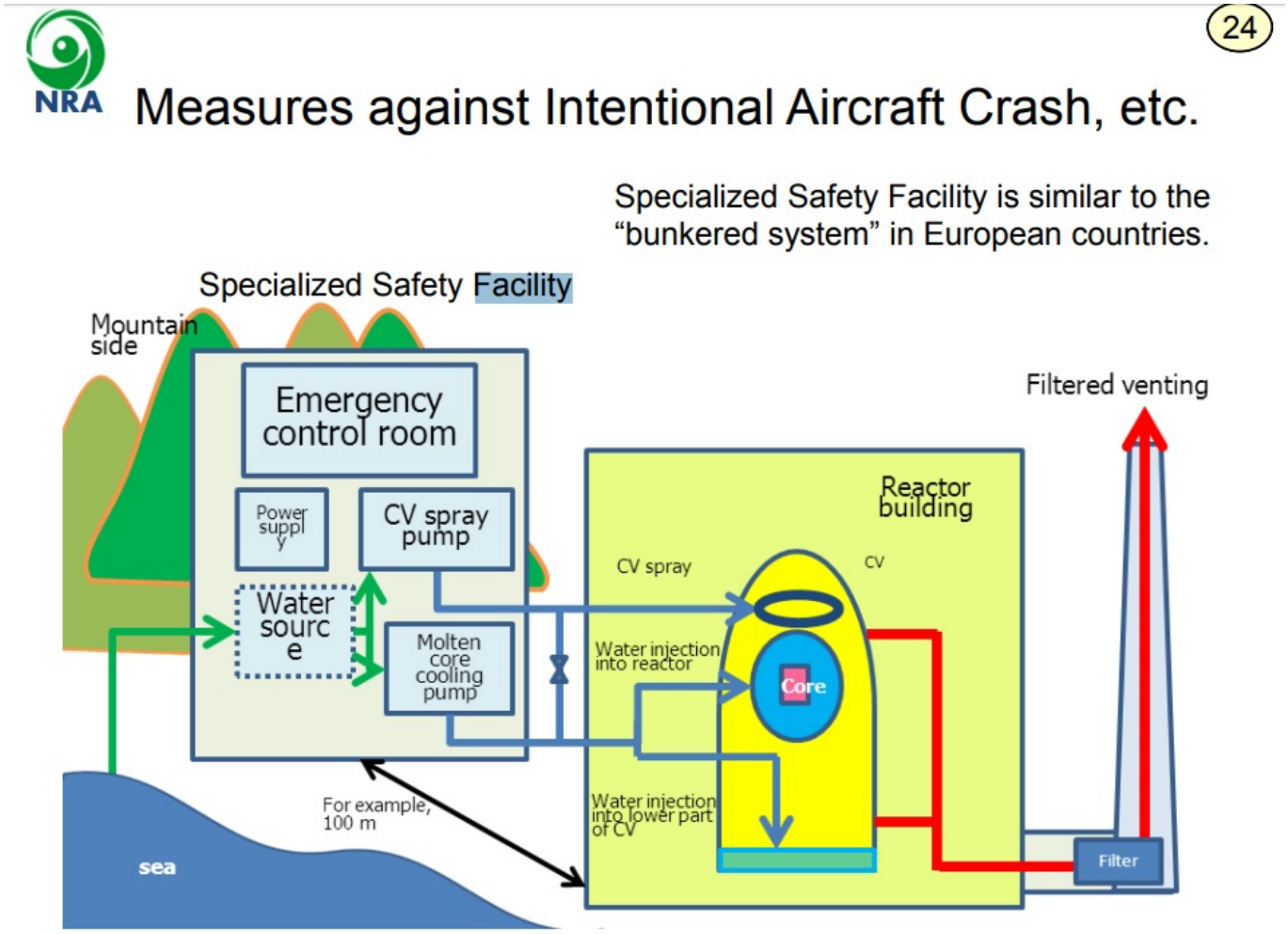
POTENTIAL INSIDER THREAT AGAINST JAPANESE NUCLEAR FACILITIES: CHALLENGE AND PROGRESS SINCE THE FUKUSHIMA NUCLEAR DISASTER



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NOVEMBER 16, 2017

I. INTRODUCTION

In this essay, Masakatsu Ota examines measures taken by Japan's nuclear sector since the Fukushima catastrophe to upgrade nuclear security, in particular, Specialized Safety Facilities, and Personnel Reliability System. Ota argues that two further steps are needed to overcome evident deficiencies that still exist, viz, strengthening newly adopted Personnel Reliability System by employing mandatory backup check and law-enforced verification by police and intelligence authorities; and, immediate and prompt transfer of large volumes of spent-fuels in storage pools to dry-casks.

