

***INTERNATIONAL PHYSICAL PROTECTION  
ADVISORY SERVICE (IPPAS)***



***INTERNATIONAL ATOMIC ENERGY AGENCY  
(IAEA)***

***Mission Report: Japan***

*16–27 February 2015*

*Prepared for the Nuclear Regulation Authority (NRA) of Japan*

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## ABBREVIATIONS

AEC	Atomic Energy Commission
ANRE	Agency for Natural Resources and Energy
BWR	boiling water reactor
CAS	central alarm station
CCTV	closed circuit television
CPPNM	<i>Convention on the Physical Protection of Nuclear Material (INFCIRC/274/Rev.1)</i>
DBT	design basis threat
ERC	Emergency Response Centre
FCA	Fast Critical Assembly
HRDC	Human Resource Development Centre
HEU	high enriched uranium
JAEA	Japan Atomic Energy Agency
JCG	Japan Coast Guard
JNES	Japan Nuclear Energy Safety Organization
LEU	low enriched uranium
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MOE	Ministry of Environment
MOX	mixed oxide [fuel]
NISA	Nuclear and Industrial Safety Agency
NMAC	nuclear material accountancy and control
NPS	nuclear power station
NPA	National Police Agency
NPSC	National Public Safety Commission
NRA	Nuclear Regulation Authority (of Japan)

NSC	Nuclear Safety Commission
NSRI	Nuclear Science Research Institute (of JAEA)
NSS	IAEA Nuclear Security Series
PDCA	plan-do-check-act
PFPF	Plutonium Fuel Production Facility
R&D	research and development
TEPCO	Tokyo Electric Power Company
URC	unacceptable radiological consequence

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## SUMMARY

This report presents the results of the IAEA International Physical Protection Advisory Service (IPPAS) mission to Japan, conducted from 16 to 27 February 2015. The mission followed a request from the Government of Japan to the IAEA, provided by the Nuclear Regulation Authority (NRA) on 21 January 2014. Japan is the 42nd State to receive an IPPAS mission and one of the first countries in Asia with a large nuclear programme to host such a mission.

The objectives of the IPPAS mission were to conduct an assessment of the current status of Japan's Nuclear Security Regime. The scope of the IPPAS mission included a national level review, a facility level review at three nuclear facilities, and a computer security review. The assessment compared the nuclear security regime in Japan with the requirements contained in the *Convention on the Physical Protection of Nuclear Material (CPPNM)*, its *2005 Amendment* and with the guidance contained in the *IAEA Nuclear Security Recommendations, on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)*, published as Nuclear Security Series (NSS) No.13, and other relevant NSS guidance documents.

The national level review included Japan's legislative and regulatory framework for physical protection of nuclear material and associated facilities, regulatory practices (licensing and other authorizations, inspection and enforcement) and coordination between organizations involved in physical protection. It included a high level review of physical protection regulation for the Fukushima-Daiichi Nuclear Power Station (NPS), although this facility was not subject to a site visit. The facility level review included two facilities operated by the Japan Atomic Energy Agency (JAEA) — the Fast Critical Assembly (FCA) and the Plutonium Fuel Production Facility (PFPF) — and the Hamaoka NPS operated by Chubu Electric Power Co., Inc. It included the evaluation of physical protection systems in place at these sites. Also, the team addressed the interface of security with nuclear material accountancy and control (NMAC) and the security/safety relationship. Detailed information regarding response force training, tactics and procedures were not provided to the IPPAS team due to inherent sensitivities.

The IAEA assembled an international eight-person team for the IPPAS mission, comprising seven nuclear security experts and a technical writer. The experts have broad experience in physical protection system design, implementation, regulatory oversight, computer security and nuclear legislation. The IPPAS team interacted with personnel from the NRA, the National Police Agency (NPA) and other relevant authorities and with the management and key security staff at the facilities visited.

The team recognizes that nuclear security in Japan has been significantly enhanced during recent years after Fukushima. This includes a revision of laws and ordinances, not only to develop requirements for the Fukushima-Daiichi plant as it is being decommissioned, but also to strengthen security and safety at the other nuclear facilities in Japan. A very important development has been the establishment of the NRA, which has resulted in the effective independence of the safety and security regulatory body from organizations tasked with promoting nuclear energy. In particular, significant efforts have been made by the NRA and other relevant authorities to amend the legal and regulatory framework and to develop technical guidance for implementation of this framework. Significant enhancements in important areas such as nuclear security culture, threat assessment and design basis threat are particularly worthy of mention. The approach of the NRA to ensure an effective interface between safety, security and NMAC provides a solid basis for a strong nuclear security regime in compliance with international instruments and with the IAEA's nuclear security fundamentals and recommendations. The team also recognizes the significant efforts of the NRA, and other relevant authorities and facility operators, to address cyber threats.

A total of 2 recommendations and 19 suggestions have been identified by the IPPAS team at both the national and at the facility levels. In addition, 10 good practices have been identified.

With regard to Fukushima-Daiichi NPS, the IPPAS team is impressed with the well-coordinated actions undertaken by the NRA, other relevant authorities, and the facility operator, in amending the legal and regulatory framework and establishing a comprehensive implementation plan for recovery from the incident. This has included ensuring appropriate security at the damaged site in a short time-frame and challenging environment.

It has been apparent during the mission that the NRA and other organizations and facilities involved in the preparation and conduct of the mission have invested significant time and resources in conducting self-assessment, and preparing a comprehensive advance information package and briefing material, and have supported the IPPAS team throughout the mission.

The IPPAS team concludes that a strong nuclear security culture is being established in Japan, with strong leadership at the NRA and at the nuclear facilities visited. The recommendations and suggestions provided in this report are intended to assist Japan in applying the process of continuous improvement in nuclear security. The number of good practices identified might assist other States in strengthening their nuclear security regimes. In summary, the team has found evidence that Japan has a well-established, robust nuclear security regime with established processes for continuous improvement.

This report, containing the results of the review, is for the exclusive use of the Government of Japan, who may share the report as appropriate. Measures have been taken to protect the confidentiality of the report and other sensitive information related to the conduct of the mission.



## I. INTRODUCTION

This report presents the results of the International Atomic Energy Agency (IAEA) International Physical Protection Advisory Service (IPPAS) mission conducted in Japan from 16 to 27 February 2015 for Japan's NRA. This was the IAEA's 66<sup>th</sup> IPPAS mission and Japan is the 42<sup>nd</sup> country to host this service.

On 21 of January 2014, the Chairman of the NRA requested an IPPAS mission to assess the physical protection regime of nuclear material and nuclear facilities in Japan. The IAEA agreed to conduct the mission in Japan from 16 to 27 February 2015.

Detailed arrangements for the mission were discussed and agreed during the preparatory meeting conducted from 30 June to 1 July 2014 in Tokyo.

For this IPPAS mission, the IAEA assembled an international eight-person team (see Appendix II) comprising seven nuclear security experts and a technical writer. The experts have broad experience in physical protection system design, implementation, regulatory oversight, computer security and nuclear legislation.

In preparation for the mission, the NRA provided the IAEA with a comprehensive advance information package, including legislative and regulatory documents and other relevant information.

The team gathered additional information on the current legal and regulatory structure through interviews with Government officials representing the NRA, the NPA, Japan Coast Guard (JCG), the Cabinet Secretariat and other relevant agencies. Also, facility visits were undertaken to the Fast Critical Assembly (FCA) of the Nuclear Science Research Institute (NSRI) and to the Plutonium Fuel Production Facility (PFPF) of the Plutonium Fuel Development Centre of the Nuclear Fuel Cycle Engineering Laboratories (FCL), both of the Japan Atomic Energy Agency (JAEA), and also to Hamaoka NPS of Chubu Electric Power Co., Inc. During these visits, the team observed the implementation of physical protection in practice and held discussions with facility personnel. Also, meetings with the staff of the State authorities and the facility visits provided opportunities for informal exchange of information on physical protection practices used in other countries and the opportunity to discuss the technical aspects of implementing physical protection systems.

### I.1. Objectives

The objectives of the IPPAS mission were to:

- make an assessment of the current status of national physical protection regime of nuclear material and facilities;
- compare the procedures and practices in Japan with the *Convention on the Physical Protection of Nuclear Material (CPPNM)* and its 2005 *Amendment*, the *IAEA Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities* (INFCIRC/225/Revision 5), published as Nuclear Security Series (NSS) No.13<sup>1</sup> and other relevant NSS guidance documents;
- review the implementation of the national laws and regulations at the FCA and the PFPF of JAEA and at Hamaoka NPS of Chubu Electric Power Co., Inc.;
- provide recommendations and suggestions regarding further enhancement of the national physical protection regime;

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<sup>1</sup> In this report, this guidance document will henceforth be referred to simply as *NSS 13*.

- identify good practices that could be communicated to other Member States of the IAEA for long term improvement.

## **I.2. Scope**

The scope of the review included three IPPAS modules: a National Level Review, a Facility Level Review, and a Computer Security Review both at the national level and at Hamaoka NPS.

The national level review included a review of Japan's legislative and regulatory framework for physical protection of nuclear material and associated facilities, regulatory practices (licensing and other authorization, inspection and enforcement) and coordination between organizations involved in physical protection. The national level review included a high level review of physical protection regulation for the Fukushima-Daiichi NPS, though a site visit was not conducted to this facility.

The facility level review covered a review and evaluation of physical protection systems in place at FCA and PFPF of JAEA, and at the Hamaoka NPS. Detailed information regarding response force actions in the case of security events and equipment available to response forces was not provided to the IPPAS team due to its sensitivity.

Also, the interface of security with NMAC and the security-safety interface were addressed during the mission.

# **NATIONAL LEVEL REVIEW**

## **II. GOVERNMENT ORGANIZATION, ASSIGNMENT OF RESPONSIBILITIES, AND INTERNATIONAL OBLIGATIONS**

### **II.1. Constitutional System**

Japan is a constitutional monarchy.

