawn

**Senior Lecturer, University of St. Andrews**

Dr. Fawn is a specialist on international security, with a geographic concentration on the former communist zone. He has conducted research on Central Europe, the Balkans, Russia, the Caucasus, and Central Asia. Dr. Fawn has received research grants from various bodies, including the British Academy, the Nuffield Foundation, the Russell Trust, and the Carnegie Trust for the Universities of Scotland.

### Alexey V. Fenenko

**Leading Research Fellow, Institute of International Security Stuides (IISS), Russian Academy of Sciences**

Dr. Fenenko is currently the leading research fellow at IISS. He is also a lecturer at Moscow State University and Voronezh State University, and a project coordinator for the Academic Educational Forum on International Affairs. His areas of expertise are national security and arms control, space security, international conflict, and globalization. He earned his Ph.D. in history at the Voronezh State University.

### Edwin J. Feulner

**President, The Heritage Foundation**

Dr. Feulner is the president of The Heritage Foundation. He received an MBA from the University of Pennsylvania's Wharton School of Business in 1964, and a Ph.D. at the University of Edinburgh in 1981. He has been a public affairs fellow for CSIS and a confidential assistant to Defense Secretary Melvin R. Laird. Before joining Heritage as its president, Dr. Feulner was the executive director of the Republican Study Committee.

### Trevor Findlay

**Professor, Centre for International Governance Innovation, Carleton University**

Dr. Findlay completed his Ph.D. in international relations at the Australian National University and spent 13 years in the Australian Foreign Service, with postings in Tokyo, Mexico City and Geneva. At the Centre for International Governance Innovation (CIGI), he applies his expertise to global governance institutions, treaty compliance, and nuclear non-proliferation as leader of the project on strengthening and reforming the IAEA, being conducted in partnership with the Canadian Centre for Treaty Compliance.

### Chuck Freilich

**Senior Fellow, Harvard Kennedy School**

Dr. Freilich is now a senior fellow at the Harvard Kennedy School, where he recently completed a book on the Israeli national security decision-making processes. Prior to joining the Kennedy School, he served as a deputy national security adviser in Israel. His primary areas of expertise are the Middle East, U.S. Middle East policy, and Israeli national security policy. He has taught political science at Harvard, NYU, Columbia, and Tel Aviv Universities. Dr. Freilich was a senior analyst at the Israel Defense Ministry, policy advisor to a cabinet minister, and a delegate at the Israeli Mission. He earned his Ph.D. from Columbia University.

### Fujiie Yoichi

**Professor Emeritus, Tokyo Institute of Technology**

Dr. Fujiie graduated from the Department of Physics at the University of Tokyo in 1958, and received his Ph. D in 1963. He worked as an associate professor of the Department of Nuclear Engineering at Osaka University, and rendered distinguished service in the study on nuclear reactor systems and the safety of advanced nuclear systems covering fast reactors and advanced thermal reactors. In 1986, he joined the Tokyo Institute of Technology, and was promoted to be the head of the laboratory in 1989. In 2001, he was appointed as chairperson of the Atomic Energy Commission of Japan.

### Furukawa Katsu

**Fellow, Research Institute of Science and Technology for Society (RISTEX)**

Mr. Furukawa is a fellow at RISTEX in the Japan Science and Technology Agency. There, he is in charge of projects on science, diplomacy, and security. He is also a member of the Council of Asian Transnational Threat Research, and a lecturer for the UN Security Council Resolution 1540 Committee Regional Workshop. He holds a bachelor's degree in economics from Keio University, and a master's of public administration from John F. Kennedy School of Government at Harvard.

### Jonathan D. George

**GS-NSO-Strategy and Policy, Lawrence Livermore National Laboratory**

General George is the director of strategic capabilities policy for the U.S. NSC. He was commissioned in 1981 and has had a variety of operational and staff assignments, including command of a bomber squadron, a bomber group, an air expeditionary wing, a bomber wing, and an intelligence, surveillance, and reconnaissance wing. His staff assignments have been at the headquarters of the U.S. Air Force, U.S. Strategic Command, U.S. Embassy in Kabul, the Department of Agriculture, and the Department of Energy.

### Brad Glosserman

**Executive Director, Pacific Forum CSIS**

Mr. Glosserman is executive director of the Pacific Forum CSIS in Honolulu. He also directs the Pacific Forum's Young Leaders program. Glosserman is the editor of Comparative Connections, the Pacific Forum's quarterly electronic journal, and originally wrote the section on U.S.-Japan relations.

### Dominique Grenêche

**CEO, Nuclear Consulting**

Dr. Greêche received his Ph.D. in nuclear physics in 1973, from the University of Paris. He worked at the French Atomic Energy Commission on nuclear reactor physics, and then spent two years at the General Atomic Company from 1978 to 1980, to work on high-temperature reactors. He is now an international expert, working for large companies such as AREVA in France and for international organizations such as the IAEA. In parallel to these consultant activities, he is a professor of nuclear engineering in several engineering schools and universities in Europe.

### Hahn Choong-hee

**Sous-Sherpa, Ministry of Foreign Affairs and Trade (MOFAT), Republic of Korea**

Mr. Hahn is the ROK sous-sherpa for the 2012 Seoul Nuclear Security Summit. As a career diplomat, his areas of expertise include North Korean nuclear affairs and the Six-Party Talks, nuclear nonproliferation, regional architecture in Northeast Asia, and ROK-U.S. relations. Mr. Hahn served as deputy director-general for North Korean Nuclear Affairs in MOFAT, where he attended the Six-Party Talks. Prior to this position, he served as director for North American Affairs in the ministry and acting director for Policy and DPRK at the Korean Peninsula Energy Development Organization (KEDO) in New York.

### Nicholas Hamisevicz

**Sous-Sherpa, Ministry of Foreign Affairs and Trade (MOFAT), Republic of Korea**

Nicholas Hamisevicz is the Director of Research and Academic Affairs at KEI. He is responsible for issues related to North Korea and for academic outreach. He organizes and speaks in KEI's numerous university programs and academic symposia around the country. Mr. Hamisevicz is also responsible for programming and publications related to North Korea.

Prior to joining KEI, Mr. Hamisevicz was the Research Associate in the Asian Studies Center at The Heritage Foundation. He wrote and provided research analysis on political and security affairs in Asia, especially regarding China, Korea, and South Asia. He was also a co-author for Heritage's publication of the Key Asian Indicators: A Book of Charts. Mr. Hamisevicz traveled twice to Taiwan as the lead liaison for The Heritage Foundation's democracy building in Asia conferences.

Mr. Hamisevicz earned a Masters of Arts degree in International Communication from American University in Washington, DC and a Masters of Arts degree in International Studies from Korea University in Seoul, South Korea. He graduated Summa Cum Laude with a Bachelor of Arts degree in Communication Studies from West Virginia Wesleyan College in Buckhannon, West Virginia.? He is also working to improve his intermediate Korean language skills.

### Han Sung Joo

**Director of Research and Academic Affairs, Korea Economic Institute**

Dr. Han received his Ph.D. in political science from the University of California, Berkeley in 1970. He went on to a distinguished career in the Korean government, serving as Minister of Foreign Affairs from 1993 to 1994 and as ambassador to the United States from 2003-2005. In between, he served as the UN Secretary-General's's special representative to Cyprus from 1996-1997, and was a member of the UN's 1999 Inquiry Commission on the 1994 Rwanda Genocide. Dr. Han is the former chairman of the Asan Institute for Policy Studies.

### Alan Hanson

**Executive Vice President, Technologies and Used Fuel Management, AREVA Nc Inc.**

Dr. Hanson is the executive vice president of Technologies and Used Fuel Management of AREVA Nc Inc. He joined the IAEA in 1979, serving first as coordinator of the International Spent Fuel Management Program and later as policy analyst with responsibilities in the areas of safeguards and non-proliferation policies. He earned his Ph.D. in nuclear engineering from MIT in 1977.

### Benjamin Hautecouverture

**Research Fellow, Foundation for Strategic Research (FRS)**

Mr. Hautecouverture is a research fellow for nonproliferation and disarmament issues at FRS and at the Center for Arms Control and International Security (CESIM) in Paris. As a member of FRS, he is currently conducting two European Union projects on the global nuclear nonproliferation regime. He is also the editor of The Nonproliferation Monthly, monthly newsletter on proliferation, nonproliferation, and disarmament issues related to nuclear, biological, chemical weapons, and their delivery systems. The areas of his research include nuclear security, the Nuclear Posture Review process, and the European Union strategy against the spread of weapons of mass destruction.

### Corey Hinderstein

**Vice President, International Program, Nuclear Threat Initiative (NTI)**

Ms. Hinderstein leads NTI's efforts related to building norms, regimes, and frameworks for global nuclear non-proliferation and security. Her areas of focus include minimizing uses of highly enriched uranium, management and verification of nuclear fuel cycle activities internationally, improving nuclear security, and other

nuclear risk reduction efforts.