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Note: this paper was written in 2015 and revised early in 2017 to reflect recent progress on nuclear security due to steps taken by the Japanese government.

The views expressed in this report do not necessarily reflect the official policy or position of the Nautilus Institute. Readers should note that Nautilus seeks a diversity of views and opinions on significant topics in order to identify common ground.

Banner image: Specialized Safety Facility diagram, KEPCO Japan, from here

II. NAPSNET SPECIAL REPORT BY MASAKATSU OTA

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Overview

The unprecedented nuclear accident that began on March 11, 2011 at the Fukushima Daiichi Nuclear Power Plant revealed serious multi-dimensional deficiencies and failures of nuclear safety and security policies in Japan. Since the accident, these deficiencies have been gradually, but only partially corrected through efforts by the newly-established independent regulatory body, Nuclear Regulation Authority (NRA) and Japan's nuclear industry sector.

One of these failures, which gathered a lot of attention from domestic and overseas specialists as well as public, is that Nuclear and Industrial Safety Agency (NISA), a predecessor-organization of NRA, missed several important opportunities to strengthen nuclear safety and security measures, including ones against terrorists, even though NISA was briefed and informed about so called "B.5.b" by the U.S. Nuclear Regulatory Commission (NRC) in 2008.

The "B.5.b" is the section of the 2002 NRC Security Order that addresses damage from fire or

explosion such as could occur from the impact of a large commercial aircraft, based on devastated experiences of the 9/11 attack in 2001.

The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, one of Japanese independent investigative bodies established after the accident, pointed out in its final report like below;

"*The regulators also had a negative attitude toward the importation of new advances in knowledge and technology from overseas. If NISA had passed on to the TEPCO (Tokyo Electric Power Company) measures that were included in the B.5.b subsection of the U.S. security order that followed the 9/11 terrorist action, and if TEPCO had put the measures in place, the accident may have been preventable.*

*There were many opportunities for taking preventive measures prior to March 11. The accident occurred because TEPCO did not take these measures, and NISA and the Nuclear Safety Commission (NSC) went along. They either intentionally postponed putting safety measures in place, or made decisions based on their organization's self interest, and not in the interest of public safety****[1]***."

By taking a careful look at and analyzing progress of nuclear security measures taken since the Fukushima accident, this paper will try to define and appraise potential terrorist attacks in Japan against nuclear facilities, especially terror attack caused by insider threat. Then, the paper will discuss about potential risk of stated-based terrorism against nuclear facilities, and presents a few policy recommendations to reduce these potential but existential nuclear risks in Japan.

Efforts by AEC and Sense of Urgency after Fukushima

U.S. President Barak Obama's new initiative to strengthen nuclear security worldwide, kicked off through his Nobel Prize-awarded speech in Prague in 2009 and the first Nuclear Security Summit in Washington D.C. in the following year, has created gradual but substantial and practical influence on Japanese nuclear policy-makers and industry. Even several years before the Fukushima nuclear disaster, such a nation-wide watershed moment for entire Japanese nuclear safety and security policy, the Government of Japan (GOJ) started internal policy debates for pursuing concrete measures to beef up security of nuclear related facilities and materials.

For example, in 2006 Japan Atomic Energy Commission (AEC) established a special working group on nuclear security, which discuss and figure out optimal standard and concept for the best practice of robust nuclear security[2]. However, more tangible, concrete and robust countermeasures were not proposed until the Fukushima accident in 2011.

