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STATUS REPORT ON REGULATORY INSPECTION PHILOSOPHY, INSPECTION ORGANISATION AND INSPECTION PRACTICES

Prepared by the CNRA Working Group on Inspection Practices (WGIP)

ABSTRACT

The CNRA believes that safety inspections are a major element in the regulatory authority's efforts to ensure the safe operation of nuclear facilities. Considering the importance of these issues, the Committee has established a special Working Group on Inspection Practices (WGIP). The purpose of WGIP, is to facilitate the exchange of information and experience related to regulatory safety inspections between CNRA Member countries

In 1995 the WGIP issued Status Report on Inspection Philosophy, Inspection Organisation and Inspection Practices, NEA/CNRA/R(94)3, OCDE/GD(95)3. Included was information on the regulatory bodies in 14 Member countries. Following publication of this report, WGIP members proposed that this work should be updated and extended to include information on both OECD Member countries and non-member countries regulatory inspection practices. The CNRA endorsed this approach. This publication is a result of that effort and provides a framework of inspection philosophy, organisation and practices which currently exist with regulatory authorities, in 32 countries (18 Member and 14 non-Member countries).

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INTRODUCTION

This report provides descriptions of the different regulatory inspection practices in OECD Member countries and non-member countries. While the compilation is not complete, it provides insights into the framework of inspection philosophies, organisational aspects and practices utilised within these countries.

It is important to note that the information contained in this report represents current practices in these countries as of ***30 June 1997***. Since this information is subject to changes, due to re-organisations, advancements, etc., the reader should take these types of occurrences into account.

The overall concept of this document is to describe regulatory inspection practices in the various countries in a brief yet descriptive narrative, which could be compiled in a concise reference booklet for use by the international community.

Countries contributing to this document are as follows (OECD Members countries are identified by asterisk):

Argentina	**Armenia**	**Australia ***
Belarus	**Belgium ***	**Brazil**
Bulgaria	**Canada ***	**China**
Czech Republic *	**Finland ***	**France ***
Germany *	**Hungary ***	**India**
Italy *	**Japan ***	**Kazakstan**
Republic of Korea *	**Mexico ***	**The Netherlands ***
Pakistan	**Russia**	**Slovak Republic**
Slovenia	**South Africa**	**Spain ***
Sweden *	**Switzerland ***	**Ukraine**
United Kingdom *	**United States ***	

The authors would like to extend their appreciation to all those who contributed information and helped in producing this report.

CHAPTER 1 - REGULATORY AUTHORITY

This chapter defines the basic role of the regulatory body, its organisational set-up, and depicts how it relates to other governmental departments or ministries (Charts[1] attached in Annexes I and II). Additionally, a brief description is provided on the bases and statutory authority of the organisation, the extent of its jurisdiction over power and non-power installations and the relationships between itself and the licensees.

1.1 ARGENTINA

By means of its Decree # 1540/94, the Argentine Executive Power created the National Board of Nuclear Regulation (*ENREN)* as an autonomous agency and assigned it all the surveillance and regulation functions in the nuclear field that were previously in charge of the National Atomic Energy Commission *(CNEA).* In April 1997, the Congress approved the Nuclear Law where the National Regulations became the Nuclear Regulatory Authority (further on: ARN). It remains an independent organisation, entrusted with all regulatory functions previously assigned to the Board and maintaining a similar organisation structure. The work to be performed by the *ENREN* involves the establishment and application of a regulatory framework for any nuclear activities performed in Argentina, with the following objectives:

- Attaining and maintaining an appropriate level of protection to people against the harmful effects of ionising radiation (except in the surveillance of X-ray generating units, used in medicine, which are under the surveillance of the Ministry of Health and Social Welfare).

- Attaining and maintaining a reasonable degree of radiological and nuclear safety.

- Ensuring that nuclear activities are not performed for non-authorised goals and that they are developed in agreement with the non-proliferation agreements undersigned by Argentina.

- Preventing intentional actions that may lead to severe radiological consequences or to the withdrawal of non-authorised nuclear material or of other material or equipment of nuclear interest.

The *ARN* is led by a Board of Directors constituted by its President and 5 members who are appointed by the Executive Power. Their appointment is for a four-year period, although they may be re-elected indefinitely.

As a regulatory authority, the *ARN* is entrusted to issue authorisations, licenses or permits, accordingly, concerning practices involving the use of radiation sources. Additionally, it applies control and surveillance with regard to compliance with the standards and regulatory documents in force by those in charge of such practices[2]. Since the very beginning of regulatory activities in Argentina,

1. Due to various circumstances (e.g., complexity, unavailability, etc.), it was not possible to obtain charts in Annex II for all contributing countries. Therefore, the reader is advised that information on missing charts should be requested from the referenced organisation

2. "Practice" is understood as any task involving radiation sources that may produce an actual or potential increase in the exposure of individuals to ionizing radiation, or in the number of people exposed.

consideration was given to the fact that efficiency in the performance of these tasks required the availability of sufficient scientific and technological knowledge and support, so as to judge —independently— the design, construction, operation and decommissioning of the installations under control

Within this framework, the overall strategy of the Argentine regulatory system has been focused on the following basic issues:

- Formulation of standards with regard to radiological and nuclear safety, safeguards and physical protection.

- Scientific and technological development in topics associated with radiological and nuclear safety, safeguards and physical protection.

- Independent performance of studies and assessments concerning radiological and nuclear safety, safeguards and physical protection for the licensing process.

- Regulatory inspections and audits aimed at verifying compliance with the licenses, permits and authorisations issued.

- Personnel training in topics related to radiological and nuclear safety, safeguards and physical protection, addressed to those responsible for safety in practices submitted to control and to those performing regulatory activities.

The compliance with regulatory standards and requirements is the minimal condition and does not exempt those responsible from taking all the necessary actions in order to guarantee radiological and nuclear safety of the installation.

1.2 ARMENIA

The Armenian Nuclear Regulatory Authority *(ANRA)* was established as an independent governmental department on 16 November 1993 by decree of the Government of Armenia. The Decree # 573 covers the legal basis for conducting inspection and regulation activities. The *ANRA* provides regulation and supervision of all activities related to the use of nuclear energy and radioactive materials.

The *ANRA* interfaces with the Ministry of Energy, Ministry of Health, Ministry of the Environment, Emergency Management Administration, Meteorological Administration and other State organisations, but jurisdictions are separate and independent.

1.3 AUSTRALIA

The basic roles or functions of the Nuclear Safety Bureau *(NSB)*, the quasi-regulatory body in Australia, are to:

- Monitor and review the safety of any nuclear plant owned by the Australian Nuclear Science and Technology Organisation *(ANSTO)*, a Federal Government agency.

- Provide technical advice to the Federal Government on the safety of nuclear plant and related matters.

- Other functions determined by the Minister for Health and Family Services, e.g., contribute to technical work associated with the Environmental Protection (Nuclear Codes) Act 1978 and participate in activities of the International Atomic Energy Agency and the Nuclear Energy Agency of the OECD relevant to the other roles of the *NSB*.

The *NSB* consists of a Technical Assessment Section, a Plant Assessment Section and a Corporate Services Section. The Technical Assessment Section performs accident consequence assessments, assesses plant technical specifications and safety cases, and evaluates radiation protection practices and programmes. The Plant Assessment Section reviews abnormal occurrences at nuclear plant and corrective actions taken, plant modifications, plant operating and maintenance procedures and safety documentation.

The *NSB* is established as an independent statutory authority under Federal Government legislation, the Australian Nuclear Science and Technology Organisation Amendment Act 1992 which amended the Australian Nuclear Science and Technology Organisation Act 1987. The *NSB* is in the Therapeutic Goods Administration of the Federal Department of Health and Family Services and is responsible to the Federal Minister for this department. The jurisdiction of the *NSB* covers *ANSTO*'s 'nuclear plant' which is defined in the Act as a nuclear reactor or critical assembly including any associated plant.

ANSTO is not strictly a licensee but the operating organisation is formally authorised by the Chairman of the Board of *ANSTO* to operate specified reactors. The *ANSTO* Amendment Act 1992 has established arrangements similar to licensing. *NSB* staff have both a formal and informal relationship with *ANSTO* in the carrying out of their responsibilities. The *ANSTO* Amendment Act 1992 gives *NSB* the power to 'do all things necessary or convenient' in the performance of its functions as well as impose restrictions or conditions on the operation of *ANSTO*'s nuclear plant, including an order to shut down, with which *ANSTO* must comply.

1.4 BELARUS

Regulatory authority for nuclear and radiation safety Gospromatomnadzor was established on 21 May 1991 by the decree No. 195 of the Cabinet of Ministers. By the decree No. 19 of the Cabinet of Ministers dated 11 January 1995, Gospromatomnadzor was incorporated in the Ministry of Emergencies, and at present the regulatory authority's name is the Committee of Promatomnadzor under the Ministry of Emergencies.

In accordance with the Statute, Promatomnadzor exercises regulatory functions in the field of nuclear and radiation safety.

1.5 BELGIUM

National Organisation

The Belgium Authority responsible for the safety of nuclear installations the Minister for Internal Affairs. He licenses non-profit organisations to inspect and asses the nuclear installations.

AIB-Vinçotte *(AVN)* is the only Licensed Inspection Organisation (LIO) responsible for inspection and safety assessment of the nuclear power plants: it is also in charge of most of the fuel cycle facilities, research institutes, universities, medical and industrial facilities as well as other smaller installations.

Other smaller LIO's are presently responsible for inspection of other nuclear facilities.

Basic Principles

Responsibility for safety according to the license is the responsibility of the Utilities, which must prove safety of any modification.

AVN Organisation

Overall organisation of *AVN* is divided into two (2) project-oriented departments (see Appendix I): Development Analysis, Support (DAS) and Operational Projects and Inspections (OPI), with a perpendicular hierarchical specialisation structures (Technical Responsibility Centres).

Missions of *AVN* in connection with Nuclear installations include:

- Assessment of new nuclear installations or of modifications in operating ones, issue an evaluation report to a special commission for ionising radiation's, propose a project of license decree.
- Conformity checks for new nuclear installations or modifications in operating nuclear installations.
- Inspections during operation of existing nuclear installations.
- Periodic safety re-assessments of nuclear installations (10-year basis).
- Advisory role in the evaluation cell in the National Crises Centre, in case of Emergency Plan.
- Assessment of operating experience and feedback in nuclear installations.
- Evaluation and applicability in Belgium of nuclear safety rules and regulations.
- INES and IRS contact for Belgium.
- Establishment of Research and Development activities.
- Contact with similar foreign organisations.

1.6 BRAZIL

The Brazilian Nuclear Energy Commission *(CNEN)* was created by federal law in august, 27, 1962 and is presently linked to the Secretary for Strategic Affairs of the Presidency of the Republic.

CNEN, through its Licensing and Control Superintendence *(SLC)* of the Radiological Protection and Nuclear Safety Directorate; is the governmental body responsible for licensing and surveillance of nuclear facilities as well as the control of nuclear materials (see Annex I).

The Reactors Co-ordination of *SLC* is responsible for the conduction of safety assessment and surveillance of both nuclear power plants and research reactors, following closely the design, construction and operation phases.

1.7 BULGARIA

The Committee on the Use of Atomic Energy for Peaceful Purposes *(AUAEPP)* acts as the regulatory body for nuclear power plants in Bulgaria. *AUAEPP* maintains jurisdiction over nuclear safety, radiation protection, nuclear material and safeguards. Act on the Use of Atomic Energy for Peaceful Purposes *(AUAEPP)* and *AUAEPP's* Regulations define the regulatory framework in Bulgaria. General safety requirements are given by ordinances approved by Council of Ministers and published in Bulgarian state gazette.

Detailed technical and administrative instructions related to the design, constructions, commissioning, operation and decommissioning of nuclear power plants are given in Instructions and Guides, published by *AUAEPP*.

1.8 CANADA

Operators of NPPs and those who use or possess nuclear materials must comply with the Atomic Energy Control Act and all regulations made pursuant to it. The mission of the Atomic Energy Control Board *(AECB)* the regulatory body established under the Act, is to ensure that the use of nuclear energy in Canada does not pose undue risk to health, safety, security and the environment. The *AECB's* licensing system is administered with the co-operation of federal and provincial departments in such areas as health, environment, transport and labour. The concerns and responsibilities of these departments are taken into account before licenses are issued by the *AECB*, providing there is no conflict with the Atomic Energy Control Act and its regulations.

The Atomic Energy Control Act establishes a five-member Board that functions as a quasi-judicial decision-making body. It makes licensing decisions for major nuclear facilities and sets policy direction on matters relating to health, safety, security and environmental issues affecting the Canadian nuclear industry.

The *AECB* staff organisation comprises the President's Office, the Secretariat, the Directorate of Reactor Regulation, the Directorate of Fuel Cycle and Materials Regulation, the Directorate of Analysis and Assessment, and the Directorate of Administration. The staff implements the policies of the Board and makes recommendations to the Board concerning the issuing of licenses, and other regulatory matters.

There is an *AECB* office at every NPP, where staff monitor the plants on a day-to-day basis. Specialists from corporate headquarters work with the on-site staff in assessing every plant's performance against legal requirements, including the conditions of operating licenses. To do this, staff review all aspects of a plant's operation and management, and inspect each plant.

On 21 March 1996, legislation was introduced in Parliament to replace the 50 year old Atomic Energy Control Act with the Nuclear Safety and Control Act. The new Act would replace the current legislation with a modern statute to provide for more explicit and effective regulation of nuclear energy.

1.9 CHINA

The National Nuclear Safety Administration *(NNSA)* was established in 1984 authorised by the State Council. It is an independent Regulatory Authority. The nuclear installations are regulated on the bases of Regulations on the Safety Supervision and Control for Civilian Nuclear Installations of the People's Republic of China (1986) as well as other regulations and codes in the fields of nuclear safety.

Detailed functions and duties of *NNSA* are:

- To establish principles and policies of nuclear safety; to prepare and promulgate nuclear safety regulations and their detailed rules of implementation; to issue nuclear safety codes and guides; to review and endorse national technical standards related to nuclear safety.

- To organise, review and assess safety performance of nuclear installations and the capabilities of operating organisations in ensuring safety; to issue or revoke nuclear safety licenses; to carry out nuclear safety surveillance; to review and supervise on-site emergency plan and preparedness; to investigate and deal with nuclear accidents; to conduct mediation and settlement of disputes relating to nuclear safety.

- To be responsible for the supervision and control as well as the granting and issuing of licenses on nuclear pressure-retaining component activities.

- To review the possession, utilisation, production, storage, transportation, treatment and disposal of nuclear materials, to approve issuance of nuclear material licenses; to inspect and enforce nuclear material control.

- To organise review and assessment, issue and manage licenses of civilian nuclear material transportation and its containers.

- To provide technical assistance in nuclear emergency management, to assess nuclear incidents or accidents and their radiological consequences, and to compile and evaluate the monitoring data of radiation, hygiene, environment, etc.

- To organise nuclear safety research and development programmes necessary for its regulatory functions and for nuclear safety in general.

- To carry out international co-operation in the area of nuclear safety, and to promote and implement nuclear safety agreements with foreign countries and international organisations.

- To deal with information dissemination, public education and training in the area of nuclear safety.

- To perform other tasks assigned by the State Council.

1.10 CZECH REPUBLIC

The Czech Republic's National Regulatory Authority in nuclear safety and radiation protection field is the State Office for Nuclear Safety *(SÚJB).* It was established as of 1 January 1993 by Act No. 21/1992 Coll. *SÚJB* is a central body of the Czech Republic's state administration with an independent budget. It is headed by its Chairman appointed by the Czech Government. The Chairman acts simultaneously as the Nuclear Safety Inspector General. The legal framework of *SÚJB* is given by 2 basic acts:

- Act No. 287/1993 Coll. on the authority of the State Office for Nuclear Safety, amended and supplemented by Act No. 85/1995 Coll.

- Act No. 28/1984

and by set of subordinate regulations.

The main assignments of *SÚJB* are the following:

- State supervision of nuclear safety of nuclear facilities and of nuclear waste and spent fuel management.

- State supervision of nuclear materials, including the implementation of related safeguards.

- State supervision of physical protection of nuclear facilities and nuclear materials.

- State supervision of selected items as well as nuclear-related dual-use items.

- State supervision in the area of protection against ionising radiation.

- Co-ordination of Radiation Monitoring Network activity within the Czech republic and assurance of the international exchange of information on the radiological situation.

- Co-operation with the International Atomic Energy Agency.

Three sections headed by Deputy-Chairman and one independent department were established within *SÚJB*:

- **Section of Nuclear Safety**, which includes departments of nuclear safety assessment, components and systems, and nuclear materials.

- **Section of Radiation Protection**, which includes departments of radiation source applications, natural radiation sources, radiation protection at nuclear facilities, and a separate division of the health aspects of radiation protection.

- **Section of Management and Technical Support**, which includes departments of international co-operation, financial management, and Office Bureau.

- **Independent Department of Emergency Preparedness** (subordinated directly to the SÚJB Chairman), which fulfils the function of the Crisis Co-ordination Centre and co-ordinates the Radiation Monitoring Network.

1.11 FINLAND

STUK - Radiation and Nuclear Safety Authority acts as the regulatory body for nuclear power plants in Finland. *STUK* maintains jurisdiction over nuclear safety, radiation protection, pressure vessel, and nuclear material and safeguards. Nuclear Energy and Radiation Protection Acts and Decrees define the regulatory framework in Finland. General safety requirements are given by Decisions by the State Council (i.e., Cabinet of Ministers).

Detailed technical and administrative instructions relative to the design, construction, commissioning and operation of nuclear power plants are given in “YVL” Guides published by *STUK*. These include; general guides, systems, pressure vessels, buildings, other structures and components, nuclear materials radiation protection and radioactive waste. In addition to the YVL Guides, *STUK* has internal guides (YTO Guides) which define inspection related practices.

1.12 FRANCE

Nuclear installations are basically regulated by the *Decree of December 11, 1963*, amended by three more recent decrees. In particular, its Article 11 defines the role of inspectors.

The authorities primarily involved in licensing procedures are the Minister for Industry and the Minister for the Environment (besides, the consent of the Minister of Health is requested).

Within the Ministry of Industry, the Nuclear Installation Safety Directorate *(DSIN)* is responsible for defining and implementing policy relating to safety of nuclear installations. Its main assignments are the following :

- drafting and monitoring the application of the general technical regulations ;

- implementing licensing procedures ;

- organising and implementing surveillance of the plants by inspectors ;

- emergency response in case or an incident or accident ;

- providing the general public and the media with information on nuclear safety problems ;
- contributing to the activities of international organisations and promoting bilateral relations with the regulatory bodies in other countries.

The *DSIN* also follows nuclear safety research and development work undertaken by organisations depending on the Ministry of Industry, particularly the *CEA* (Commissariat à l'Energie Atomique) and EdF (Electricité de France).

At the local level, the Regional Directorates for Industry, Research and the Environment *(DRIREs)* implement their tasks of nuclear plant surveillance, which are, mainly :

- inspection
- approval and monitoring of power plants outage programmes
- processing of waiver requests (with regards to the general operating rules)
- processing of declared incidents
- supervision of pressure vessel regulation (and associated processing of waiver requests)
- supervision of regulations for registered installations (on environmental grounds)
- labour regulations supervision
- relations with local Authorities (prefects, mayors, etc...)

Besides, both the *DSIN* and *DRIRE*s get technical support from the Institute for Nuclear Safety and Protection *(IPSN)*, which carries out safety analyses performed by experts, and brings direct assistance for inspections.

Finally, it should be added, that, regarding monitoring of radiological releases on the environment, the Office for Protection against Ionising Radiation (OPRI), belonging to the Ministry of Health, participates in defining and implementing the government policy.

1.13 GERMANY

As indicated by its name, the Federal Republic of Germany is a federal state. The Federal Constitution therefore contains detailed provisions on the legislative and administrative competencies of the Federation (Bund) and the individual states (Länder). Pursuant to the Federal Act of 1959 on the Peaceful Uses of Atomic Energy and Protection Against Hazards (Atomic Energy Act) the supreme authorities of the Länder, designated by their governments, are competent for the granting, withdrawal and revocation of licenses for nuclear installations.

The Atomic Energy Act empowers the Bund to issue ordinances and general administrative regulations which are mainly implemented by the Länder acting on behalf of the Federation. The federal control and supervision relate to the legality and expediency of the implementation of the Atomic Energy Act by the Länder. The competent authorities of the Länder are subject to the directives of the competent supreme federal authority, in this case, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety *(BMU)*.

According to the Atomic Energy Act the construction, operation and possession of nuclear installations are subject to continuous supervision. The supreme authorities of the Länder are responsible for exercising supervisory and control functions, which they may delegate to subordinate agencies, in individual cases. In general, independent experts or expert organisations, namely the Technical Inspection Agencies *(TÜV)* are involved.

In addition, import, export other professional handling and transportation of radioactive material, as well as construction and operation of final repositories for radioactive waste are subject to governmental licensing and supervision.

1.14 HUNGARY

The first legal regulations on radioactive materials and radiotherapy were issued in 1964, followed by legal standards arising from international contracts and regulating the definition of other record keeping duties in the early 70's. State level legal control over nuclear equipment was established in 1978. This decree of the council of ministers *(CM)* listed the tasks related to the establishment of the Paks Nuclear Power Station as well as the scopes of authorities of portfolios resulting from the above tasks. Then, based on the CM decree No. 10/1978.(II.2.)MT, a ministerial decree was issued (Number 5/1979.(III.31.)) regarding safety issues of the nuclear power plants, regulating licensing processes, supervision, safety engineering requirements and last, but not least named the state regulatory body in these issues. At that time this role was performed by a section and later a division of the State Energetic and Energy Safety Technology Supervisory Board *(SEESTSB).* Detailed technical requirements have to date been listed in regulations comprising the appendices of this decree. At nearly the same time, safety regulations and authority process regulations were issued for other nuclear institutions (training and research reactor, critical system), however, these appeared only as at the level of ministerial instructions.