### Emile Hokayem

**Senior Fellow for Regional Security, International Institute for Strategic Studies (IISS)**

Mr. Hokayem is senior fellow for Regional Security in IISS's Middle East office in Manama, Bahrain. Previously he worked as political editor and international affairs columnist for the Abu Dhabi based newspaper, The National. From 2004 to 2008 he was research fellow at the Stimson Center. His research focuses on Iran-GCC relations, regional security in the Gulf and Middle East, and the role of outside actors in the Middle East.

### Zachary Hosford

**Research Associate, Center for a New American Security (CNAS)**

Zachary Hosford is research associate at CNAS. He previously served as both the executive assistant and the special assistant to the two co-founders of the organization, Kurt Campbell and Mich?le Flournoy, as well as the special assistant to the current CEO, Nathaniel Fick. His research at CNAS centers on U.S. and East Asian defense issues, including acquisition and nuclear weapons policy. Some of his recent work has focused on China's naval modernization, the U.S.-China nuclear relationship, South Korean defense capabilities and priorities, U.S. policy regarding North Korean nuclear activities, and Aum Shinrikyo's chemical and biological weapons programs.

### Roger Howsley

**Executive Director, World Institute for Nuclear Security (WINS)**

Dr. Howsley is the executive director of WINS. He was the former director of Security, Safeguards and International Affairs (SSIA) for British Nuclear Fuels Ltd. and has over 25-years of international experience relating to nuclear non-proliferation and security across the nuclear fuel cycle, working with the IAEA, Euratom, National Police Forces, and security organizations.

### Athanasios Hristoulas

**Professor, Instituto Tecnológico Autónomo de México (ITAM)**

Dr. Hristoulasis a professor of international relations ITAM. He is also the coordinator of the diploma course on national security at the same institution. He is a member of the National System of Researchers, Level I. He received his Ph.D. in political science from McGill University in 1996. Before moving from Canada to Mexico, he was the military and strategic studies postdoctoral fellow at the Norman Paterson School of International Affairs. He has published extensively on Mexican national security policy, Canadian foreign policy, and North American security cooperation.

### Paul Hughes

**Director of Nonproliferation and Arms Control Program, United States Institute of Peace (USIP)**

Mr. Hughes is the director of USIP's Nonproliferation and Arms Control Program as well as a senior program officer with the Center for Conflict Analysis and Prevention. He previously served as the executive director of the Quadrennial Defense Review Independent Panel and the Congressional Commission on the Strategic Posture of the United States, and as the director of Iraq programs in the Center for Post-Conflict Peace and Stability Operations. Prior to joining USIP, he served as an active duty Army colonel and as the Army's senior military fellow to the Institute for National Security Studies of the National Defense University.

### Mohamed Tarek Hussein

**Professor, Nuclear and High Energy Physics, Cairo University**

Dr. Hussein is a theoretical physicist whose research focuses on phenomenological models of hadronic interactions in particle physics and the clustering phenomena of particle production in hadron-nucleus and nucleus-nucleus interactions. He was the president of the Academy of Scientific Research and Technology in Egypt from 2008 to 2010 and professor of theoretical physics and vice dean for education at the faculty of science of Cairo University from 2004 to 2007. A member in the council of the Atomic Energy Authority of Egypt, he was selected as the vice president of SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East) project in 2010.

### Hwang Yongsoo

**Principal Researcher, Korea Atomic Energy Research Institute (KAERI)**

Dr. Hwang is currently working as visiting fellow at CSIS in Washington DC. He is also principal researcher at KAERI. He got his master's and Ph.D. degrees from the University of California, Berkeley in the field of nuclear chemical engineering. He has worked as a lab director and a project manager for High Level Waste Disposal & Wolsong Repository Safety Assessment, Nuclear Fuel Cycle Strategy Development, Policy Development for Long Term Spent Fuel Management, East Asia Nuclear Non-proliferation, U.S-ROK Nuclear Cooperation, and others.

### Aleksandr Ilitchev

**Senior Officer, Department of Political Affairs, United Nations**

Mr. Ilitcehv is a career diplomat, with the United Nations Secretariat since 1992. He is responsible for Northeast Asia, as well as the ASEAN Regional Forum, and regional security issues. Prior to joining the UN he served continuously in the Russian Foreign Ministry from 1974. He received an M.A. in international relations and journalism from the Moscow State Institute for International Relations in 1974.
In addition to Russian, he speaks English, Arabic, and French.

### Vladimir Ivanov

**Director, East West Institute (EWI), Moscow Office**

Dr. Ivanov is the director of the East West Institute's Branch in Russia. He is currently involved in all EWI's projects with a 'Russia dimension,' particularly on reframing the Euro-Atlantic Security, Ballistic Missile Defence, and Cyber security. Dr. Ivanov played a leading role in EWI's cooperation with Russia on promoting international private-public partnerships to combat terrorism in such areas as cyber security, critical infrastructure protection, and countering illicit trade in precious metals and gemstones. He also is an associate professor with the Moscow State Institute of International Relations lecturing in public relations and journalism.

### Iwata Shuichi

**Professor, University of Tokyo**

Dr. Iwata is president of the Committee on Data for Science and Technology, professor at the Graduate School of Frontier Sciences at the University of Tokyo, chairman of the 122 Committee, and JSPS/vice-chairman of the Knowledge Infrastructure Committee at the Ministry of Education, Culture, Sports, Science, and

Technology (MEXT) and Ministry of Economy, Trade, and Industry (METI). Dr. Iwata earned his degree in nuclear engineering in 1975 from the University of Tokyo.

### Jun Bong-Geun

**Professor, IFANS**

Mr. Jun is director-general for national security and unification studies at South Korea's Institute for Foreign Affairs and National Security (IFANS).

### Kang Ki-Sig

**Technical Head (PLiM/LTO), Nuclear Power Engineering Section, IAEA**

Mr. Kang has over 25 years of experience in various aspects of engineering and operation of nuclear power plant life cycle management. During the last ten years, Mr. Kang has participated in nuclear power plant life-cycle management related activities, by means of solving technical problems to enhance nuclear safety and managing various programs by providing knowledge and expertise to the IAEA. Before joining the IAEA, his position was project manager of implementation and team programs for engineering and operations in the Korea Power Engineering Company (KOPEC).

### Katsuta Tadahiro

**Associate Professor, Meiji University**

Mr. Katsuta is currently an associate professor at Meiji University. From 2008 to 2009, he did research on multilateral nuclear fuel cycle system as a visiting researcher at Princeton University. From 2006 to 2008, he did research on the separated plutonium management problem in Japan caused by Rokkasho reprocessing plant operation at the University of Tokyo. Mr. Katsuta received a Ph.D. in plasma physics from Hiroshima University in 1997.

### Feroz Khan

**Lecturer, Naval Postgraduate School**

Mr. Khan is a lecturer in the Department of National Security Affairs at the Naval Postgraduate School in Monterey, California, where he has been since 2003. He served in the Pakistani Army for 32 years, retiring with the rank of Brigadier General. During his service, he made key contributions to formulating and advocating Pakistan's security policy on nuclear and conventional arms control and strategic stability in South Asia. He is currently writing a book on Pakistan's nuclear program and U.S. policy.

### Masood Khan

**Pakistani Ambassador to China**

Mr. Khan is Pakistan's ambassador to China, a post which he has held since 2008. Prior to his current assignment, from 2005 to 2008, he was Pakistan's permanent representative to the UN and other international organizations in Geneva. Earlier, Mr. Khan worked as Foreign Office spokesman in Islamabad; director-general to the UN Disarmament; and director-general in East Asia and Pacific region. He was president of the Conference on Disarmament from June to August in 2005.

### Igor Khripunov

**Professor, Center for International Trade and Security, University of Georgia**

After six years of employment with the UN Secretariat in New York, Dr. Khripunov joined the Russian Ministry of Foreign Affairs in 1977. In 1983, he received his Ph.D. in international relations from the Moscow-based Diplomatic Academy and resumed his diplomatic career as an arms control expert. After resigning from the Russian Foreign Service in 1992, he joined the Center for International Trade and Security (formerly the Center for East-West Trade Policy) at the University of Georgia and is now a distinguished fellow as well as adjunct professor for the University of Georgia's School of Public and International Affairs. He is also a consultant to the IAEA.

### Kim Byung Koo

**Professor, Konyang University**

Mr. Kim, otherwise known as BK, was recruited by the IAEA in 2002. Mr. Kim has served as IAEA Technical Cooperation Director for all regions of the world and retired in 2008. He is a visiting professor at KAIST and Konyang University in Daejeon, teaching "Nuclear Energy Policy" and "International Relations." Mr. Kim served as a member of Standing Advisory Group in Safeguards Implementation as an advisor to the IAEA Director-General until 2001.

### Kim Sung-han

**Professor, Director of Ilmin International Relations Institute, Korea University**

Dr. Kim is a professor and associate dean at the Graduate School of International Studies (GSIS) and the director of the Ilmin International Relations Institute at Korea University. From 1994 to 2007, Dr. Kim was a professor at the Institute of Foreign Affairs and National Security (IFANS). He has also served as Vice President of the Korean Association of International Studies and as President of Korean Association of American Politics. A prolific contributor to scholarly journals, Dr. Kim advises several governmental legislative and executive bodies. A specialist in U.S. foreign policy and international security, he earned a Ph.D. from the University of Texas at Austin.