As defined in Japan's *Constitution*, the Emperor performs duties of State but does not have powers related to Government (Article 4 of the *Constitution*). Some other duties of the Emperor are prescribed in the Article 7 of the *Constitution*, but can be executed only on the advice and approval of the Cabinet. Unlike the monarchy in some other States, the Emperor is not the source of sovereign power and the Government does not act under his name. Instead, the Emperor represents the State and appoints other high officials in the name of the State, in which the Japanese people hold sovereignty.

Like in many other States, the Japanese Government is divided into three branches: the Legislative branch, the Executive branch and the Judicial branch, as defined by the current post-war *Constitution* of Japan, promulgated in 1946.

#### **II.1.1. Legislative Branch**

In Japan, the legislative branch is the National Diet. Under the *Constitution* (Article 41) it is "the highest organ of State power".

It is a bicameral legislature, composed of a lower house, the House of Representatives (480 members), and an upper house, the House of Councilors (242 members). Empowered by the *Constitution* to be "the highest organ of State power" and the only "sole law-making organ of the State", the members of both houses are directly elected under a parallel voting system. The National Diet, therefore, reflects the sovereignty of the people; a principle of popular sovereignty whereby the supreme power lies within, in this case, the Japanese people.

The National Diet's responsibilities include the making of laws (Article 41 and 59 of the *Constitution*), the approval of the annual national budget (Article 60), the approval of the conclusion of treaties (Article 61) and the selection of the Prime Minister (Article 67).

For a bill to become a law, it is first to be passed by both houses of the National Diet, signed by the Ministers of State, countersigned by the Prime Minister, and then finally promulgated by the Emperor.

### **II.1.2. Executive Branch**

The executive branch of Japan is headed by the Prime Minister. The Prime Minister is the head of the Cabinet, and is designated by the National Diet from among the members of the Diet for a term of four years, with no limits imposed on the number of terms the Prime Minister may hold.

The Prime Minister heads the Cabinet and exercises "control and supervision" of the executive branch, and is the head of Government and commander-in-chief of the Japan Self-Defence Forces. The Prime Minister's powers include presenting bills to the Diet, signing laws and declaring a state of emergency.

The Cabinet consists of the Ministers of State and may be appointed or dismissed by the Prime Minister at any time. A majority of its members must be chosen from among the members of the National Diet. The number of members of the Cabinet appointed, excluding the Prime Minister himself, must be fourteen or fewer, but may be increased to up to seventeen should a special need arise.

### **II.1.3. Judicial Branch**

The judicial branch of Japan consists of the Supreme Court, and four other lower courts; the High Courts, District Courts, Family Courts and Summary Courts. Divided into four basic tiers, the courts' independence from the executive and legislative branches is guaranteed by the *Constitution* (Article 76). No extraordinary tribunal can be established, nor can any organ or agency of the executive branch be given final judicial power.

All judges are independent in the exercise of their conscience and are bound only by the *Constitution* and the laws.

The Chief Justice is appointed by the Emperor, after being nominated by the Cabinet and may be dismissed by a majority in a referendum, while the court judges are appointed by the Cabinet, in attestation of the Emperor and are removable only by public impeachment.

### **II.1.4. Safety, Security and Safeguards in Japan**

Prior to 2012, the functions of safety, security and safeguards were assigned to several Governmental agencies. The main regulatory body (for commercial nuclear facilities) was the Nuclear and Industrial Safety Agency (NISA), a semi-autonomous body ('special agency') under the Agency for Natural Resources and Energy (ANRE) within the Ministry of Economy Trade and Industry (METI). NISA relied on the Japan Nuclear Energy Safety Organization (JNES), which was formed in 2003 to carry out on-site inspections and assessments. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) was responsible for environmental radiation monitoring, promotion of nuclear energy and nuclear safety regulation for research reactors. The Nuclear Safety Commission (NSC) was established as an independent agency under the Cabinet Office to develop and promulgate safety regulations and also to monitor the work of NISA and MEXT.

Although it had a status of special agency within METI, NISA was routinely overpowered by industry interests when it came to promoting and enforcing more rigorous safety standards. The overlapping structure of Japan's regulatory structure — where the NSC had responsibility for preparing and promoting new safety regulations, which should then be monitored and enforced by NISA — showed, in reality, that the NSC had little power to ensure that NISA strictly incorporated its recommendations into new regulations or to ensure that those regulations were enforced.

Similarly to the NSC for safety, the Atomic Energy Commission (AEC) — established as an independent agency under the Cabinet Office — was assigned responsibilities for nuclear security.



### III. LEGISLATIVE AND REGULATORY FRAMEWORK

#### III.1. International Instruments

Besides the domestic legal framework (see section below), involvement in international nuclear security-relevant instruments/activities should be highlighted. Japan is a party to the following international legal instruments:

- *Convention on the Physical Protection of Nuclear Material* — in force since 27 November 1988;
- *Amendment to the Convention on the Physical Protection of Nuclear Material* — deposited its instrument of acceptance on 27 June 2014;
- *Treaty on the Non-Proliferation of Nuclear Weapons* — in force since 8 June 1976;
- *Agreement between the Government of Japan and the International Atomic Energy Agency in Implementation of Article III.1 and 4 of the Treaty on the Non-Proliferation of Nuclear Weapons* — in force since 2 December 1977;
- *Protocol Additional to the Agreement between the Government of Japan and the International Atomic Energy Agency in Implementation of Article III.1 and 4 of the Treaty on the Non-Proliferation of Nuclear Weapons* — in force since 16 December 1999;
- *International Convention for the Suppression of the Financing of Terrorism* — in force since 11 July 2002;
- *International Convention for the Suppression of Acts of Nuclear Terrorism* — in force since 2 September 2007.

Japan has also made a political commitment with regard to the *Code of Conduct on the Safety and Security of Radioactive Sources* [pursuant to GC(47)/RES/7.B] and the *Supplementary Guidance on the Import and Export of Radioactive Sources* [pursuant to GC(48)/RES/10.D] and appointed its contact point — the NRA.

Japan also complies with the:

- *UN Security Council Resolution 1540* — by which all States shall refrain from supporting non-State actors that attempt to acquire, use or transfer nuclear, chemical or biological weapons and their delivery systems — and submits the required national reports to the 1540 Committee.
- *UN Security Council Resolution 1373* — which calls on States to work together to prevent and suppress terrorist acts — and submits the required national reports to the Counter-Terrorism Committee.

Furthermore, Japan is a party to all relevant international legal instruments in the broader area of nuclear safety and radiation protection. Just to mention some of them: the *Convention on Nuclear Safety* (from 24 October 1996), the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* (from 24 November 2003), the *Convention on Early Notification of a Nuclear Accident* (from 10 July 1987) and the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency* (from 10 July 1987). In the area of nuclear third party liability, Japan is not a party to either of the existing global regimes (the ‘Vienna’ *Convention on Civil Liability for Nuclear Damage* and the ‘Paris’ *Convention on Third Party Liability in the Field of Nuclear Energy*). On the other hand, Japan has just recently accepted (15 January 2015) the *Convention on Supplementary Compensation for Nuclear Damage*, by which, pursuant to Article XX.1, the Convention will enter into force on 15 April 2015, i.e. on the ninetieth day following the date on which at least five States with a minimum of 400 000 units of installed nuclear capacity have deposited an instrument referred to in Article XVIII.

Japan has also concluded numerous bilateral agreements with other countries concerning cooperation in the use of nuclear energy for peaceful purposes (with the United States of America, the United Kingdom, Canada, Australia, France, China, Euratom, Kazakhstan, the Republic of Korea, Viet Nam, Jordan, Russia, Turkey and the United Arab Emirates), under which some arrangements were made on the level of regulatory authorities, e.g. one signed

between the NRA and US DOE concerning cooperation in the field of nuclear energy-related R&D.

Besides the participation stated above, Japan actively cooperates with the IAEA in its various activities, programmes and venues, including those that are security related.

### III.2. Laws and Secondary Legislation

At the outset, it should be noted that Japanese nuclear legislation does not include a separate act specifically addressing only the issues of physical protection of nuclear facilities and nuclear material. Such provisions are integrated into the acts governing nuclear safety and the peaceful uses of nuclear energy in general.

That said, the legislation that establishes Japan's physical protection regime is in a constant process of updating; this is reflected in the amendments and supplements adopted as a result of the above-described changes in the Governmental re-organization leading to the establishment of the NRA. Besides top level legislative acts, the NRA (and formerly NISA and MEXT) has been revising ordinances on a continuous basis. Most recently, in December 2011 and in March 2012, the ordinances were revised to reflect the lessons learned from the accident in the Tokyo Electric Power Company's (TEPCO's) Fukushima-Daiichi NPS and to incorporate the IAEA's recommended measures in *NSS 13*.

Japan's basic regulatory system functions through multiple pieces of legislation that were intended to build upon one another. The starting point for all nuclear regulatory actions (covering more than just reactor safety) is the *Atomic Energy Basic Act*. The law establishes that regulatory guidelines are to be enacted through future, more specific legislation; future legislation (the *Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors*) establishes that regulatory requirements are to be enacted pursuant to future cabinet orders; cabinet orders establish that specific regulatory practices are to be laid out through NRA ordinance. The following table indicatively and schematically shows this system.

TABLE 1. REGULATORY LEGISLATION

<b>Regulatory Mechanism</b>	<b>Function</b>
<i>Atomic Energy Basic Act</i>	<ul style="list-style-type: none"> <li>- States broad objectives regarding nuclear endeavours</li> <li>- Establishes basic organization framework for subsequent laws to expand upon</li> </ul>
<i>Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors</i>	<ul style="list-style-type: none"> <li>- Lays out broad objectives and requirements regarding regulatory matters</li> <li>- Revised in 2012 to account for the creation of the NRA</li> </ul>
Cabinet Order	<ul style="list-style-type: none"> <li>- Establishes which organizations will be in charge of specific regulatory matters</li> </ul>
NRA Ordinance	<ul style="list-style-type: none"> <li>- Defines specific level of capacity, equipment and procedures that must be met to ensure physical protection</li> </ul>
NRA Regulatory Guide	<ul style="list-style-type: none"> <li>- Provides standards, interpretation of requirements and examples in order to meet the requirements</li> </ul>

The *Atomic Energy Basic Act* (Act No. 186 of 19 December 1955; hereinafter referred to as the *Basic Act*), as can be seen in the table above, is a starting point. On the basis of the *Basic Act*, other laws necessary for the utilization of nuclear energy are enacted and revised as necessary. It states broad objectives regarding utilization of nuclear energy (limitation only to peaceful purposes; ensuring safety; compliance with established international standards) and establishes a basic organizational framework for subsequent laws to expand upon.