In September 2011, AEC concluded a policy concept paper titled "Basic Approach to Securing Nuclear Security," which listed necessary measures to be taken and important points to be thoroughly considered from four perspectives, such as responsibilities of administrative bodies and private utilities engaged with nuclear security, structure maintenance for strengthening nuclear security, protection of nuclear materials and facilities, and countermeasures against nuclear/radiological materials stolen from regulated facilities. Also, this policy concept paper proposed four concrete measures for establishing robust and sustainable nuclear security as "lessons learnt from the Fukushima Daiichi nuclear accident." These four measures are;

1. Strengthen protection measures
2. Strengthen countermeasures against internal threat

3. Strengthen education and training
4. Strengthen nuclear security structure at the time of emergency[3]

With respect to the point 2 abovementioned, the AEC paper said;

"*Inadequacy of entry and exit management at the time of the (Fukushima nuclear) accident was identified. Permit businesses should strengthen countermeasures against internal threats, including thorough measures to prevent invasion of suspicious individuals****[4]****.*"

It is noteworthy that AEC clearly recommended countermeasures focusing on "internal threat." One of the main reasons for AEC to make this specific recommendation was closely related with aftermath turmoil of the Fukushima nuclear disaster. On July 13th, Ministry of Health, Labor and Welfare announced that it was not able to make a contact with 132 workers who had been temporarily involved in a series of disposal and containment operations at the severely damaged Fukushima Daiichi since the accident had taken place on March 11th[5].

The ministry, which is in charge of workers' health and labor environments, tried to reach these workers belonging to 22 sub-contractors of TEPCO, the operator of the Fukushima Daiichi, in order to keep records of their internal radiation exposure for ascertaining their safety environment. According to TEPCO, total number of workers involved in the accident disposal process from March to May 2011 was more than 13,000. This means around 1 % of the entire workforce remained unaccountable for[6].

In worse, this "missing in action" number rose to 198 just a week after the initial ministry announcement. TEPCO was forced to explain a reason of this drastic rise of the number, saying some workers had used a false name for employment registration or made a mistake in filling a registration form. TEPCO continued their efforts to locate and identify these missing workers, but 150 were still missing at the beginning of August same year[7].

Fortunately, there has been no report of sabotage or terror-type incident at the disposal process of the Fukushima Daiichi so far. But, such shocking reality of series of security mishap on the ground created serious public concern and raised eye blows of nuclear regulator and nuclear policy advisory bodies like AEC. Some sort of sense of urgency for strengthening nuclear security appears to make AEC to propose specific recommendation on countermeasures against potential internal threat at nuclear facilities.

Establishing NRA and Efforts to Beef up Security

Before the Fukushima nuclear disaster, NISA was the leading nuclear regulatory body of the GOJ. However, NISA belonged to and was influenced by the Ministry of Economy, Trade and Industry (METI) which has been an ardent promoter of nuclear energy in Japan for almost half a century. This structural deficiency, which raises suspicion about potential collusion between regulators and promoters, brought a strong public backlash all over Japan after its citizens recognized the severity and harshness of the 311 nuclear accident.

The aforementioned episode about NISA's fault on the "B.5.b" reinforced this suspicion about collusion inside "Nuclear Village," which amplified public distrust and resentment against Japanese nuclear policy establishment.[8]

The anti-nuclear power sentiment and distrust prevailing after the Fukushima disaster pressured then DPJ (Democratic Party of Japan) government led by Prime Minister Naoto Kan and his

successor, Prime Minister Yoshihiko Noda, to review entire nuclear regulatory policy and make comprehensive structural changes of nuclear regulatory system. In this context, a more independent regulatory body, called Nuclear Regulation Authority (NRA), was established in September 2012.

On January 9th, 2013, NRA announced its mission and guiding principles, declaring like below;

"*Our fundamental mission is to protect the general public and the environment through rigorous and reliable regulations of nuclear activities……We shall discard the previous ineffective approach to regulatory work and stress the importance of a field-oriented approach to achieve genuinely effective regulations……We shall be ready to swiftly respond to all emergency situations while ensuring that in 'normal' times a fully effective response system is always in place.*[9]

The main scope of the mission and guiding principles of NRA is to strengthen the nuclear safety system in a total manner, reflecting such miserable and disastrous series of failures revealed by the Fukushima accident. On top of nuclear safety, nuclear security is another scope NRA has to cover with effective confluence of safety and security dimensions through building a new regulatory standard.