A more and more urgent need had developed for a comprehensive law regarding the peaceful use of nuclear energy, and this void still prevailing in the late 70's was to be filled by the law No. I in 1980 regarding nuclear energy. This law as well as the CM decree No. 12/1980 on its implementation did not change the established scopes of authorities, but defined several new authorities and responsibilities to be regulated at the ministerial level, and these formed the basis for numerous ministerial decrees issued later.

It is a justified, or so to say, evident requirement that regulatory control must be performed by an administrative body endowed with appropriate professional skills and authority, independent of those possessing owner's rights. This principle was only partly applied in the case of the nuclear establishment, since the SEESTSB was subjected to the same member of the cabinet responsible for the industry (minister of heavy industry, then minister of industry and later minister of industry and trade) as the superior body of the Paks Nuclear Power Plant Company, the Hungarian Electricity Board. Theoretically, the situation was the same in the case of all the other nuclear institutions. Significant changes were only introduced with the gradual development of the framework of constitutionality, having come into force on 1 January 1991. Based on government decree No. 104/1990. (XII.15.)Korm, the Hungarian Atomic Energy Commission's *(HAEC)* scope of tasks and authority were redefined and a new national administrative body, the Hungarian Nuclear Energy Office *(HAEO)* was established to operate under the leadership of the President of *HAEC*.

The role of the nuclear safety authority comprises two types of tasks: on the one hand, regulations and requirements must be specified by the authority (as a controlling body), and on the other hand these regulations and requirements must be enforced which are implemented during the licensing and supervision processes. New legislation at the statutory and government decree level are obviously administered by the Parliament and the government while the same task at the level of ministerial decrees and regulations are performed by the member of the cabinet who is the President of *HAEC*.

The above mentioned 1990 government decree states that the President of the *HAEC* will proceed in administrative issues within his scope of authority by means of the *HAEO*, while the Nuclear Safety Inspectorate *(NSI)* and Supreme Nuclear Safety Inspectorate *(SNSI),* established in 1991, proceed in safety issues within the *HAEO's* scope of authority at first and second instance levels. The regulatory control of nuclear facilities is currently regulated by the already referenced 5/1979.(III.31.) NIM decree significantly modified by the 4/1993.(VI.15.)TNM decree. Its appendices comprise 11 volumes of safety regulations, 8 of which include requirements regarding the nuclear power plants, and the rest apply to other nuclear installations.

1.15 INDIA

The Atomic Energy Regulatory Board was set up in 1983 by a Central Government gazette notification (S.O. No. 4772 dated 31st December, 1983) to carry out certain regulatory and safety functions envisaged under Section 16 (Control of Radioactive Substances), Section 17 (Special provisions to Safety) and Section 23 (Administration of Factories Act, 1948) of the Atomic Energy Act 1962 (33 of 1962). The Board has five members. The Board is responsible to the Atomic Energy Commission.

Chairman, *AERB* is designated the competent authority to enforce the following Rules promulgated under the Atomic Energy Act 1962.

- Radiation Protection Rules, 1971.
- Atomic Energy (Working of the Mines, Minerals and Handling of Prescribed Substances) Rules, 1984.
- Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987.
- Atomic Energy (Control of Irradiation of Food) Rules, 1996.
- Atomic Energy (Factories) Rules, 1996.

The main functions of the Board are to:

- Develop Safety Codes, Guides and Standards for siting, design, construction, commissioning, operation and decommissioning of the different types of plants, keeping in view the international recommendations and local requirements, and develop safety policies in both radiation and industrial safety areas;
- Ensure compliance by the installations of the Department of Atomic Energy *(DAE)* and non-*DAE* installations of safety codes and standards during construction/commissioning and operation;

- Review from the safety angle requests for authorising commissioning/operation of projects/plants of the Department of Atomic Energy. Before authorisation of commissioning/operation of the plant/project is granted, the *AERB* will be satisfied by appropriate review of:

  - Final Design Analysis Report prepared by the Project/Plant;

  - Commissioning reports and results thereof; and

  - Proposed operating procedures and operational limits and conditions

that the plant/project can be operated without undue risk to the operating personnel and the population. For this purpose, *AERB* may ask for relevant additional supporting information;

- Review health and safety aspects of modifications in design/operation involving changes in the technical specifications adopted in any of the *DAE* units;

- Review operational experience in the light of the radiological and other safety criteria recommended by the International Commission on Radiological Protection, International Atomic Energy Agency and such other International bodies and adapted to suit Indian conditions, and thereby evolve major safety policies;

- Prescribe acceptable limits of radiation exposure to occupational workers and members of the public and approve acceptable limits of environmental releases of radioactive substances (In the *DAE* units, the *AERB* shall also prescribe limits for environmental release of conventional pollutants);

- Review the emergency preparedness plans prepared by the different *DAE* units, similar plans for non-*DAE* installations and during transport of large radioactive sources (e.g. irradiated fuel, kilo/mega curie sources, fissile materials);

- Promote research and development efforts for fulfilling the above functions and responsibilities;

- Review the training programme, qualifications and licensing policies for personnel by the projects/plants;

- Prescribe the syllabi for training of personnel in safety aspects at all levels;

- Maintain liaison with statutory bodies in the country as well as abroad regarding safety matters;

- Take such steps as necessary to keep the public informed on major issues of radiological safety significance;

- Send reports periodically to Chairman, *AEC* on safety status including observance of safety regulations and standards and implementation of the recommendations in all *DAE* and non-*DAE* units. It will also submit an Annual Report of its activities to Chairman, *AEC.*

AERB gets technical support from Bhabba Atomic Research Centre, Indira Gandhi Centre for Atomic Research and other institutions under the Department of Atomic Energy in carrying out its mandate.

AERB relies on a multi-tier procedure in its regulatory activities. For instance in the case of operating nuclear installations (including nuclear power plants) the review is carried out by a Committee at the plant level, the Safety Review Committee for Operating Plants at a higher level and then the Atomic Energy Regulatory Board. The Committees concerned are appointed by the Atomic Energy Regulatory Board.

1.16 ITALY

Legislation governing the peaceful use of nuclear energy in Italy is mainly based on the Decree of the President of the Republic, No. 185 of 1964 (DPR 185/64). The new Legislative Decree 17.3.95 No. 230 replaces in its entirety the old DPR 185/64 and implements into Italian law the European directives 80/836. 84/467, 84/466, 89/618, 90/641 and 92/3, concerning health protection for the population and the workers against risks from ionising radiations.

With regard to the standards concerning authorising procedures for nuclear plants, the new decree is completely equal to the old one, since it was not considered suitable to revise the procedures presently in force, which have been integrated with those concerning the decommissioning of nuclear installations, a topic not covered by the previous DPR 185/64.

Therefore, the decree 230/95 covers all the various stages in the life of a nuclear installation: design, construction, acceptance trials, commissioning, operation and final decommissioning. The decree is the legal basis for conducting inspection activities.

The authority responsible for licensing is the Minister for Industry and Trade, which has wide powers for framing the relevant regulations and issuing licenses. Operations concerning only the decommissioning of nuclear installations are subjected to a preliminary approval by the Ministry of Industry and Trade, taking into account the advice from the Ministry of the Environment, Internal Affairs, Employment and Social Services, Public Health, the Regional or Provincial interested bodies and *ANPA*

The technical body responsible for regulatory procedures was the Directorate of Nuclear Safety and Radiological Protection *(DISP)*,until January 1994 when Italian law n. 61, dated 21 January 1994 entered into force. This law establishes the Italian National Agency of Environmental Protection *(ANPA)*, and disposes that DISP and all its roles and tasks were transferred to *ANPA*, as of 28 January 1994. Therefore, *ANPA* takes the previous duties of *DISP*, as national Regulatory Body for nuclear safety and radiological protection. *ANPA* is charged with inspection and enforcement regarding nuclear safety during construction, operation, decommissioning of nuclear power plants, fuel facilities, medical and industrial facilities, and research reactors.

1.17 JAPAN

The Japanese government set up a special advisory committee to the Prime Minister to consider reorganisation of the nation's nuclear safety administration. The main points of this reorganisation were as follows:

- A nuclear facility should be regulated by a single competent authority, depending on a facility type, from design and construction up to operation and final decommissioning.

- The former Atomic Energy Commission *(AEC)* should be divided into a new Atomic Energy Commission for the promotion of nuclear activities and the Nuclear Safety Commission *(NSC)* for safety oversight.

- Safety examination of a nuclear facility performed by a competent authority should be reviewed by *NSC*. *NSC* also receives reports related to safety matters of the facility. *NSC* performs the deliberation, and if necessary notifies the competent authority of the results, e.g., results of periodic inspections, incident and accident reports. This is so called the "Double Check System" in Japan.

Consistency in the administration of safety regulations is the foundation of this policy. The Ministry of International Trade and Industry *(MITI)* is the competent authority for commercial nuclear power plants, and the Ministry of Transport *(MOT)* is the competent authority for commercial nuclear power ships. Science and Technology Agency *(STA)* is the competent authority which administers research reactors, reactors under development and all nuclear fuel cycle facilities including facilities dealing with radioisotopes (except for those used in medical applications). Licensing and safety regulation of nuclear facilities are implemented by these competent authorities.

Concerning welding inspection, Japan Power Engineering and Inspection Corporation *(JAPEIC)* and the Nuclear Safety Technology Center *(NUSTEC)* are designated by *MITI* and *STA* based on The Electric Utilities Industry Law (EUIL) and The Law of Nuclear Source Materials, Nuclear Fuel Materials and Reactors (RNNR Law) respectively.

1.18 KAZAKSTAN

The Kazakstan Atomic Energy Agency *(KAEA)* was established in 1992 by Decree of the President. *KAEA* is an independent regulatory body for nuclear installations in Kazakstan.

KAEA organises and conducts the state regulating and inspection of the safety production, managing and use of nuclear power, nuclear materials, radioactive materials and products on their basis in order to provide the safety of the public, the protection of the environment and property.

1.19 REPUBLIC OF KOREA

The main legislation governing the safety of nuclear installation is the Atomic Energy Act, which provides the legal foundation for nuclear activities. Regulation and licensing of nuclear facilities in Korea are based on the provisions of the Atomic Energy Act, Enforcement Decree and Enforcement Regulation, Notice of the Minister of Science & Technology and Technical Specifications which are part of safety analysis reports.

The Korea Institute of Nuclear Safety *(KINS)* was established in February 1990 through special legislation by the National Assembly. The *KINS* is a technical expert group established to support the Ministry of Science and Technology *(MOST)* with technical expertise in effectively performing nuclear regulatory functions. Entrusted by the government, *MOST*, in accordance with the Atomic Energy Act, *KINS* is responsible for:

- Safety review and evaluation to assure the safety of nuclear installations.
- Safety inspection for nuclear installations.
- Technical standards development.
- Radiation protection, RIs and radiation generators regulation.

- Development of regulatory policy and enforcement of nuclear safety laws and regulations.

- Research & development in the area of unresolved safety issues identified through safety review and inspection of nuclear facilities in various stages.

1.20 MEXICO

The National Commission of Nuclear Safety and Safeguards, Comisión Nacional de Seguridad Nuclear y Salvaguardias, *CNSNS*, was created under the Nuclear Reglamentary Law of Article 27 of the Republic's constitution, on 26 January 1979. This law gives the broad authority to regulate all nuclear installations and all users of radioactive material. The regulatory body authority derives from the Secretary of Energy, and directly from the Undersecretariat for Energy. The *CNSNS* is also authority in matters like safeguards and physical security for the nuclear installations.

The *CNSNS* has the authority given by law, to declare the closure of for safety reasons of nuclear and radioactive installations if necessary, and to grant licenses to the operational staff of facilities.

1.21 THE NETHERLANDS

The legal basis for supervision of nuclear installations is the Nuclear Energy Act of 1963 including its later added decrees. All nuclear installations are subject to the supervision of competent authorities. Inspectors designated by these authorities have free access to the installation and can require, if necessary, all information.

The following competent authorities are charged with the execution of this act, i.e., licensing and policy making:

- Ministry of Economic Affairs *(EZ)* regarding physical security

- Ministry of Housing, Physical Planning and the Environment *(VROM)* regarding nuclear safety as related to environmental protection such as waste and effluent management and safety aspects related to off-site emergency consequences.

- Ministry of Social Affairs and Employment *(SZW)* regarding (i) nuclear safety in general excluding waste and effluent management and control and the off-site emergency preparedness and planning, (ii) radiation protection of workers and (iii) integrity of pressure vessels and piping.

The Nuclear Safety Department *(KFD)* within the Ministry of *SZW* is charged with inspection and enforcement regarding nuclear safety in general including integrity of pressure vessels and piping and radiation protection.

1.22 PAKISTAN

In Pakistan, the day-to-day regulatory matters pertaining to nuclear aspects are looked after by the Directorate of Nuclear Safety and Radiation Protection *(DNSRP)*, created under Pakistan Nuclear Safety and Radiation Protection Ordinance - 1984. The *DNSRP* is headed by a Director-General. However, the ultimate nuclear regulatory authority - which approves the regulations, guides and codes

of practice - is the Pakistan Nuclear Regulatory Board *(PNRB)* which was created under the executive order of Prime Minister of Pakistan in 1994. The Board has four full time members and five part time members. This Board is currently headed by an individual who is also the Chairman of Pakistan Atomic Energy Commission *(PAEC).* The Director-General *DNSRP* also serves as a member and ex-officio Secretary of *PNRB*. Two members (Member Finance and Member Administration) of *PAEC* are also shared by *PNRB*. The remaining five (5) Members are eminent scientists/engineers, none of whom can have, by charter, any existing connection with the *PAEC* during their tenure on the *PNRB*. This composition ensures that the external technical members have the majority vote over the members with *PAEC* affiliations.

The governmental organisation responsible for the licensing of Nuclear Power Plants and other nuclear installations in Pakistan is the Directorate of Nuclear Safety and Radiation Protection (*DNSRP*). The licensing procedure in Pakistan follows the IAEA guidelines and safety requirements. Accordingly, the nuclear power plants in Pakistan have to be (currently) designed in accordance with the latest revisions of the IAEA-NUSS, however in case of difficulties other international codes and standards may also be used. The Chinese supplied PWR which is under construction at Chashma is designed according to the codes and guides of *USNRC*.

The licensing procedure for nuclear power plants in Pakistan comprises the following three stages :

- Registration of Site
- Issuance of Construction License
- Issuance of Operating License.

The main national laws and regulations are as follows :

- Pakistan Nuclear Safety and Radiation Protection Ordinance 1984
- Pakistan Nuclear Safety and Radiation Protection Regulations 1990.

After the promulgation of Pakistan Nuclear Safety and Radiation Protection ordinance in 1984, and Pakistan Nuclear Safety and Radiation Protection Regulations in 1990, work on the preparation of regulatory documents started in 1990. The first such document prepared in 1990 was the “Procedure for Licensing of nuclear Power Plants in Pakistan”, which provides the basis for the licensing of nuclear power plants in Pakistan. Similarly, “Procedure for licensing of Research Reactors in Pakistan” was also prepared in 1991.

To ensure that the construction, installation and commissioning at the Chashma site is according to the approved codes and standards *DNSRP* has established an office at CHASNUPP site. *DNSRP* is also considering to set up another office at KANUPP.

1.23 RUSSIA

The Federal Nuclear and Radiation Safety Authority of Russia (Gosatomnadzor of Russia) was established in 1992 by Decree of the President as amendments. It is an independent Regulatory body. The legal basis for the Gosatomnadzor of Russia are:

- The Federal Law on Use of Atomic Energy (1995)
- The Federal Law on Radiation Safety of Public (1996); and others

The Gosatomnadzor of Russia provides regulation and supervision of all activities related to the use of nuclear energy and of radioactive materials for peaceful purposes. The main assignments of Gosatomnadzor are the following:

- State regulation and supervision on the safe use of nuclear energy and of nuclear materials
- Implementing licensing procedures
- Drafting and monitoring the application of the technical requirements and regulations
- Providing the general public with information on nuclear safety problems

1.24 SLOVAK REPUBLIC

Nuclear Regulatory Authority of Slovak Republic *(ÚJD SR)* is the central state authority responsible for the nuclear regulatory activities, at the level of other ministries with direct access to the Government and to the Parliament. The *ÚJD SR* was established on 1 January 1993 by Act No. 2/1993.

Main responsibilities of the *ÚJD SR* are:

- state supervision of nuclear safety of nuclear facilities, radioactive waste treatment, spent fuel treatment and other phases of the fuel cycle.
- Control and accounting of nuclear materials
- quality assessment of selected equipment and techniques
- assessment of the programmes for utilisation of nuclear energy
- fulfilling of commitments of the Slovak Republic arising from International agreements in the area of nuclear safety and use of nuclear materials

General bases for the use of nuclear energy and for regulatory control are enacted in Act No. 28/1984 and in the corresponding set of regulations. New “atomic” Act and new regulations are under preparation at present.

ÚJD SR executes three (3) basis activities: inspection, assessment and rule making.

1.25 SLOVENIA

Slovenian Nuclear Safety Administration *(SNSA)* was established at the end of 1987, as an independent autonomous regulatory body responsible directly to the government. Re-organisation of the Administration in 1991 put *SNSA* in the frame of the Ministry of Environment and Physical Planning.

Main competencies of the *SNSA* were defined in the Act of Organisation and Field of Activities of the Ministries of Nov. 94 (Off. Gaz. RS No. 71/94):

- nuclear and radiological safety of nuclear facilities
- trade, transport and handling of nuclear and radioactive materials
- accounting for and control of all nuclear facilities and materials (safeguards)
- physical protection of nuclear facilities and materials
- liability for nuclear damage
- training of NPP personnel
- quality assurance
- radiological monitoring
- early exchange of information in case of nuclear or radiological emergencies
- international co-operation in the field of nuclear safety
- inspection

There are several other laws which regulate the administration as a whole and must be followed by all regulatory bodies. Some of these laws are: Act on Government, Act on Administrative Procedures, and the Act on Administration. These acts define interfaces between different ministries, between Government and ministries, responsibilities and scope of activities of different governmental bodies, etc. In administrative process when *SNSA* decides to accept or not the request of nuclear installations for substantial modifications or changes in technical specifications, the Act on Administrative Procedures must be followed.

1.26 SOUTH AFRICA

The Council for Nuclear Safety *(CNS)* is established under the Nuclear Energy Act, 1993, in terms of which the *CNS* must, with a view to the safeguarding of persons against nuclear damage, regulate and exercise control, through the issue of nuclear licences over:

- The construction or use of a nuclear installation;

- the use, possession, production, storage, processing, enriching, reprocessing, conveyance or disposal of radioactive material;

- the discarding of radioactive waste;

- the storage of irradiated nuclear fuel;

- the carrying out of any other activity involving radioactive material and which is capable of causing nuclear damage.

The prevailing legislation mandates the *CNS*, as a completely independent body, to regulate over the total nuclear fuel cycle, but not over fabricated radioactive sources.

Presently, licences have been issued to Eskom for the Koeberg nuclear power station (KNPS), to the Atomic Energy Corporation *(AEC)* for its facilities at Pelindaba and for its low- and intermediate-level radwaste repository at Vaalputs, to some fifty mines and minerals processing and ancillary operations and to twenty users of small quantities of radioactive materials.

The Council (or Board) comprises eight members, appointed by the Minister of Mineral and Energy Affairs, and the staff complement of the *CNS* comprises eighty-five persons distributed over the areas shown in Annex 1.

The regulatory approach of the *CNS* is to require licensees to conduct quantitative risk assessments/hazards analyses of their plants and activities in order to demonstrate compliance with *CNS* safety criteria, following which the *CNS* verifies adherence to licence conditions through compliance-inspection programmes.

1.27 SPAIN

The Nuclear Safety Council *(CSN)* was created in 1980 independent of Central Administration of the State. *CSN* is the unique body with competence in nuclear safety and radiation protection matters. The *CSN* grants operating staff licenses, radiation protection and dosimetry services authorisations, and its reports are requested and are binding for construction, operation, decommissioning of nuclear power plants, fuel facilities, medical & industrial facilities and research reactors, nuclear component fabrication, transportation, and medical services authorisations.

The *CSN* has a matrical organisation, in which a project manager for each nuclear installation co-ordinates analysis, inspections of technical specialists and other services. Each specialist carries out evaluations and inspections in their own area of speciality. There are also two resident inspectors located at each nuclear power plant site.

1.28 SWEDEN

Three main laws regulate the nuclear safety programme in Sweden. The Law on Nuclear Activities, the Law on Financing of Future Costs for Spent Fuel and Nuclear Waste, and the Radiation Protection Law. In addition, special laws cover nuclear liability and emergency planning.

The Law on Nuclear Activities, defines nuclear materials, nuclear waste, nuclear installations, and nuclear activities which require licensing. The law assigns full responsibility to the licensee for the safety of nuclear activities and establishes the legal authority of the Swedish Nuclear Power Inspectorate *(SKI)*. The Radiation Protection Law, specifies general radiation protection requirements with regard to occupational exposure and exposure to the general public and establishes the legal authority of the Swedish Radiation Protection Institute *(SSI)*.

SKI and *SSI*, both independent authorities, jointly carry responsibility for ensuring that licensees assume their responsibility in providing safety and radiation protection.

1.29 SWITZERLAND

The legal basis for the regulation and supervision of nuclear activities are:

- The Nuclear Law of December 23, 1959 (Federal law concerning peaceful use of nuclear energy and radiation protection).
- The Federal Amendment to the Nuclear Law of October 6, 1978.
- The Federal Ordinance about the Supervision of Nuclear installations of March 14, 1983.

According to the ordinance the Federal Nuclear Safety Inspectorate *(HSK)* exercises supervision over nuclear installations in Switzerland. Its main tasks are the establishment of the safety review to be delivered to the federal government with regard to the granting of a general license or of permits for construction, operating, etc., of nuclear installations, and the surveillance and inspection of these installations.

The licensee has full responsibility for the safety of his plant. The regulatory body defines the safety requirements and checks for fulfilment of these requirements. Persons entrusted with the surveillance may at any time require information and have access to all documents; they have unhindered access to all installations, offices, and stores.

1.30 UKRAINE

The Ministry of Environmental Protection and Nuclear Safety of Ukraine was created in 1993 according to the Decree of the President. This Nuclear Authority of Ukraine is the independent regulatory body in the area of the nuclear and radiation safety.