### Kim Sung-Hwan

**Minister, Ministry of Foreign Affairs and Trade (MOFAT), Republic of Korea**

Mr. Kim graduated from the department of economics at Seoul National University in 1976, and later studied at School of Slavonic and East European Studies at the University of London. He served as the deputy minister for planning and management at MOFAT from January 2005. In June 2008, Mr. Kim served as the senior secretary to the president for foreign Affairs and trade and was subsequently appointed as minister of foreign affairs and trade in October 2010.

### Kim Taewoo

**Researcher, Korea Institute of Defense Analyses (KIDA)**

Mr. Kim is a researcher at Korea Institute of Defense Analyses (KIDA) at the division of Center for Military Planning. He has his master's degree at Graduate School of International & Translation Hankuk University of Foreign Studies. Kim's fields of research are DM&S policy, international cooperation, standard data system, C4ISR effectiveness analysis.

### Bruce Klingner

**Senior Research Fellow, Northeast Asia, The Heritage Foundation**

Mr. Klingner is the senior research fellow for Northeast Asia at The Heritage Foundation's Asian Studies Center. He joined Heritage in 2007 after 20 years in the intelligence community working at the CIA and Defense Intelligence Agency. In 1993, he was the selected as chief of the CIA's Korea Branch which provided analytic reports on military developments during the nuclear crisis with North Korea. From 1996 to 2001, Klingner was the deputy chief for Korea in the CIA's Directorate of Intelligence where he was responsible for analyzing Korean political, military, economic, and leadership issues for the president and other senior policymakers.

### Mikhail Kobrinskiy

**Head, Institute of Atomic Energy Safely Development**

Mr. Kobrinskiy is the head of laboratory at the Nuclear Safety Institute (IBRAE) in Moscow, Russia.

### Kotani Tetsuo

**Special Research Fellow, The Okazaki Institute**

Mr. Kotani is a special research fellow at the Okazaki Institute. He is also a senior research fellow at the Research Institute for Peace and Security, and a member of the International Advisory Council. He was a visiting fellow at the U.S.-Japan Center at Vanderbilt University, and in 2003 won the Japanese Defense Minister's Prize. He is the author of Umino Anzenhosho [maritime security] and his English publications include Presence and Credibility: Homeporting USS MIDWAY at Yokosuka, and Turbulent Changes: The Democratic Party Government and Japan's Foreign Policy.

### Ricardo Lagorio

**Special Representative for Global Issues, Foreign Ministry of Argentina**

Ambassador Lagorio is a career diplomat. He is currently a special representative for global issues to the deputy foreign minister of Argentina. For 2003-2008 was the foreign policy advisor to the vice-president. He earned his bachelor's in political science from Pontifica Universidad Católica. He was a member of the Argentinean diplomatic mission to the UN from 1982 to 1989 and deputy chief of mission at the Argentinean embassy in the U.S. from 2000 to 2003. He was the undersecretary for policy and strategy at the Argentinean Ministry of Defense from 1993 to 1996. Mr. Lagorio has an M.A. in political science from the UCA, and is a Ph.D. candidate at the City University of New York.

### Ellen Laipson

**President and CEO, Stimson Center**

Ellen Laipson is president and chief executive officer at the Stimson Center. She also directs the Southwest Asia project, which focuses on security issues in the Gulf region. Before joining Stimson in 2002, she served in government for 25 years and held senior positions in the National Intelligence Council, the National Security Council, the U.S. Department of State, and the Library of Congress. In late 2009, President Obama named Laipson to the President's Intelligence Advisory Board.

### Tom LaTourrette

**Senior Physical Scientist, RAND Corporation**

Dr. LaTourrette is a senior physical scientist at the RAND Corporation, specializing in energy, public safety, and homeland security policy. He was also a member of the Advisory Panel to California's Little Hoover Commission report, Safeguarding the State: Preparing for Catastrophic Events, in 2006. He holds a Ph.D. in geology from the California Institute of Technology.

### Jennifer Laurendeau

**U.S. State Department**

From 1986 to 1988, Laurendeau worked as a research fellow at the International Security Program at Harvard's Belfer Center for Science and International Affairs. Ms. Laurendeau is currently affiliated with the NATO Office of the U.S. Department of State in Washington DC.

### Le Chi Dung

**Deputy Director General, Vietnam Agency for Radiation and Nuclear Safety (VARANS); Sous-Sherpa, Ministry of Foreign Affairs, Vietnam**

Mr. Dung started working in the field of peaceful use of atomic energy in 1977 as a researcher in the Vietnam Atomic Energy Institute (VINATOM). He then moved to VARANS in 2005 and became a member of the drafting team of the Vietnam Atomic Energy Law, enacted in 2008.

### Lee Dong Myung

**Head of Radiation Detection and Monitoring Department, Korea Institute of Nuclear Safety (KINS)**

Mr. Lee is head of radiation detection and monitoring department at KINS. He is responsible for the system operation for radioxenon detection against North Korean covert nuclear activities. He has participated as a radionuclide expert at the CTBTO working group B meeting. He has extensive experience in radioactivity analysis in a variety of samples. Mr. Lee has been involved in monitoring the environmental radioactivity of the Korean peninsula since the Fukushima nuclear accident.

### Lee Hong Koo

**Former Prime Minister, Republic of Korea**

Dr. Lee was the prime minister of South Korea from 1994 to 1995. Before that, Dr. Lee served twice as the deputy prime minister for unification dealing with the relations between the two Koreas. He was also a member of the Korean National Assembly and the chairman of then-ruling New Korea Party. Dr. Lee was the Korean ambassador to the United Kingdom from 1991 to 1993 and to the United States from 1998 to 2000.

### Lee Jong In

**Senior Advisor, Nuclear Safety, Korea Institute of Nuclear Safety (KINS)**

Dr. Lee is currently a senior advisor at KINS.

### Lee Jung Hoon

**Director of Institute of Modern Korean Studies, Yonsei University**

Professor Lee received his education from Tufts University and the University of Oxford. He has lectured throughout the United States and Japan and remains an advisor to the Ministry of Foreign Affairs and the National Security Council. His expertise lies in North Korean nuclear history, U.S. foreign policy, South Korean politics, and East Asian security relations. He is currently serving as the dean of the Division of International Education and Exchange at Yonsei.

### Michael Lekson

**Deputy Provost, Academy for International Conflict Management and Peacebuilding, United States Institute of Peace (USIP)**

Michael Lekson is currently the deputy provost for USIP's Academy for International Conflict Management and Peacebuilding. He joined the Institute's Professional Training program in 2003 as a program officer. He came to the Institute following a 26-year career in the Department of State, where he was deputy assistant secretary of state for arms control, overseeing all multilateral arms control negotiations and treaty implementation, for which he received the secretary's Distinguished Service Award. Prior to that, Lekson was deputy to the special representative of the president and the secretary of state for implementation of the Dayton Peace Accords.

### Jeffrey Lewis

**Director, East Asia Nonproliferation Program, Center for Nonproliferation Studies (CNS), Monterey Institute**

Dr. Lewis is director of the East Asia Non-proliferation Program at CNS. Before coming to CNS, he was the director of the Nuclear Strategy and Nonproliferation Initiative at the New America Foundation. Prior to this, Dr. Lewis was executive director of the Managing the Atom Project at the Belfer Center for Science and International Affairs, executive director of the Association of Professional Schools of International Affairs, and visiting fellow at CSIS. He is also a research scholar at the Center for International and Security Studies at the University of Maryland's School of Public Policy.

### Simon Long

**Columnist, *The Economist***

Mr. Long is a columnist for Banyan based in Singapore and The Economist Asia. He took up the post at Banyan in August 2010. Before that, he had worked in London for four years as the magazine's Asia editor, and as South Asia bureau chief for four years in Delhi. He joined The Economist in 1995, as a Southeast Asia correspondent, based in Bangkok. In 1998, he returned to London as finance and economics editor. He had previously spent nine years with the BBC, as an analyst on East Asian affairs in London, as Beijing correspondent in 1989-91, and Hong Kong correspondent from 1993. He wrote extensively for the Guardian newspaper, and many other outlets. For a number of years he was the author of The Economist Intelligence Unit country reports on China, Taiwan, and Hong Kong.

### Bruce MacDonald

**Senior Director, Nonproliferation and Arms Control Program, United States Institute of Peace (USIP)**

Mr. MacDonald is the senior director of the Nonproliferation and Arms Control Program at USIP. He is an independent consultant providing technology and policy management services to government and the private sector. He is a member of the Council on Foreign Relations' Cybersecurity Advisory Group and was project leader for the Council's study of China, Space Weapons, and U.S. Security. Mr. MacDonald received two masters' degrees from Princeton University, one in aerospace engineering, specializing in rocket propulsion, and the second in public and international affairs. Mr. MacDonald is also a member of the American Institute of Aeronautics and Astronautics.

### Jenifer Mackby

**Adjunct Fellow/Consultant, International Security Program, CSIS**

Jenifer Mackby is a fellow in the International Security Program at CSIS. She has worked in France for the CSIS Strengthening the Global Partnership project, for a Russian-European project on bioterrorism, for U.S. force reductions in Europe, and as rapporteur for numerous international conferences. In Washington, she works on nuclear and nonproliferation issues.