The *Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors* (Act No. 166 of 10 June 1957; hereinafter referred to as the *Reactor Regulation Act*) is — for the greater part — uniformly structured by chapters for activities within the utilization of nuclear energy (e.g. refining activities; fabricating and enrichment activities; installation, operation of reactors — research and testing as well as power reactors; interim storage activities; reprocessing activities; radioactive waste disposal and storage activities). The *Reactor Regulation Act* contains provisions on basic requirements for obtaining the appropriate licence (e.g. designation, permission), and such matters as criteria for issuing a licence, on criteria for ineligibility to obtain a licence, on obligations regarding notification of changes and commencement of activities, on criteria for restriction/suspension of a licence, on record keeping.

Each of the above stated chapters of the act includes provisions and requirements regarding:

- measures to be taken for operational safety and physical protection of specified nuclear fuel material (as further specified by the corresponding ordinance of the NRA). If the NRA finds that a licensee is not in compliance with the ordinance with regard to the measures required, the NRA may order the licensee to correct the measures to meet the requirements;
- development of the security plan, which also has to be prepared pursuant to the specified provisions of the corresponding NRA ordinance and approved by it. The NRA may order licensees to amend their security plans, if necessary;
- appointment of physical protection managers.

In addition, the *Reactor Regulation Act* contains provisions on:

- periodic inspections on the status of compliance with a licensee's security plan, on-site inspections and also on penalties (see more under IV.1);
- opinion of the National Public Safety Commission (NPSC) and the JCG and cooperation between the NPSC, the NRA and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT — see more under IV.3);
- secrecy obligation/ confidentiality.

For the time being, there are no provisions on trustworthiness in Japan's legislation, i.e. not in the above-stated acts, nor in the second level legislation listed below. The current process for trustworthiness checking at nuclear facilities requires the operator to conduct identification checks on the individual and review their record of employment reliability. In addition, the operator may interview the individual as part of the recruitment process.

The team was informed that the NRA's Committee on Nuclear Security had placed a high priority on the introduction of a system for confirming trustworthiness. An objective in the NRA's Mid-term Strategy (from FY 2015 to FY 2019) is also to enhance nuclear security by introducing provisions for determining trustworthiness into the legal and regulatory framework. It is planned that during 2015, the amendments of related NRA ordinances will be adopted and NRA guidelines for trustworthiness checks will be developed. Until then, the current process remains in effect. The NRA is encouraged to continue its efforts to implement its Mid-term Strategy.

**Basis:** *NSS 13*, 3.14: Taking into consideration State laws, regulations, or polices regarding personal privacy and job requirements, the State should determine the trustworthiness policy intended to identify the circumstances in which the trustworthiness determination is required and how it is made, using a graded approach. In implementing this policy the State should ensure that processes are in place to determine the trustworthiness of persons with authorized access to sensitive information or, as applicable, to nuclear material or nuclear facilities.

**Recommendation:** The Government of Japan should adopt regulations for trustworthiness in accordance with the established policy and legal framework.

*Enforcement Order of the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors* (Cabinet Order No.324 of November 21, 1957) is hereinafter referred to as the *Enforcement Order*.

The importance of this order lies mostly in the fact that the definition of the 'specified nuclear fuel material subject to physical protection' in Article 3 of the order corresponds to *nuclear material* as defined in Article 1 and Annex 2 of the *CPPNM*.

The provisions (e.g. of Articles 6, 10, 18, 20-4, and specially Article 53) of this order are also important because they represent a link to those articles of the *Reactor Regulation Act*, where it indicates the application of physical protection measures in relation to the specified nuclear fuel material.

Article 63 of the order represents the link to the *Reactor Regulation Act* (Article 72) where the opinion of the JCG/NPSC is required before the NRA grants specific approval and where those administrative bodies may proactively state their opinions, while Article 64 represents the link to the same article of the act where the NRA should, without delay, contact both the JCG and the NPSC.

Finally, the provision of Article 60 sets the quorum and qualifications of physical protection inspectors.

#### *Ordinances*

Ordinances may be adopted at different levels of the executive branch, i.e. by the Prime Minister's Office, by other ministries or by the NRA. The NRA mandate to issue the ordinances is given by the Article 26 of the *Establishment Act*.

The ordinances listed below are divided into two categories: those which set the requirements for the designation or licensing and those which set requirements for operation.

*Ordinance on Standards for the Location, Structure, and Equipment of Commercial Power Reactors and Their Auxiliary Facilities* (Ordinance of the Nuclear Regulation Authority No. 5 of June 28, 2013)

*Ordinance on Standards for the Location, Structure, and Equipment of Nuclear Reactors for Providing Research and Test* (Ordinance of the Nuclear Regulation Authority No.21 of December 6, 2013)

*Ordinance on Standards for the Location, Structure, and Equipment of Usage Facilities* (Ordinance of the Nuclear Regulation Authority No.34 of December 6, 2013)

*Ordinance on the Installation, Operation, etc. of Commercial Power Reactors* (Ordinance of the Ministry of International Trade and Industry No. 77 of December 28, 1978)

*Ordinance on the Installation, Operation, etc. of Nuclear Reactors for Providing Research and Test* (Prime Minister's Office Ordinance of No. 83 of December 9, 1957)

*Ordinance on the Use etc. of Nuclear Fuel Material* (Prime Minister's Office Ordinance of No. 84 of December 9, 1957)

*Ordinance on Operational Safety of Reactor Facilities at TEPCO's Fukushima-Daiichi NPS and Physical Protection of Specified Nuclear Fuel Material* (Ordinance of the Nuclear Regulation Authority No. 2 of April 12, 2013).

The first three ordinances listed above include the licensing requirement on systems that must be installed to prevent illegal entry, to prevent explosive and flammable material (including material that may damage people and other material) from being brought in and out in an unauthorized manner, and to prevent unauthorized computer access. There are nine such ordinances which set the criteria for not compromising accident prevention measures.

In the next four ordinances, the physical protection measures to be taken by licensees for protection of specified nuclear material are prescribed. The ordinances require different levels of protection measures for different types and amounts of specified nuclear fuel material (as prescribed in the *Enforcement Order*) and matters which the licensees should include in a security plan, such as requirements for facilities and equipment for physical protection, those fostering nuclear security culture, a computer security plan, periodic assessment and improvement, and contingency plan. There are 13 such ordinances which provide regulation on physical protection.



In addition to the above, the ordinances set forth requirements for inspection of the status of compliance with a security plan, for records regarding physical protection measures, for physical protection managers and for licensee’s reports to the NRA on accidents and failures (stolen or missing nuclear fuel material).

In summary, the ordinance for power reactors identifies equipment defined as vital equipment, and provides protection requirements for equipment located within or outside a protected area, defined in the ordinance as “vital equipment to be protected within the protected area,” and “vital equipment to be protected outside the protected area.” Neither the *Ordinance on the Installation, Operation, etc. of Nuclear Reactors for Providing Research and Test*, nor the *Ordinance on the Use etc. of Nuclear Fuel Material* includes similar requirements for the identification and protection of vital equipment.

There was initially some confusion regarding the requirement for security areas, but follow-on discussions indicated that Japan’s regulations use the term *protected area* to define an area that equates in *NSS 13* to both an *inner area* and a *vital area*. For Category II nuclear material, the term *protected area* is used in the same context as the recommendations in *NSS 13*. In addition, the term *protected area* is used to designate the security area within which Category III nuclear material is stored. For clarity, the comparison of security areas is displayed in Tables 2 and 3.

TABLE 2. IAEA AND JAPAN’S DEFINED SECURITY AREAS FOR PROTECTION AGAINST THEFT

PROTECTION AGAINST THEFT OF NUCLEAR MATERIAL						
	IAEA Recommendations			Japan’s Regulations		
Security Layer	Category I	Category II	Category III	Category I & Category II (for Commercial Reactors)	Category II	Category III
1	Limited Access Area	Limited Access Area	Limited Access Area	Limited Access Area	Limited Access Area	Protected Area
2	Protected Area	Protected Area		Peripheral Protected Area	Protected Area	
3	Inner Area			Protected Area		
4	Strong Room			Robust facility		

It appears that the intent of *NSS 13* has been met with regard to the number of security areas for protection of nuclear material against theft. The only question remaining is whether Japan's ordinances have provisions meeting the intent of *NSS 13* for the identification and protection of systems, equipment and devices, or nuclear material that, if sabotaged, could lead directly or indirectly to a radioactive release.

TABLE 3. IAEA AND JAPAN'S DEFINED SECURITY AREAS FOR PROTECTION AGAINST SABOTAGE

		PROTECTION AGAINST SABOTAGE		DBT Applied Facilities Only
		<i>Japan's Regulations</i>	<i>IAEA Recommendations</i>	<i>Japan's Regulations</i>
Security Layer		<b>Vital Equipment</b> (Power Reactors&Fuel reprocessing Only)	<b>Vital Systems, Equipment and Devices, and Nuclear Material</b>	<b>Equipment subject to protection</b> (Research & Test Reactors, Fuel facilities, etc.)
1	Limited Access Area	Limited Access Area	Limited Access Area	Limited Access Area
2	Peripheral Protected Area	Peripheral Protected Area	Protected Area (PA)	Peripheral Protected Area (Not for Cat II)
3	Protected Area (PA)	Vital Equipment Outside a PA	Vital Area	Protected Area (PA)
4	Vital Equipment Inside a PA			Equipment subject to protection

The IAEA has developed *NSS 16*, titled *Identification of Vital Areas at Nuclear Facilities*, with the objective of providing States with a process for identifying vital areas as a basis for the establishment of protection measures for those areas to prevent sabotage of nuclear facilities or nuclear material.