In June 2012, GOJ amended "Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors" by adding a new element to original purpose of the law. The amended law says, "(NRA) make necessary regulations assuming the occurrence of large scale natural disasters, and terrorism and other criminal acts[10]." Following this amendment process, NRA established a new nuclear regulatory standard in July 2013. Its main elements of countermeasures against severe accident and nuclear terrorism were announced as stated below:

1. Multiple-step protection measures like "Prevention of core damage", "Maintenance of containment function", "Control release by ventilation", "Suppression of diffusion of radioactive materials"
2. Further improvement of reliability by combining permanent-placed equipments with portable-type equipments which are key components for handling a severe accident, following the U.S. model
3. Strengthening protection measures of nuclear spent fuel pools
4. Expanding tolerance of emergency response headquarters, improvement of reliability and durability of communication system, improvement of reliability and durability of measuring system for facilities including spent fuel pools (=strengthening command/communication and measurement system)
5. Importance of integrated demonstration of hardware (=equipment) and software (=on-site work) as one, also requesting maintenance of manuals, ensuring of personnel, implementation of training and so on
6. Requiring distributed storage and connection of portable equipments as a measure against deliberate aircraft collision, and introduction of "Specialized Safety Facility" as backup measures for improving reliability.[11]

Based on the new regulatory standard including these elements, NRA has been gradually implementing comprehensive safety and security measures which could have mitigated the same level of disaster the Fukushima accident had brought about. Noteworthy progress on nuclear security has been observed in some specific dimensions such as the new requirement for sites to have a "Specialized Safety Facility."

According to NRA's annual national-report to the review meeting of Convention on Nuclear Safety in

2016, a Specialized Safety Facility is "a facility for measures against acts of terrorism such as intentional large-airplane crashes to the reactor building." Also, a Specialized Safety Facility is "required to…be a facility necessary to prevent containment vessel failure at a location about 100 meters or more from a reactor building. [12]"

After this new safety rule was established, each nuclear power plant shall be, equipped with Specialized Safety Facility within five years from the date of approval of a construction plan related to measures for managing severe accidents. NRA officials indicated to the author that Specialized Safety Facility reflects a security concept adopted by Germany and Switzerland, which, however, not materialized yet in the U.S. where more portable systems are available for emergency use as a back-up measure[13].

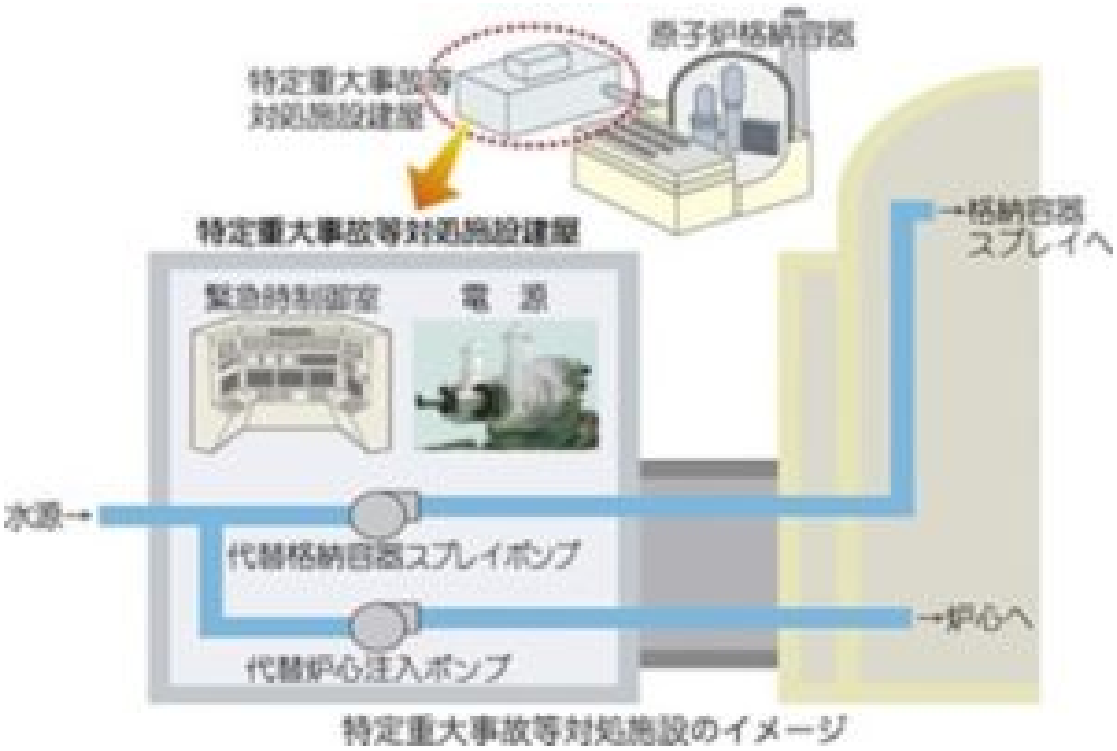

Chart 1; Image of Specialized Safety Facility[14]

Note: The building at the top next to a reactor-building is Specialized Safety Facility equipped with emergency response center and backup power resource. Specialized Safety Facility should be 100 meter away from reactor.