The legal basis of the Ministry is the Law of Ukraine on Use of Nuclear Energy and Radiation Safety.

The Ministry of Environmental Protection of Ukraine provides regulation and supervision of nuclear and radiation safety related to the nuclear facilities. The organisation charts of the Ministry of Environmental Protection as well as the Main State Inspectorate *(MSI)* are attached to Appendix 1.

1.31 UNITED KINGDOM

The main legislation governing the safety, and enforcement of safety, of nuclear installations is the Nuclear Installations Act as amended, together with the Health and Safety at Work, etc., Act 1974 and the Ionising Radiations Regulations 1985. Under the Nuclear Installations Act no site may be used for the purpose of constructing, commissioning or operating any nuclear installation unless a license has been granted by the Health and Safety Executive *(HSE)*. A nuclear installation is broadly defined as being an installation where nuclear fuel is manufactured, enriched or reprocessed, where products from irradiated nuclear fuel are manufactured, or an installation which is a power or research reactor (some defence related activities are excluded).

Her Majesties Nuclear Installations Inspectorate *(NII)* as part of the *HSE* is responsible for enforcing safety and health legislation at any licensed site. A statutory body called the Health and Safety Commission *(HSC)* sits between Government and *HSE*. The aims of HSC and *HSE* together are to protect the health, safety and welfare of employees, and to safeguard others, principally the public, who may be exposed to risks from industrial activity.

In addition to the provisions of the above mentioned laws and regulations, each nuclear site license has conditions attached which have the force of law and which place either absolute requirements or require the making of adequate arrangements and compliance with those arrangements. A fundamental feature of one condition, is the requirement for the licensee to demonstrate the safety of the proposed operation in a document known as the “safety case”, prior to the start of that operation.

Breach of any law, regulation or license condition is a criminal offence and the offender may be prosecuted in the United Kingdom courts of law. Inspectors appointed by the *HSE* also have the power to stop unsafe acts or require improvements to be made within given time scales. Some of the conditions attached to the license also give the *HSE* the power to direct the licensee to undertake a specified task (e.g., shutdown reactors) and the power to consent or approve to certain activities (e.g., items of high safety significance). These powers are carefully set out so as to not take away the absolute responsibility of the licensee for safety on the licensed site.

Neither *HSE* or *NII* are involved in licensing of individuals at the nuclear installation, but powers in the license conditions exist to enable the *HSE* to stop any appointment by the licensee of persons to key safety related posts such as control room operators. Actions of *NII* are subject to internal review processes and in extreme cases can be subject to review by the United Kingdom courts of law.

The Government sets the policy on siting of nuclear installations, dealing with radioactive waste and decommissioning which *NII* implements through the granting of site licenses and its powers under the site license conditions. *HSE* sets policy in respect of work radiation exposure which is enforced by *NII* on licensed nuclear installations and by other parts of *HSE* for other industrial and medical uses of radioactive material. *NII* also enforces other safety and health regulations in relation to non-nuclear hazards at licensed nuclear sites.

1.32 UNITED STATES

In the Atomic Energy Act of 1954, the Atomic Energy Commission *(AEC)*, was vested with developmental and regulatory functions related to peaceful uses of atomic energy. In 1974, the Energy Reorganisation Act, split the *AEC* into the Energy Research and Development Administration *(ERDA)* and the Nuclear Regulatory Commission *(NRC)*. The *NRC* has jurisdiction over all non-governmental uses of special nuclear materials and man-made isotopes. This includes power and non-power reactors, fuel facilities and users of nuclear materials. The *NRC* does not have jurisdiction over natural sources, such as radon nor accelerator-produced radiation.

The *NRC* has broad authority under the Atomic Energy Act of 1954, including the authority to perform inspections. This authority is implemented through a regulation, 10 CFR 50.70, which requires licensees and construction permit holders to permit *NRC* inspections of records, premises, activities, and licensed materials.

The *NRC's* mission is to protect the health and safety of the public and the environment in the use of nuclear facilities and materials. The inspection programme is one of the principal methods used to accomplish this mission. *NRC* regulations and inspection activities are based on the understanding that the nuclear industry is ultimately responsible for the proper construction and safe operation of its facilities. The inspection programme is designed and carried out to independently verify that the licensee is building and operating its nuclear facility in accordance with its permit, license, and the regulatory requirements and that its work activities are being performed in a high-quality, proper manner to assure operation with adequate protection.

CHAPTER 2 - FINANCIAL / BUDGETARY SCHEMES

This chapter provides information on how budgets for the regulatory are financed. A brief description of how and where funds are obtained and dispersed throughout the regulatory organisation (Charts attached as Appendix III). Also, where appropriate, information is provided on punitive actions taken such as fines or penalties which are levelled by the authority.

2.1 ARGENTINA

The budget is primarily supported from the State fundings (75%) and a small percentage from regulatory taxes (25%) applied to the Utility and the Atomic Energy Commission. There is a project based on financial penalties according with the non-compliance with the license conditions. The resources distribution are conformed by the following costs: inspections (32%), technical and scientific support (28%), administration (29%) and other (11%).

2.2 ARMENIA

To implement its tasks, the *ANRA* gets financial resources form the state budget. These resources cover the regulators, inspectors, as well as technical administration staff salaries and various work expenses. The *ANRA* receives no fees from fines or other punitive actions.

2.3 AUSTRALIA

The *NSB* reports to the Parliamentary Secretary of the Ministry through the Therapeutic Goods Administration *(TGA)* and is fully funded through *TGA* by Federal Government appropriation. Due to the small size of the *NSB*, the budget funds are administered as one account and made available to the three *NSB* functional Sections as needed. Licence fees are not levied by the *NSB* nor does the *NSB* have the power to impose fines or penalties on the operator of regulated nuclear plant.

2.4 BELARUS

To implement its tasks Promatomnadzor gets it financial resources from the state budget. The budget resources cover salaries of the regulators, inspector and administration staff as well as expenses on business trips. All technical expenses are covered through paid services (expert assessment work). Promatomnadzor does not get any resources from fines or other punitive actions.

2.5 BELGIUM

The Ministerial services are financed on the basis of nuclear taxes paid by the licensees. The *LIO* are paid by the licensee on the basis of the time spent on inspections and assessments. The finances and activities of the *LIO* are controlled by a special committee chaired by a high level public servant.

2.6 BRAZIL

The running costs of the Brazilian Nuclear Energy Commission are primarily covered by the federal government.

2.7 BULGARIA

To implement its functions and duties given in Act on the Use of Atomic Energy for Peaceful Purposes , the *AUAEPP* gets financial resources from the State Budget. This resources cover the regulators, inspectors, as well as technical administration staff salaries and various work expenses. Some of the licensing procedures have to be paid by the applicants.

2.8 CANADA

The *AECB* regulates the various nuclear industries through comprehensive licensing procedures. Among the *AECB's* licensees are facilities that mine and refine uranium or fabricate uranium fuel, nuclear reactors, research and waste management facilities, industrial radiographers, manufacturers and suppliers of radioisotopes, hospitals, universities and clinics. Also included in the list are the petroleum industry, transportation packaging companies, and the agriculture, food beverage, communications construction, pulp, paper and printing industries.

In 1990, the *AECB* began implementing fees to recover the costs of its regulatory activities from most licensees. Educational institutions and publicly funded, non-profit health care institutions are exempt from these fees.

Revenues from the fees accrue to the government of Canada and are not at the disposal of the *AECB*. The *AECB* does not, and in fact cannot, spend these revenues. The resources for regulating the nuclear industry are approved by Parliament, and fees recover the costs for these resources.

Regulatory costs for non-exempt licensees make up approximately 85% of the total *AECB* cost. The remaining 15% is comprised of costs for non-regulatory activities and costs for regulating licensees who are exempt from the fees. To date, the *AECB* has not achieved its target of full recovery of the 85% portion. For example, in fiscal year 1995-96, the *AECB* recovered 75% of its 37.6M$ recoverable licensing costs.

2.9 CHINA

To implement its functions and duties, the *NNSA* gets financial resources from the government budget. Some of the licensing procedures have to paid by the applicants.

2.10 CZECH REPUBLIC

The annual budget of the *SÚJB* is an integral part of the State budget. It covers both the *SÚJB* and its technical support organisation the National Institute for Radiation Protection (NRPL). The budget is structured as follows: salaries (25%), research and development (8%), technical support programme (10%), investments (20%) and others (37%). The budget of *SÚJB* is part of the State budget and is

approved annually by the Parliament. These financial resources are used to cover all expenses of the *SÚJB* and *NRPL.*

SÚJB receives no income from fines or other punitive actions. Income from financial penalties is a part of the State budget which is not available for direct *SÚJB* use.

2.11 FINLAND

The sources of funding of *STUK* are as follows (1995): budgetary allocations (76 %), income from services (19 %), external funding of joint ventures (2 %) and other sources e.g. Employment authorities (3 %). Total finance in 1995 was 100 million FIM. Expenditures by sector are as follows (1995): nuclear safety (32 %), radiation safety (7 %), preparedness (9 %), research (34 %) and external services (18 %).

The principle in Finland is that customers should pay the costs of inspection activities. This has been organised in such a way that *STUK* sends bills e.g. to the power companies on the basis of actual regulatory work carried out. The power companies do not pay to *STUK* but to the Ministry of Finance. *STUK*'s income comes from the governmental annual budget approved by the parliament. Because international co-operation has been increased a lot during recent years e.g. with the European Commission *STUK* also takes part in this co-operation. The income from these international sources can be paid directly to *STUK*.

2.12 FRANCE

To implement its tasks, the *DSIN* gets financial resources, part of which were conferred by the amending national budget provisions for 1975 and the related application decree of May 24, 1976.

The operators pay two types of fees each year : those levied against applications for authorisation decrees and regulatory licenses on one hand, and the annual dues on the other hand ; both are integrated into the budget of Ministry of Industry as a compensation fund. The scale of these financial contributions is revised annually by the Parliament. These resources are used to cover both the regulator (and inspector) staff salaries and operating expenses, as well as the various work and safety analyses undertaken by the IPSN in the context of a convention renewed each year. The *DSIN* gets no budget from fines or other punitive actions.

2.13 GERMANY

Budgeting and Costs

To implement their respective tasks, the staff of the Federal Ministries and agencies and of the Länder authorities as well as their material expenses are budgeted within the Federal and the Länder governmental annual budgets. There are also budgets for research on nuclear safety and radiation protection.

According to the basic principles of the Administration Cost Act, fees are levied for all administrative actions in favour of individual persons or private companies. In the case of licensing and supervision of nuclear installations, the Atomic Energy Act provides the regulation for the charging of costs, including fees and expenses, to the applicant or the licensee. Details on the respective fees are laid down in the Atomic Energy Act Cost Ordinance.

For example, the fee for granting a construction licence for a nuclear power plant is set to 2/1000 of the construction costs of the nuclear licensed part of the plant. For other licensing decisions, fees may range from 1000 to 1 Million DM. In addition, fees for conducting inspections and measurements are fixed. These fees shall be based on the actual expenses and will be invoiced to the licensee.

The licensing as well as the inspection authorities may contract experts and expert organisations (TÜV´s) for expertises and conduct of inspections, provided these expenses are justified according to the technical needs and difficulties. The expenses for the experts are reimbursed to the regulatory body by the licensee.

Punitive Actions

Criminal acts such as handling of fissile nuclear material or operation of a nuclear reactor without a valid licence will be punished according to the laws. Infringement of laws or rules like violations of regulatory directions as well as deliberate and negligent nonconformity with the legal requirements of the Radiation Protection Ordinance will be fined. Fines are levied to the responsible individuals and may amount up to 100,000 DM. The regulatory body gets no budget from these fines.

2.14 HUNGARY

The authority organisations and the regulatory body *(HAEO)* are financed from the governmental budget. The licensees pay a special fee on the basis of ministerial order 39/1994. (XII.15) IKM for the state administration procedures. The actual fee for operating nuclear reactors is approx. 400 USD / MWth for the authority procedures and 37 USD / MWth for the safeguard procedures for 1996. In accordance with the Hungarian financial rules this fee is to be used exclusively for financing of the regulatory work.

2.15 INDIA

AERB gets the financial resources from the Central Government. The Board does not charge licence fees or fines.

2.16 ITALY

The running costs of *ANPA* are primarily covered by State funding, however, a small percentage of running costs are funded by reimbursement from public and private enterprise, due to licensing activity for nuclear plants and installations employing ionising radiations. Such income is then employed for subsidising running costs within the Regulatory Authority.

With regard to the radiological protection of workers, there may be instances of faults which are identified during surveillance by *ANPA's* inspectors. In such cases, the inspector reports the failure to the Judiciary and issues a penalty , a quarter of which is payable directly to *ANPA*., if the enterprise corrects the fault within a specified time. When a fault is not corrected before the allotted time period expires, the Judiciary, informed of that by *ANPA's* inspector, enforces payments of interest of the entire penalty. The proceeds, under these circumstances, go to the State, rather than the Regulatory Authority.

2.17 JAPAN

The expenses of personnel, travelling, researches and others in the *MITI* and *STA* are covered by taxes. There is a small amount of income by inspection, which is reduced to the national treasury. Government ordinance and ministerial ordinance stipulate the inspection fee, based on the kind of inspection and objectives, which are revised every 3 years, in principle.

In *JAPEIC* and *NUSTEC* the financial management strongly depends on the income of inspections which are there main resources. Therefore, inspection fees are determined by the actual expenses of personnel, travelling, office charge and so on, in consideration of past results, and as stipulated by government ordinance or ministerial ordinance in the same manner as described previously.

The EUIL stipulates the penalties for the utilities who have as their duties, to supply the stable electricity. If offences against the law are committed, they are fined. In the RNNR Law, there are also penalties of which fuel manufacturers or research institutes shall be fined if they treat nuclear fuel without permission or disperse fuel materials outside.

2.18 KAZAKSTAN

To implement its task, *KAEA* gets financial resources from the national budget. After the Law on the Use of Atomic Energy is adopted, some of the licensing procedures will have to be paid by the applicants.

2.19 REPUBLIC OF KOREA

To implement its tasks, the *KINS* primarily receives financial resources from the Government Budget and Licensing Fees. These resources are used for both Regulatory Activities and Research & Development in the field of nuclear safety, as well as Operations Cost and Miscellaneous. The *KINS* receives no budget from fines or other punitive actions.

2.20 MEXICO

To implement its task the *CNSNS* gets financial resources totally for the federal government.

2.21 THE NETHERLANDS

To implement the tasks the competent authorities get their financial resources from the national budget. The nuclear facilities have to pay an annual fee to compensate the costs for the government inspection services.

Income from fines or other punitive actions will flow to the national budget.

2.22 PAKISTAN

To implement its functions and duties, *DNSRP* gets financial resources from the Pakistan Atomic Energy Commission *(PAEC),* however the *PNRB* budget is directly sanctioned from the government budget. Licensing fees are another source of revenue for *DNSRP*.

2.23 RUSSIA

To implement its task, the Gosatomnadzor of Russia gets financial resources from the federal budget. It doesn't get any budget from fines or other punitive actions. Some of the licensing procedures (expertise's) have to be paid by the applicants.

2.24 SLOVAK REPUBLIC

The annual budget of the *SNRA* is 100% subsidised by Governmental funding. There is no provision from fines or penalties directly to the *SNRA* budget.

2.25 SLOVENIA

SNSA is financed from the national budget within the Ministry of Environment and Physical Planning. *SNSA* has independent funds available for strictly defined tasks planned annually. Licensees do not pay special fees for financing of the regulatory body.

SNSA has the authority to levy financial fines or penalties from licensees but such funds are not available for the use of *SNSA*.

2.26 SOUTH AFRICA

The principle of the polluter pays is adopted in South Africa, resulting in approximately 75% of the budget of the *CNS* coming from licence fees, the remainder being provided by the state to cover expenditure which would be inappropriate to levy upon licensees. In the budgeting process estimates are made of man-hours to be expended in the various project areas and these funds, once approved by the Council, are made available. The prevailing legislation provides for penalties to be imposed following prosecution, and in addition, for the *CNS* to revoke a licence or restrict a licensee's operations.

2.27 SPAIN

The Nuclear Safety Council services are financed on the basis of taxes paid by the licensees (nuclear and radioactive installations).

The *CSN* does not receive any other budget from the State. The *CSN* budget is controlled by the public treasury. The *CSN* gets no budget from fines or other punitive actions.

2.28 SWEDEN

Appropriations from the state budget finance the *SKI* activities. *SKI's* proposal for its activities in the forthcoming financial year are considered by the Government in just the same way as other agencies. The activities are evaluated by the Government as is the case for other agencies and the evaluation is provided in the budget bill. Resources are allocated in the Government's letter of appropriation, prescribing in addition agency directives where the objectives for the activities to apply are also

specified. Contrary to what is normal for an appropriation financed agency, the Government's costs for the *SKI* activities are offset by regulatory and research fees paid by the nuclear facilities.

Two types of appropriation are available to *SKI:* Administration costs and Nuclear safety research.

2.29 SWITZERLAND

The annual budget of the Inspectorate *(HSK)* is approximately 6.2 million Swiss francs (salaries and infrastructure, including the secretariat of the Advisory Commission *(KSA),* but excluding the Commission as such). In addition, some 7 million Swiss francs are budgeted for external experts and for research contracts.

The expenses of *HSK* are mostly compensated for by specific revenue from the Federal Treasury. Fees have to be paid by the applicants/licensees for all licensing procedures. The operators of nuclear installations are invoiced by the federal administration for the actual costs of the supervision by the Inspectorate and its experts.

Financial penalties as a method of enforcement may theoretically be imposed in case of non-conformance with license conditions, but they have never been used.

2.30 UKRAINE

The Ministry of Environmental Protection of Ukraine gets the financial resources from national budget. Any financial resources from fines and punitive actions, the Ministry of Ukraine doesn't get.

2.31 UNITED KINGDOM

Under the Nuclear Installations Act, *HSE* recovers most of the running costs of *NII*, together with the costs of any research thought necessary from licensees. Fines, which the United Kingdom courts of law may impose on a licensee or person, go to the courts and not *NII*.

2.32 UNITED STATES

The *NRC* is authorised under Title V of the Independent Offices Appropriation Act of 1952 to collect license fees. Pursuant to 31 U.S.C. 9701, any person who receives a service or thing of value from the Commission shall pay fees to cover the *NR*C's cost in providing such service or thing of value.

Pursuant to 42 U.S.C. 2213, the *NRC* shall assess and collect annual charges from persons licensed by the Commission. P.L. 102-486, Title XXIX, section 2903 of the Energy Policy Act of 1992 requires, except for the holder of any license for a federally-owned research reactor used primarily for educational training and academic research purposes, the Commission to assess and collect annual charges from persons licensed by the Commission that approximate 100 percent of the Commission's budget authority, less any amount appropriated to the Commission from the Nuclear Waste Fund and the amount of fees collected under the Independent Offices Appropriation Act of 1952 (31 U.S.C. 9701), for each year of FY 1991-1998.

The *NRC* is required to deposit all revenues collected to miscellaneous receipts of the Treasury unless specifically authorised by an appropriation to retain and use such revenue.

Revenues from Licensing Fees, Inspection Services, and Other Services and Collections shall be retained and used for necessary Salaries and expenses in this account and shall remain available until expended.

Overview of *NRC* Enforcement Programme

- The Commission has developed an enforcement programme and enforcement policy to support the *NRC's* overall safety mission in protecting the public and the environment. Consistent with that purpose, enforcement action is used as a deterrent to emphasise the importance of compliance with regulatory requirements, and to encourage prompt identification and prompt, comprehensive correction of violations.

- Violations are identified through inspections and investigations. All violations are subject to civil enforcement action and may also be subject to criminal prosecution. After an apparent violation is identified, it is assessed in accordance with the Commission's Enforcement Policy. The Policy was published on June 30, 1995, as NUREG-1600, "General Statement of Policy and Procedure for *NRC* Enforcement Actions," to provide widespread dissemination. Because it is a policy statement and not a regulation, the Commission may deviate from this statement of policy and procedure as appropriate under the circumstances of a particular case.

- There are 3 primary enforcement sanctions available: Notices of Violation, civil penalties, and orders. A Notice of Violation (NOV) summarises the results of an inspection, identifies a requirement and how it was violated, and formalises a violation pursuant to 10 CFR 2.201. A civil penalty is a monetary fine issued under authority of section 234 of the Atomic Energy Act. That section provides for penalties of up to $100,000 per violation per day. NOVs and civil penalties are issued based on violations. Orders may be issued for violations, or in the absence of a violation, because of a public health or safety issue.

- The Commission's order issuing authority is broad and extends to any area of licensed activity that affects the public health and safety. Orders modify, suspend, or revoke licenses or require specific actions by licensees or individuals. As a result of a rulemaking in 1991, the Commission's regulations now provide for issuing orders to individuals who are not themselves license.

- A predecisional enforcement conference is normally conducted with a licensee before making an enforcement decision if escalated enforcement action (i.e., Severity Level I, II, or III violations, civil penalties or orders) appears to be warranted, and if the *NRC* concludes that it is necessary or the licensee requests it. The purpose of the conference is to obtain information that will assist the *NRC* in determining the appropriate enforcement action, such as (1) a common understanding of facts, root causes and missed opportunities associated with the apparent violations, (2) a common understanding of corrective action taken or planned, and (3) a common understanding of the significance of issues and the need for lasting comprehensive corrective action.

- Civil penalties are considered for Severity Level III violations and are normally assessed for Severity Level I and II violations and knowing and conscious violations of the reporting requirements of Section 206 of the Energy Reorganisation Act.

- The *NRC* imposes different levels of civil penalties based on a combination of the type of licensed activity, the type of licensee, the severity level of the violation, and (1) whether the licensee has had any previous escalated enforcement action (regardless of the

activity area) during the past 2 years or past two inspections, whichever is longer: (2) whether the licensee should be given credit for actions related to identification; (3) whether the licensee's corrective actions are prompt and comprehensive; and (4) whether, in view of all the circumstances, the matter in question requires the exercise of discretion. Although each of these decisional points may have several associated considerations for any given case, the outcome of the assessment process for each violation or problem, absent the exercise of discretion, is limited to one of the following three results: no civil penalty, a base civil penalty, or twice the base civil penalty.