**Basis:** *NSS 16*: Vital area identification (VAI) is the process of identifying the areas in a nuclear facility around which protection will be provided in order to prevent or reduce the likelihood of sabotage.

**Suggestion:** The State may consider adopting a process similar to the one defined in *NSS 16* for identification of vital areas at nuclear facilities.

NRA ordinances require a backup alarm station for commercial NPSs and interim storage facilities but do not require a backup alarm station for facilities using Category I nuclear fuel. *NSS 13* has a recommendation for provisions to ensure that the functions of the CAS can continue during an emergency. In nearly all countries, this recommendation is met through the use of a backup alarm station.

**Suggestion:** The NRA may consider adopting regulations for a backup alarm station for Category I facilities.

#### *NRA Guidelines*

Due to the short duration of the mission, only a few NRA guidelines were reviewed by the team. Although the guidelines are not treated as public documents, they are provided to licensees. Even though the purpose of the guidelines is mainly to show specific examples of how to reach the requirements prescribed in ordinances, the NRA guidelines may be understood as mandatory since they are also used as a standard for the NRA, for example, to review security plans and to inspect the operator's state of compliance with regulatory requirements and with security plan.

Throughout the interviews and presentations, the team was informed about different NRA guidelines, covering topics such as:

- national threat assessment and DBT
- information management plan
- nuclear security culture
- rules/requirements for physical protection measures

#### *Act for Establishment of the Nuclear Regulation Authority*

The purpose and main provisions of this act are described in II.1.4 above and IV below.

#### *Act on Punishment of Acts to endanger Human Lives by generating Radiation* (Act No. 38 of May 11, 2007)

Contrary to the legal systems in some other countries, where all criminal offences are codified in a penal code, in Japan — besides the *Penal Code* — there are other acts containing criminal offences and laying down penalties for them. As stated in Article 1 of this act, its purpose is to ensure the proper enforcement of the *International Convention for the Suppression of Acts of Nuclear Terrorism* and other international agreements, as listed above (see under III.1) to which Japan is a contracting party. The latest revision of this act will come into force on the day on which the *CPPNM Amendment* enters into force.

There are also other pieces of legislation that are directly or indirectly linked to a broader scope of physical protection and nuclear security or to the functioning of the regulatory authorities. For example, the:

- *Police Law* (Law No. 162 of June 8, 1954)
- *Act on Special Measures concerning Nuclear Emergency Preparedness*
- *Security Service Act*
- *State Secrecy Act*
- *Act on Access to Information held by Administrative Organs*
- *Administrative Complaint Review Act*.

In conclusion, the IPPAS team considers that ample coverage has been made in acts and associated delegated legislation (orders, ordinances, and guidelines) for the obligation of the State to establish and maintain a legislative and regulatory framework to govern physical protection, as prescribed by the *Amended CPPNM* in Fundamental Principle C: Legislative and Regulatory Framework. The process of continuous legislative alignment with the current internationally recognized standards and good practices is in place through the system of amendments of the legal framework.

## IV. ROLES AND RESPONSIBILITIES OF COMPETENT AUTHORITY

As already explained under II.1.4 above, the NRA was established by the *Establishment Act* in 2012 under the MOE as its external organ, taking the lessons learned from the accident at the Fukushima-Daiichi NPS into consideration. The *Establishment Act*, in its Article 1, states that the purpose of the establishment of the NRA is to eliminate the harmful effects of a vertically-divided administration on the use of nuclear energy and to resolve problems that may arise under a situation where a single Government organization acts both as an authority to promote the use of nuclear energy and as a regulatory authority.

The NRA is composed of a Chairman and four Commissioners, and has its Secretariat and its Human Resource Development Centre (HRDC).

The Chairman and the Commissioners are appointed by the Prime Minister upon obtaining the consent of both Houses of the Diet, from among persons who are of noble character and have excellent knowledge of nuclear energy and nuclear safety. If a declaration of a nuclear emergency situation is issued pursuant to the provisions of Article 15, paragraph (2) of the *Act on Special Measures Concerning Nuclear Emergency Preparedness* or there are other circumstances requiring urgency, as prescribed in paragraph 3 of Article 7 of the *Establishment Act*, the Prime Minister may appoint the Chairman from among those who are qualified; in such case the ex post facto consent of both Houses of the Diet has to be obtained promptly.

The *Establishment Act* includes provisions on conditions under which the Prime Minister may dismiss the Chairman or a Commissioner.

The term of office of the Chairman and the Commissioners is five years provided, however, that they may be reappointed.

The NRA Secretariat handles its affairs and has a secretary-general and other officials who all act in accordance with the orders of the Chairman.

The NRA ensures transparency in its operation through a thorough disclosure of the information that it holds with the aim of guaranteeing the public's right to know. The team was informed that, for example, the information on results of NRA inspections was made public as far as possible. However, the information related to physical protection that falls under Article 5 of the *Act on Access to Information held by Administrative Organs* is kept undisclosed. On the basis of the *Establishment Act* (Article 24), the NRA reports annually to the Diet, through the Prime Minister, on the handling of the affairs under its jurisdiction and makes a summary thereof public.

Article 13 of the *Establishment Act* provides for establishment of two NRA Committees, namely the Reactor Safety Examination Committee and the Nuclear Fuel Safety Examination Committee, whose functions are described in subsequent articles of the same act; furthermore, the *Establishment Act* includes the provision on Radiation Council and Emergency Response Measures Committee. Moreover, the team was informed that within the NRA another committee had been established, namely the Committee on Nuclear Security with the aim of promoting the strengthening of nuclear security and making contributions to international efforts in nuclear security. At present, the following three working groups are installed under the committee and have been performing examinations on the specific issues:

- Working Group on Nuclear Security in Transport
- Working Group on Establishment for Trustworthiness of Individuals
- Working Group on Nuclear Security Related to Radioactive Isotopes.

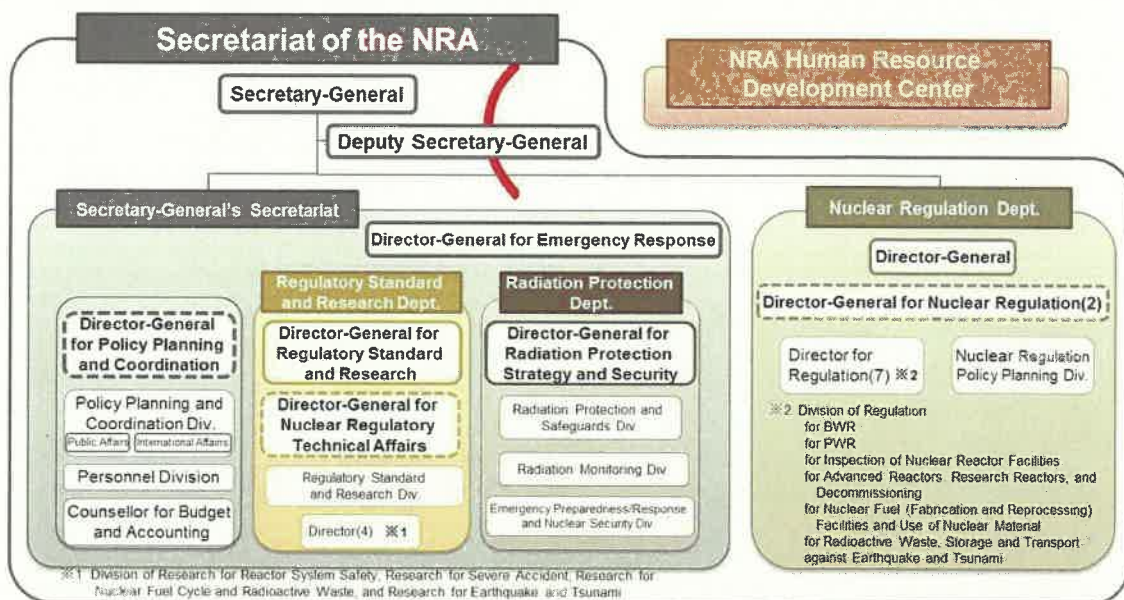
In order to enforce acts or cabinet orders, or as delegated by acts or cabinet orders, the NRA may adopt ordinances for regulating in detail those areas falling under its jurisdiction (Article 26 of the *Establishment Act*).

Article 4 of the *Establishment Act* lists the powers held by the NRA; including the authority of the NRA to be in charge of “affairs concerning the adjustment of affairs of the relevant administrative organs regarding the physical protection of nuclear fuel material and other radioactive material”.

Besides the secretariat, there is another organizational unit of the NRA, namely the HRDC. Furthermore, in March 2014, the JNES – which was a technical support organization with regard to setting up regulatory requirements for licensees – was merged to the NRA. Since some of JNES staff have been included in the Nuclear Security Office, and the physical protection related function of the NRA has been strengthened.

As of March 2014 the NRA Secretariat staff together with HRDC staff numbered nearly 1000.

The FY2013 budget was 63 273 million Yen.



*Figure 2. Organization of NRA.*

Within the organizational structure (Fig. 2) of the secretariat of the NRA there is the Radiation Protection Department; a part of this department is the Emergency Preparedness/Response and Nuclear Security Division, responsible for activities and areas related to the physical protection of nuclear material and to nuclear emergencies. Within this Division, the Nuclear Security Office is placed; Radiation Protection and Safeguards Division, responsible for areas related to the regulations for preventing radiation hazards and nuclear safeguards, is also a part of Radiation Protection Department. The Nuclear Security Office is responsible for the following matters related to the physical protection of nuclear fuel material:

- The coordination of the activities of the relevant administrative organs associated with the physical protection of nuclear fuel material and other radioactive material, namely the NPA and the JCG; besides these two, there are several other administrative organs connected with nuclear security (see more under IV.3);
- The physical protection of nuclear fuel material.