### Abdelmajid Mahjoub

**Director General, Arab Atomic Energy Agency (AAEA)**

Dr. Mahjoub received a master's degree from Tulane University in New Orleans and a Ph.D. from the University of Nebraska. He is currently director general of the AAEA based in Tunis. Prior to that, he worked at the IAEA in the department of technical cooperation for a period of seven years from 2001 to 2008. In addition, Dr. Mahjoub has worked as an expert as well as consultant for many international organizations including UNESCO, Food and Agricultural Organization, and the World Food Programme.

### Charles McCombie

**President, Association for Regional International Underground Storage (Arius)**

Dr Charles McCombie was technical director of Nagra, the Swiss national Waste Management Organization. Currently, he is a principal and co-owner of MCM Consulting and president of the Arius Association. He is an author or co-author of approximately 200 published papers or articles and has served on numerous review and advisory bodies, including the Board on Radioactive Waste Management of the U.S. National Research Council and the International Review Committees of NUMO, Japan. In 2011, he was awarded a Lifetime Achievement Award at the Waste Management Symposia. He has a Ph.D. in physics.

### David A. McCormack

**Head of CTBT Verification, Comprehensive Test Ban Treaty Organization**

Dr. McCormack is based in Ottawa where he currently heads the nuclear explosion monitoring programme of the Geological Survey of Canada. Originally from Northern Ireland, he has degrees in physics and seismology. Dr. McCormack has held several research positions related to nuclear treaty monitoring in the UK and Canada. Since 1997, he has acted as a senior technical adviser to the Canadian delegation to the CTBTO Preparatory Commission.

### James G. McGann

**Director, Think Tanks and Civil Societies Programs (TTCSP), University of Pennsylvania**

Dr. McGann is the assistant director of the International Relations Program as well as director of the Think Tanks and Civil Societies Program (TTCSP) at the University of Pennsylvania. He is also a senior fellow at the Foreign Policy Research Institute, a think tank based in Philadelphia. Prior to working at the university, Dr. McGann was an assistant professor of political science at Villanova University where he taught international relations, international organizations, and international law. Dr. McGann's current research focuses on the role of think tanks in formulation of U.S. domestic and foreign policy and a global mapping of security and international affairs think tanks.

### James McNally

**Nuclear Weapons Expert**

Dr. McNally has an extensive background acquired over 25+ years at Los Alamos National Laboratory in

nuclear weapons research and development as well as nuclear proliferation and verification issues. He has a Caltech Ph.D. in nuclear physics. Other activities include serving on: the U.S.-UK team assessing the 2004 Gadhafi nuclear weapon program abandonment; U.S.-USSR negotiations on the Threshold Test Ban Treaty; the Joint Verification Experiment that measured on-site yields of nuclear explosions at the Soviet and U.S. test sites; and responsibility for the U.S. AEC laser fusion and laser enrichment office in the mid 70s.

### Min Gyungsik

**Senior Researcher, KINAC**

Dr. Min is manager of the Verification Technology Department at the National Nuclear Management and Control Agency of Korea (NNCA). He started his career as a seismologist and later moved to the IAEA Safeguards area and attended Committee 24 as a member of the Korean delegation for the negotiation of the Additional Protocol. Dr. Min earned his Ph.D. in seismology and CTBT at Southern Methodist University.

### Liu Ming

**Director, Institute of Asia-Pacific Studies, Shanghai Academy of Social Sciences (SASS)**

Dr. Liu is currently a professor, director of the Institute of Asia-Pacific Studies, and director of Center for Korea Studies at SASS. He is concurrently a fellow at the Center for Korean Peninsula Studies, China Academy of Social Sciences, and the Center for Korea Studies, Fudan University. Dr. Liu holds a B.A. from the Nanjing Foreign Languages Institute, a Master's of Law from the International Politics Department at Fudan University, and a Ph.D. from the World Economy Institute at Fudan University. He has also been a visiting scholar at Columbia University, Seoul National University, and Stanford University.

### P. Moorthy

**Professor, Pondicherry University**

Dr. Moorthy is a professor in the Department of Politics and International Studies at Pondicherry University in India. His areas of expertise are peace and disarmament studies, science and technology, nation building, and human resources management.

### Sonia Fernández Moreno

**Senior Advisor on Nuclear Policy, Nuclear Regulatory Authority, Argentina; Argentine Council for International Relations (CARI)**

Sonia Fernández Moreno is a senior expert in nonproliferation and nuclear policy issues. She has served in the federal government of Argentina in the Atomic Energy Commission and at the Nuclear Regulatory Authority for more than twenty five years. She is a senior consultant of ABACC. At present, she is a senior advisor of ARN and head of the Training and Education Department. She participates in the Argentinean delegation to the IAEA's Board of Governors.

### Clark Murdock

**Senior Adviser, International Security Program, CSIS**

Dr. Murdock is senior adviser at CSIS. He specializes in strategic planning, defense policy, and national security. From 1995 to 2000 he was deputy director of the headquarters planning function of the USAF, and in 2000 Dr. Murdock taught at the National War College. He received his Ph.D. in political science from the University of Wisconsin-Madison.

### Nakagome Yoshihiro

**Vice President, Japan Nuclear Energy Safety Organization (JNES)**

Mr. Nakagome is the vice-president at the Japan Nuclear Energy Safety Organization (JNES) and is the emeritus professor of Research Reactor Institute at Kyoto University.

### David Nazé

**Conference Coordinator, Institute for International and Strategic Relations**

M. David Nazé, is an experienced conference coordinator, having worked in the communication area for 10 years in Paris. In 2001, he worked for Corbis Corporation. In October 2005, he joined the Comité Richelieu, where he became the conference manager of the SME Pact program, which was supported by the French government. In December 2010, he was appointed as project development partner by the Director of the Institut for International and Strategic Relations (IRIS). He graduated from Paris III University, where he studied information and communication.

### William J. Newcomb

**Former Deputy Coordinator, North Korea Working Group, U.S. State Department**

William J. Newcomb is a former U.S. government economist. In 2008, Mr. Newcomb retired from the Treasury Department where he was senior economic advisor to the assistant secretary for intelligence and analysis. From 1984 to 2005, he served as the senior economist for Communist Asia in the Bureau of Intelligence and Research at the U.S. Department of State, and wrote extensively on developments in China, Vietnam, and North Korea for U.S. policymakers. During 2003-2005, Newcomb was deputy coordinator of the department's North Korea Working Group. He specializes in the analysis of command economies and the economics of reform and transition and has studied economic developments in North Korea for more than 30 years.

### David Nokes

**Former Vice President, National Security and Arms Control Division, Sandia National Laboratory**

Mr. Nokes is the former vice president of Sandia's National Security and Arms Control division. In this position he was responsible for arms control, threat assessment, security technology, nonproliferation, and international cooperative programs. Prior to this he was director of Systems Assessment and Research Center at Sandia. He has more than 40 years experience in the nuclear weapons program, and supporting the U.S. intelligence community, homeland security, and war on terror.

### James H. Nolt

**Campus Dean, New York Institute of Technology's Nanjing Campus in China**

Dr. Nolt is the campus dean of the New York Institute of Technology's Nanjing campus in China. He has been a senior fellow at the World Policy Institute in New York since 1995. He taught at Vanderbilt University and the New School for Social Research, and has written a number of articles on China-Taiwan military relations. Dr. Nolt is currently writing a book entitled, International Political Economy: The Business of War and Peace. Dr. Nolt earned a Ph.D. in political science from the University of Chicago.

### Ivan Oelrich

**Senior Fellow, Strategic Security Program, Federation of American Scientists**

Dr. Oelrich is the senior fellow for the Strategic Security Program at the Federation of American Scientists. His introduction to national security began at the Institute for Defense Analyses (IDA). Dr. Oelrich left IDA for a one-year fellowship at the Center for Science and International Affairs at the Kennedy School of Government at Harvard University. On his return to Washington DC, he accepted a position as a senior analyst at the Office of Technology Assessment. After returning to IDA, he focused on several research sectors on environmental restoration and development for military lands. Oelrich received his Ph.D. from Princeton University in chemistry.

### Chris Ogden

**Lecturer, University of St. Andrews**

Dr. Ogden is a lecturer in Asian Security at the University of St. Andrews. His 2010 Ph.D. dissertation 'Gear Shift: Hindu Nationalism and the Evolution of Indian Security' (University of Edinburgh) sought to show how domestic policy sources directly impact a state's external security policies; work explicitly concerned with constructed identities in international relations. His other research interests relate to identity and security politics in East and South Asia, as well as the analytical uses of social psychology in international relations. Chris has previously taught at the Universities of Edinburgh, Glasgow, and Durham.

### Tomohiro Okamoto

**Lieutenant General, Japan Air Self-Defense Force (JASDF)**

Mr. Okamoto is the executive director for the Executive Committee, Peace in Asia, as well as a guest researcher for the Eurasia Institute 21. Born in Tokyo in 1943, he graduated from the National Defense Academy. He retired from the JASDF in 2001 after finishing the mission as the director general of Joint Staff Office. His recent publications include: Thinking of the New Strategy for the Defense and Security of Japan, and The New Aspect of the Modernized War.