- If a civil penalty is to be proposed, a written Notice of Violation and Proposed Imposition of Civil Penalty is issued and the licensee has 30 days to respond in writing, by either paying the penalty or contesting it. The *NRC* considers the response, and if the penalty is contested, may either mitigate the penalty or impose it by order.

- If the civil penalty is to be imposed by order, the order is published in the *Federal Register*. Thereafter, the licensee may pay the civil penalty or request a hearing.

- In addition to civil penalties, orders may be used to modify, suspend, or revoke licenses. Orders that modify a license may require additional corrective actions, such as removing specified individuals from licensed activities or requiring additional controls or outside audits. The *NRC* issues a press release with a proposed civil penalty or order.

CHAPTER 3 - INSPECTION PROGRAMMES

This chapter provides a brief look at the inspection programmes in each of the countries during normal operation. A description is provided of the types of inspections performed relating to plant operation, equipment evaluation, plant modifications, health physics aspects, operator performance, security, etc.. Further information is furnished on the frequency of inspections, reporting requirements, evaluation of events, and follow-up activities, and public information requirements.

3.1 ARGENTINA

The regulatory activities include: regulatory inspections and audits performed to verify compliance with both operation and construction licenses; independent safety analysis and assessments; the issue of formal standards and guidelines; analysis of incidents; and personnel training, both for those responsible for safety in practices submitted to control and for that performing regulatory activities. Concerning NPPs, the *ARN* has established a set of minimal requirements that are mainly based on fundamental safety objectives. The regulatory approach is probabilistic in nature and involves a criterion for risk acceptance in NPPs based on the concept of individual risk and using the philosophy underlying the ICRP's dose limitation system.

Regulatory inspections are carried out through programme on a routine and non-routine basis. Routine inspections are related to routine plant activities; they involve monitoring the process and verifying compliance with the applicable regulations (Operation/Construction Licenses) and standards. They are usually performed by an on-site resident inspector who applies the regulatory criteria and acts as a direct liaison between the *ARN* and the NPP. Non-routine inspections are performed when specialised expertise is required for monitoring specific activities. They are carried out by other *ARN* inspectors and serve to support and supplement the on-site resident's activities. Basically, overall inspections involve: the assessment of hardware availability; hardware challenges; administrative controls and operators actions; and the verification of certain items, through carefully selected sampling, to determine whether processes are within the acceptable tolerances. The inspection programme does also include matters that are specific for each installation, as described in the operation license, basically taking into account the type of installation and operational experience.

NPP safety assessments include a systematic review of the ways in which structures, systems and components might fail and an identification of the consequences of such failures. Several methods have been developed for assessing whether safety objectives are met or not. These methods are applied during the design and constructions stages, as well as during operation —on the basis of operational experience— and when evaluating modifications in the plant configuration. Both a deterministic and a probabilistic method are currently being used —supplementarily— in safety assessments. The former involves: thermohydraulic analyses, reactor physics, structural integrity, control systems and human factors, so as to ensure that the appropriate safety margins are attained. The latter, in which PSA is applied, serves to ensure a sufficiently low global risk and a sufficiently high and well-balanced reliability in safety-related functions. PSAs constitute an analytical technique aimed at integrating diverse matters related to design and operation, so as to assess risks in a particular NPP and develop a data base that allows for analysing both plant-specific and generic issues. The *ARN* requires a full-scope plant PSA as part of its regulatory philosophy. Furthermore, PSAs are used by the *ARN* as a regulatory tool for the analysis of reliability, human actions and precursors. In the future, they will also be applied to risk-based inspections. Reliability analyses serve

to identify safety-significant components and their failure modes and, in order to achieve the reliability targets in safety systems, an analysis is performed of preventive and corrective maintenance, as well as of downtime (excessive or insufficient), of high component failure frequencies and of surveillance aspects. Proposals for backfitting and plant modifications are also analysed under the light of reliability. Human actions involved in the analysed accident sequences, the most important pre- and post-accidental errors and the major human error contributors are identified and inspected, as well as recovery actions.

Risk-based inspections aid inspectors in selecting safety systems or components to be inspected on the basis of their ranking and of their failure modes, as established in the plant's PSA. Consequently, among the regulatory applications of the PSA, plant-specific risk-based inspection guides (RIGs) are going to be issued for the NPPs in operation. Furthermore, risk-based inspections shall provide a system walkdown including a checklist containing only items related to dominant failure modes. RIGs will contain the dominant accident sequences, a system priority list and the identification of the risk significant items by system, with accompanying inspection recommendations, common-cause or dependent failures and important human errors.

3.2 ARMENIA

The resident inspectors of the *ANRA* cover the following areas:

- operations
- maintenance
- radioactive wastes
- emergency planning
- radiation protection
- training
- site security
- fire protection

3.3 AUSTRALIA

During normal operation of the Australian Nuclear Science and Technology Organisation's *(ANSTO)* nuclear plant, the Nuclear Safety Bureau (*NSB*) carries out both regular and irregular inspections of plant operation, safety equipment performance, radiation protection and operator inspections of plant operation, safety equipment performance, radiation protection and operator accreditation/re-accreditation. Regular inspections include field audits of the reactor operating log carried out approximately monthly. *Ad hoc* inspections are performed as required with regard to safety-related plant modifications, operator accreditation/re-accreditations and after certain abnormal occurrences. Audits of defined areas of operational safety are also undertaken periodically on an *ad hoc* basis. Reporting of abnormal occurrences by *ANSTO* is quarterly and the reports are reviewed and evaluated by the *NSB* on receipt.

The *NSB* performs annual audits of radiation protection at *ANSTO's* reactor. Additional inspections with regard to radiation protection may be performed in response to abnormal occurrences or modifications to the reactor or its operation. Following the audits and inspections, *ANSTO* is required to submit a schedule for rectifying any deficiencies found, and the *NSB* follows-up to ensure that actions are completed. The *NSB* also monitors reactor operating staff dose records as well as radioactive discharges from the *ANSTO* site.

The *NSB*'s public information activities include *ad hoc* publishing of newsletters and answering enquiries from the public. Formal *NSB* reports on particular topics, as well as quarterly and annual reports of *NSB* activities which are tabled in Federal Parliament, are freely available to the public. The results of the annual audits are published as formal *NSB* reports. Lists of all *NSB* reports are included in the *NSB*'s annual report.

3.4 BELARUS

Resident inspectors of Promatomnazdor cover the following areas:

- operation of radiation and nuclear installations,
- maintenance,
- radioactive wastes,
- radiation safety measures and control of radiation exposures, and
- accounting for, control and physical protection of nuclear material.

3.5 BELGIUM

Type of Inspector Organisation

One inspector is dedicated for each unit (a twin unit counts as one). Supervisors assigned for each site or common site entities and an Inspection Section Head provides co-ordination and guidance. Periodic and special inspections are co-ordinated through all the units.

Inspection Categories

Periodic inspections involve a synthetic overview and perspectives for each entity of the plant/site and are performed on a 3 month basis. The scope includes;

radioactive release, waste treatment

- chemistry, radiochemistry
- radiation protection
- conventional safety
- operation

- nuclear support
- tests
- mechanical and electrical maintenance
- quality assurance
- management
- training centres

Ad-hoc inspections are carried out at any time in any field of activity. Specific visits are made in the case of incidents, modifications, or license examinations for control room operators.

3.6 BRAZIL

The Reactors Co-ordination of the Licensing and Control Superintendence, through its four Supervisions (Safety Analysis, Systems & Engineering, Test & Materials and Radiological Safety) as well as a Group of Resident Inspectors conducts a surveillance programme, as follows:

- a routine work performed by resident inspectors and the issue of daily bulletins on the operational conditions of Angra-1 NPP as well as weekly bulletins on the construction activities of Angra-2 NPP;
- a set of planned inspections and audits as well as unplanned reactive inspections conducted by the staff of the Reactors Co-ordination located at *CNEN's* headquarters, with the assistance of the resident inspectors.

This programme aims to cover the main operational safety areas as maintenance, tests, radiological protection, design changes, fire hazards, quality verification, among others. The operational safety assessment, besides the results of inspections and audits, is also based on licensee periodic reports and other technical operational support documents.

3.7 BULGARIA

The Inspectorate on the Safe Use of Atomic Energy is in charge of checking on implementation of all established requirements, issuing licenses, co-operating with other concerned non-nuclear safety regulatory bodies and defining research and technical support as necessary.

Inspectors of the Inspectorate and other specialised non-nuclear safety regulatory bodies exercise control on the safe use of nuclear materials. They have the right and competence of free assess, requiring appropriate tests including ionising sources, obtaining information, checking the personnel licenses and taking adequate samples for examination and analysis.

The inspectors have to participate in investigations concerning abnormal events and their consequences and corrective actions. Inspection reports establish the necessary preventive and corrective measures including time limits for implementation.

3.8 CANADA

To promote consistency, the *AECB* developed a systematic core inspection programme for power reactors that specifies minimum frequencies, depth and coverage. This programme includes 31 core inspections, a policy governing implementation, standard inspection procedures and checklists, an estimate of resource requirements, and a procedure covering periodic reviews of findings.

Types of inspections include the following:

- operating practice assessments - fuel handling, waste management, maintenance, start-up, normal operation, shutdown safety, heat sinks.
- appraisals - security, radiation protection, safety culture, chemistry, emergency preparedness, fuel & physics.
- interviews - fuel & physics.
- audits - pressure boundary, prescribed substances, change control, record keeping.
- rounds - control room, field (area).
- systems - shutdown system 1, shutdown system 2, emergency core cooling, containment, standby safety systems, safety-related systems, electrical systems.
- observations - software maintenance, setback/stepback, turbine testing, emergency drills.

Although the inspection programme focuses on verification of each plant's compliance with regulatory requirements, it recognises also the need for re-active inspections. Whereas the core inspections are broad in nature, re-active inspections usually have a deeper focus. These inspections are prompted by such things as core inspection findings or events.

The approach encompassed by the programme does not assess individual inspections using criteria such as "pass/fail" or "satisfactory/needs improvement". Instead, resident inspectors at each plant are to meet every 3 to 4 months specifically to review findings and identify trends or the need for a deeper re-active type inspection in a particular area.

At the end of each year, resident offices produce an annual assessment report on plant performance against legal requirements, including compliance with the conditions of the operating license. The inspection reports themselves are available to the public.

3.9 CHINA

The nuclear surveillance consists of 2 tasks, .e.g., nuclear inspection and enforcement.

The objectives of nuclear safety inspection are to verify the implementation of safety regulatory requirements and license conditions, to perform surveillance on the correction of items that are not in conformance with nuclear regulatory requirements and the license conditions, to justify the qualification of the personnel related to nuclear safety, to ensure the materials, components structures, systems and activities conform with nuclear safety requirements, and to ensure licensees reporting of any defect and abnormal event in time.

For carrying out nuclear safety surveillance, the *NNSA* has established agencies in 3 regions, e.g., the Shanghai Regional Office, the Guangong Regional Office, and the Chengdu Regional Office. They are responsible for the nuclear safety surveillance in the regions of East China, South China and West China, respectively.

The *NNSA* or its regional offices may send inspectors (group) to the sites of the nuclear installations to exercise the functions of nuclear safety surveillance.

The nuclear safety inspection on NPP are classified into daily inspections, routine inspections and non-routine inspections.

Monthly inspections are carried out at research reactors, critical assemblies, and fuel cycle facilities, and the findings are reported to *NNSA* headquarters through monthly reports. Routine and non-routine inspections are planned and carried out by *NNSA* headquarters and its regional offices. The inspection reports are distributed to operating organisations after being approved by *NNSA* management. The operating organisation should take corrective actions according to the requirements in the reports.

The *NNSA* is responsible for the supervision of possession and usage of civilian nuclear materials. The main items of the supervision are implementation of nuclear materials control and license condition , the effectiveness of control, account and physical protection for nuclear material.

The operating organisations should observe reporting requirements of *NNSA*. The reports are composed of regular reports, ir-regular reports, and emergency reports. Emergency reports should reach the *NNSA* according to the regulations on emergency preparedness of nuclear installations.

In order to protect the site personnel, the public and the environment form possible adverse effects arising form nuclear installations, the *NNSA* requests that operating organisations and related organisations should eliminate unsafe factors of items and activities in nuclear installations. The *NNSA* will take enforcement action to order the operating organisation to take safety measures or to stop activities endangering nuclear safety when necessary.

3.10 CZECH REPUBLIC

SÚJB inspection programme covers all activities related to the use of nuclear energy and ionising radiation sources. It is carried out by the nuclear safety and radiation protection inspectors, who are appointed by the Chairman of *SÚJB.* The objective of the inspection programme is to verify how licensees comply with all license conditions and other safety regulations. Inspectors work at the headquarters or directly at the NPP sites, as well as in regional centres.

The inspection programme is prepared in accordance with *SÚJB* Instruction VDS 15 Rev. 2/96, specifying the unified approach in the planning of inspection activities of the nuclear safety inspectors, with the objective to obtain well balanced and sufficient information needed for the evaluation of how nuclear safety requirements are observed. The *SÚJB* inspection activities do not substitute for the responsible organisation (Operator) controls.

Inspection activities are composed of regular (general) and specialised parts.

Regular inspections are as a rule, performed by the resident inspectors and comprise of the observations, assessment and documenting of relevant Operator and Supplier activities. These activities are performed according to the inspection plan of the resident inspectors, and to a certain degree, also according to that of headquarters.

Specialised inspections are carried out in accordance with the Plan of Inspection Activity of *SÚJB* or following the resident inspectors recommendation, as a result of regular inspection findings, or in the case caused by an emergency.

A special part of the Plan concerning the NPP Temelin (under construction) is prepared especially with regard to activities related to construction and start-up steps. It includes mainly inspections of quality assurance of equipment and civil construction work, inspection of relating documentation and the course of personnel training.

The part of the Plan concerning NPP Dukovany includes inspections during operation and shutdown stages of the installation, as well as schedule of the regular inspections by the resident inspectors. This inspection plan is prepared especially with regard to the following aspects:

- annual operation plan,
- evaluation of the inspection programmes and operational safety during preceding period.
- how the *SÚJB* binding conditions and requirements are fulfilled,
- evaluation of the quality assurance programmes, and
- information acquired by the *SÚJB* individual departments.

3.11 FINLAND

Regulatory control of operating nuclear power plants contain reviews and inspections which can be divided into 3 categories:

- Periodic inspections as specified by *STUK* in plant specific programmes.
- Inspections of specific technical and other topics.
- Safety re-assessment.

Periodical inspection programme are focused on the power company's activities which are important to safety. The control aims to ensure compliance and assess the appropriateness of the power company's activities. In preparation and in connection with each inspection, examples of the results of activities in question are reviewed. Inspections cover organisation and management, personnel training, conduct of operations, maintenance and repairs, technical support functions, fire protection, radiation protection, radiation safety of the environment, nuclear waste management, physical protection, and emergency preparedness.

Separate inspections cover areas including; qualification of personnel, event investigation, supervision of the outages, modification and repair of systems, in-service inspections, surveillance activities, start-up, nuclear fuel and nuclear materials, etc.

3.12 FRANCE

A yearly inspection programme is drawn up by the *DSIN*, in concert with the regional directorates *(DRIREs)*, the *IPSN* and the inspectors themselves. The aim of this programme is both to satisfy the requirements of efficient supervision of all nuclear installations and to focus attention on specific technical aspects (in-service inspection, fire protection, containment, maintenance, operation, etc...).

In addition, following certain significant incidents, the *DSIN* orders, if necessary, a specific inspection of the concerned plant.

After the inspection, the inspector sends a report to the head of the *DSIN* with his observations and comments. The head of the *DRIRE* sends a letter to the operator asking for more comments about the findings.

Typically, for PWRs, a minimum of 15 inspections are performed annually on each site with 4 units. 10 to 20 additional meetings or informal inspections may be held each year on such a site.

In 1995, 615 inspections were performed, 285 of them on PWRs.

There are no public information requirements regarding the inspection programmes, that is to say, the public has no access to them, nor to the inspections themselves.

However, summaries of all recent inspections are given in the review bulletin “Contrôle” on nuclear plant safety (as well as the incidents reports), issued by the *DSIN* every other month.

Besides, press releases and information packages are given to the press (at both national and local level), usually on a yearly basis, and the journalists are provided with all the relevant information.

3.13 GERMANY

The inspection programmes cover all activities of the licensees related to the legal requirements and to the provisions of the Construction and Operational License of the plant.

During the construction of a nuclear installation or during implementation of modifications, so-called accompanying controls are carried out, which are designed to ensure that the manufacturing, construction and testing of all safety related systems and components comply with the requirements of the permit. After start of operation, inspections are carried out at regular intervals.

The supervisory programme during the plant’s service life includes:

- monitoring compliance with legal regulations and licensing notifications, compliance with safety regulations and guidelines.
  - compliance with physical security regulations.
  - inspection of safety deficiencies.
  - safety reviews, assessment of licensee safety reviews.
  - normal operation, recurrent inspections and in-service inspections and tests.
- evaluation of abnormal occurrences.

- approval of minor modifications (major modifications require a license).
- control of radioactive discharges.
- operating the KFÜ-System (automatic transfer and recording system of important nuclear power plant status and operational data).
- radiation protection monitoring of personnel and environment, independent control of radioactive emissions.
- control of professional skills of the operation personnel and training programmes.

In addition to monitoring compliance with legal regulations and requirements, the regulatory supervision aims at encouraging the licensee to constantly improving on the plant's safety status.

On-site visits at the plant take place on the average of about once per week. Personal contacts are made at different levels (plant manager, shift supervisor, RP manager, sections heads). Operational procedures, testing procedures and the General In-service-testing Programme is reviewed by experts or expert organisations (TÜV) assigned by the regulatory authority (see Chapter 7). Also experts supervise in-service inspections and tests and review the results. There are topical team inspection meetings at regular intervals involving the licensee, the experts and the regulatory authority. There are no resident inspectors at the site.

The supervisory authority may order to discontinue any situation which is contrary to legal provisions or conditions of the license or which causes danger to life, health, or property through the effects of ionising radiation. It may, in particular, order that (specific) safety measures be taken, that radioactive substances be stored or kept in custody and that the construction or operation of a nuclear installation be suspended temporarily or permanently.

On behalf of the Federal Government, the *BMU* ensures, that the instruments available to the Länder Authorities are used uniformly and effectively with regard to the matters of law and expediency. In particular, the *BMU*:

- requests regular reports on operation experience.
- involves advice of the Reactor Safety Commission *(RSK)* and of the Commission on Radiological Protection *(SSK).*
- involves a central registration office for reportable events at the Federal Office for Radiation Protection *(BfS)* and in-depth evaluation by the Gesellschaft für Anlagen-und Reaktorsicherheit *(GRS).*
- evaluates accumulated operational experience nation-wide and international.

3.14 HUNGARY

The *NSI* issues facility, system and equipment level licenses to nuclear installations in accordance with the relevant law and safety regulations. Facility level licenses must be obtained to selecting a site for a nuclear facility and to construct, commission, operate, modify, suspend, shut down or decommission such facility. In addition, the periodic safety review in every 12 years is also considered to be an instance of facility level licensing.

During the periods of operation of nuclear facilities, frequent regulatory licensing activity is necessary for both systems and equipment. According to the above mentioned regulations, the production, import, commissioning, periodic revision, repair and installation of nuclear equipment are activities requiring regulatory license. The groups of equipment jointly performing some function constitute systems, and the systems of key importance from a safety point of view also require licensing procedures.

The supervision activities of *NSI* extend to checking compliance with regulatory requirements, technical rules and standards regarding the facilities, their systems and equipment and related activities, and finally the conditions and prescriptions defined in licenses.

The NSI's requirement regarding the Paks Nuclear Power Plant Co. Ltd. as an operator is the employment of safety and quality control units that are strong, skilled and adequately independent from structural units performing the actual operation. The authority checks whether these units adequately perform their tasks and fulfil their defined roles, and those supervisions that are most critical from a safety point of view are performed with the participation of regulatory inspectors.

A partly different approach is taken in the case of the two other licensees. Direct and indirect supervision methods are also applied to Research Reactor of KFKI Atomic Energy Research Institute *(AERI)* and the Training Reactor of the Technical University of Budapest (TUB), while the inspectorate carries out itself the structural supervision and pressure tests of all first safety class (i.e. the most critical) mechanical equipment.

The assessment activities of *NSI* are basically related to its licensing and supervision responsibilities. The Technical Division - established in early 1995 - and its Section of Analysis are responsible for providing assistance to the inspectorate's work with more detailed analyses. In addition to checking compliance with safety and other regulations during licensing procedures and supervision, the review of the safety of a nuclear facility must also be performed periodically. Analyses use deterministic approaches and qualitative methods in most cases. In the case of complex problems or when quantitative results are also required, the *NSI* involves expert organisations. Currently the evaluation of abnormal events in nuclear institutions, defined as a mandatory activity of the inspectorate by the decree No. 5/1979.(III.31.) NIM, constitute the majority of assessment activities. In these cases the analyses are aimed at evaluating whether the conditions of safe operation were given during and following the event, whether the short and long term measures planned by the operator are correct and adequate or not, in order to keep or retain the desired level of safety and to ensure compliance with effective regulations. The responsibilities of the Quality Assurance Section of *NSI* is to assist in improving the quality of regulatory activities and the work performed by the operator and its contracted partners.

3.15 INDIA

The Directorate of Regulatory Inspection (*DRI&E*) of the Atomic Energy Regulatory Board draws a yearly regulatory inspection programme for each of the operating nuclear power plants (NPP). Routine regulatory inspections are carried out on the basis of a check list covering operational practices, radiation protection, quality assurance, technical support, plant maintenance, training, etc. at a frequency of about twice a year.

Special inspections are carried out, when necessary, to investigate incidents of safety significance, safety deficiencies, or to witness special tests and emergency exercises.

Exit meeting is held at the NPP at the end of regulatory inspection and Plant Management is briefed of the observations of the regulatory plant inspection team. The findings of the inspection team are formally reported along with recommended required corrective action. Implementation of these corrective actions is followed up and necessary enforcement measures are taken.