In addition to its main office in Tokyo, the Nuclear Security Office has nine sub-offices across the country (Fig. 3). Notwithstanding the fact that the *Enforcement Order* provides for 43 physical protection inspectors [Article 60(3)] the team was informed that the current status is as follows: there are 14 inspectors in the main office in Tokyo and another 14 in sub-offices, all of them dedicated to physical inspection. In addition, the Nuclear Security Office is supported by six inspectors who cover

partially safety and partially security. Besides the physical protection inspectors, there are also 11 employees in the main office only, who do not have inspection powers.

There are 59 places of activity, sometimes with more than one facility at the same site, which are subject to NRA regulations, the security related legislation has been amended in recent years and is to be further amended, special arrangements are in place for Fukushima-Daiichi NPS (as a 'specified nuclear facility') and rotation/personnel transfer is applied also to NRA inspectors. Keeping this huge workload in mind, it has to be stressed that the current number of physical protection inspectors does not meet the number allocated in the *Enforcement Order*. Furthermore, the *Establishment Act* in its Article 6 (of the supplementary provisions) lists the measures that the Government should promptly take after the Fukushima accident and among them is also to ensure a sufficient number of positions available for new recruits. In fact, the *Enforcement Order* set a quorum of 43 physical protection inspectors.

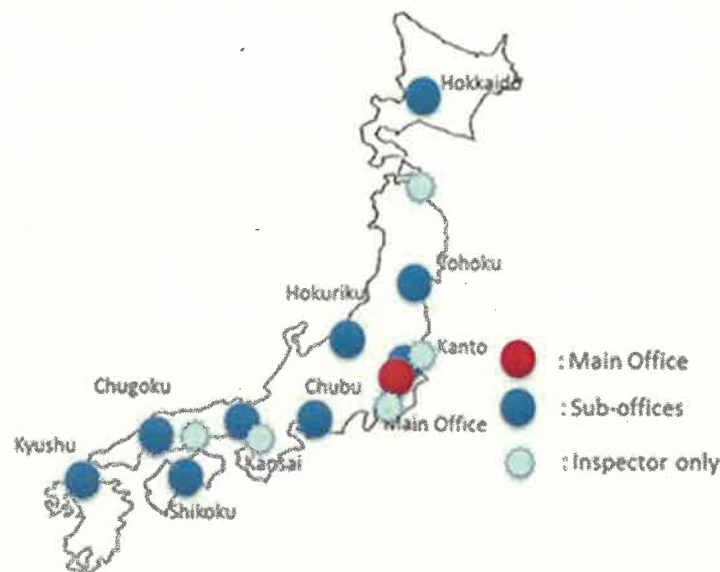


Figure 3. Nuclear Security Office & its sub-offices.

**Basis:** NSS 13, Fundamental Principle D: The State should establish or designate a competent authority which is responsible for the implementation of the legislative and regulatory framework, and in provided with adequate authority , competence and financial and human resources to fulfil its assigned responsibility.

**Suggestion:** The NRA may consider recruiting the approved number of physical protection inspectors in order to meet the number of places (43) provided for in the existing legislation.

#### IV.1. Inspection and Enforcement

Inspection powers of the NRA are prescribed in several legal acts. While the *Basic Act* has no specific provision on inspection and thus even less about physical protection inspection, the same is true of the *Establishment Act*. But the latter has within its Article 4, which lists competences and responsibilities of the NRA, also a provision which says that NRA is competent and responsible, in addition to what is set forth in the preceding items of Article 4(1), also for tasks the NRA is assigned by other acts (including orders based on such acts).

On the basis of this provision, the *Reactor Regulation Act* empowers the NRA to conduct, pursuant to the provisions of the appropriate NRA ordinance, periodic physical protection inspection for activities within the utilization of nuclear energy in order to check the licensee's compliance with the security plan. In conducting the inspection, the officials designated by the NRA have powers listed below as specified by the NRA ordinance, namely to:

- enter the office, factory or place of activity;
- inspect books, documents or any other necessary property;
- question people concerned;
- request the submission of necessary samples of specified nuclear fuel or other material (limited to the minimum amount necessary for the analysis).

In addition to the above-described 'regular' inspections (conducted once every year, as stipulated by the appropriate ordinance, such as Article 97(1) of the *Ordinance on the Installation, Operation, etc. of Commercial Power Reactors* or Article 16-2(2) of the *Ordinance on the Installation, Operation, etc. of Nuclear Reactors for Providing Research and Test*) and to ensure proper enforcement of the *Reactor Regulation Act*, the NRA may conduct on-site inspections of the factory or office of any licensees of nuclear energy activity to the extent necessary (*Reactor Regulation Act*, Article 68), having the same powers as are prescribed for regular inspections.

According to Article 72 of the same act, the NPA and the JCG can also conduct on-site inspections of the factory or office of a licensee.

Inspection results and findings are shared between the NRA, the NPA and the JCG. The team was also informed that security authorities ordinarily join NRA physical protection inspectors when they conduct inspections at the nuclear facilities.

The *Reactor Regulation Act* furthermore provides that when the NRA finds that any physical protection measures are in violation of an NRA ordinance, it may order the relevant licensee to take corrective measures. The *Reactor Regulation Act* provides for different kinds of measures which can be used by the NRA in case of violation of security plan. For the most serious measures (e.g. cancellation of licence; suspension of operation; dismissal of Physical Protection Manager), the NRA issues an administrative disposition/decision. For the other violations which are not classified as Level 1, administrative guidance is foreseen, which may be issued either by the NRA or by the Director of the Nuclear Security Office. Only at the lowest level of such administrative guidances (when violation is not considered as violation of a security plan), the physical protection inspector is allowed to issue notification to the licensee which includes a suggestion on how to introduce corrective actions. The authority for issuing official documents is specified in the Commission's internal rules — *Manual on the Response to Violation etc. of Security Plan*.

Although the nuclear legislation does not include provisions for appeal (except those in Article 70 of the *Reactor Regulation Act* connected to disposition/decision pertaining to the safeguards inspections) there is another piece of general legislation which covers appeal procedure, i.e. the *Administrative Complaint Review Act*. Basically, the team was informed that on a licensee's appeal, the NRA took a final decision (since there are no superior administrative agencies to the NRA, considering that the MOE could not decide on an appeal). A licensee not satisfied with the final decision on appeal has judicial protection. However, the whole system applies only to administrative dispositions issued by the NRA while for administrative guidance (which may be issued either by the NRA or by the Director of Nuclear Security Office), this act does not apply.

For more serious offences, the *Act on Punishment of Acts to Endanger Human Lives by Generating Radiation* and the *Penal Code* may be used. The *Penal Code* contains criminal offences and lays down penalties for them; for the majority of these criminal offences, several years of imprisonment with hard labour are prescribed.

Although not directly related to inspection and enforcement duties of the NRA, the *Reactor Regulation Act* provides in its Article 66 that employees of the licensee are encouraged to make allegations to the NRA if the licensee has been violating the legislation. Such employees should not be dismissed by the licensee or be given any other disadvantageous treatment.

## IV.2. Licensing

Within its licensing activities in relation to physical protection of nuclear material and nuclear facilities, the NRA performs:

- designation or permission of activities, and permission for nuclear reactor installation.
- approval of a security plan before commencing handling specified nuclear fuel material by a licensee.
- periodic inspections on the status of compliance with licensee's security plan.

As already described previously in this report (see III.2), the *Reactor Regulation Act* is uniformly structured and includes provisions which define the requirements for obtaining the appropriate licence (designation, permission) and criteria for issuing the licence for activities within the utilization of nuclear energy. In that part of the act which regulates the installation, operation, etc. of power reactors, the provision of Article 43-3-6 stipulates that at the stage of applying for a construction permit for a nuclear power reactor, the applicant has to demonstrate that the location, structure and equipment of the power reactor facilities conform with the standards as specified by the ordinance of the NRA; the *Ordinance on Standards for the Location, Structure, and Equipment of Commercial Power Reactors and their Auxiliary Facilities* in its Article 7 stipulates: "A factory, etc. must have equipment to prevent illegal entry into power reactor facilities, unauthorized bringing of explosive items, flammable items, or items that may possibly damage other people or other items into power reactor facilities, as well as unauthorized computer access."

In addition, before starting the handling of the specified nuclear fuel material, according to Article 43-3-27 (Security Plan) of the *Reactor Regulation Act*, the licensee shall prepare provisions for a security plan and shall receive approval by the NRA.

The security plan has to be based on the national threat assessment and DBT, which the NRA provides together with the corresponding guidelines to the licensees.

Before authorizing the security plan, on the basis of Article 72 of the same act, the NRA should hear the opinion of the NPSC or the Commandant of the JCG.

The same requirements are prescribed in the *Reactor Regulation Act* (and in appropriate ordinances) for all other licensing procedures for nuclear material and nuclear facilities. For example: the requirements for *Regulations Concerning the Installation, Operation, etc. of Research and Test Reactors* follow the same pattern; they are prescribed in Article 23 — Permission for the Installation and 24(1)(iii) — Criteria for the Permission of the *Reactor Regulation Act* and, with a reference to the appropriate NRA ordinance, in this case the *Ordinance on Standards for the Location, Structure, and Equipment of Nuclear Reactors for Providing Research and Test*. Also in this case, the approval of the security plan is obligatory (Article 43-2).

Each of those ordinances includes a provision on the contents of the security plan; if security plan is to be approved by the NRA, it has to be in line with the required structure and content (as for example: general rules; system for fostering nuclear security culture; structure of physical protection organization; physical protection manager; guards; physical protection equipment; maintenance of equipment; control of nuclear fuel material; contingency plan; education and exercises and confidentiality).