### Andrew Oros

**Associate Professor of Political Science and International Studies, Washington College**

Dr. Oros has studied at three universities in Japan and was an invited research fellow at the National Institute for Defense Studies in Tokyo in the summer of 2009. He is a specialist on the international and comparative politics of East Asia and the advanced industrial democracies, with an emphasis on contending approaches to managing security. He also serves as chair of the Division of Social Sciences. Prior to earning his Ph.D., he worked as the editor of Millennium: Journal of International Studies and as a studies associate for the Pacific Council on International Policy, the western partner of the New York-based Council on Foreign Relations.

### Andrew Orrell

**Director, Nuclear Energy Programs, Sandia National Laboratory**

Mr. Orrell is the director of Nuclear Energy Programs for Sandia National Laboratories. He has 20 years of industry experience in nuclear waste management and repository systems. He recently headed Sandia's Lead Laboratory for Repository Systems program and led Sandia's completion of the post-closure performance assessment portions of the Yucca Mountain License Application. Prior to working on the Yucca Mountain Program, he was a manager for the Waste Isolation Pilot Plant (WIPP) and the National Transuranic Waste Management program.

### Ota Masakatsu

**Senior/Editorial Writer, Kyodo News**

Dr. Ota is a senior and editorial writer at Kyodo News. His specialty is nuclear policies and nuclear nonproliferation issues, especially on the U.S-Japan alliance characterized by the "Nuclear Umbrella," and bilateral nuclear cooperation. He was awarded the Vaughn-Uyeda Prize in 2007 and Peace Cooperative Journalist Fund Prize in 2009. He earned his Ph.D. on policy studies from the National Graduate Institute for Policy Studies in Tokyo. He is also a former Fulbright Scholar.

### John Park

**Senior Research Associate, Center for Conflict Analysis and Prevention, U.S. Institute of Peace**

Dr. Park focuses on Northeast Asian security, economic and energy issues, and U.S. foreign policy toward the region. He is the director of the Institute's Korea Working Group, a consultative body comprising senior experts from the government and think tank communities. Dr. Park came to the Institute from Goldman Sachs' public finance group in New York. Prior to that, he was the project leader of the North Korea Analysis Group, a Managing the Atom working group at the Harvard Kennedy School. Dr. Park received his Ph.D. from Cambridge University. He completed his predoctoral and postdoctoral training at the Belfer Center for Science and International Affairs at the Harvard Kennedy School.

### Andrew Pierre

**Jennings Randolph Senior Fellow, United States Institute of Peace**

Andrew J. Pierre is a senior fellow at the United States Institute of Peace in Washington, DC. Previously he was a senior associate of the Carnegie Endowment for Peace, where he dealt with issues of European politics and security as well as arms proliferation. He also directed programs at the Carnegie Center in Moscow. Dr. Pierre has served as the director-general of the Atlantic Institute for International Affairs in Paris (1987-89); senior fellow and acting director of studies at the Council on Foreign Relations in New York (1969-87); senior associate at the Hudson Institute (1966-69); and research associate at the Brookings Institute (1960-62). A former foreign service officer, he held posts in London and at the Department of State (1962-65). Dr. Pierre has taught at many universities, including Columbia University, Briarcliff College, and most recently, at the School of Advanced International Studies at Johns Hopkins University. He is a graduate of Amherst College and the Institut d'Etudes Politiques in Paris, and received a Ph.D. in political science from Columbia University.

### Mohanan B. Pillai

**Professor, Pondicherry University**

Mr. Pillai is a professor at Pondicherry University. His current areas of study include industrial economics, foreign investment, technology transfer, industrial clusters, and regional development. He received his Ph.D. in economics from the Sardar Patel Institute of Economic and Social Research in 1983.

### Joshua Pollack

**Senior Analyst, Science Applications International Corporation (SAIC)**

Joshua Pollack is a senior policy analyst, specializing in arms control, deterrence, and nonproliferation. He is a graduate of Vassar College and the University of Maryland, where he attended the Maryland School of Public Policy. He has contributed frequently to the Bulletin of Atomic Scientists and ArmsControlWonk.com.

His recent publications also include Tracing Syria's Nuclear Ambitions, in the Fall/Winter 2010 issue of the Journal of International Security Affairs, and North Korea's Nuclear Exports: On What Terms?, which appeared at 38North.org in October 2010. His study of the evolution of North Korea's missile trade will appear in the July 2011 issue of the Nonproliferation Review.

### Miles Pomper

**Senior Research Associate, Center for Nonproliferation Studies (CNS), Monterey Institute**

Mr. Pomper is a senior research associate in Monterey's Washington DC office. Mr. Pomper joined CNS in 2009 as a senior research associate after serving as editor-in-chief of Arms Control Today, a post he held since March 2003. Previously, he was the lead foreign policy reporter for CQ Weekly, and a Foreign Service officer with the U.S. Information Agency. His career has also included several years spent covering national security and political issues at the Legi-Slate News Service and the publication of book chapters, analytical articles, and reports for publications.

### Vincente Garrido Rebolledo

**Director, International Affairs and Foreign Policy Foundation (INCIPE)**

Mr. Rebolledo is currently the director of IINCIPE. He is also a senior lecturer in international public law and international relations at the King Juan Carlos University in Madrid. He specializes in disarmament, arms control, and non-proliferation on which he has published more than 100 articles and 8 books as author or editor. Mr. Rebolledo received a bachelor's degrees in political science and sociology by the Complutense University of Madrid in 1966 and received his doctorate degree in international relations from the same university in 1995.

### Alan D. Romberg

**Distinguished Fellow and Director, East Asia Program, Stimson Center**

Mr. Romberg is the director of the East Asia program at Stimson. He served 20 years as a U.S. Foreign Service officer. He was the principal deputy director of the State Department's Policy Planning staff and deputy spokesman of the department. Additionally, Romberg spent almost ten years as the CV Starr senior fellow for Asian Studies at the Council on Foreign Relations. Mr. Romberg holds an M.A. from Harvard University.

### Leonid Ryabikhin

**Executive Secretary, Committee of Scientists for Global Security and Arms Control**

Mr. Ryabikhin is the executive secretary of the Committee of Scientists for Global Security and Arms Control. He led the Russian experts in the U.S.-Russian Joint Technical Assessment of the Iranian nuclear and missile potential published in May 2009. For the last two decades, Mr. Ryabikhin has been studying and doing research in the field of military/security policy and foreign relations. He is also an alumnus of the Asian-Pacific Center for security studies in Honolulu. He is also a member of the Expert Council of Special Envoy of the President of the Russian Federation for the Interaction with NATO in Missile Defense.

### Lora Saalman

**Associate, Nuclear Policy Program, Carnegie Endowment**

Dr. Saalman is an associate in the Nuclear Policy Program at the Carnegie Endowment, based at the Carnegie—Tsinghua Center for Global Policy in Beijing. Her research focuses on Chinese nuclear weapon and nonproliferation policies and Sino?Indian strategic relations, linking the work of Carnegie's programs in Beijing and Washington. Saalman completed her Ph.D. at Tsinghua University in Beijing, where she was the first American to earn a doctorate from its Department of International Relations. Her dissertation covers the impact of U.S. and European export control shifts on Sino?Indian military modernization.

### Gary Samore

**Special Assistant to the President and White House Coordinator for Arms Control and Weapons of Mass Destruction, Proliferation and Terrorism**

Dr. Samore is special assistant to the President and White House coordinator for Arms Control and Weapons of Mass Destruction, Proliferation, and Terrorism. He was the director of the Council on Foreign Relations (2006 to 2009); vice president for global security and sustainability at the John D. and Catherine T. MacArthur Foundation (2005); and a researcher at the International Institute of Strategic Studies (2001 to 2005). He earned his Ph.D. at Harvard University.

### David Sanger

**Chief Washington Correspondent, *The New York Times***

Mr. Sanger is the chief Washington correspondent for The New York Times. A 1982 graduate of Harvard College, Sanger has been writing for the Times for over 26 years covering foreign policy, globalization, nuclear proliferation, and the presidency. He has been a member of two teams that won the Pulitzer Prize, and has been awarded numerous honors for national security and foreign policy coverage. His first book, The Inheritance: The World Obama Confronts and the Challenges to American Power, was a best-seller.

### Hans-Joachim Schmidt

**Senior Research Fellow, Peace Research Institute Frankfurt (PRIF)**

Dr. Schmidt is currently a senior research fellow at PRIF in Policies for Security Governance of States. His research expertise covers conventional and nuclear arms control in Europe and on the Korean peninsula. He is a consultant to the German government and to international institutions. He received his doctorate in political science at Frankfurt University in 2002. His dissertation was The Change of Conventional Arms Control 1989-1996. He is also a member of the working group Just Peace of the German Commission Justitia et Pax (Catholic Church).