Vulnerability of New Security Measure

However, these gradual and steady steps taken by NRA for enhancing nuclear security are still in the middle of the road that would lead to an enduring, more robust and sufficient security system. One big deficiency is the inadequacy of Personnel Reliability System for officials and workers of nuclear industry in Japan. Among major nations utilizing nuclear powers, Japan was one of only a few nations not employing a Personnel Reliability System until very recently.

A long delay of introduction of the system was due to several reasons such as existence of strong labor unions which are very sensitive about disclosure of personal information and the long absence

of strict secrecy protection system in nuclear area. At a press conference in September 2016, Dr. Shunichi Tanaka, Chair of NRA, acknowledged these points, saying "Personnel Reliability System has been debated for a long time in Japan, but could not be introduced easily. Because each nation has her own problem related with the culture and nationality, which prevents (the Personnel Reliability System) from functioning in a uniform way."[15]

Following AEC's policy debates after the Fukushima disaster, NRA established a working group consisting of outside specialists in 2013 and continued to discuss the introduction of Personnell Reliability System[16]. In September 2016, based on a series of discussion and recommendations by the working group, which reflects a nuclear security guideline of International Atomic Energy Agency (IAEA), INFCIRC 225 rev.5, NRA formally decided to introduce Personnel Reliability System by changes of related regulations.[17].

The NRA decision requires nuclear utility companies to take several concrete steps, viz:

1. Identify staff-personnel including employees of contractors and subcontractors, who are permitted access to classified information about nuclear security.
2. Regulate a background check of possible access-permitted personnel on these points; personal career, connection with foreign nations, terrorism or potential crime organization, criminal track record related with nuclear security, reprimand record related with nuclear security.
3. Regulate a background check through submission of individual report, interview, and vocational aptitude test.
4. Not to allow any personnel who is suspected of conducting sabotage or revealing classified information to have access to classified information and facility.
5. Establish sufficient monitoring equipment inside protection areas handling nuclear materials.[18]

But, these measures are taken by each nuclear utility company without backup verification or active support by governmental authorities like police departments and intelligence agencies. An individual report to be submitted by each staff-personnel to the utility company is made in self-declaratory style without any verifiable process. Also, problems exist in the interview process under the new reliability system.

These are vulnerable factors which may create a loophole for a malicious actor like a terrorist who has an original intention to intrude nuclear facilities for the purpose of sabotage while pretending to be a royal and disciplined employee at normal time.

Even the NRA Chair, Dr. Tanaka, admitted the inadequacy of the new system. At the press conference after deciding to introduce Personnel Reliability System on September 7th 2016, he said "I think it will be unknown how effectively it will work until we see some progress in the future. However, it will be better than before[19]."

Potential Threat against Nuclear Power Plants in Japan

After introducing these new countermeasures against nuclear terrorism like Specialized Safety

Facility and Personal Reliability System into Japanese nuclear sector, to what extent can Japanese nuclear regulator prevent or reduce risk of nuclear sabotage in the future? And, how effectively will these measures deter potential internal threat from being materialized?

It is very difficult to quantify potential nuclear risks like intentional sabotage and terror attacks against nuclear power plants all over Japan. However, we can envision some possible scenarios which may cause a large nuclear disaster.

Scenario 1; Malicious actors like terrorists, either state-sponsored terrorist or independent cell-type one, with sabotage intention sneak into and give serious damage to a nuclear power plant with support of a internal collaborator who passed newly introduced Personnel Reliability System.

In general, commercial nuclear power plants in Japan have a limited number of armed guards inside the boundary. At the time of emergency, guards with low levels or firearms have to fend off intruders until local police forces arrive at the site for more forceful defense and counteraction. This dismal reality undermines Japan’s poor reputation for physical protection of nuclear facilities against sabotage and theft.

According to the Nuclear Security Index 2016 published by Nuclear Threat Initiative (NTI), Japan ranks 13th in overall score among 24 nations with weapon-grade nuclear materials. A huge stockpile of separated plutonium and enrich uranium degrades Japan. And its score of "Insider Threat Prevention" is "67" just above average score "66[20]."