Any modification or amendment to the security plan has to be approved by the NRA in the same manner as the approval of the initial security plan. Within NRA's periodic inspection, it may order the operator to improve or correct the security plan, if necessary, to be in line with current legislative requirements.

The security plan has to be based on the national threat assessment and DBT, which the NRA provides together with the corresponding guidelines to the licensees.

In 2013, the revised *Reactor Regulation Act* was enforced while, at the same time, ordinances governing the physical protection of nuclear facilities were also revised. The NRA conducted a review of operators' licences related to the modification of the security plan. The number of review cases that the NRA approved in FY2013 (i.e. from 1 April 2013 to 31 March 2014) was 82 out of which eight



were for fuel facilities, five for research and test reactors, 43 for commercial power reactors, three for reactors in a stage of R&D, one for a storage facility, six for reprocessing facilities, two for waste management facilities and 14 for facilities where nuclear fuel material is used.

### **IV.3. Integration and Participation of Other Organizations**

As has been stated and described previously in the report, the *Reactor Regulation Act* defines the relationship between the NRA and the NPSC and the relationship between the NRA and the JCG, namely:

- before the NRA approves a licensee's security plan, the opinion of the NPSC or the Commandant of the JCG is needed;
- the NPSC and the JCG can deliver their opinion to the NRA where necessary;
- the NPSC and the JCG can implement on-site inspection of the factory or office of a licensee.

Also, *Reactor Regulation Act* provides that when the NRA has approved a licensee's security plan or implemented physical protection inspection of nuclear material or nuclear facilities, or has received a notification from a physical protection manager, the NRA shall contact the NPSC and the JCG without delay to transfer the information.

In addition, the *Reactor Regulation Act* contains a provision that the NRA maintain close coordination and cooperation with the NPA and the JCG, and also with the MLIT. This ministry is also responsible for regulation on transport of nuclear fuel material and radioactive material.

Several other ministries and agencies are involved in the coordination of nuclear security tasks and duties on the basis of other general or specific pieces of legislation. The Ministry of Health, Labour and Welfare is responsible for regulation of radioactive material used in medicine and the Ministry of Agriculture, Forestry and Fisheries for regulation of radioactive material used in veterinary work. Furthermore, the Cabinet Office is responsible for comprehensive coordination of those agencies acting in the event of an emergency, for example (besides NRA, NPA, JCG), the Ministry of Defence and Fire and Disaster Management Agency. This is also the case when, on the level of NRA, an emergency response centre is activated.

The NRA secretariat organizes meetings with those agencies listed above. Such meetings are conducted on a regular basis and are attended by representatives of those ministries and agencies as required by the meeting agenda.

## **V. THREAT ASSESSMENT AND DBT**

It is important that threats are adequately assessed and defined in order to design and implement an appropriate physical protection regime and system. The State's physical protection should be based on the State's current evaluation of the threat.

The ordinances described below provide for the physical protection measures to be implemented by the licensees with regard to the DBT.

The *Ordinance on the Installation, Operation, etc. of Commercial Power Reactors*, Article 91 (Physical Protection Measures), paragraph (2), prescribes a detailed list of measures. Furthermore, at point (xxvii) it also mentions those measures which relate to confidentiality of the DBT — (a) the matters concerning the threat, such as sabotage, separately specified by the NRA. In point (xxviii) of the same paragraph, it prescribes that all measures necessary for the physical protection of specified nuclear fuel material are to be taken in response to the threat, such as sabotage, separately specified by the NRA. According to Article 96 (1) (xvii) of the same ordinance, this information must be included in the licensee's security plan.

Similarly, this information can be found with regard to *Ordinances relating to Research Reactors* at Article 14-3 paragraph 5 and *Nuclear Fuel Material* at Article 3-3 paragraph 5.

## **VI. RISK INFORMED APPROACH**

There have been significant changes to Japan's approach to risk management in recent years which have included amendments to the *Reactor Regulation Act* in 2005, the introduction of physical protection measures to meet the DBT and the introduction of compliance based inspections and enforcement.

In addition, the establishment of the NRA in 2012 provided a regulatory authority independent from other Government departments with a clear remit for the regulation of threat reduction through a graded approach and defence in depth.

### **VI.1. Graded Approach**

The aim of the graded approach is to ensure that the physical protection requirements are commensurate with the threat and the potential consequences of malicious acts. It is clear that consideration has been given to the principle of a graded approach against the unauthorized removal of nuclear material (theft), taking into account the relative attractiveness and nature of the material, and has been articulated in Table 4.

Definition of nuclear material to be protected		Category		
Material (Unirradiated)	Weight	I	II	III
<b>Pu</b>	<b>&gt; 15g</b>	<b>≅ 2 kg</b>	<b>&gt; 500 g &lt; 2 kg</b>	<b>&gt; 15 g ≅ 500 g</b>
<b>U-235</b>	<b>≅ 20%</b>	<b>&gt; 15g</b>	<b>≅ 5 kg</b>	<b>&gt; 15 g ≅ 1 kg</b>
	<b>&lt; 20%</b>	<b>&gt; 1kg</b>		<b>≅ 10 kg</b>
	<b>≅ 10%</b>	<b>&gt; 1kg</b>		<b>&gt; 1 kg &lt; 10 g</b>
	<b>&lt; 10%</b>			
	<b>&gt; NU</b>	<b>≅ 10kg</b>		<b>≅ 10 kg</b>
<b>U-233</b>	<b>&gt; 15g</b>	<b>≅ 2 kg</b>	<b>&gt; 500 g &lt; 2 kg</b>	<b>&gt; 15 g ≅ 500 g</b>

<For irradiated fuel etc. whose radiation levels exceed 1 Gy/hr at one meter unshielded>

- Fuel of Category I or Category II can be reduced one category level.
- Category for NU, DU, Th, EU 10% fuel is Category II.
- Category for vitrified waste is Category III.

## VI.2. Defence in Depth

The aim of defence in depth is to provide a robust, layered physical protection system, using a variety of methods.

The NRA has developed a concept of physical protection based on a principle of layered defence providing detection, delay and response in a graded structure with appropriate effective protection within four specific areas for Category I facilities:

- limited access area
- peripheral protected area
- protected area
- robust facility

The physical protection requirements for each of these areas are defined in the relevant ordinance for commercial power reactors, research facilities and nuclear fuel facilities.

protection measures for the robust facility are detailed in separate guidelines relating to the physical requirements against the DBT.

The terminology used to define these layers differs from those used in IAEA publications, but essentially provides the same effect. The mixture of physical, technical and organizational methods of protection meets the requirements of a robust physical protection system.

## VII. SUSTAINING THE PHYSICAL PROTECTION REGIME

A nuclear security regime ensures that each competent authority and authorized person and other organizations with nuclear security responsibilities contribute to the sustainability of the regime by allocating sufficient human, financial and technical resources to carry out the organization's nuclear security responsibilities on a continuing basis using a risk informed approach.

Officially inaugurated on 19 September 2012, the NRA's mission is to protect the general public and the environment through rigorous and reliable regulation of nuclear activity. The organization has developed five specific principles to be adhered to in the course of its duties:

- Independent decision making
- Effective actions — a field orientated approach
- An open and transparent organization
- Improvement and commitment
- Emergency response

Physical protection inspectors within the NRA are expected to have appropriate qualifications based on NRA requirements. This will require them to be Government officials, holding a Bachelor of Science Degree or appropriate experience. They are required to complete a training course designated by the Chairman of the NRA. Basic training and follow-up training would appear to offer a comprehensive syllabus, but there is no evidence of formal testing or certification to ensure the inspector's competency.

**Basis:** *NSS 12* promotes an educational standard in nuclear security and the basis of a certificate programme for the development of certified nuclear security specialists.

**Suggestion:** The NRA may consider formalizing a certificate programme for testing and certification of physical protection inspectors.

At industry level, provision for sustainability is made through the *Nuclear Reactor Act*, which prescribes the appointment of a physical protection manager, (Article 12-3), the requirements on the licensee to produce a security plan (Article 12-2) and provides the NRA with the powers to dismiss the physical protection manager in the event that s/he violates the regulations as prescribed (Article 12-5).

## VII.1. Security Culture

The NRA has adopted its *Code of Conduct on Nuclear Security Culture* and has made amendments to relevant Ordinances to ensure that security culture is properly addressed in a security plan and receives the appropriate level of attention from senior management.

Focusing on the principle of plan, do, check and act (PDCA), the NRA has ensured that a licensee's security plan contains clear direction to senior management of their responsibilities. This requires the CEO of a company to develop nuclear security culture guidelines. The head of the facility is to develop and implement an action plan (plan, do). The head of the facility is then required to report back to the CEO (check) and the CEO provides feedback and instructions for action based on the report (act). The CEO is required to review the guidelines at least once a year and revise as necessary.

The process ensures senior management involvement and places the onus to promote security culture squarely on the site operator. The implementation of an effective security culture process is subject to regulatory inspection.

This activity was supported by the NRA during a workshop held in March 2014 and a briefing by the NRA Commissioners to company executives in April 2014. In addition, the Chairman and the Commissioners conducted individual interviews with the executives to emphasize the importance of security culture. The NRA's work has also been supported by lectures and presentations at conferences and seminars.

Of particular interest is the NRA development of a model self-assessment questionnaire, developed by the NRA and disseminated to all operators as the basis for their own questionnaire process. In addition, the NRA has produced an educational video that addresses a number of security culture issues and posters, which were in evidence during the facility visits.

Evidence suggests that the overall effort by the NRA in this area has produced an improvement across the industry, but the organization is guarding against complacency.

**Good Practice:** The development and implementation of the nuclear security culture programme and the promotion of the process through senior management, with the close attention and direction of the hierarchy of the NRA, particularly in respect of the interviews of CEOs by the NRA Chairman and Commissioners is considered good practice.