### Paul Schulte

**Non-resident Senior Associate, Carnegie Endowment**

Mr. Schulte is a non-resident senior associate in the Carnegie Nuclear Policy Program and at Carnegie Europe, where his research focuses on the future of deterrence, nuclear strategy, nuclear non-proliferation, cyber security, and their political implications. Dr. Schulte is a senior visiting fellow in the Disarmament and Globalization Program at the University of London's School of Oriental and African studies. Additionally, he is a senior visiting fellow at both the Centre for Defense Studies at King's College at the University of London and the Centre for the Study of Global Governance at the London School of Economics and Political Science.

### Ken Sheffer

**Counsellor to the President, The Heritage Foundation**

Mr. Sheffer is the counsellor to the president of The Heritage Foundation. Sheffer has been affiliated with The Heritage Foundation since 1982. Prior to that, he served as special assistant to the Lt. Governor of New York in 1979. In 1980, he served on the campaign of then-candidate Ronald Reagan and then on the presidential transition team until the inauguration of the President in 1981. Mr. Sheffer went on to serve in the Reagan White House on the National Security Council staff from 1981 to 1982.

### Norachit Sinhaseni

**Ambassador and Permanent Representative of Thailand to the United Nations, Ministry of Foreign Affairs, Kingdom of Thailand**

Ambassador Sinhaseni was appointed ambassador to the United Nations in 2009. Before that, he was deputy permanent secretary in the Ministry of Foreign Affairs since (2007-2009). From 2003 to 2007, he served as ambassador to New Zealand, Samoa, and Tonga. In 2001 he was appointed director general in the Department of Information and Foreign Ministry Spokesman, and later director general in the Department of East Asian Affairs. A graduate of Thailand's National Defence College, Mr. Sinhaseni earned a Bachelor of Laws from Chulalongkorn University in Bangkok, and a master's from the Fletcher School of Law and Diplomacy at Tufts University.

### Walter B. Slocombe

**Senior Counsel, Caplin & Drysdale**

Mr. Slocombe is senior counsel in Caplin & Drysdale's Washington DC office. He first joined the firm as an associate in 1971 and became a member in 1974. He served as undersecretary of defense for policy from 1994 to 2001, and in 2003, as senior advisor for National Defense in the Coalition Provisional Authority for Iraq. In 2004, President Bush appointed him to the Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction. He earned his law degree from Harvard University.

### Scott Snyder

**Adjunct Senior Fellow for Korea Studies, Council on Foreign Relations (CFR)**

Mr. Snyder is an adjunct senior fellow for Korea studies at Council on Foreign Relations (CFR). He is also the director of the Center for U.S.-Korea Policy and senior associate of Washington programs in the International Relations program of The Asia Foundation. He joined The Asia Foundation as the country representative of Korea in January 2000 and moved to the Washington office in April 2004. Mr. Snyder is also a senior associate at Pacific Forum CSIS.

### Leonardo Sobehart

**Head of Legal Affairs Department, INVAP SE**

Dr. Sobehart earned his Ph.D. in nuclear engineering and law degree from the National University of Buenos Aires. He is currently legal and technical advisor to INVAP. From 2004-2003 he was the universal agent of the Nuclear Regulatory Authority of Argentina, and from 2002-2001 he was chairman of the board of the same institution. He has served as the alternative representative of Argentina to the IAEA, and has spoken around the world on nuclear issues.

### Soeya Yoshihide

**Professor, Faculty of Law, Keio University**

Dr. Soeya is a professor of political science and international relations at the Faculty of Law of Keio University. He also serves as the director of the Institute of East Asian Studies of the same university. His areas of interest are politics and security in East Asia, and Japanese diplomacy and its external relations in the region and the world. He received his Ph.D. from the University of Michigan in 1987, majoring in world politics. Dr. Soeya currently serves on the Board of Directors of the Japan Association of International Studies, and the Research Institute for Peace and Security (RIPS) in Tokyo, and is a member of the Advisory Group of the Ministry of Foreign Affairs.

### Henry D. Sokolski

**Executive Director, Nonproliferation Policy Education Center (NPEC)**

Mr. Sokolski is the executive director of the Nonproliferation Policy Education Center (NPEC). He currently serves as an adjunct professor at the Institute of World Politics in Washington, and as a member on the Congressional Commission on the Prevention of Weapons of Mass Destruction, Proliferation, and Terrorism. In addition, Mr. Sokolski has been a resident fellow at the National Institute for Public Policy, the Heritage Foundation, and the Hoover Institution.

### Etel Solingen

**Chancellor's Professor, UC Irvine**

Ms. Solingen is chancellor's professor at the University of California, Irvine and president-elect of the International Studies Association. Her most recent book, Nuclear Logics: Contrasting Paths in East Asia and the Middle East was awarded the APSA's Woodrow Wilson Foundation Award and the Robert Jervis and Paul Schroeder Award. She has received a MacArthur Foundation Research and Writing Award, and a Social Science Research Council-MacArthur Foundation Fellowship, among others. She is president of the APSA'sInternational History and Politics Section and was chair of the Steering Committee of the University of California's system-wide Institute on Global Conflict and Cooperation.

### Leonard Spector

**Deputy Director, Center for Nonproliferation Studies (CNS), Monterey Institute**

Mr. Spector is deputy director of CNS and leads the Center's Washington DC Office. In addition he serves as editor-in-chief of the Center's publications. Mr. Spector joined CNS from the U.S. Department of Energy, where he served as an assistant deputy administrator for Arms Control and Nonproliferation at the National Nuclear Security Administration.

### Sharon Squassoni

**Director & Senior Fellow, Proliferation Prevention Program, CSIS**

Ms. Squassoni serves as director and senior fellow of the Proliferation Prevention Program at CSIS. Prior to joining CSIS, she was a senior associate in the Nuclear Nonproliferation Program at the Carnegie Endowment for International Peace. From 2002 to 2007, she advised Congress as a senior specialist in weapons of mass destruction at the Congressional Research Service.

### Laurent Stricker

**Chairman, World Association of Nuclear Operators (WANO)**

As the chairman of the WANO Governing Board since 2009, Mr. Stricker is the senior advisor to the chairman and CEO of Electricit? de France. He was head of nuclear operations for six years from 1999-2005. He was responsible for the operation of the French nuclear fleet—58 nuclear units, representing a generating capacity of approximately 63,000 MW. In 2003, he became chairman of the Board of WANO Paris Centre and a member of the Main Governing Board.

### Takahashi Sugio

**Visiting Fellow, National Institute for Defense Studies**

Mr. Takahashi received his M.A. in political science from Waseda University in 1997. He is a senior fellow at the National Institute for Defense Studies. His research areas of expertise include the military strategy and the Japan-U.S. Alliance. He is the author of the book, The Japanese Perception of the Information Technology- Revolution in Military Affairs: Toward a Defensive Information-Based Transformation.

### Shaista Tabassum

**Chairman, Department of International Relation, Karachi University Pakistan**

Dr. Tabassum is the chairman of the Department of International Relation at Karachi University, where she also holds a Ph.D. in the U.S Policy of Nuclear Nonproliferation in South Asia with special reference to Pakistan. She is the author of Nuclear Policy of the United States in South Asia: Proliferation or Non-Proliferation.

### Suzuki Tatsujiro

**Vice-Chairman, Japan Atomic Energy Commission**

Dr. Suzuki has served on the Nuclear Safety Commission in Japan since April 2001, and as chair since April 2006. From 1986 to 2003, he was a professor of nuclear engineering at the University of Tokyo. He earned his Ph.D. in nuclear engineering in 1971 from the University of Tokyo, and then joined the faculty in 1977 after serving as a research associate.

### Tatsumi Yuki

**Senior Associate, East Asia Program, Stimson Center**

Mrs. Tatsumi has been senior associate of the East Asia Program at the Stimson Center since 2008. Ms. Tatsumi has authored or edited several volumes, the most recent of which is North Korea: A Challenge for the US-Japan Alliance. She has also testified before the U.S. Congress and has appeared on PBS, CNN International, Voice of America, BBC International, and CNBC-Asia. A native of Tokyo, Tatsumi holds a B.A. from the International Christian University in Tokyo, and an M.A. from the Paul H. Nitze School of Advanced International Studies (SAIS) at the Johns Hopkins University in Washington DC.

### Sue Mi Terry

**National Intelligence Fellow, Council on Foreign Relations (CFR)**

Ms. Terry previously worked as the deputy national intelligence officer for East Asia at the National Intelligence Council. Her current work examines North Korean leadership succession plans, Pyongyang's evolving nuclear strategy, and the potential for instability in North Korea. She is an expert on Korean Peninsula affairs, particularly North Korean security policy and domestic stability issues. She was previously the director of Japan, Korea, and Oceanic Affairs for the National Security Council. She has also been the senior analyst covering a variety of North Korean issues at the Directorate of Intelligence in the CIA.

### William H. Tobey

**Senior Fellow, Belfer Center for Science and International Affairs, Harvard University**

Mr. Tobey was most recently deputy administrator for Defense Nuclear Non-proliferation at the National Nuclear Security Administration. There, he managed the U.S. government's largest program to prevent nuclear proliferation and terrorism by detecting, securing, and disposing of dangerous nuclear material. Mr. Tobey also served on the National Security Council staff in three administrations, in defense policy, arms control, and counter-proliferation positions. He has participated in international negotiations ranging from the START talks with the Soviet Union, to the Six-Party Talks with North Korea.