The regulatory inspection team is led by a senior level staff member from *DRI&E*. The team has about 8 experts drawn presently from *AERB* and Atomic Research Centres.

The inspection teams from the Atomic Energy Regulatory Board visits the nuclear power plants to monitor their compliance with the provisions of industrial safety envisaged under the Atomic Energy (Factories) Rules, 1996.

3.16 ITALY

It is the responsibility of *ANPA*:

- During the construction phase. To check that the nuclear installation is constructed in accordance with the project initially approved.

- During the commissioning phase. To supervise the conduct of the non-nuclear and nuclear tests; to verify the adequacy of the Technical Specifications that are to become part of the operating license.

- During operation. To carry out inspection activities on the basis of an annual surveillance programme that includes inspections as follows:

  - Routine checks regarding the operating requirements and technical specifications applicable to the plant process parameters in various operating modes, including refuelling/shutdown phases. The ordinary surveillance is always scheduled by means of internal criteria and procedures which define frequency and type of check for each plant.

  - Moreover, extra-ordinary, and off-programme inspections are also performed as follows:

  - Extra-ordinary inspections consist of surveillance of design, construction and final tests of new systems to be installed in connection with a review or a modification of the plant. They also include surveillance of the application of corrective actions due to previous inspections or as a result of operating experience.

  - Off-programme inspections are performed in the case of abnormal occurrences or conditions (abnormal events or conditions must be reported to the regulatory body, according to specified reporting requirements) or when requested by other Authorised Institutions (Judiciary Authority is included).

As a policy, *ANPA* has no resident inspectors, but they have free access to the installations and they can require, if necessary, all information.

During plant operation, a yearly inspection involves an overview for the entity of the plant: organisation and management, personnel training, maintenance, radiological protection, nuclear waste management, physical protection and emergency preparedness.

- Once the plant enters shutdown Period (for subsequent de-commissioning). ANPA reduces its surveillance activity, by limiting its role only to the verification of the safe state of some systems and the control of:

  - Systems and procedures required for the radiological protection of the workers.

  - Radioactive discharges into the environment.

  - Operability of some conventional safety systems, such as, fire protection, ventilation, emergency power supply.

  - Organisation foreseen in an emergency situation.

Particular attention is additionally given to storage of fuel elements, including a verification of their structural integrity, at yearly intervals.

For each of the above operating conditions, a report of each inspection must be completed, which includes details of the verifications and tests carried out, findings, possible corrective actions required, and follow-up recommendations. Inspection reports are regularly analysed within *ANPA* organisation in order to:

- Keep plant safety review up-to-date.

- Establish any necessary regulatory actions.

- Reframe, as may be advisable, subsequent inspection programmes.

Inspection report is a public document and a copy of the report is sent to the owner for comments. A letter is then sent to the licensee requesting corrective actions in a given time limit. If a deviation from the regulations is detected, a sanction is proposed.

3.17 JAPAN

STA and *MITI* execute the following inspections and reviews of reactors in Japan after executing environmental and safety evaluations and granting permission for installation and approval of plant construction plans:

- Welding Inspections - Executed for main machinery and equipment as required by law.

- Fuel Material / Assembly Inspections - Executed for fuel assemblies at every stage of processing.

- Pre-Service Inspections - Executed at every stage of construction, for machinery and equipment which have been approved in plant construction plans.

- Periodical Inspections - Executed at certain intervals as required by law for Regulation of Nuclear Source material, Nuclear Fuel material, and reactors or by law for electric articles among machinery and equipment that have passed the pre-service inspections and have been put into service.

- Licensees must establish Self-Safety Regulations in order to ensure safety in the management and operation of reactors.

- Resident expert for operational management - Stationed at each nuclear power plant to ensure that the plant is operated without any difficulties. Resident expert for operational management submits reports on the operating conditions of the plant.

3.18 KAZAKSTAN

The inspection programme covers all activities related to the legal requirements and to provisions of the site, construction, operation licenses of the nuclear installations.

There are 3 divisions in the Central Office of the *KAEA* (Nuclear Safety, Radiation Protection, and Safeguards and Physical Protection) which conduct inspection activities. Inspection activities are headed by the Chief State Inspector.

KAEA has resident inspectors, who are located at each NPP. The inspection programme consists of routine inspections and special inspections. Inspection results are reported every 3 months to the Central Office of the *KAEA*.

3.19 REPUBLIC OF KOREA

In Korea, regulatory inspection programmes include the pre-operational inspection, periodical inspections, quality assurance inspections, daily inspection conducted by resident inspectors, and special inspections as follows:

- Pre-operational Inspection ***(****KINS****)*** - The applicant shall be subject to pre-operational inspection to prove the performance of the reactor facility meets safety requirements specified in the relevant technical standards. If utility passes all pre-operational inspections, then the Operating License is officially issued by the Ministry of Science & Technology (*MOST*).

  If these functional test results are unsatisfactory. Inspectors decide on proper corrections which should be made to improve performance of equipment and components. The official findings or recommendations are issued, followed up and resolved in order for the utility to pass the pre-operational inspection..

- Periodical inspection *(KINS)* - In accordance with the provisions of the Enforcement Decree of the Atomic Energy Act, the licensee shall be subject to periodical inspections, which are usually conducted on an annual basis. Through this inspection, inspectors check to see that performance of reactor facility, designed to withstand pressure, radiation, and other operating environments, is actually maintained in a state in which the reactor facility passed the pre-operational inspection. If satisfactory, *MOST* issues a license for power operation.

  Periodical inspection consists of standard inspection items (usually 50 - 60 items) which are established for each reactor type and then some special inspection items tat are strategically selected based on the operating history and on experiences gained from the previous operating cycle. The inspection items are developed to cover all technical areas and operational aspects of a plant. During periodical inspection,

inspectors also review the necessary utility documents, witness activities and evaluate maintenance and test records.

- Quality Assurance (QA) inspections *(KINS)* - This inspection is carried out on an annual basis by *KINS* inspectors to check whether the quality assurance activities of the utility are performed in accordance with the QA programme submitted to the regulatory body.

- Daily inspections (Resident Inspectors) - Operational safety of an NPP is continuously monitored through daily inspections at the plant by resident inspectors. The Resident Inspectors Office at each plant site consists of several government officers and *KINS* staff. They monitor the safety parameters and review the station logs everyday to confirm whether the plant is operated in compliance with the plant's technical specifications. They also routinely witness safety-related functional tests such as the start-up test of the emergency diesel generator, etc.

- Special Inspection - If an event or a significant safety system failure occurs, the resident inspectors investigate the event and report it immediately to the *MOST* and *KINS*. If the *MOST* decides that the event is safety-significant and that an in-depth investigation is necessary, a joint special inspection team comprised of *MOST* and *KINS* staff will be organised and assigned to the site. This inspection is controlled and co-ordinated by the *MOST*.

3.20 MEXICO

The inspection programme for nuclear power plants is carried out in two departments in different division within the *CNSNS*, one of them is devoted to inspect the following aspects: Construction Programmes, Operational Activities, and Trend Analysis, the other has been devoted to topics related with radiological protection and emergency preparedness. Due to the specialisation of the people of radiological protection, this matter is under control of the Office of Radiological Safety.

The inspection programme is orientated to cover the following activities: Periodic inspections (annually programmed), Resident Inspector inspections, and inspections on demand basis to cover special events (like operational, shutdown, reloads, etc.).

Periodic inspections are programmed on an annual basis and focused on the typical utility activities; organisation responsibilities, personal training, conduct of operations, maintenance, fire protection, radiation protection and emergency preparedness, plant modifications, environmental impact, physical security activities, quality assurance and quality control rules, and the inspection of different utility compromises.

Inspections performed on research reactors and pilot fuel fabrication plants are less intensive in activities but also comprises of: personal training, radiation protection and quality assurance. Normally there are at least two inspections per year.

Resident Inspectors inspections are carried out continuously. *CNSNS* has two resident inspectors (one for each nuclear power plant unit). Their responsibility is to cover the following aspects: Technical Specifications requirements, performance of licensed personnel on duty, and routine operational activities.

Special team Inspections, are normally organised after the occurrence of an important event at a nuclear installation. The main objectives are: to find out the root causes of equipment failures or weaknesses in human/organisation performance. This kind of inspection is also a resource to every non-scheduled activity requiring the intervention of the regulatory body.

3.21 THE NETHERLANDS

The supervision tasks of KFD regarding inspections are; to perform inspections and audits at nuclear power installations, in order to assure they fulfil requirements of the Nuclear Energy Act, to compare operational characteristics with the safety concept of the original license, and to utilise various enforcement instruments depending on the serious of the shortcoming.

The general inspection programme covers all aspects of operation and is performed in a cycle of about three years. This programme consists of; basic inspection plan (operation, system walk downs, maintenance and surveillance), management inspection plan (licensee's organisation, management and administration of surveillance, maintenance, radiation protection, etc.), active / reactive inspection plan (incidents and other important selected items), and team inspection plan (operation, maintenance, refuelling stops, and special items). Specific inspection procedures to implement the general inspection programme are written.

3.22 PAKISTAN

The inspection activities of *DNSRP* covers all aspects of nuclear power programme. For the under construction power plant at Chashma, *DNSRP* has established Regional Nuclear Safety Inspectorate *(RNSI)* with a mandate to carry out surveillance during all phases of the project. In addition a programme of inspection of the safety related equipment at the manufacturer's site has also been established. For KANUPP two type of inspection is carried out. Regular inspections are carried out quarterly, in addition special inspection team visit KANUPP after every safety significant event.

3.23 RUSSIA

The inspection programmes cover all activities related to the legal requirements and to the provisions of the site, construction and operational license of the plants.

The central office of the Gosatomnadzor of Russia provides inspections on a periodical basis (each plant once every 4 years). The regional inspectorate participates in these inspections too.

Regional bodies including resident inspectors conduct their own inspection programmes according to annual plans. Site resident inspectors at each NPP also carry out continuously inspections related to all aspects of safety. Inspections results are reported every 6 months to the Central office of the Gosatomnadzor of Russia.

Types of inspections are:

- Complex (core) inspections usually carried out by Central Office of Gosatomnadzor.
- Purpose inspections usually carried out by one or a group on inspectors in one area.
- Operative inspections carried out by resident inspectors.

3.24 SLOVAK REPUBLIC

The basic philosophy behind the *ÚJD SR* inspection programmes is to ensure the safety of the nuclear facilities and thereby to avoid endangering the environment, the health and the lives of people.

The inspection programme for the nuclear facilities is carried out by the Inspection Branch which is headed by the Chief Inspector. There are four (4) departments with main activities devoted to:

- Nuclear Safety Assessment
- Systems and Components
- Nuclear Materials
- Radwaste and Decommissioning

There are resident inspectors located at each Nuclear Power Plant. The Inspection programme consists of routine inspections, special inspections and team inspections. Areas generally covered by inspections include:

- Plant operation - operational safety verification
- Emergency systems verification
- Events investigation
- Fire protection
- Maintenance
- Surveillance
- Plant security / physical protection
- Engineering / technical support
- Commissioning
- Personnel training
- Nuclear waste management
- Nuclear fuel storage and transports
- Safety control of nuclear materials
- Major outages, modifications
- Decommissioning

Types of inspections include:

- Core inspection programme - routine inspections carried out by resident inspectors
- Special planned inspections
- Special unplanned inspections
- Team planned inspections
- Team unplanned inspections

Long term planning - *ÚJD SR* issues annually the long term inspection programme. This programme fully covers Core inspection programme, Special and Team planned inspections.

Unplanned inspections - Unplanned inspections are initiated by the *ÚJD SR* in response to unexpected, unplanned or unusual situations, occurrences or *ÚJD SR* needs. Inspections may be occasioned by a single situation occurring at a particular plant or may be in response to a generic problem encountered at another plant or identified by the review and assessment of inspectors.

3.25 SLOVENIA

The section of inspection control within *SNSA* consists of the section head and 4 inspectors for nuclear safety. The main task of the nuclear safety inspector is to perform the inspection in compliance with the regulations and to determine scope and depth of the inspection.

The inspections are planned in accordance with the general annual programme of inspections, which is divided into four 3 month periods. The more detailed plans are prepared at the beginning of each 3 month period and after the end of each 3 month period the inspection reports are reviewed and compliance of the objectives and the scope of the inspections with the general annual programme is established. The new 3 month plan is then amended according to the findings given in the review of the inspection reports. The general annual programme is divided into the following areas:

- Operation of nuclear installation
- Radiological surveillance
- Maintenance and surveillance tests
- Emergency preparedness
- Physical protection
- Modifications and training
- QA/QC
- Other activities

Other activities comprise inspections after reactor trips or abnormal events, follow-up inspections, “post-outage” inspections, inspections of OSART recommendations implementation and similar activities.

The inspections are organised as a single or as a planned series of inspections in order to determine whether the licensee’s actions meet regulatory requirements. The inspections can be (a) planned or (b) non-planned (e.g., inspections which cover reactor trips, abnormal events, etc.). Planned inspections can be announced or un-announced.

There are no resident inspectors which have an office on-site, but the continuous monitoring of the nuclear power plant performance is performed through the planned inspections of 2 inspectors once or twice a week (there are about 80 such inspection trips per year). The inspection report is written on the spot and a copy of this report is handed over to the plant staff.

3.26 SOUTH AFRICA

The resident inspectors carry out inspection for licence compliance based on a risk approach which targets those areas and activities of highest risk. Random inspections are also undertaken in response to the dynamic requirements of the plant states, occurrences and operating trends.

The inspection programme is computerised and generates inspection requests for action and records inspection results for trending and history. The scope of the inspections covers the full range of licensed activities including operations, maintenance, ISI, NDT, fuel, chemistry, radiation protection, effluent and waste management, environmental monitoring, emergency planning and preparedness, physical security, quality management.

Daily visits are made to the control rooms and all aspects of operator training and requalification are monitored. The *CNS* maintains a permanent examinations staff at the plant responsible for regular examination and licensing of plant operators.

Information is made available through an annual report of the *CNS* activities and performance, and in addition is supplied to the media and public on an ad hoc basis through press releases and meetings with interested parties.

3.27 SPAIN

The resident inspectors cover operational safety areas including; plant operations, health physics, chemistry, maintenance, technical support, training, and emergency preparedness. A report is issued monthly.

There are other programmed inspections (approximately one area / power plant / year) which are more specialised involving the following operational areas; Maintenance (including environmental qualification), In-service Inspections, Quality Assurance, Operating Experience management, Design Modifications, Management, Health Physics (including ALARA and Environmental Radiological Impact), Radioactive Wastes and Effluents, Emergency Planning, Training and Chemistry.

Inspections for equipment review are performed annually on the following systems:

- Fire systems
- Electrical and instrumentation systems

- Containment Isolation systems

Other special interest (areas may change each year) inspections are performed each year. Some examples are; erosion / corrosion, motorised valve performance, blackout management, service water systems, compressed air systems, control room layout. Non programmed inspections includes areas such as event investigation and plant modification.

Apart from resident Inspection work, l0 to 25 inspections (with written reports) are done annually in each nuclear power plant. Inspection reports are public documents and a copy of the report is sent to the owner for comments. A letter is then sent to the licensee requesting correction of the deviations (in a given time limit). If a deviation from a regulation is detected, a sanction is proposed.

3.28 SWEDEN

SKI carries out and co-ordinates the inspection of nuclear installations and *SSI* ensures that the conditions for the protection of workers and neighbouring population against the hazards of ionising radiation are observed as well performing an important duty with local authorities in the preparation of emergency schemes.

The inspection programme consists of routine inspections, special inspections and team inspections. Routine inspection covers all operational phases, LERS, planned shutdowns, outages, on-going matters, filed issues, organisational changes, exemptions from regulation, decisions taken by *SKI*, and QA audits.

The inspection matrix has the following headlines:

- Management and organisation
- QA Activities
- Maintenance
- Modification work
- Operation
- Training
- Emergency Training

Special inspections are reactive in its nature and cover follow-up on events and abnormal occurrences. Team inspections are utilised when a particular need has been established or as a result of important findings or incidents.

Inspections consist of both technical inspection of installations and quality inspection of a licensees organisation. A gradual shift of emphasis from assessing the technical performance of systems and components to assessing the quality of management, operation and maintenance has developed over recent years.

Results of inspections are documented in reports, and any recommendations are brought to the licensee’s knowledge

3.29 SWITZERLAND

The inspection programme covers siting, construction, commissioning and operation. Routine inspections cover all items of an operating plant, which cannot be handled by headquarters office. Non-routine inspections are mostly dedicated to hardware problems or modifications, and to a smaller extent to management problems.

Most visits are scheduled for case of preparation and to accommodate NPP staff availability. Unscheduled visits are not considered unless the licensee or his personnel have deficiencies in safety culture. Access is possible without escort of the licensee, although is required or preferred to improve efficiency.

Types of inspections include:

- Monthly inspection of the plant co-ordinator (site inspector) - operating history, monthly reports, reportable events, modifications, maintenance activities, tests, etc.

- Periodical specific technical inspections - operating mode, availability of safety relevant equipment, compliance with operating limits, test programmes and procedures, functional tests, surveillance programmes, QA, radiation protection, personnel licensing, etc.

- Special extraordinary inspections of non-periodical cause - Incidents or other relevant events, major repairs, modifications, backfitting, special tests, reassessments, etc.

- Periodical meetings with NPP management - meetings on operating experience (once every 3 months) and meetings on managerial level (twice per year).

Health physics aspects, waste management and operator performance (such as licensing of operational staff) are covered by the inspection practices of *HSK.* On security aspects, a different federal department is responsible.

3.30 UKRAINE

The inspection programmes cover all the activities of operation organisation (licensee) and contractors.

The Main State Inspectorate of Ukraine according to the annual plan performs the planned inspections on the base of proper inspection programmes.

The inspection results are reported to the Nuclear Regulatory Administration of the Ministry of Ukraine and to the operation organisation (licensee) subject to the inspection procedure. As examples are included some inspection programmes on technical safety. These programmes are utilised by the Main State Inspectorate during planned inspection:

- the inspection of technical conditions of safety systems;

- the inspection dedicated to maintenance issues and services;

- the inspection regarding the technological discipline of the NPP maintenance personnel;

- the inspection programmes regarding the NPP control services, realising the engineering and technical support during the period of maintenance.

3.31 UNITED KINGDOM

NII allocates a site inspector to each licensed site. Typically, a power reactor station consisting of 2 reactors will have a single site inspector responsible for inspection duties. The site inspector carries out a range of duties including planned inspections, re-active inspections and management of modifications proposed by the licensee which require *NII's* involvement (Major projects are managed by a separate group of inspectors). Site inspectors call upon the resources of assessors who specialise in specific topics to support them in these duties. *NII's* inspection activities are similar at all types of nuclear installations, though different inspection frequencies and coverage may be appropriate.

Planned annual programme of inspections are carried out at each site to confirm that licensees comply with the license conditions and other regulations. The topics covered in each programme include:

- Control of the site and Nuclear Matter

- Quality Assurance and Control of Records

- Investigation and Reporting

- Instruction, Training and Authorisation of Persons on the Site

- Emergency Preparedness

- Advice on Nuclear Safety

- Control of Safety Cases

- Control of Plant Design and Status

- Control of Employee Doses

- Control of Operations

- Plant Shutdown and Test Requirements

- Control of Waste

Planned inspections also cover other nuclear safety related topics such as pressure and lifting systems and management of safety. In addition, a small number of team inspections or audits are carried out when a particular need has been established.

Inspections can cover checks on the adequacy of licensee's arrangements; checks for compliance with relevant safety legislation, license conditions and licensee's arrangements; plant inspection; witnessing of activities; discussion with management, operators, and work people; and checking of records. Site inspectors also take part in liaison meetings with representatives of members of the public who live near the nuclear facility.

Each Site Inspector spends about 30% of working time on the site, in typically 20 visits per year. Following an inspection visit, the Site Inspector writes a report on the activities undertaken and implements any necessary follow-up actions. The remainder of time is spent on management of modifications and changes to safety cases and modifications, assistance to other Site Inspectors, licensing activities, training. etc.

Further details may be found in the document "The Work of *HSE**'s*** Nuclear Installations Inspectorate" published by *HSE*.

3.32 UNITED STATES

Three essential components of *NRC*'s reactor inspection program are to determine the state of reactor safety, to confirm that operations are in compliance with the provisions of the license, and to ascertain whether other conditions exist with safety implications serious enough to warrant corrective action. The primary focus is on plant operations, maintenance, engineering, plant support, and licensee control systems; and includes efforts by *NRC* resident, region-based, and headquarters inspectors.

The *NRC*'s inspection program consists of three basic types of inspections (1) the core inspection program, (2) plant-specific regional initiative inspections, and (3) generic safety issue inspections. In FY 1997, the *NRC* will continue to work toward refining probabilistic risk assessment (PRA) methods and information and incorporating them into inspection planning and assessment of potential safety issues. This effort is part of the agency-wide PRA implementation plan for strengthening and increasing the use of PRA technology in agency regulatory activities. For those plants that have demonstrated superior performance in specific areas of the *NRC*'s systematic assessment of licensee performance (SALP) program, the goal is that they receive only the core inspection program and generic safety issue inspections. Regional administrators have significant flexibility to direct additional inspections on safety problems and on plants that require special attention rather than on completing a more rigidly defined inspection program for each site. This flexibility helps to ensure that resources are allocated effectively to enhance reactor safety.

The *NRC* assigns at least two resident inspectors to each operating reactor site. Their primary job is to observe, evaluate, and report on the adequacy of licensee nuclear safety activities concentrating on day-to-day licensee operations, event follow-up activities, and licensee activities and processes important to safety and reliability. In addition, they co-ordinate on-site activities of the various agency offices and participate in emergency exercises. Resident inspectors carry out the major part of the core inspection program and participate in regional initiative and generic safety issue inspection.