## VII.2. Quality Assurance

A State is required to ensure that physical protection measures are effective, reliable and sustainable. The *Reactor Regulation Act* directs that licensees are responsible for the physical protection of their sites and must produce a security plan, approved by the NRA. The NRA ordinances provide a description of the appropriate physical protection measures at all types of nuclear facilities and licensees must take account of these requirements in conjunction with the DBT. Article 91(2)(xxi) of the *Ordinance on Commercial Power Reactors* directs the requirement to conduct checks and maintenance on equipment and devices necessary for the physical protection of specified nuclear fuel and measures to maintain functionality.

The NRA conducts compliance based inspections of these facilities to ensure these requirements are being maintained.

With regard to NRA activity, quality assurance is determined through a cyclical process, developing management policy and prioritizing programmes into an implementation phase, which is subject to the PDCA philosophy as part of the NRA management process.

## VII.3. Confidentiality

It is important for a State to establish a mechanism for the protection of sensitive information and systems containing sensitive information. Equally, an element of this process relies on the ability of the operator to assess the trustworthiness of an individual who may have access to the information and systems.

### VII.3.1. Confidentiality of Information

The issue of Confidentiality is addressed by the State, in law through the *Reactor Regulation Act* Article 68-2 (Secrecy Obligation), which defines the requirement for licensees and their employees involved in any nuclear activity not to divulge any information relating to the physical protection of specified nuclear material. The provision includes former employees, State employees and national/local Government employees who may have had access to the information through administrative measures.

The State has also made provision under Article 78(xxxi) of the same act to punish individuals who have breached the Secrecy Obligation in Article 68-2. The punishment can take the form of imprisonment with hard labour for up to a year, a substantial fine or both.

With regard to the NRA, the *Establishment Act*, Article 11(1) directs that the Chairman and Commissioners shall not divulge any secret information which may have come to their knowledge in the course of their duties and applies equally after they have left the posts.

The requirement for confidentiality is extended to licensees via the *Ordinance for Power Reactors*, Article 91(2) (xxvi), which defines the need to manage information relating to the physical protection and processes associated with nuclear material, including threat related issues and contingency plans.

The structure for the management of information within Government agencies is produced by the Cabinet secretariat. The NRA is then responsible for the production of the information security policy and the production of information management guidelines.

The classification system makes provision for:

- *top secret*
- *secret*
- *controlled information* (based on the need-to-know principle).

The implementation of the *Reactor Regulation Act*, Article 68-2 (Secrecy Obligation), with regard to types of facility is managed through the requirement to include clear information management details in respective security plans.

During the facility visits, the IPPAS team observed the implementation of how sensitive information was handled and stored at the facilities. The assessment of the team is that all facilities have a level of physical protective measures in place to protect sensitive information. These observed protective measures may meet the NRA's requirements and the intent of *NSS 13*; however, the team considers them not always equivalent with what they consider the customary protection level in other countries where often more detailed technical guidance is given.

**Suggestion:** The NRA is advised to review its required protection measures for *secret* and *top secret* information against standards found in other countries and, on that basis, consider revising the current requirements for physically protecting sensitive information.

## VIII. PLANNING AND PREPAREDNESS FOR AND RESPONSE TO NUCLEAR SECURITY EVENTS

Emergency response is one of the five core principles for the NRA which states that the organization will be ready to swiftly respond to all emergency situations while ensuring that in 'normal' times a fully effective response system is always in place.

The structure for emergency response is supported within the legal framework in the ordinances and provides the requirement for all nuclear facilities to have a contingency plan to address the risk of theft or sabotage of specified nuclear material or specific equipment used in the handling of such material, or an attack on the physical protection measures associated with the facility. guidelines to the operators which stipulate the required contents of the contingency plan which must form part of the security plan and is subject to regulatory approval.

In addition, the ordinance requires licensees to conduct education and training of individuals according to their function. These measures are exercised on an annual basis, subject to regulatory review by the NRA and the NPA/JCG authorities.

A bottom-up process, the NRA operates an Emergency Response Centre (ERC) within the NRA headquarters, which is designed to coordinate Government and local task force operations. This facility has a real time monitoring capability of all safety data relating to Japan's reactors. When activated, the ERC will coordinate both off-site and on-site activity through seven predetermined functions:

- Plant
- Medical Care
- Public Affairs
- Resident Health and Safety
- Logistic Support
- Radiation Protection
- Administration.

At the national level, the State contingency plan comprises the activation of Nuclear Emergency Response Headquarters at the Prime Minister's official residence. This is done under Article 15 of the *Special Measures Concerning Emergency Preparedness Act*. The NRA-ERC supports these headquarters in the decision making process and the Chairman of the NRA moves to the Prime Minister's residence to provide support to the decision making process. Other officials to attend the Nuclear Emergency Response Headquarters, depending on the nature of the emergency, could include NPA, the Fire & Disaster Management Agency, the Ministry of Foreign Affairs, the JCG and the MOD.

In terms of training, the NRA-ERC conducts annual exercises with the Nuclear Emergency Response Headquarters and local prefectures also conduct annual training.

Joint exercises to test response to nuclear security incidents are regularly conducted with cooperation between the NRA, the NPA, the JCG and the operator. The exercises conducted do not involve all concerned organizations (e.g. fire brigade, medical).

**Suggestion:** The State may consider conducting joint emergency and security exercises at nuclear facilities involving all relevant agencies and organizations.

## **FACILITY REVIEW**



## COMPUTER SECURITY REVIEW

The IPPAS mission reviewed the computer security framework and inspection process at the NRA and subsequently assessed the implementation of the NRA's computer security requirements at Hamaoka NPS.

### XIII. LEGAL AND REGULATORY FRAMEWORK

The requirements for protecting computer systems are based on the *Reactor Regulation Act*, Article 43-3-22. This requirement is cascaded down in Article 91, paragraph 2, item (18) and (19) of the *Ordinance for Commercial Power Reactors* and guidelines, e.g. the *Guidance and Models for Computer Security Measures at Nuclear Facilities*. As part of the security regime for facilities, licensees are required to have a computer security plan as a separate document under their overall security plan. The computer security plan is aimed to cover the protection of sensitive information and sensitive computer systems used for physical protection and nuclear safety and material accountancy.

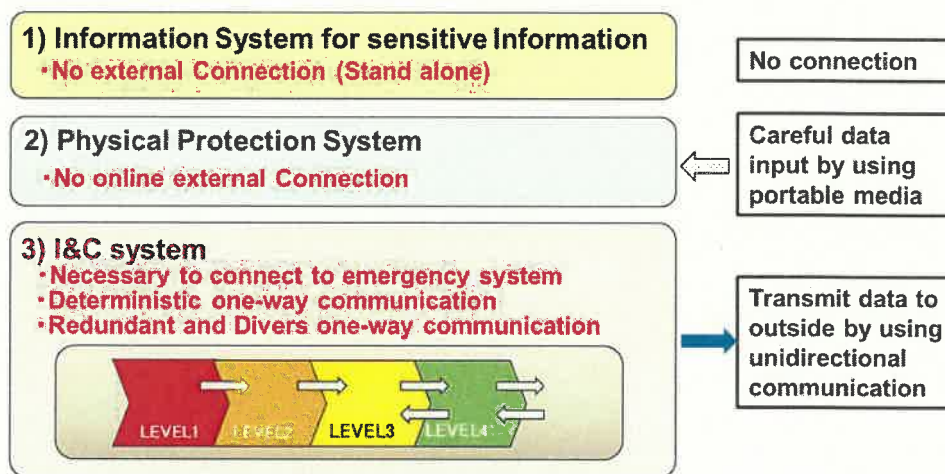


Figure 36. Basic protection strategy.

The NRA's authorization for the security plans is required, so the NRA has established a basis for computer security at the facility level (Fig. 36).

The IPPAS team understands that the NRA has two experts on computer security, responsible specifically for developing the requirements for computer security. The development process for requirements also involves several other people from the NRA and other agencies.

The developed requirements are comprehensive and reflect IAEA guidance. In the developed framework for computer security, the concepts of a graded approach and defence in depth are clearly visible.

The IPPAS team understands that *Guidance and models for computer security measures at nuclear facilities* has a pivotal role in communicating NRA's requirements to facilities. As this document is relatively new, the team encourages the NRA to continue to focus on computer security, ensuring that its guidance documents are written, officially issued and periodically reviewed and updated.

The above mentioned guidance document includes requirements on network architecture and network layering. The four logical network layers defined in this architecture follow international good practice and offer a graded approach and defence in depth. Specifically allocating computer systems used for physical protection to layer 2 and also the required data flow management, not only between levels 1 and 2 but also between levels 2 and 3, goes beyond what is typically done in other countries.

**Good practice:** The comprehensive guidelines for network layering, including the specific allocation of computer systems used for physical protection to network layer 2; and the requirement of having data flow management not only between levels 1 and 2 but also between levels 2 and 3 is considered a good practice.

## **XIV. ROLES AND RESPONSIBILITIES OF COMPETENT AUTHORITY**

Next to developing the requirements for protection, one of the NRA's main responsibilities is developing an inspection regime to verify that nuclear facilities have implemented the required computer security measures in an effective manner. The IPPAS team understands that it is the NRA's strategy to train the physical protection inspectors in computer security so that they will be able to inspect computer security measures at facilities as part of their normal inspection activities.

Although the IPPAS team values giving all inspectors a certain basic knowledge on computer security, the team also thinks it is necessary to have dedicated computer security experts to do in-depth computer security inspection. Moreover, the training on computer security given to the physical protection inspectors seems to be limited. Computer security is a highly technical and dynamic area and typically requires specific and in-depth specialized knowledge. These dedicated computer security experts could be either employed by the NRA, seconded to the NRA by other Ministries (e.g. from IPA, JPCERT/CC or similar) or other Governmental organizations (e.g. police), or contracted temporarily from commercial specialized service providers.

Other than regular physical protection inspections, which include computer security inspections by physical protection inspectors, the information that the IPPAS team was given suggests that during 2013 and 2014, the NRA did not conduct a sufficient number of detailed investigations and inspections on cyber security at nuclear facilities.