### Akira Tokuhiro

**Associate Professor, University of Idaho**

Dr. Akira received his Ph.D. in nuclear engineering from Purdue University in 1991. He is an associate professor at the University of Idaho. He was an assistant professor in the Department of Nuclear Engineering at the University of Missouri (2000-2005) and director of the University of Missouri's reactor facility.

### Alexandra Toma

**Executive Director, The Connect U.S. Fund**

Alexandra Toma is the Executive Director of the Connect U.S. Fund, where she manages the Fund's day to day programs and grant-making activities. In addition, she founded and co-chairs the Fissile Materials Working Group, a coalition of nuclear security experts. Alex has a diverse professional background in national security policymaking, having worked previously as a policy advisor on Capitol Hill, a consultant to the National Defense University, a defense analyst for DFI International, and in the nonprofit sector. Alex has been named an emerging leader in U.S. foreign policy as both a Truman National Security Fellow and a Center for Strategic and International Studies' (CSIS) Next America Fellow. She speaks frequently on nuclear weapons and nonproliferation issues.

### Victoria Tuke

**Ph.D. Candidate, University of Warwick**

Ms. Tuke is a final-year Ph.D. at the University of Warwick, where she is analyzing Japanese foreign policy towards India. She has conducted extensive fieldwork in Tokyo as a visiting researcher at Waseda University. She holds a B.A. in history (Warwick) and an M.A. in international relations (Warwick). Her research interests also include China's public diplomacy. She has conducted research on the declining population in Japan with a Lord Rootes Award, worked for the diplomatic advisory group, Independent Diplomat, taught English in China and Rwanda.

### Jitendra Uttam

**Assistant Professor, Jawaharlal Nehru University**

Dr. Uttam received a Ph.D. in international political economy from Seoul National University in 2002. He is an assistant professor in Korean studies at Jawaharlal Nehru University. He has published numerous books

and papers on the East Asian economy.

### Juhani Vira

**Senior Vice President, Posiva Oy**

Dr. Vira is the senior vice president responsible for research at Posiva Oy in Finland. His present responsibility covers both the research into long-term safety of geological disposal and the Olkiluoto site characterization activities, including the investigations carried out in the ONKALO, an underground rock characterization facility that is planned to be used later as the main access way to the repository. Before Posiva Oy, Dr. Vira worked as a research scientist at VTT Technical Research Centre studying various aspects of nuclear fuel cycles, including their relationships with nuclear proliferation issues. Dr. Vira holds a doctorate of science degree from the Helsinki University of Technology.

### Kyoichi Wakayama

**Adjunct Fellow, Japan Institute for International Affairs (JIIA)**

Mr. Wakayama is currently an adjunct fellow with JIIA. He specializes in issues related to China.

### James Walsh

**Research Associate, Security Studies Program, MIT**

Dr. Walsh is a research associate at MIT's security studies program. He is also a faculty member of the MIT political science department and serves as an analyst for CNN. He has traveled to both Iran and North Korea for talks with officials about their nuclear programs. His new book on North Korea will be published early next year. Dr. Walsh was executive director of the Managing the Atom project at Harvard University and a visiting scholar at Lawrence Livermore National Laboratory. He has taught at both Harvard University and MIT. Dr. Walsh received his Ph.D. from MIT.

### Wang Jun

**Chinese Head of Delegation, CTBTO**

Wang Jun is a diplomat from China, and is the Chinese head of delegation at the CTBTO.

### Wang Junsheng

**Researcher, Chinese Academy of Social Sciences**

Mr. Wang is a researcher at the Chinese Academy of Social Sciences, where he specializes in international relations and Chinese foreign policy.

### Richard Weitz

**Senior Fellow, Hudson Institute**

Richard Weitz is senior fellow and director of the Center for Political-Military Analysis at the Hudson Institute. His current research includes regional security developments relating to Europe, Eurasia, and East Asia as well as U.S. foreign, defense, and homeland security policies. Dr. Weitz is also a non-resident senior advisor at the Project on National Security Reform (PNSR), where he oversees case study research, and a non-resident senior fellow at the Center for a New American Security (CNAS), where he contributes to various defense projects. Dr. Weitz is a graduate of Harvard College, the London School of Economics, Oxford University, and Harvard University (Ph.D. in political science), where he was elected to Phi Beta Kappa.

### Larry Welch

**Former President and CEO, Institute for Defense Analyses**

General Welch, USAF (retired) is the former president and CEO of the Institute for Defense Analyses (IDA). He served as a senior fellow at IDA from 2003-2006. He is the former chief of staff of the U.S. Air Force. During his 38 years in the Air Force, General Welch served in operational and staff assignments in training organizations and tactical fighter units worldwide. He received his M.S. in international relations from George Washington University and is a graduate of the Armed Forces Staff College and National War College.

### Amy F. Woolf

**Nuclear Weapons Policy Specialist, Congressional Research Service (CRS)**

Ms. Woolf is a specialist in nuclear weapons policy in the Foreign Affairs, Defense, and Trade Division of CRS at the Library of Congress. Before joining CRS, Ms. Woolf was a member of the Research Staff at the Institute for Defense Analyses (IDA) in Alexandria, Virginia. She also spent a year at the Department of Defense, working on the 1994 Nuclear Posture Review. Ms. Woolf received a Masters in Public Policy from the Kennedy School of Government at Harvard University in 1983 and a B.A. in political science from Stanford University in 1981.

### Larry Wortzel

**U.S.-China Economic and Security Review Commission**

Dr. Wortzel is a commissioner on the US-China Economic and Security Review Commission. He was chairman of the commission in 2006 and 2008. Previously, he was vice president of the Foreign Policy and Defense Studies at The Heritage Foundation. Dr. Wortzel spent 32 years in the military, serving as an infantryman in the U.S. Marine Corps as well as the U.S. Army. Dr. Wortzel earned his Ph.D. in political science at the University of Hawaii-Manoa. He is the author of two books on China's politics and military modernization and is the editor of eight other books on the Chinese People's Liberation Army.

### Muhammad Shahrul Ikram Bin Yaakob

**Malaysian Ambassador and Permanent Representative to Austria and the UN, Vienna**

Mr. Yaakob is currently ambassador and permanent representative of Malaysia to Austria and the UN in Vienna. He is also currently sherpa for Malaysia to the forthcoming Second Nuclear Security Summit scheduled to be held in Seoul. Mr. Yaakob was the chairman of the Board of Governors of the IAEA from February 2010 until September 2010. Prior to taking up his current post, he was ambassador of Malaysia to Qatar in 2007-2010 and had served in various capacities at the Malaysian diplomatic mission in China and the U.S. As undersecretary for the Multilateral Political Division at the Malaysian Foreign Ministry from 2002 to 2005, he was responsible for issues relating to disarmament, non-proliferation, terrorism, and trans-organised crime.

### Yamaguchi Noboru

**Special Advisor to the Cabinet, Japan**

Mr. Yamaguchi is currently a special advisor to the cabinet of Japan, and a professor at the National Defense Academy of Japan. He graduated from the National Defense Academy of Japan and earned his master's degree from the Fletcher School of Law and Diplomacy at Tufts University. He has served, among others, as a visiting scholar at the John M. Olin Institute for Strategic Studies of Harvard University, a senior defense

attaché at the Embassy of Japan in the United States, deputy commandant of the Japan Ground Self Defense Force (JGSDF) Aviation School, and as commanding general of the JGSDF Ground Research and Development Command.

### Yen Tiehlin

**Deputy Executive Director, Center for Security Studies (MCSS)**

Mr. Yen is currently the deputy executive director of MCSS at National Chengchi University. He joined MCSS after retiring from the Navy in November 2009. In his 28-year service in the Republic of China Navy, he commanded a warship, ROCS Yue-Yang, and earned his master's degree of security policy studies from George Washington University. Mr. Yen also attended the U.S. Naval War College for his advanced PME. In 2002, he was selected as the first ROC military officer to attend the Executive Course in Asia Pacific Center for Security Studies (APCSS). Mr. Yen specializes in force planning and defense analysis.

### Yoo Hosik

**Korea Institute of Non-proliferation and Control (KINAC)**

Mr. Yoo has over 20 years of experience in the nuclear field. He has conducted research work on the development of nuclear fuel at the Korea Atomic Energy Research Institute (KAERI) and the Korea Nuclear Fuel Company (KNFC). As a material scientist, he was involved in various technological development programs, such as the high burn-up nuclear fuel for pressurized water reactors and burnable poison fuels. In 2005, he joined KINAC where he is working in the regulation field related to physical protection.

### Yoon Wan Ki

**Korea Institute of Non-proliferation and Control (KINAC)**

Dr. Yoon has extensive experience in safeguards and security. He is currently with KINAC.

### Yuan Jingdong

**Associate Professor, Centre for International Security Studies (CISS), University of Sydney**

Dr. Yuan specializes in Asia-Pacific security, Chinese defense and foreign policy, and global and regional arms control and non-proliferation issues. A graduate of the Xi'an Foreign Language University, he received his Ph.D. in political science from Queen's University in 1995. He is currently working on a book manuscript on post-Cold War Chinese security policy. Prior to joining CISS, Dr. Yuan served as director of the East Asia nonproliferation program, and was an associate professor of international policy studies at the Monterey Institute.