Region-based and headquarters inspectors supplement the activities carried out by resident inspectors through a variety or program and technical inspections that afford an in-depth look at licensee operations. In-depth, specialised technical inspections are carried out by inspectors in the broad areas of plant operations, maintenance, engineering, plant support (security, radiation safety, emergency preparedness), and licensee control systems (systems established by the licensee to identify, resolve, and prevent problems that would degrade plant safety). In addition, region-based inspectors and headquarters staff respond to allegations of safety and safeguards violations at nuclear facilities and provide technical support to investigative personnel.

The *NRC* also conducts operationally-determined inspections, which are comprehensive examinations that evaluate the performance of plant systems under specific circumstances. Such inspections include, but are not limited to, service water system operational performance inspections, operational readiness assessment team inspections, safety system functional inspections, safety systems outage modification inspections, operational safety team inspections, and safety issue inspections. These inspections are conducted by teams of specialists that include operations-, design-, and installation-oriented personnel, and provide senior *NRC* management with integrated perspectives on plant performance in specific areas of operational safety where regional inspections indicate the need for more comprehensive inspection. The *NRC* plans to conduct approximately 6 operationally-determined inspections in FY 1997.

Vendor/contractor inspections are reactive in nature and determine whether suppliers of materials, components, and services used in nuclear power plants are complying with *NRC* requirements. These inspections improve reactor safety by (1) ensuring that root causes of reported vendor-related problems are identified and that suitable corrective actions are developed and implemented, (2) informing the nuclear industry of substandard, suspected counterfeit, or fraudulently marketed vendor products, and (3) ensuring that fraudulently marketed products are traced to their source. The *NRC* plans to conduct approximately 35 reactor vendor/contractor inspections in FY 1997.

Reactor operator licensing requalification inspections were implemented as part of the FY 1994 amendment to *NRC*'s operator licensing regulations. The *NRC* will use this performance-based inspection program to evaluate licensee examination and training programs and to improve operational safety through early identification and correction of programmatic weaknesses.

CHAPTER 4 - SHUTDOWN ACTIVITIES

This chapter provides a brief summary of inspection programme functions during periods when the plant is shutdown. The section provides a look at inspection activities performed during refuelling, plant modification work, and similar evolutions.

4.1 ARGENTINA

During planned outages *ARN* performs inspections related to safety-significant components, surveillance program (functional tests), maintenance activities (in-service-inspections, corrective, preventive and predictive maintenance), check the ALARA performance program, plant modifications and plant configuration control. The importance of these activities are also based on the PSA results and they are carried out by resident inspectors and specialised teams

4.2 ARMENIA

Shutdown activities include inspection programmes, safety improvement programmes, design modifications, and control and authorising of reactor start-up. All planned maintenance and modifications are submitted for approval at least 3 months before the refuelling shutdown.

4.3 AUSTRALIA

The Australian Nuclear Science and Technology's *(ANSTO)* operating research reactor has short shutdowns at monthly intervals for refuelling and the Nuclear Safety Bureau (*NSB*) does not usually perform any additional inspections at this time. Much longer shutdowns occur every four years to permit equipment inspections and special maintenance, as well as certain plant modifications, to be carried out.

The *NSB* monitors closely the activities during the four-yearly shutdowns and may carry out field inspections if deemed necessary during inspection and maintenance activities. All *ANSTO* reports of shutdown maintenance and inspection activities are reviewed by the *NSB*. Formal *NSB* agreement is required for restart of a reactor after such a shutdown.

4.4 BELARUS

There are no operated nuclear installations in Belarus presently. Nuclear material has been removed and placed in the storage facility.

4.5 BELGIUM

Inspection Programme - Modification Control

- Supervision of small projects or modifications by dedicated inspectors.
- For greater (larger) projects, follow-up of the projects by the dedicated inspector, with the help of a project leader for the management of the safety assessments.

4.6 BRAZIL

A core design safety analysis report is issued each refuelling outage and test inspections are conducted to verify the adequacy of the core design until the equilibrium cycle is reached. The maintenance and surveillance programmes are inspected as well as the design modifications of safety related equipment during its commissioning phase

4.7 BULGARIA

Shutdown activities include inspection programmes safety improvement programmes, design modifications, functional tests, maintenance activities etc. All planned activities are submitted by *AUAEPP* for approval in accordance with *AUAEPP*.

4.8 CANADA

Several inspections in the core programme involve activities that take place during shutdown. Operating Practice Assessments (OPAs) involve an examination of aspects such as the quality of the preventive and corrective maintenance programmes, post maintenance testing with respect to procedural adherence, the quality of start-up operation, shutdown safety, and heat sink availability. The programme also includes an Observation of turbine testing with respect to major valves and overspeed equipment.

Resident inspectors monitor the administrative and equipment related measures in place during outages to ensure the reactor remains sub-critical. They verify that equipment and components are in specified position, that locking/blocking devices have been applied correctly and that proper tags have been hung. Opportunities are taken also during outages to conduct re-active type inspections in areas where it is judged that licensee performance requires additional scrutiny.

4.9 CHINA

The operating organisation should submit a plan for refuelling outages, modifications or similar activities and get approval from the *NNSA* before NPP shutdown. The inspections should be made by *NNSA* or its regional office during the shutdown period. After shutdown maintenance and refuelling, the restarting of the NPP should be authorised by *NNSA*.

4.10 CZECH REPUBLIC

Inspections during shutdown are performed by:

- resident inspectors in accordance with a resident inspectors' inspection plan.
- inspection team in accordance with a plan of inspection activities of the *SÚJB*.

These inspection plans cover:

- shutdown programme
- maintenance
- safety valves tests
- housekeeping
- design modifications
- surveillance tests of safety systems
- surveillance tests of reactor protection systems
- in-service inspection
- personnel training
- start-up programmes
- technical specifications during start-up

Specialised inspection is always carried out to check the preparedness of equipment and personnel for start-up of the unit.

4.11 FINLAND

Nuclear power operation includes activities which can be implemented only after *STUK*'s approval. Approval is tied to preceding inspections and is verified afterward, that implementation complies with the plans and meets regulatory conditions. Requirements and obligations which apply to inspection of different topics, are listed in the YVL Guidelines.

The inspection in relation to shutdown activities cover: outage planning and execution, refuelling, in-service inspections, repairs, modifications and preventive maintenance, post-outage plant start-up etc; The plant can be started up after the refuelling and/or larger maintenance outage only after *STUK* has given a decision on plant start-up. *STUK*'s control is described in the guide YVL 1.13.

The important inspections which the operating organisation is obliged to request are for repairs and modifications. For all repairs of failed safety relevant components, as well as for modifications of safety systems, the operating organisation has to present plans (including technical documentation, methods utilised, quality control, testing, etc.) in advance for approval by *STUK*. Upon completion of work, the operating organisation has to request for construction and/or commissioning inspections.

4.12 FRANCE

Monitoring of power plant outages for refuelling is one of the major tasks of the *DRIREs*.

The maintenance and modifications programmes are submitted to the *DRIREs* for approval. The *DRIREs* base their decisions on the analyses of these dossiers, carried out by the Safety Assessment Department of *IPSN*, and then formally write a letter of approval to the plant management.

The *DRIREs* are also legally responsible for supervising the application of pressure vessel regulations to all installations of the plant (nuclear and not nuclear), and associated waivers when requested by operator.

For each outage, a site-dedicated inspector from the *DRIRE* reviews and monitors the programmes. Several meetings are held with the operator and at least one inspection is conducted.

Typically, a PWR site dedicated inspector devotes 3 months per year to shutdown activities.

4.13 GERMANY

The operation organisation (licensee) is required to provide plans for the outage period in advance. These plans shall define the refuelling, all maintenance and testing programmes and the implementation of planned modifications. The conduct of the outage must meet the operational conditions (availability) of the safety systems, namely, the available trains of the electrical supply, the decay heat removal system, etc., as laid down in the Technical Specifications (Operation Manual) for shutdown conditions.

A detailed inspection programme will be set up to cover repairs, modifications, reactor core refuelling, fuel element inspection, and recurrent testings of systems, components, valves, welding, etc. Almost all recurrent tests and inspections are supervised and reviewed by experts *(TÜV).* The calculation of the reactor core composition is to be validated by independent experts *(TÜV)* performing independent calculations and reviewing the start-up testing programme.

Individual working plans expected to consume more than 50 mSv collective dose are to be described in detail and are checked for ALARA provisions.

The plant start-up usually requires approval by the regulatory body after the formal notification, that all required testings have been completed successfully.

4.14 HUNGARY

NSI performs its activity by written procedures in all phases of the refuelling outage.

1. Regulatory approval for the maintenance during shut-down.

NSI reviews the maintenance plan before 30 days of the shut-down by the following topics:

- all planned modification are approved by *NSI*
- the actual scheduled periodical tests are complete
- the valid NSI requirements are fulfilled for the outage
- Finally the maintenance plan shall be approved by NSI.

2. Inspections on shut-down activity

NSI takes part in all important safety related testing and investigations. Occasionally *NSI* inspect other maintenance activities 2-5 times per outage (which are selected preliminary at the approval for the shut-down maintenance). *NSI* performs detailed audits for some selected works including the organisation of the licensee and its subcontractors. *NSI* examines the anomalies, failures that are explored in the outage period.

3. Acceptance of the final report on the outage maintenance

The NPP submits the final report about the outage activity and the related important occurrences. The acceptance of the final report based on the evaluation of the works completeness and on the consequences of the works that have not taken place.

4.15 INDIA

The nuclear power plants plan the annual and other long outages in advance. These plans include activities such as refuelling, maintenance, in-service inspections and testing and implementation of modifications.

The modification to safety related systems and major repairs require review and clearance from Safety Review Committee for Operating Plants *(SARCOP)* a Committee appointed by *AERB*. *DRI&E* oversees the shutdown activities either during its periodic regulatory inspections or by conducting special inspections and audits. These inspections specially cover the aspects of in-service inspections and testing during the outage.

4.16 ITALY

The Licensee is required to prepare the shutdown programme in advance and to produce a final report of the finding at the end of the shutdown activities. Plant modifications for safety related systems must be submitted to *ANPA* for approval.

During shutdown periods the inspection work is increased: the inspectors dedicated to the plant perform inspections of important systems or plant modifications, in particular all components and equipment kept in service or stored on-site must be checked by systematic inspection (specified according to risk and the available knowledge of their behaviour with time).

The Regulatory Authority inspection programme will be set-up in advance; the general objectives of the programmes are:

- To check the physical condition of the engineered barriers.
- To monitor the state of conservation of other systems and structures in the facility.
- To record any relevant changes in behaviour of material remaining within the facility.

4.17 JAPAN

During shutdowns, *STA* or *MITI* performs periodical inspections of important machinery and equipment in every plant on approximately seventy items. Overall inspections and function tests are usually conducted for facilities necessary for operation as well as important machinery and equipment for safety systems. In the case of commercial nuclear power plants, *JAPEIC* witnesses in-service inspections and a portion of overhaul inspections and function tests. *MITI* also confirms the inspection records which are reported by *JAPEIC*.

4.18 KAZAKSTAN

The operation organisation has to inform *KAEA* about the shutdown programme in advance of the outage. The shutdown programme includes maintenance and modification work, in-service inspection, and testing and surveillance activities. Plant modifications for safety related systems and components must be submitted to *KAEA* for approval before implementation.

4.19 REPUBLIC OF KOREA

During the shutdown period of a NPP, the *KINS* carries out the Periodical Inspection. The Pressure and radioactivity retaining systems which isolate the fission products, and safety related systems which prevent or *miti*gate accidents should be inspected during the periodical inspection.

Those systems are as follows:

- Reactor (including fuel)
- Reactor Coolant System
- Instrumentation and Control System
- Fuel Handling and Storage System
- Radioactive Waste Management System
- Radiation Protection System

- Containment System
- Reactor Safety System
- Emergency Power Supply System
- Other Reactor Safety Related Systems.

After the periodical inspection is completed, the *KINS* submits the inspection report to the *MOST*. The *MOST* reviews the inspection results and issues a license for power operation of the related NPP.

4.20 MEXICO

During shutdown the resident inspector in charge of each nuclear power plant unit receives support from headquarters office, due to increase in normal inspection activities in areas in which he is not specialised, such as: In-service Inspection, ALARA Programme, Valve and containment leak tests and plant modifications. Also, as part of the normal duties during reload or shutdown, the resident inspector is supported (at his request) with additional personnel (with similar qualifications and experience) in order to provide more efficient coverage for areas such as: system availability to fulfil Limits and Conditions of the Technical Specifications and surveillance requirements.

4.21 THE NETHERLANDS

Minor and major modifications and modification and projects in the framework of backfitting activities and periodic re-evaluations are assessed by the specialists of the KFD staff. Every three months a meeting on managerial level with the NPP's is held to discuss the progress of projects and other important items.

All planned maintenance and modifications are submitted for approval at least three months before the refuelling shutdown. Inspection activities during shutdown are increased and focused on the aspect such as redundancy planning, radiation protection, in-service inspection and surveillance activities and specific modifications.

At the end of the shutdown period a dedicated inspection is performed to make sure that the plant has carried out all the necessary modifications, inspections and tests before the start of a new operational cycle.

4.22 PAKISTAN

KANUPP the currently operating power plant is a PHWR type in which on power fuelling is done, therefore no shutdown is required for refuelling. However, shutdown is planned for routine maintenance. For the under construction plant (CHASNUPP) which is a PWR type, it is envisaged that shutdown for refuelling will be notified to the regulatory body.

4.23 RUSSIA

Shutdown activities include inspection programmes, modification control and authorising of reactor start-up. After major modernisation, physical start up authorises the central office of Gosatomnadzor on results of inspection.

4.24 SLOVAK REPUBLIC

Special and team inspections are carried out during shutdown periods (specially during refuelling and reconstruction), besides routine inspections performed by resident inspectors.

Shutdown activities include:

- confinement opening and tests
- safety valve(s) tests
- surveillance tests (safety systems, reactor protection)
- start-up programmes
- housekeeping
- shutdown programme (maintenance)
- design modifications
- fulfilment of conditions for start-up after outage
- in-service inspection results
- training of personnel

For more efficient regulatory control, a temporary license is issued for Bohunice V-1 plant for a one-year period, for Bohunice V-2 plant for a four-year period.

4.25 SLOVENIA

During refuelling or longer outages the frequency of planned inspections is increased to 3 (sometimes 4) a week. The inspection for this purpose is re-inforced with the staff of authorised organisations *(TSO).* There are 5 authorised organisations which are assigned to work mainly during the outage. The authorised organisations survey maintenance activities on the safety equipment, major non-safety equipment, electrical equipment, instrumentation and control, and witness functional testing, surveillance testing and NDT. The representatives of each authorised organisation are requested to present written reports about their findings and to explain the findings in regular weekly meetings with the nuclear safety inspectors. Forty-five days from the end of the outage the full written report about the outage, compiled from all 5 authorised organisations and with the suggestions and recommendations should be submitted to *SNSA*. This report is used as the basis for “post-outage inspections”, in which the nuclear safety inspectors, representatives of the authorised organisations

and the plant staff take part. The suggestions and the recommendations are discussed with the plant staff to clarify these suggestions and recommendations and to find the best way to implement them.

There must be enough evidence that he authorised organisations are capable to perform their work as it is expected and requested. Therefore, the audits of authorised organisations, which are led by *SNSA* staff, are taking place bi-annually.

4.26 SOUTH AFRICA

The licensee has to inform the *CNS* in advance of the intention to shutdown and of any modifications to be carried out during shutdown, scope of work and unloading and reloading of fuel details. Written permission is required from the *CNS* before any of the above can be commenced. During shutdowns the *CNS* inspectors, comprising of residential inspectors supplemented by *CNS* specialists from Head Office monitor ALARA, radiation protection activities, in-service inspections, fuel handling activities, containment integrity, Operating Technical Specification (OTS) compliance, modifications implementation, contractor control, systems line up and subsequently criticality and low power tests, etc.

4.27 SPAIN

At shutdown periods (specifically during refuelling) inspection work is increased. Resident Inspectors review and follow the shutdown programmes in order to verify:

- System availability fulfils the Operability Limiting conditions established in the Technical Specifications.
- Surveillance requirements established for the reload period in the Technical Specifications are performed.
- Plant Modifications important for safety are implemented and tested.
- Plant configuration is maintained.
- ALARA provisions are respected.

Specialists in different areas inspect the following:

- ALARA programme
- In-service Inspection Programme
- Fuel Cycle Safety Analysis
- Nuclear Tests
- Containment Leak Tests
- Specific Modifications
- Surveillance Tests

4.28 SWEDEN

The licensee has to inform *SKI* about the shutdown programme in advance of the outage. Plant modifications for safety related systems and components must be submitted to *SKI* for approval before implementation. The programme includes maintenance and modification work as well as testing, examination and in-service inspection activities.

Inspection activities may include the planning process prior to the outage and the implementation of plans during the outage, management involvement, control of safety system line-up and outage scheduling. Inspections are also carried out to ensure that the requirements of the Technical Specifications for shutdown are fulfilled.

4.29 SWITZERLAND

Refuelling shutdown activities require an inspection programme of their own. In shutdown periods inspection frequency is increased. It comprises core configuration, in-service inspection programme, plant modifications, ALARA provisions, maintenance activities, functional tests according to the Technical Specifications, etc. The inspections are carried out by site inspectors, inspection teams, and field specialists.

At other shutdowns, e.g., for repairs or caused by events, inspections are also necessary on the specific event and for start-up.

4.30 UKRAINE

The reactor core refuelling procedure, performed by NPP operation organisation (licensee) must be accomplished according to the following requirements of *MSI*:

- before the core refuelling the operation organisation (licensee) submits to *MSI* the core calculations as to the loading contemplated;

- *MSI* checks the compliance of submitted calculations, as well as neutron and physical characteristics of the intended core loading with the normative and technical documentation requirements;

- after core refuelling the Main State Inspectorate checks the compliance of actual core loading with the calculated one. In case of compliance the *MSI* doesn't restrict the start-up of the unit;

- after the start-up of physical measurements carrying out the results of such measurements has to be submitted to the Main State Inspectorate. If the computed values are confirmed and there are no deviations from design parameters and parameters specified by Regulations, the *MSI* doesn't set a limit to the energy level of power of a unit.

4.31 UNITED KINGDOM

The licensee prepares a programme of work, including maintenance and modifications, for each major shutdown which takes place every 2 or 3 years on gas cooled reactors and which is reviewed by *NII*. During the shutdown, the site Inspector and *NII* assessors will witness some activities and may inspect parts of the plant which are not normally accessible during operation. Inspections are also carried out to ensure that the work is done in a safe manner. The licensee is required to produce a report on the findings of the shutdown activities and to make the case for start-up. This report is assessed by the site Inspector and *NII* assessors and, when found satisfactory, *NII* consents to restart the reactor for a further specified period of time.

4.32 UNITED STATES

Resident inspection and regional specialists conduct inspections during each outage. These inspections are connected to the particular activities of the outage.

Two special *NRC* inspections were developed to assess licensee performance during a scheduled major plant outage; the Safety Systems Outage Modification Inspection, and the Shutdown Risk and Outage Management Inspection. Safety Systems Outage Modification Inspections are team inspections which review design, installation, and testing related to plant modifications. The design portion is usually conducted before the outage, while the installation and testing portions coincide with periods during the outage when activities to be inspected are being performed. The modification inspections have been conducted at only a small number of plants, because of the large inspection resource commitment.

Shutdown Risk and Outage Management Inspections are team inspections focusing on activities for ensuring availability of electric power supplies, decay heat removal systems, reactor coolant inventory control, and containment control. They review planning preceding the outage and implementation of plans during the outage. Among the activities reviewed are management involvement, control of plant configuration, scheduling, procedures, training, and communication. Included in the review of plant configuration control are: the control of system boundaries for portions of systems isolated for maintenance; and the return of those systems / equipment to operable status. Five inspections of this type have been conducted to date. Further shutdown risk inspections have been delayed pending issuance of a regulation to specifically address the minimisation of risk during plant shutdown.

CHAPTER 5 - ABNORMAL OCCURRENCE

This chapter provides a brief description of the requirements for reporting abnormal occurrences within the plant, the response by the inspection programme and the follow-up actions taken.

5.1 ARGENTINA

The *ARN* pays close attention to relevant events occurring at domestic plants —which must be reported in accordance with the license—, as well as to those occurring at foreign plants, whose details are obtained through various information channels, such as the IAEA's IRS and regulators meetings. Every relevant event occurred in a domestic plant is submitted to an independent in-depth analysis, in which both the deterministic and the probabilistic methods are applied, so as to minimise recurrence. In the case of events occurred in foreign plants, an in-depth analysis is carried out to determine whether a similar event could be expected to occur in a local plant. The process of abnormal occurrence (at domestic and outside plants) includes:

- Detection, characterisation and communication
- Classification and feeding the reports into the databases.
- Selection of events for their analysis
- Analysis of direct and root causes
- Assessment of corrective actions
- Review, search for consensus and approval
- Implementation and follow-up of corrective actions
- Diffusion of the experience gained

Once a relevant event has occurred, the authority present at the installation (Manager or Shift Supervisor) shall quickly send a very brief and summarised "Immediate Communication" to the Regulatory Authority, describing the characteristics of the event. The communication shall be sent by fax or by electronic mail at the *ARN*, which must be available at the installation's control room. When out of the regular working hours, it is recommended that the resident inspector be reported by telephone or radio message. In case of accidents involving overexposure, a significant dispersion of radioactive material or a significant failure in safety-related systems, within 24 hours, a more detailed report shall be sent to the Regulatory Authority. Once the event has come to an end and the situation is back to normal, the causes that originated the event shall be investigated and a detailed report shall be prepared. In case of a relevant event, the Regulatory Authority shall appoint a technical committee that must perform an independent review of the event.

Precursors are operational events or plant conditions constituting an important part of a postulated core-damaging accident sequence. Their analysis provides a systematic evaluation of events and a probabilistic estimate of how close was the plant to core damage and of plant vulnerabilities.

5.2 ARMENIA

In accordance with the *ANRA*'s regulations the abnormal events have to be reported to the *ANRA* office within 24 hours and final reports addressed to the *ANRA* within 39 days.