**Basis:** *NSS 13*, 3.20: The State's competent authority should be responsible for verifying continued compliance with the physical protection requirements and licence conditions through regular inspections and for ensuring that corrective action is taken when needed.

**Recommendation:** The NRA should consider further strengthening its ability to effectively inspect computer security at nuclear facilities with dedicated computer security experts. The additional resources (either internal or external) should have in-depth and detailed insight in the highly technical and dynamic area of computer security.

**Suggestion:** The NRA may consider increasing its capability to conduct frequent and comprehensive computer security inspections.

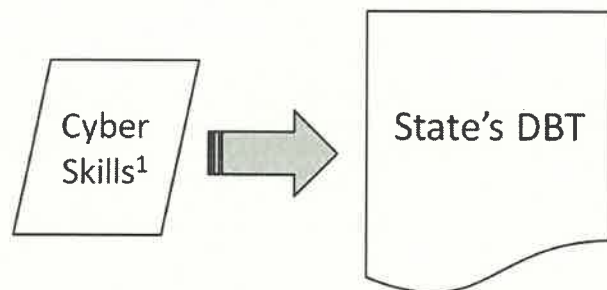
**Suggestion:** If the NRA continues its practice of using physical protection inspectors for computer security, it could re-assess and further expand its training curriculum on computer security for the inspectors, using both tailor-made NRA internal training and also commercially available training

modules. Where possible, training concluded with an accompanying exam or certification is preferable.

The IPPAS team feels that the NRA would benefit from considering whether or not the process of disseminating threat information to the nuclear facilities is effective. There are two parts to this.

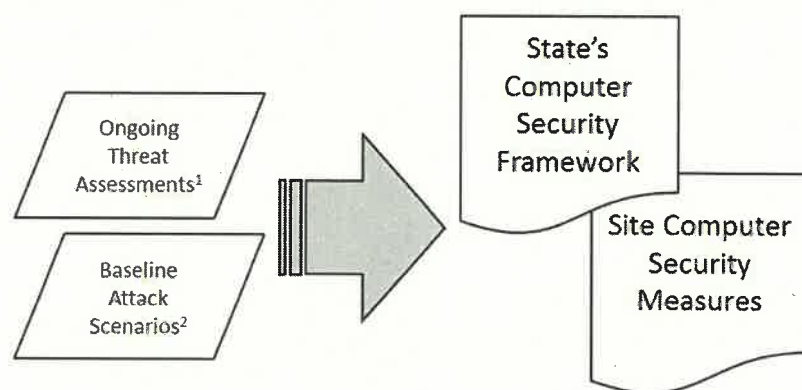
The IPPAS team was shown that the NRA had a structure in place for disseminating threat information to operators, also considering the dynamic nature of developments in cyber-threat. Disseminating real threat information to operators on, for instance, Stuxnet and Bad-USB was done via this process. This process is important and ideally should also be used to disseminate even weekly developments in cyber threat.

Next, it is also important to develop a longer term view on cyber related threats and risks (Fig. 37). Here, the description of threat needs to be more abstract, not describing actual discovered attack malware but rather describing conceivable adversary scenarios and attack routes and possibly additional cyber-related protection targets that become relevant because of the increase in use of computer systems supporting, for instance, the nuclear safety systems and the physical protection systems.



<sup>1</sup> 'Cyber' skills: Skills in using computer and automated control systems in direct support of physical attacks, for intelligence gathering, for computer based attacks, for money gathering, etc. (NSS 10, 5.1.2.)

**Figure 37. Inclusion of cyber skills in State DBT.**



<sup>1</sup> It is vital that facilities maintain an active and ongoing threat assessment, which is regularly briefed to management and operations. NSS 17, 2.4.

<sup>2</sup> Consideration should be given to incorporating into such scenarios threats of either stand-alone attacks using/against computer systems or coordinated attacks including the use of computer systems. NSS 17, 6.3.1.

**Figure 38. Use of DBT concepts in computer security.**

For that reason, in *NSS 10* on DBT development and maintenance, the IAEA recommends including cyber scenarios in the State's DBT (Fig. 38). The IPPAS team understands that the current DBT in Japan includes only physical scenarios.

**Basis:** *NSS 10*, 5.1.2: adversary capabilities include “Cyber skills: skills in using computer and automated control systems in direct support of physical attacks, for information gathering, for computer based attacks, for money gathering, etc.”

**Suggestion:** The NRA could consider adding adversary cyber skills — which could be used in a cyber- attack or blended attack — to the DBT, and adding information regarding identification of cyber-related protection targets.

Another aspect is disseminating real, current threat information, e.g. information on recently discovered vulnerabilities in software, new zero-day exploits, possibly currently discovered activities of entities that try to break into, or otherwise compromise, computer networks. This threat information could very well come from outside to the nuclear sector (e.g. Japanese intelligence services, other ministries or other industry sectors). Consideration of a process for collecting relevant information and distributing it to the 59 facilities may be considered. Also, certain threat levels could be agreed on so that, regardless of current technical details, there could be a quick and effective understanding of how serious the current threat level actually is both for computer security experts and for less specialized staff. (e.g. green–yellow–orange–red).

**Good practice:** Recognizing the sensitivity of the NRA's own internal computer systems and verifying the performance and effectiveness of its computer security measures on its own internal network by penetration testing is considered by the IPPAS team as a good practice.

It is also important that facilities carry out penetration tests on their computer networks. Probably this is more difficult to do on industrial control systems and safety related systems, but it is still important. Penetration tests on these types of networks could, for instance, be done before commissioning a system or during maintenance of a nuclear installation. Penetration testing of physical protection systems (access control, detection systems, camera systems) can be done more easily and is important as well. The adversary may not come from an external location, but could be an insider attempting on site to access or sabotage the computer systems used for physical protection, perhaps even with authorization for normal network access.

## **XV. IMPLEMENTATION OF COMPUTER SECURITY AT THE HAMAOKA NUCLEAR POWER STATION**

## **ACKNOWLEDGEMENTS**

The IPPAS team expresses its gratitude to the NRA and all who helped the Japan IPPAS mission to run smoothly. Throughout the mission, the staff of the NRA, of the facilities visited and of all concerned Government organizations cooperated whole-heartedly with the IPPAS team members, generously giving their time, relevant information and kind hospitality. Such untiring assistance and also the timely provision of advance information helped to make the mission a success. Moreover, the exchange of technical knowledge and experience between the team members and their Japanese counterparts at the NRA and at the facilities was mutually beneficial. The IPPAS team warmly thanks their Japanese hosts for such outstanding cooperation.

## **Appendix I: Synopsis of Recommendations, Suggestions and Good Practices**

### **NATIONAL LEVEL REVIEW**

#### **LEGAL AND REGULATORY FRAMEWORK**

**Recommendation:** The Government of Japan should adopt regulations for trustworthiness in accordance with the established policy and legal framework.

**Suggestion:** The State may consider adopting a process similar to the one defined in *NSS 16* for identification of vital areas at nuclear facilities.

**Suggestion:** The NRA may consider adopting regulations for a backup alarm station for Category I facilities.

#### **COMPETENT AUTHORITY**

**Suggestion:** The NRA may consider recruiting the approved number of physical protection inspectors in order to meet the number of places (43) provided for in the existing legislation.

#### **SUSTAINING THE PHYSICAL PROTECTION REGIME**

**Suggestion:** The NRA may consider formalizing a certificate programme for testing and certification of physical protection inspectors.

**Suggestion:** The NRA is advised to review its required protection measures for *secret* and *top secret* information against standards found in other countries and, on that basis, consider revising the current requirements for physically protecting sensitive information.

**Good Practice:** The development and implementation of the nuclear security culture programme and the promotion of the process through senior management, with the close attention and direction of the hierarchy of the NRA, particularly in respect of the interviews of CEOs by the NRA Chairman and Commissioners is considered good practice.

#### **PLANNING AND PREPAREDNESS FOR AND RESPONSE TO NUCLEAR SECURITY EVENTS**

**Suggestion:** The State may consider conducting joint emergency and security exercises at nuclear facilities involving all relevant agencies and organizations.

### **FACILITY REVIEW**

## COMPUTER SECURITY REVIEW

### National

**Recommendation:** The NRA should consider further strengthening its ability to effectively inspect computer security at nuclear facilities with dedicated computer security experts. The additional resources (either internal or external) should have in-depth and detailed insight in the highly technical and dynamic area of computer security.

**Suggestion:** The NRA may consider increasing its capability to conduct frequent and comprehensive computer security inspections.

**Suggestion:** If the NRA continues its practice of using physical protection inspectors for computer security, it could re-assess and further expand its training curriculum on computer security for the



inspectors, using both tailor-made NRA internal training and also commercially available training modules. Where possible, training concluded with an accompanying exam or certification is preferable.

**Suggestion** The NRA could consider adding adversary cyber skills — which could be used in a cyber-attack or blended attack — to the DBT, and adding information regarding identification of cyber-related protection targets.

**Good practice:** The comprehensive guideline for network layering, including the specific allocation of computer systems used for physical protection to network layer 2; and the requirement of having data flow management not only between levels 1 and 2 but also between levels 2 and 3 is considered a good practice.

**Good practice:** Recognizing the sensitivity of the NRA's own internal computer systems and verifying the performance and effectiveness of its computer security measures on its own internal network by penetration testing is considered by the IPPAS team as a good practice.

## **Appendix II: IPPAS Team Composition**

**Joseph Sandoval**, SNL, USA (team leader)

**Ales Skraban**, SNSA, Slovenia (legal expert)

**Khairul**, Batan, Indonesia (research reactor security expert)

**Brett Roberts-Howe**, ONR, UK (regulatory expert on physical protection of nuclear material & facilities)

**Tapani Hack**, STUK, Finland (regulatory expert on physical protection of nuclear material & facilities)

**Anno Keizer**, URENCO, Netherlands (computer security expert)

**Susan Cohen-Unger**, IAEA (technical writer).

**Arvydas Stadalnikas**, IAEA (mission coordinator and physical protection specialist)