Relatively, Japan has a lower risk of nuclear terror initiated by Islamic extremists because of its historical and demographic background. But, considering other ethnic and racial aspects, foreign residents with strong hostility against Japanese may play a destructive role against nuclear facilities in Japan by taking advantage of vulnerable points of national nuclear security system, especially vulnerability of newly introduced Personnel Reliability System.

For half a century, Japan has had negative and hostile relationship with North Korea over the latter's nuclear/missile programs and abduction of Japanese citizens by North Korea's spy agents and its collaborator in Japan. Taking these historical sequences and current tense situation surrounding the Korean Peninsula into consideration, a possible scenario of nuclear sabotage or terror attack against Japanese nuclear facilities could not, and should not, be excluded at all.

Scenario2; A potential adversary state conducts physical attack against Japanese nuclear facilities by shooting a ballistic missile or launching plane attacks in a pre-emptive manner.

Japan is surrounded by military powers with nuclear weapons like Russia, China and North Korea. The most serious security concern for Japanese authority and citizens is North Korea's expanding nuclear and ballistic missile arsenals with repeated threatening messages through its national propaganda broadcast. A young and erratic leader, Kim Jong Un, appears to be another uncertain security element for Japan.

North Korea developed and possesses substantial number of liquid-fueled Medium Range Ballistic Missiles (MRBM) called Nodong, which can reach most part of Japanese territory with possible payload large enough for carrying s nuclear warhead. According to one experienced Japanese analyst, total number of deployable Nodong missiles is estimated to be 200 with less 50 Transporter Erector Launchers (TELs).[21] Other analytical source provides another estimate of the missile number like at least 450.[22] North Korea also has continued to deploy a longer-range ballistic missile named Musdan with 2500-3000 km estimated-range.

A surprise missile attack against Japan by North Korea is very unlikely at normal times. However, miscalculation and abrupt tension-escalation by regional players including North Korea may induce its leader to think about possibly launching his valuable military assets like Nodong against nuclear facilities in Japan. If this serious threat is materialized, even Specialized Safety Facility, which will be built within five years from the date of approval of complementary construction plan of restarting reactor, seems unable to evade the potentially terrible devastation caused by such missile attack. Creating a more stable security environment as well as achieving diplomatic solution of the North Korea's nuclear and missile problem is the only credible answer to block realization of this wild scenario even though its possibility is quite low.

Conclusion

Since the Fukushima nuclear accident took place in March 2011, Japanese nuclear regulatory body, NRA, and nuclear promoter, AEC, has continued their efforts to enhance security and protection measures for nuclear facilities in Japan. Especially, NRA introduced new nuclear safety and security countermeasures like introduction of "Specialized Safety Facilities" and "Personnel Reliability System" based on the lessons learned from the unprecedented disaster almost 6 years ago.

But, there is still some inadequacy which could create a small window of opportunity for potential internal threat with malicious intention to cause severe damage on Japanese public security and peaceful order. Strengthening newly adopted Personnel Reliability System by employing mandatory backup check and law-enforced verification by police and intelligence authorities will be critical to closing this loophole.

One more important issue which has to be addressed is the spread of nuclear spent-fuel pools at reactor sites around Japan. Dry-cask storage has been employed only at two sites in Japan--one of them is the Fukushima Daiichi Nuclear Power Plant, where robust safety and security of dry-casks was clearly demonstrated during the nuclear disaster initiated by such large tsunamis. Immediate and prompt transfer of large volumes of spent-fuels in these pools to dry-casks is another important countermeasure to reduce potential nuclear risk in Japan.[23]

- **ENDNOTES**

IV. NAUTILUS INVITES YOUR RESPONSE

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

[1] The Fukushima Nuclear Accident Independent Investigation Commission, *The official report of Executive summary*, 2012, p.16, see its website, https://www.nirs.org/wp-content/uploads/fukushima/naiic_report.pdf (accessed on November 28, 2016). Also, see another investigative report, " Fukushima Genpatsu Jiko Dokuritsu Chosa Kensho Iinkai Chosa Kensho Hokokusho (The Independent Investigation Commission on the Fukushima Nuclear Accident Research and Review Report),"written by the commission in 2012, pp.340-342.

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