### Jose Gabriel ZEPEDA

**Director, Human and International Security, Ministry of Foreign Affairs, Chile**

Ambassador Zepeda is the director of Human and International Security at the Ministry of Foreign Affairs of Chile. He is a lawyer and a career diplomat. During his career, he served as ambassador of to Egypt from 2008-2010, ambassador to Trinidad & Tobago from 2005-2008 and as deputy director for the South American Affairs Division within the Ministry of Foreign Affairs from 2003-05. He joined the Chilean Foreign Service in 1974. Mr. Zepeda has a B.S. in law and social sciences, given by the University of Chile. He also graduated from the Diplomatic Academy of Chile and the University of Belgrano.

### Zhang Jiadong

**Associate Professor & Assistant Director, Program on Arms Control and Regional Security, Fudan University**

Dr. Zhang studied at the School of International Relationship and Public Affairs at Fudan University and got a Ph.D. in international relations for his studies on terrorism affairs. From July 2004, he began work in Center for American Studies at Fudan University, working on terrorism affairs, anti-terrorism, and American anti-terrorism policy.

### Zhang Yanbing

**School of Public policy and Management, Tsinghua University**

Dr. Zhang is an assistant professor at Tsinghua University. He received his Ph.D. at the University of Sheffield. From 2007 to 2008, he was a director of Master's Program in International Development at the School of Public Policy and Management at Tsinghua University. Also, he has taught courses on politics, development economics, and comparative politics and government.

### Zhao Quansheng

**Professor, American University**

Dr. Zhao is a professor of international relations and director of the Center for Asian Studies at American University in Washington, DC. From 1993 to 2009, he was a research associate at the Fairbank Center for East Asian Research of Harvard University, and from 1999 to 2008, he was division director of Comparative and Regional Studies at American University. A specialist in international relations and comparative politics focusing on East Asia, Dr. Zhao is the author of Interpreting Chinese Foreign Policy and Japanese Policymaking. He earned his Ph.D. from the University of California at Berkeley.

## Asan Plenum Young Experts

**Mark Bell**
Presidential Fellow and Ph.D Candidate, Massachusetts Institute of Technology

**Sarah Bessell**
Program Assistant, Center for Conflict Management,
The U.S. Institute for Peace

**Mwita Chacha**
Graduate Research Associate, Center for International Trade and Security, University of Georgia

**Chung Kee Hoon**
Research Intern, Proliferation Prevention Program, Center for Security and International Studies (CSIS)

**Ryan Costello**
Fissile Materials Working Group Coordinator, The Connect U.S. Fund

**Eduardo Diez**
Coordinator of Nuclear Committee, Argentine Council for International Relations

**Talitha Dowds**
Project on Nuclear Issues, Center for Security and International Studies (CSIS)

**Leif-Eric Easley**
Northeast Asian History Fellow, Asia-Pacific Research Center, Stanford University

**Daniel Gearin**
Joseph S. Nye, Jr. National Security Research Intern, Center for a New American Security

**Michael S, Gerson**
Research Analyst, Stategic Studies Division, Center for Naval Analyses

**Nicholas Hamisevicz**
Director of Research and Academic Affairs, Korea Economic Institute

**Melissa Hanham**
Research Associate, Center for Nonproliferation Studies (CNS), Monterey Institute

**Kelsey Hartigan**
Policy Analyst, National Security Network

**Kenta Horio**
Ph.D Candidate, Department of Nuclear Engineering and Management, University of Tokyo; Nonproliferation Information Analyst, Ministry of Foreign Affairs, Japan

**Mark Jansson**
Director, Project on Nuclear Issues, Center for Security and International Studies (CSIS)

**Christopher Jones**
Program Coordinator, International Security Program, Center for Security and International Studies

**Gordon Wyn Jones**
Ph.D. Candidate, King's College London

**Duyeon Kim**
Deputy Director, Center for Arms Control and Non-Proliferation

**Lance Kim**
National Science Foundation Public Policy and Nuclear Threats Fellow, Department of Nuclear Engineering, University of California at Berkeley; Stanton Nuclear Security Fellow, The RAND Corporation (Fall 2011)

**Yuma Kuwata**
Graduate Student, Policy Management Department, Keio University

**Nadya Larsen**
Assistant Professor, Department of Defense

**Jeong Ik Lee**
Assistant Professor, Department of Nuclear and Quantum Engineering, Korea Advanced Institute of Science and Technology (KAIST)

**Greer Meisels**
Fellow, Sasakawa Peace Foundation; James A. Kelly Fellow, Pacific Forum CSIS; Former Assistant Project Director, Asia-Pacific Security, National Committee on American Foreign Policy

**Chad Peltier**
Research Intern, Institute for National Strategic Studies Defense University

**Tomas Pico**
Diplomat, Ministry of Foreign Affairs, International Trade and Culture, Argentina

**Jason Portner**
Communications Intern, Natural Resources Defense Council; former intern, Office of General Counsel, U.S. Department of Energy

**Caroline Reilly**
Ph.D. Candidate, Princeton University; Member of the Next Generation Working Group on U.S.-Russian Arms Control, Center for Strategic and International Studies (CSIS)

**Brian Rose**
Program Specialist, United States Institute of Peace (USIP)

**Crispin Rovere**
Ph.D. Candidate, Strategic and Defence Studies Centre, Australian National University

**Jessie Ryou**
Ph.D. Candidate, Department of Political Science, George Washington University

**Javier Serrat**
Scoville Fellow, Center for Nonproliferation Studies (CNS), Monterey Institute

**Tamara Spitzer-Hobeika**
Research Assistant, Proliferation Prevention Program, Center for Strategic and International Studies (CSIS)

**Dawn Verdugo**
Adjunct Professor and Research Associate, James Martin Center for Nonproliferation Studies

**Wilfred Wan**
Stanton Nuclear Security Pre-doctoral Fellow, Belfer Center for Science and International Affairs, Harvard University

**John Warden**
Program Coordinator, Project on Nuclear Issues, Center for Strategic and International Studies

**Seung Min Woo**
Ph.D. Candidate, Department of Nuclear Engineering, University of California at Berkeley (Fall 2011)

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Executive Assistant to the President

## Comments

"What a great conference··· I was delighted to have participated in it. Congratulations and a particular word of thanks to [Asan] staff who did such a marvelous job in pulling it all together."
**Edwin J. Feulner, The Heritage Foundation**

"The first Asan Plenum has been a great success and a very important contribution for debating one of the most sensitive issues of our 21 century."
**Ricardo E. Lagorio, Argentine Council for International Relations (CARI)**

"My sincere gratitude for affording me the opportunity to participate in what proved to be a cutting edge conference."
**James G. McGann, Think Tanks and Civil Societies Program, University of Pennsylvania**

"It was a very well-run and informative conference, an amazing start to what promises to become a great tradition."
**William Tobey, Belfer Center, Harvard University**

"Panel subjects were very timely and well balanced."
**Iwata Shuichi, University of Tokyo**

"I was very much impressed by the tremendous organizational work in preparing the Asan Plenum."
**Chaim Braun, Center for International Security and Cooperation (CISAC), IIS/Stanford University**

"I was one of the young scholars. I thought the conference was excellent··· a great opportunity to meet established experts in the field as well as younger scholars. I got a huge amount out of the conference, and would love to be involved in future Asan events."
**Mark Bell, Massachusetts Institute of Technology (MIT)**

"Thank you for a most well organized and interesting conference. The overall impression was simply; excellent."
**Ola Dahlman, Comprehensive Test Ban Treaty (CTBT)**

"The substance discussed was very high level and informative; the individuals at the conference were also appropriate and interesting."
**Elbridge Colby, Center for Naval Analyses (CNA)**

"The Asan Plenum experience was an exceptional one. Both the selection of the panelists as well as the topics raised were at the highest level. It is remarkable to put together such a good conference on such a short notice."
**Szymon Bochenski, Polish Sous-Sherpa for the Nuclear Security Summit, Ministry of Foreign Affairs of the Republic of Poland**

"The exceptional breadth of backgrounds and experience represented by the attendees expanded my understanding of the issues that were the plenum's focus, Our Nuclear Future."
**David Nokes, Sandia National Laboratory**

"Asan has put itself on the international map of leading think tanks, an institute all should be interested in ongoing contact with. It was also deeply rewarding to have the opportunity to see a bit of your beautiful country. Keep up the excellent work and looking forward to future conferences and work together."
**Chuck Freilich, Former Deputy National Security Advisor, Israel**

"Outreach to the future through the Asan Plenum Young Experts program hit a very positive personal chord. Providing such a young experts program should benefit us all."
**James H. McNally, Los Alamos National Laboratory**

I'd like to express my appreciation of the mission of the Asan Institute. It is really a center of think tank for policy studies in different disciplines of knowledge and sciences
**Tarek Hussein, Cairo University and the Council of Egyptian Atomic Energy Authority**

"It seems the consensus is that this is an incredible event, one that will become quite an annual institution as you go along."
**Ken Sheffer, The Heritage Foundation**


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