5.3 AUSTRALIA

The Australian Nuclear Science and Technology Organisation's *(ANSTO*) reactor operating division is required to provide the Nuclear Safety Bureau (*NSB*) every quarter with a summary of abnormal occurrences of a minor nature which do not significantly affect safety. Incidents with on-site impact or significant failures in safety provisions must be reported to the *NSB* within two days. For more serious incidents and accidents the *NSB* must be notified as soon as practicable.

Where warranted by the seriousness or nature of the abnormal occurrence, the *NSB* will conduct inspections on a case by case basis in relation to corrective actions taken by the operating organisation to prevent a recurrence.

5.4 BELARUS

In accordance with the National Radiation Safety Standards, abnormal events shall be reported to all relevant organisations as soon as possible.

5.5 BELGIUM

Operating Experience

- Operating experience from foreign countries is first analysed by Section *DRF* in *AVN*, which proposes actions to the Nuclear Inspection Support section (NIS).

- The Belgium operating feedback is treated by the inspection section, with technical-administrative support provided by the Nuclear Inspection Support section (NIS).

5.6 BRAZIL

The requirements for reporting abnormal occurrences within the plant are defined in a specific standard, CNEN-NE-1.14 "Nuclear Power Plant Operation Reports", January 1983, that regulates the process by which the Operator reports events to the Regulatory Authority. According to this regulation, events must be reported following the criteria below:

- hours notification - There are 9 kinds of events that must be notified to *CNEN* immediately, by phone, by radio or fax, and the reports should be sent within 1 4 days;

- days notification - There are 4 kinds of events that must be reported to *CNEN* within 30 days;

- as soon as possible notification: - There are 7 kinds of events that must be notified to *CNEN,* as soon as possible, by phone, radio or fax, and the required time to send the reports will be determined case by case by *CNEN.*

The report on abnormal occurrences shall include, at least, a narrative description, a safety assessment with the determination of the main cause of the event as well as the corrective actions and lessons learned. The rate of the event as well as the corrective actions and lessons learned. The rate of the event in the International Nuclear Event Scale - INES - is used to determine its safety significance. The Incident Report System - IRS is disseminated by *CNEN* to the licensee that also has agreements with International Operator Organisations for the exchange of operational experience.

CNEN also analyses some events that are considered relevant to safety, in order to verify if the Operator event analysis was well conducted, with the aid of a written procedure for the investigation of the event. This activity is done case by case and depends upon the evaluation and analysis of the event report done by the Reactors Co-ordination staff at *CNEN's* headquarters and the corrective actions are followed by the resident inspectors.

A planned audit is conducted, at least every two years, on Event Analysis and Operation Safety Experience Programme of the licensee and if the corrective measures required have not been implemented, unplanned reactive inspections are conducted.

5.7 BULGARIA

In accordance with *AUAEPP* Ordinance N2 the abnormal events related to nuclear safety have to be reported to the *AUAEPP* office within 24 hours. Final written report has to be sent to the *AUAEPP* within 30 days.

5.8 CANADA

As a condition of its operating license, each licensee must report abnormal events to the *AECB* within specified time limits. The reports are made usually to a resident inspector, who reviews the reports against reportability requirements, checks for completeness and accuracy, carries out a preliminary analysis, and checks for trends and corrective actions taken for any previous or similar occurrence. The inspector also decides if the follow-up actions identified are adequate and treated with appropriate priority, and if other organisations or utilities require notification. There is also consideration of specific actions that *AECB* staff may take in response to the event, including inspections.

The resident inspectors also forward copies of the reports to an Event Analysis Group *(EAG)* at headquarters. The objective of the *EAG* is to ensure a unified and consistent approach to the evaluation of events occurring at all NPPs in Canada, while determining or confirming the following:

- Licensee's compliance with reporting requirements stipulated in the operating license and with all applicable regulatory requirements;

- Whether an event constitutes a violation of a license condition;

- The need for additional *AECB* actions;

- Trends and patterns of failures through systematic studies.

The Group also provides information to resident inspectors on precursor events occurring at other plants, to management, to various *AECB* staff groups/divisions and to the Incident Reporting System (IRS) of the IAEA and OECD. This information is on a data base that is available to *AECB* inspection teams.

5.9 CHINA

Significant abnormal occurrences within the plant have to be reported to the *NNSA*, according to the reporting requirements in the nuclear safety regulations. The *NNSA* evaluates the occurrence and requires the operating organisation to carry out activities if necessary.

Safety-related events are recorded at the plant site, and made available to the inspectors. Evaluations of events from nuclear installations in other countries are also carried out by *NNSA* and made available to the *NNSA* and operating organisations.

5.10 CZECH REPUBLIC

The legal basis for event reporting system in the Czech Republic is the Act 28/1984 and special instructions of *SÚJB*. They lay down the duties of the responsible organisation to inform without delay the inspector of nuclear safety concerned and *SÚJB* of important facts, especially of extraordinary events affecting nuclear safety of the nuclear facility and deviations from the approved limits and conditions (Technical Specifications).

Criteria for events reporting to the Regulatory Authority are quite comprehensive and basically are in compliance with the IAEA recommendations. Nuclear power plant reports must be prepared and transmitted in accordance with the Technical Specifications, adopted by the Regulatory Authority.

A. Within 72 hours from the moment of occurrence detection:

- Non-planned decrease of unit power without emergency protection actuation.

- Presence of foreign objects in primary circuit.

- Radiation set-up which exceeds the intervention levels determined by the Regional radiation protection inspector.

- Occurrence of nuclear related dangerous situations in shutdown reactor during handling of the fuel.

- Loss of normal and emergency lighting in the reactor hall for longer than 10 minutes.

- Non-tightness of the primary circuit's main components.

- Automatic actions of ESFAS and stepwise start-up automatics.

- Non-planned actuation of steam generator safety (relief) valve and that of pressuriser.

B. Within 24 hours from the detection of an occurrence:

- Any fires within the NPP fenced area.

C. Immediately (not later than within 8 hours from the moment of occurrence detection)

- Activation of reactor protection system.
- Pressure loss of primary coolant (>=2t/h, or radioactivity according to limiting condition) from selected systems.
- Violations of limits and conditions for normal operation.
- Loss of natural circulation and impossibility of its restoration within 1 hour.
- All occurrences evaluated by a shift personnel as of level 2 and higher on the INES scale.

5.11 FINLAND

STUK follows the operation of nuclear power plants through constant reporting which includes daily, monthly or quarterly, and annual reports. The safety level of a plant is re-evaluated after any abnormal event. To ensure systematic analysis of an event and its causes, an investigation team, may be nominated by *STUK*. This team considers root causes of equipment failures and human errors, weaknesses in performance of operating organisation, etc., and presents a report including recommendations for corrective actions, to prevent reoccurrence of similar events.

A thorough evaluation of the situation at the Finnish plants is also done if an event reported from a foreign plant is suspected to be of such nature that it might as well occur at a Finnish plant. Additionally, safety re-assessment is done on the basis of PSA studies and in view of new information gained from safety research programmes.

5.12 FRANCE

There are two levels of events :

- safety related events which are recorded at the plant site, and made available to the inspectors ;
- significant incidents reported to the *DSIN*, according to the International Nuclear Event Scale. They give rise to immediate notification by telex and an to incident report within the next two months.

Feedback is the operator's responsibility. This feedback process is assessed by the regulator, who also checks that no technical point has been forgotten.

Subsequent to certain significant incidents, *DSIN* orders, if necessary, an inspection of the plant concerned, and, in some cases, associated enforcement actions.

5.13 GERMANY

Abnormal events have to be reported to the supervisory authority of the Länder, according to the reporting criteria laid down in the Nuclear Safety Officer and Reporting Ordinance. The criteria, are categorised in S (immediately), E (within 24 hours), N (within 5 working days) events. These categories refer to possible administrative actions to be taken by the authority. The INES scale is used to refer to the safety significance of such events.

The supervisory authority evaluates the events, in general by involving the *TÜVs* or other independent expert organisations, to ask for corrective actions, if necessary. All reported events from all nuclear installations in the Federal Republic of Germany are documented and evaluated by the Incident Reporting Office at the Federal Office for Radiation Protection *(BfS)*. Summary reports of abnormal events are forwarded to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety *(BMU)* and to the Federal Parliament.

A systematic in-depth screening of all events is performed by the Gesellschaft fur Anlagen-und Reaktorsicherheit *(GRS).* Events identified by this process to be of a significant relevance to other nuclear installations are investigated in-depth. *GRS* provides these evaluations to all licensing and supervisory authorities of the Länder, to the *TÜV's* and to the operators of nuclear installations. In return, the supervisory bodies of the Länder require the operators to check this information for relevance and necessary corrective actions in order to avoid similar events.

Evaluations of events from nuclear installations in other countries are also carried out by *GRS* and made available to the supervisory authorities and the utilities in Germany.

5.14 HUNGARY

Abnormal occurrences have to be reported to *NSI* according to the reporting criteria, based on the Ministerial Decree 5/1979.(III.31.) and IAEA Safety Series No. 93. The licensees are required to report:

- immediate notification (by phone)
- notification, preliminary report within 24 hours (by FAX max. 1 page)
- evaluation report within 10 days
- quarterly status report and brief assessment of correction actions,
- summarised notification of not safety significant occurrences - quarterly

In the framework of the Authority's control activities, it is obliged to investigate nuclear operation breakdowns and nuclear accidents. As a result of the inspection, it defines the reasons for the occurrence of operational breakdown and accident, reveals irregularities and takes measures in order to prevent similar events. In the framework of its control activities, the *NSI* is obliged to evaluate the reports it receives. If this is justified by the results of the assessments, it is obliged to conduct the necessary inspections, to reveal the irregularities and to take measures in order to eliminate and prevent the same. In the course of nuclear operational breakdown and nuclear accidents, the *NSI* may take over - against a receipt - the things serving as exhibits, without violating the process of special authorities enticed to take measures, or may have the operator store the same in a separated way, and furthermore may take the necessary measures in order to protect life, health and property.

5.15 INDIA

The Technical Specification for operation of Nuclear Power Plants lays down the reporting requirements of Safety Related Unusual Occurrences (SRUORs). It also specifies the format, the reporting criteria and the prescribed time limits within which the event should be reported to Atomic Energy Regulatory Board, and its Safety Committees. Safety significant events of higher order as defined in the Technical Specifications are required to be reported within 24 hours of occurrence by telex/fax/telephone/telegram followed by a detailed report in the prescribed format within 20 days of occurrence. The events of lower safety significance are required to be reported within 20 days of occurrence.

These reports are processed in Operating Plants Safety Division *(OPSD)* of Atomic Energy Regulatory Board (*AERB*) for completeness of information, safety significance, generic issues, precursors, recurrence of events, adequacy of investigations, root cause analysis and corrective remedial measures and need for follow up actions. The events requiring detailed review and enforcement actions are forwarded to the relevant Safety Committee for discussions. For the events requiring on-site investigations, an inspection team from the Directorate of Regulatory Inspection and Enforcement (*DRI&E*) of *AERB* is debutied.

A periodic compilation of summaries of safety significant events in all NPPs is also prepared for trend and pattern analysis and for operational feedback to different NPP management.

These *SRUORs* are also processed in OPSD, *AERB* for reporting to IAEA for its Incident Reporting System and the International Nuclear Event Scale.

5.16 ITALY

In accordance with the Management Specifications imposed by the plant operating prescriptions, the licensee of a nuclear installation is required to report all safety relevant events to *ANPA*. The Technical Guide n. 11, which is issued by the Regulatory Authority, gives the criteria for supplying periodic and extraordinary information on events, in particular, abnormal occurrences relating to operation. Every event is classified on the IAEA-INES scale.

ANPA must be notified of the event as rapidly as possible (and in any case no later than 24 hours after the event), by telephone. Confirmation must be sent by telegram or telex, not later than one working day after the event. A written report must follow within 4 weeks. Human factor aspects are one of the items to be addressed in the report. The report is also required to address whether the event was due to a cognitive or procedural error.

Every 6 months, an Operating Report must be forwarded by the licensee to the Regulatory Authority, giving an analytical and reasoned assessment of the operation and maintenance of the nuclear power plant with suitable references to and comparisons with the contents of the Final Safety Report. This report must constitute a documented assessment of the plant operation and maintenance.

Once a notification about an abnormal event has been received, the Regulatory Authority investigates the event and evaluates the need and sufficiency of the corrective actions taken or proposed by the licensee. As a preliminary activity, off-programme inspections are normally performed by the

Regulatory inspectors to gather supplementary information and, if necessary, to impose specific plant requirements. After clarification of the event scenario, a technical report will be prepared by the Regulatory Authority in order to disseminate information concerning operating experiences.

In order to collect, screen and store operational data more effectively, the information is maintained in a computerised data base. Moreover, events reported from a foreign plant are also evaluated if they considered significant for Italian plants.

5.17 JAPAN

Licensees have an obligation to report abnormal phenomena that has been found in machinery and equipment during operation or shutdown to *STA* or *MITI* according to the laws and *MITI* notifications. In the case of commercial nuclear power plants, the Technical Advisory Committee in *MITI* which is composed of experts, examine important matters among abnormal phenomena reported and evaluates the safety and soundness of machinery and equipment.

5.18 KAZAKSTAN

Abnormal events are evaluated according to the *KAEA* regulations within the nuclear installations. Abnormal events have to be reported to the *KAEA* over the telephone (in any case, no later than 1 hour after the event), by fax messages (within the next 24 hours), and special report forms addressed to the *KAEA* within 10 to 25 days.

Criteria for event reporting are in compliance with the IAEA recommendations.

Every abnormal event is classified on the IAEA - INES scale. Since 1995, Kazakstan has participated in the IAEA - INES information system.

5.19 REPUBLIC OF KOREA

National regulations require licensees to immediately notify the regulatory body, the *MOST* of abnormal occurrences as specified in the Notice of Minister, Notice 96-25. This Ministerial Notice was enacted in December 1992 and effected on 1 March 1993. The Notice provides in detail the scope of reports and administrative procedures, the evaluation criteria for event rating of the accident and incidents in the nuclear power plant. The event shall be communicated immediately by telephone to the regulatory organisation or to the resident inspectors on-site with a written follow-up report by the next working day. The detailed report shall be submitted to *MOST* within 30 days of the event occurrence. The accident and incident reports including event scale will be submitted to the international organisation, IAEA - INES and IAEA - IRS for level 2 or above, or for international interest requiring a press release as stipulated in Notice 96-25.

In the case of commercial nuclear power plants the technical evaluation committee has been run by the *KINS* and is composed of 15 experts (including 8 experts outside of *KINS*). This committee examines and evaluates the causes, corrective actions and event scales of abnormal occurrences based on licensees reports and site investigations by *KINS* experts

5.20 MEXICO

In case of the occurrence of any abnormal event at any nuclear installation, the licensee is required to notify the regulatory body, depending on the severity of the event, immediately, within four hours or during the day of occurrence. After this notification (telephone or telefax), which must contain all relevant information to enable independent evaluation of the severity, the licensee is also required to fulfil the format to qualify the event on the international event scale. Following preliminary analysis, the licensee is required to transmit, within 30 days, a written report in which the root cause of the event must be clearly identified. If the event is considered relevant, *CNSNS* could organise a special investigation team.

5.21 THE NETHERLANDS

In accordance with the Technical Specifications the licensees are required to report abnormal occurrences. Significant events have to be reported immediately, within 8 hours. Depending on the safety relevance, an inspection is carried out. Events are evaluated within the nuclear utility and by the authorities. If necessary, corrective actions are taken.

All nuclear facilities have received a procedure on how to contact the *KFD* in case of an abnormal occurrence. The procedure indicates the sort of information that has to be reported immediately and later on by writing.

5.22 PAKISTAN

Any significant abnormal occurrences within the plant have to be reported to the *DNSRP* within twenty four hours. A detail report should be submitted later, but not later than one month after the incident. The abnormal occurrences are also routinely reported to IAEA-INES and IRS.

5.23 RUSSIA

Events are evaluated according to the Gosatomnadzor's regulations within the nuclear utility. The resident inspector draws his own conclusions from the results of the evaluation. Abnormal events have to be reported to the Central office of the Gosatomnadzor over the phone (within the following hour); by telex messages to the central office (within the next 24 hours); and through a final report addressed to the Regional bodies within 30 days.

Criteria for event reporting are in compliance with the IAEA recommendations (IAEA Safety Guide No. 93). Conclusions of abnormal events are included in the annual report.

Feedback is the operator's responsibility. The Regulatory Authority accesses quality of investigations, implementing of corrective measures and results of root cause analyses.

5.24 SLOVAK REPUBLIC

In accordance with the Technical Specifications, approved by *ÚJD SR*, the licensees are required to report abnormal occurrences. Reporting criteria comprises of three (3) parts:

- immediate notification (maximum - within 8 hours)
- report within 72 hours (preliminary report)
- report within 30 days (final report)

Criteria for reporting events to the *ÚJD SR* are quite comprehensive and basically are in compliance with the IAEA recommendations (IAEA Safety Guide No. 93).

The nuclear power plant is primarily responsible for events investigation and assessment, but investigation of some events is carried out by *ÚJD SR*. If necessary, corrective actions are taken by the plant or requested by the *ÚJD SR*.

Finally, *ÚJD SR* carries out assessment of all events in Slovak NPPs and events included in the Incident Reporting System (IRS). *ÚJD SR* is also responsible for dissemination and exchange of information.

Corrective measures which have an influence on the safety of the plant. The complete documentation has to be submitted to *ÚJD SR*, including design description, safety analysis and quality assurance programme. The evaluation of the effectiveness of the corrective measures is performed during and after their implementation and on a regular basis - annually.

5.25 SLOVENIA

In accordance with the regulations on reporting, NPP Technical Specifications and plant internal procedures on reporting, abnormal occurrences are reported to *SNSA*, depending on their severity. There are 3 categories of reported occurrences which require:

- immediate notification by telephone followed by fax within 24 hours and written report within 14 days,
- report within 30 days, and
- special report (deviations, tests, etc.).

Once a notification has been received, *SNSA* starts an investigation of the occurrence. It consists of an inspection and of evaluation of the information. Corrective actions taken by the plant are closely followed. Based on the first hour information *SNSA* prepares an INES report. At the end of each year a complete review of all occurrences of the year is performed in order to decide which will be reported to the IAEA - IRS.

5.26 SOUTH AFRICA

The *CNS* has requirements set down in the operating licence to cover the reporting and evaluation of occurrences. These define reportable events, time constraints for reporting, details of individuals and channels of communication. Occurrence and event reporting response is maintained by a 24 hour call out facility through the *CNS* site staff and is integrated into a *CNS* Head Office system for emergency response if necessary.

All occurrences/abnormal events are assessed for their degree of severity by the *CNS* and responses are actioned accordingly. The *CNS* also monitors the rating of events via the IAEA INES System. Events are tracked, trended and fed back into the inspection programme as relevant.

5.27 SPAIN

The *CSN* Safety Guide No 1.6 defines the reportable events, fixes the periods of time to inform *CSN*, and establishes the minimum content of the reports. The functions of *CSN* in event follow-up are as follows:

With the preliminary data collected, an Information Note is issued for *CSN* and public information. The information is sent to the technical staff for evaluation and a special inspection is conveyed if the case requires. The event is classified on the IAEA-INES scale. The distributed Information Note is transmitted to the Administrative Authorities, if the event is classified >1, on the INES scale, and sent for public information through teletex network. The event, root causes, and corrective actions are evaluated, with different degrees of depthness, depending upon the importance of the event. Event investigation techniques (i.e., MORT) are utilised if required. If the event is considered a generic issue, a letter is transmitted to other plants.

Events that have led to special inspections include:

- Repetitive events.
- Events with direct or root cause uncertain.
- Events classified > level 1 (INES scale).

A computerised data bank (DACNE) is maintained on behalf of all nuclear power plants. Two sub-banks exist; one for component failure data and the other with event data.

5.28 SWEDEN

Reporting requirements are specified in the technical specifications. These include daily, monthly and annual reports. If an abnormal event occurs the *SKI*s “decision -maker on duty”, must immediately be notified (in one hour).

Examples of an abnormal event are:

- Safety limit has been exceeded.
- Degradation of a barrier for confinement of radioactive material.
- Major release to the environment.
- Unexpected major change of reactivity in the reactor.

The response by *SKI* can be to call out the emergency staff or to send an investigating team to the site. Before plant start-up following an abnormal occurrence a safety assessment must be performed and permission to re-start must be approved by *SKI*.

5.29 SWITZERLAND

Events have to be reported according to a guideline. The guideline includes the criteria for notifying, reporting, categorising and investigating all events with safety significance.

Event investigation is carried out by both the utilities and the regulators. Event investigation and follow-up actions are connected with inspections as suitable. Moreover, events in plants of other countries are also evaluated if they are significant for Swiss plants.

5.30 UKRAINE

The events occurring during NPP operation are evaluated according to Regulations, Codes and Standards in the area of nuclear and radiation safety.

The investigation of deviations during NPP operation is performed in accordance with the above documents.

In case of abnormal conditions (violation) during NPP operation, the operation organisation has to create the committee of violation investigation and to provide MSI with the information meeting the actual requirements.

The MSI reviews the submitted information, determines the severity level adequacy and considers whether the actions taken are sufficient to avoid the recurrence of such events during NPP operation.

5.31 UNITED KINGDOM

The licensee is required to make arrangements for notification, recording, investigation and reporting of abnormal occurrences on the site. Some occurrences are categorised as requiring immediate reporting to *NII*. Any such report is channelled within *NII* to a senior inspector who will make a judgement on the nature of the initial response. The response might be one of the following:

- to initiate *NII*'s emergency arrangements;
- to send inspectors to site to determine the causes of the occurrence and whether enforcement action is required;
- to leave *NII* follow-up action to the next routine visit to site by the site Inspector.
- to carry out a team inspection into the occurrence.

The licensee is also expected to review all occurrences at his own and similar plants with a view to preventing future occurrences and the site Inspector also inspects this function.

5.32 UNITED STATES

Federal Regulations require licensees to immediately notify the *NRC* of operational events. These and other operational experiences are evaluated by the *NRC* to identify the more significant events for consideration. The *NRC* maintains a 24-hour operations centre to receive the most significant information by telephone and requires written Licensee Event Reports within 30 days for less significant events.

The resident inspectors are the primary on-site evaluators of site events or incidents. It is expected that the greater part of event-related inspection effort will be performed by the resident inspectors, who may be supplemented by other inspectors, depending on the type of event. For significant operational events, either an Incident Investigation Team (IIT) or an Augmented Inspection Team (AIT) performs a review. The IIT is utilised for events of greater safety or safeguards significance. The IIT bases its activities on the principles of incident investigation, whereas the AIT combines fact finding and inspection practices. Follow-up actions are conducted for both IITs and AITs to ensure resolution of their findings, at the plant in question.

All operational events and conditions reported to the agency and those that are identified through the *NRC* inspection programme are screened for generic significance. An Information Notice may be issued within a few months to all affected licensees (approximately 100 are issued each year). For the most significant events or conditions identified, a Bulletin or Generic Letter may be issued, which requests actions or analysis to be performed and requires a response regarding current and planned actions.

On a sampling basis, the *NRC* inspects the adequacy of licensee evaluations and corrective actions with regard to the events at their own facilities and the information available to them from the agency and industry sources.

CHAPTER 6 - EMERGENCY RESPONSE

This chapter provides information on the role of the inspection agency during an emergency response situation. Included are the role of the inspectorate and other governmental departments or ministries, actions taken during an emergency response period and the follow-up activities after the emergency is ended.

6.1 ARGENTINA

As a part of their mandatory documentation, the Argentine nuclear power plants have their respective Emergency Plans for early intervention, within a territory with a 10 km radius, in case of nuclear accidents involving the release of radionuclides into the environment and affecting the neighbouring population. Such plans contemplate the application of measures aimed at preventing and mitigating tentative radiological consequences. The regulatory authority responsible for the areas around nuclear power plants is Civil Defence, an agency that —for this purpose— reports to the local municipal government. Through agreements, the local government transmits the required provisional authority to the NPP manager, so that the latter can apply the above mentioned measures for the protection of the population. There are two types of measures applied, as required by the nuclear Regulatory Authority. On one hand, those applied automatically, when there is evidence of a nuclear accident within the station, since the very beginning of the release into the environment, such as: sheltering, stable iodine pills and road control. On the other, the measures applied after evaluations confirmed by measurements, such as a later evacuation of the population, restrictions in food consumption and return to the affected areas. The Regulatory Authority evaluates the functional capacity for response to potential accident by analysing the results of emergency drills to be performed annually by the nuclear power plants. Also, a role to be carried out by the Regulatory Authority during the development of a nuclear accident is advising on this issue to Civil Defence and to other public agencies that may be summoned to participate and that must make decisions.

6.2 ARMENIA

In case of an emergency situation, the licensee is responsible for mitigating the on-site consequences of the incident. The Licensee is responsible for reporting the event to *ANRA*. The responsibilities for off-site emergency actions are within the Emergency Management Administration.

For cases of serious problems, the Prime Minister organises the State Emergency Commission. Technical advice and interventions are provided by the *ANRA*.

6.3 AUSTRALIA

The Nuclear Safety Bureau (*NSB*) does not have a formal role in the emergency response plan of the Australian Nuclear Science and Technology Organisation (ANSTO), but is notified of all safety-significant incidents and emergencies at the reactors. As part of its function to monitor and review safety at the reactors, the *NSB* monitors emergency response actions and reviews follow-up activities. Staff of the *NSB* are available to advise the operator on emergency response and follow-up actions, and, where considered necessary, the *NSB* may require actions be taken to ensure the safety of the operating staff, the public and the environment.

6.4 BELARUS

In case of an emergency, the licensee is responsible for mitigating the consequences of an incident. It shall report the incident to supervisory bodies and the Ministry for Emergencies. The responsibility for taking off-site emergency response measures lies with the Department for Emergency Situations of the Ministry for Emergencies, the Committee for Hydrometeorology and the Ministry of Health.

6.5 BELGIUM

Emergency inspectorate response includes:

- Verification that the utility takes all the necessary safety actions.
- Advisory role to the Authorities via the Evaluation Cell in the National Crises Centre.
- Five engineers are on duty via pagers and automatic recorder, for intervention on site (power plants and non-power plants), at the crises centre and in *AVN* headquarters organisation and from independent calculations.

6.6 BRAZIL

During a radiological emergency situation, *CNEN* takes part and provides advice to a federal system named *SIPRON* (System for the Protection of the Nuclear Programme), which is composed by organisms and entities of the public administration that have attributions in the fields of physical protection, safeguards, environmental protection, protection of the population on emergencies, health, information, etc.

A “Plan for Emergency Situations” has been elaborated by *CNEN* to tackle emergencies in nuclear power plants as well as in fuel cycle facilities. The response to radiological incidents in medical, industrial and research facilities is also part of the this Emergency Plan. The Institute of Radiological Protection and Dosimetry of *CNEN* is responsible for the environmental radiation monitoring and acts in a co-ordinated manner, within the National System *SIPRON*.

According to the Licensee’s Local Emergency Plan for reactors, there are four classes of Emergency action Levels that must be notified immediately to *CNEN*. Each class is associated with a set of initiating conditions:

- Unusual Events;
- Alert;
- Site Area Emergency;
- General Emergency.

CNEN’s main responsibility regarding emergency planning are to establish regulations and instructions related to the response to emergency situations and to provide specific advice in the

fields of nuclear safety, radiological protection, safeguards and physical protection. *CNEN* also analyses and approves "on site" emergency plans of nuclear facilities. "Off site" plans are implemented by the Civil Defence structure of the country.

The Research Institutes of CNEN perform environmental radiation monitoring, giving the necessary support for the implementation of the "off site" protective actions.

6.7 BULGARIA

In case of emergency situation, the licensee is responsible for mitigating the on site consequences of the incident. The licensee is responsible for reporting the event to *AUAEPP*. The responsibilities for off-site emergency situations are submitted in the National Emergency Plan, prepared by Permanent Commission on Protection of the Population in Case of Calamities and Accidents to the Council of Ministers of Republic of Bulgaria.

The role of the *AUAEPP* during an emergency is to monitor the response, evaluate the emergency response actions together with Ministry of Health, Ministry of Environment, Ministry of Energy and Energy Resources, provide technical advice when requested, provide regulatory approval when required and inform IAEA and closest countries according to ratified conventions.

6.8 CANADA

Within the context of the *AECB's* emergency response plan, the licensee is the on-site authority, responsible for the management and implementation of on-site emergency response in accordance with an approved emergency response plan. Off-site response falls under provincial jurisdiction. Although the *AECB* evaluates licensees' preparedness with respect to on-site capability, it also verifies the interface with off-site authorities

The role of the *AECB* during an emergency is to monitor the response, evaluate the emergency response actions, provide technical advice when requested, provide regulatory approval when required and inform the government and the public on its assessment of the situation, as a federal regulator. The *AECB* fulfils this role by acting at 4 different levels: on-site (or at the accident scene for transportation events), at the provincial operations centres, at the *AECB* headquarters, and at the federal government.

As soon as the on-site emergency is terminated the *AECB's* Emergency Director will determine the need for post-accident assessment and, if required, will direct one or a team of *AECB* staff to go to the location of the emergency to evaluate the impact of the accident and determine the cause. This team should also assess the performance of the *AECB's* emergency actions.

6.9 CHINA

The operating organisation is in charge of the on-site emergency response. The local government is in charge of the off-site emergency response under the leadership of the National Co-ordination Committee for Accident in NPP. The *NNSA* takes supervision of the on-site emergency response and supports off-site emergency response in the technical area during the emergency response period.

6.10 CZECH REPUBLIC

Emergency planning structure is divided into 2 levels - national and regional. On the national level, the Governmental Commission for Radiation Accident *(GCRA*) is established. It is responsible for all components of the preparedness for handling radiation accidents. In case a serious accident happens, *GCRA* co-ordinates all activities aiming at the mitigation of its consequences.

GCRA is supported by the Expert Advisory Group (EAG) and the *SÚJB* Emergency Response Centre *(ERC). EAG* is appointed to:

- Prepare an expert evaluation and recommendations concerning the emergency planning programmes, the model aiming at the prediction of exposure of the public and programmes of implementing countermeasures after a nuclear accident.

- Provide in case of accident proposals and recommendations to *GCRA* on application of protective measures and handling consequences under the specific conditions of the occurring event.

ERC performs function of the Contact Point, co-ordinates activities of Radiation Monitoring Network of the Czech Republic, ensures technical and expert support in the field of nuclear safety and radiation protection for *GCRA* and Regional Authorities as well.

Introducing regional off-site protective measures completely rests with the Regional Authorities and their advisory bodies - Regional Commissions for Radiation Accident *(RCRA).* They are responsible for planning and performing of all necessary steps for the protection of population and mitigation of consequences of the radiation accident in the Emergency Planning Zone of the NPP. Regional Authorities are supported by *SÚJB-ERC* and the NPP.

In case of radiation incident or accident it is the responsibility of the NPP to perform initial assessment of the event and its probable development. The NPP must notify immediately *SÚJB* and Regional Authorities, ensure warning of the population in the Emergency Planning Zone and contribute to the assessment and prediction of accident consequences. Simultaneously, NPP ensures monitoring and evaluates radiation situation in its vicinity by means of its laboratory and prepares recommendations of the protective measures for Regional Authorities in early phase for radiation accident.

6.11 FINLAND

In addition to the regulatory control of nuclear power plant operation, *STUK* maintains its preparedness to act in plant emergencies. In an emergency, *STUK* is the authority controlling accident management and an expert body providing assistance to the authorities in charge of the rescue services.

6.12 FRANCE

Two authorities are responsible for operations in an emergency situation : the Prefect (local representative of the government) on one hand, and the plant management on the other hand.

The relevant ministerial departments make the necessary arrangements to enable the Prefect to carry out his decision-making tasks, essentially by supplying him, as also does the operator for its part, with

information and recommendations, enabling him to assess the state of the installation, the scale of the incident or accident, and the possible developments.

In the case of an incident or an accident, *DSIN* implements the following management system :

- At the national level :
- An emergency centre at the Ministry of Industry headquarters, in Paris, headed by the director of *DSIN.*
- A “think-tank” headed by the technical safety director of *IPSN*, the technical associate of *DSIN*, operating at the nuclear research centre in Fontenay-aux-Roses near Paris.
- At the local level :
- A local team of inspectors from the corresponding *DRIRE* divided between the site of the nuclear installation and the corresponding prefecture. At the site, the primary task of the *DRIRE* representative is to ensure that the *DSIN* emergency team is kept properly informed.

The setting up and the effectiveness of such a management system depends on rapid mobilisation of the teams and multiple telecommunication resources; therefore:

- An emergency telephone station located at the *DSIN* emergency centre is to be initially triggered by the plant management of the nuclear installation, with the recording of his alert message on a telephone voice mail system ; then the station calls immediately and automatically all Biplus receivers (which the regulator staff and inspectors are to carry with them).
- The transmission of information to the *DSIN* emergency centre is channelled through eight separate communication networks.

Six exercises per year are carried out to test the emergency management system. They are based on a pre-defined scenario, kept secret.

6.13 GERMANY

During an incident at a nuclear facility, the licensee is responsible for mitigating the consequences of the incident. The emergency inspectorate response includes verification that the licensee takes all necessary safety actions. In cases that the environment is effected by the incident, emergency response teams at the local governments prepare the necessary actions to assess the implications and to protect the public. The responsibilities for off-site emergency actions are not within the nuclear regulatory bodies, although assessment and evaluation of the incident and the radiological situation and pertinent advice to these emergency response teams (crises centres) are given. The crises centres are also supported by a delegate of the licensee.

6.14 HUNGARY

Unlike authorities in developed countries, current regulations do not impose any role of the *NSI* in emergency response. In order to eliminate this, a concept has been developed for *NSIs* possible roles in cases of on-site emergency response. According to this definition, the *NSI* will perform independent analyses and evaluations in early stages of incidents, in the area of source term prediction and calculating further consequences of the incident considering measures already taken. In order to implement the necessary tools for this, the concept includes a plan for the establishment of an incident evaluation and advisory centre with activities in training inspectorate personnel as well as in receiving and processing abnormal event reports. International assistance has been expected for the establishment of the centre named *CERTA* (Center for Emergency Response, Training and Analysis). Phase I of this project is planned to finish by the end of 1996, and the project will be completed by the end of 1998.

6.15 INDIA

The nuclear emergency response plan lays down:

- The procedure for site and off-site emergency including intervention levels, protective measures, duties and responsibilities of various agencies and requirement of facilities and equipment for handling emergencies.
- Action plans for handling on-site emergencies.
- Action plans for handling off-site emergencies.

NPP management is the on-site authority responsible for management and implementation of the emergency response plan as approved by Atomic Energy Regulatory Board.

The management of off-site emergency response falls under the jurisdiction of the public authorities.

The Department of Atomic Energy has constituted a Crisis Management Group at the headquarters to co-ordinate and liaison with public authorities for establishment and implementation of off-site emergency response plans.

AERB ensures establishment of the on-site and off-site emergency response plans. *AERB*, through periodic regulatory inspections also ensures that facilities and equipments are adequately equipped and personnel trained as envisaged in the emergency action plan. It also ensures that periodic emergency exercises are carried out to assess the response of the various agencies and to rectify deficiencies.

6.16 ITALY

During an incident at a licensed facility, the licensee is responsible for mitigating the on-site consequences of the incident and promptly reporting the event to *ANPA* and the local government.

As a consequence, the Prefect of the province concerned (locale representative of the government), is the main body responsible for emergency plan implementation. The Prefect is supported by an Emergency Committee *(CE).* The *CE* is made up of all concerned local authorities such as; fire

brigade, health service, agriculture inspectorate, army, police, etc. A Committee for Radiometric Co-ordination *(RC)* is charged by the Prefect to co-ordinate, within a few hours after the accident, environmental radioactivity measurements and assessments.

Technical advice and interventions are provided by the Regulatory Authority ***(****ANPA****)***, both by its Emergency Co-ordination Centre *(ECC),* located in Rome, and by its Emergency Inspectorate, charged to reach the emergency area with suitable radiometric support, as soon as possible (within a few hours).

Therefore, *ANPA* participates in the emergency plan in order to provide technical advice, experienced personnel and laboratory facilities. An exercise is carried out each year to test out the emergency management system.

A national emergency plan for major and trans-boundary accidents is also provided.

6.17 JAPAN

When an accident has occurred, the licensee must report to *STA* or *MITI* and local governments promptly. *STA* or *MITI* hold urgent meetings to examine measures to counter the problems. When necessary, *STA* or *MITI* organises project teams to investigate causes and examine measures to counter them.

For serious problems affecting the environment, the Prime Minister organises a separate headquarters, headed by a Minister of State, to establish measures to counter these matters of serious concern.

6.18 KAZAKSTAN

In case of any accident, the utility is responsible for the mitigation of consequences. *KAEA* is the authority controlling accident management related to nuclear and radiation safety. An expert body provides assistance to the authorities in charge of the rescue services. When necessary, *KAEA* organises a special group to investigate causes and examine measures to counter them.

Dependent on accident consequences, 2 emergency plans exist:

- on-site emergency plan.
- off-site emergency plan.

There are 2 levels of emergency response for Kazakstan:

- State Level
  - State Committee on Emergency Situations is government body responsible for all emergency preparedness on territory of Kazakstan.
- Local Level
  - Territory Committee on Emergency Situations is executive body responsible for all activities covered by the off-site emergency plan.

- Emergency organisations of the NPP operator is covered by the on-site emergency plan.

6.19 REPUBLIC OF KOREA

During a radiological emergency response situation at a nuclear facility, the licensee is responsible for mitigating the consequences of the incident and for providing appropriate action recommendations to local governments, and for insuring that *KINS* and *MOST* (National emergency Co-ordinator) are immediately informed.

In case the environment is affected, responsibilities for off-site emergency actions are within the local authority. National response activities are co-ordinated with local and national authorities, and the licensee's response efforts.

KINS activates its Technical Advisory team at the Technical Emergency Operation Centre in Taejon Headquarters and *KINS* emergency personnel evaluate the plant situation, assess the implications, and forecast the radiological consequences. *KINS* recommends to local governments any additional actions needed to protect the public.

The *KINS* response includes verification that the licensee takes all necessary safety actions. The *KINS* monitors the incident in order to be ready to give advice to the licensee based on its assessment of the plant situation, so the Licensee can obtain needed expertise and equipment. *KINS* will also investigate the course of events and causes, assess and decide which further measures need to be taken. The *KINS* dispatches teams to the local and national governments to provide technical advice, and to the site for significant events. All *KINS* activities are co-ordinated from local and national government headquarters and the licensee emergency Operations Facility near the site. *KINS* emergency response teams and local governments provide technical advice to prepare the necessary actions to assess the implications and to protect the public.

As a follow-up action, *MOST*/*KINS* Inspection Teams may investigate significant operational events. Following the achievement of control over the emergency, *MOST*/*KINS* will then be involved in assessing proposals to return the nuclear facility to normality using its powers under the license conditions.

6.20 MEXICO

During the occurrence of any incident, the utility is responsible for the mitigation of consequences. There are 4 classes of incidents. If the severity of any incident (external or internal) is such that it is necessary to classify it in any of the 4 classes, the licensee is also required to notify the regulatory body immediately. If the event continues to increase in severity, then it is necessary to notify the ministry of interior, who is the governmental organisation responsible for co-ordinating all efforts to cope with an event which is trespassing the site. After notification and if it is considered pertinent, the regulatory body response emergency organisation (permanently on call), will reassemble at the Operations Emergency Facility Centre at *CNSNS* headquarters. This group can monitor the development of the event and has the capability to give recommendations to the governmental offices (ministry of interior).

6.21 THE NETHERLANDS

In case of an emergency situation (the emergency classification system of the IAEA has been adopted) the National Contingency Plan for Nuclear Accidents (NPK) which describes the emergency response organisation, becomes operative. Co-ordination of the off-site response is the responsibility of the Ministry of Housing, Physical Planning and the Environment *(VROM).* Personnel of the *KFD* participate in the several groups / teams of the national emergency organisation to provide technical information and advice. The Technical Information Group in this organisation have direct contact with the affected installation. In addition, inspectors on site verify that the licensee takes the necessary actions and have contact with the representative of the *KFD.*

6.22 PAKISTAN

The operating organisation is in charge of the on-site emergency response. Each site prepares its own emergency preparedness plan which is approved by *DNSRP*. Emergency drills are carried out regularly to determine the effectiveness of the programme, and are always generally witnessed by *DNSRP* personnel.

6.23 RUSSIA

In an emergency case, the Gosatomnadzor of Russia is the authority controlling accident management related to nuclear and radiation safety. An expert body provides assistance to the authorities in charge of the rescue services

6.24 SLOVAK REPUBLIC

There are two (2) levels of emergency response in the Slovak Republic:

National Level:

- The National Emergency Commission for Radiological Accidents. This is a governmental body responsible for emergency preparedness on territory of the Slovak Republic. Members of this commission are representatives of various ministries and organisations involved in the Slovak structure of emergency planning. The Chairman of the Nuclear Regulatory Authority is a member of this commission.

- The Emergency Response Centre of the Nuclear Regulatory Authority. The Centre provides technical support for the *ÚJD SR* Chairman. Its function during an emergency is to independently evaluate the technical state of the facility, the radiological situation in NPP surroundings and to provide advice and recommendations for the Emergency Commission through the *ÚJD SR* Chairman. Another objective is to check and supervise the correctness of operator activities.

Local Level:

- The Regional Emergency Commission for Radiological Accidents. It is established at a district office which is under the responsibility of the Ministry of Interior. This is an executive body responsible for all activities covered by the off-site emergency plan. During the emergency, in case of a severe accident, this commission closely co-operates with the National Emergency Commission and the NPP operator.

- Emergency arrangement of the NPP operator is covered by the on-site emergency plan.

6.25 SLOVENIA

The State Emergency Plan is operated by the Protection and Rescue Administration (Ministry of Defence) with the Civil Protection Headquarters. Within the *SNSA* there are 3 expert groups formed in case of emergency that are giving support to the Civil Protection Headquarters, which are:

- Expert group for the analysis of the nuclear accident,

- Expert group for the assessment of doses to the environment during nuclear accident, and

- Expert group for logistic support and public information.

In accordance with the *SNSA*'s Emergency Plan, one or two inspectors immediately after the emergency has been declared go to the NPP. They are equipped with protection and monitoring means. In the plant they are located in the Operations Support Centre. Their role is to collect information on the accident and periodically report to the *SNSA*.

6.26 SOUTH AFRICA

A formal *CNS* system is in place to cover the reporting of and response to any emergency at the KNPS. Regular exercises are held by the licensee and monitored by the *CNS*, in addition the *CNS* devises and implements an annual full scale emergency exercise to test all on-site and off-site capabilities. These exercises are usually witnessed by international experts and other invited persons.

The continued availability of systems, facilities and training to service the emergency plan are inspected and maintained through the *CNS* inspection programme.

6.27 SPAIN

There are three main partners in a Emergency, the Owner, the Civil government (Central Government Delegation in each Province) and the *CSN*. The Civil Governor is the Head of the Exterior Emergency Plan, co-ordinating all civil and public health bodies (fire, police, health agents, etc.) and taking the decisions concerning public protection (shielding, iodine profilaxis, evacuation, etc.). The *CSN* designates the head (normally one resident Inspector in each Province with nuclear power plants) of Radiation Protection Group for Exterior Emergency Plan, and advises the Governor about public protection decisions.

To this end, the *CSN* has created 4 groups; Operating Analysis Group, Radiation Protection Group, Support Group, and the Direction of Emergency, itself, to follow plant evolutions, calculate doses, and communicate with all outside organisations. These groups are concentrated, upon activation, in the *CSN* Emergency Room (SALEM). The Emergency Room has the capability to receive, through telefon and microwave network, safety parameter evolutions for each nuclear power plant (approximately 30 variables, with the capacity to amplify to 100 parameters), data from meteorological towers at nuclear power plants and radiation measurements of the national radiation networks, computer calculations and communication arrangements.

6.28 SWEDEN

In case of a serious accident at a nuclear power plant, the licensee is responsible for mitigating the consequences and for giving appropriate protective recommendations to the County Board.

When *SKI* is notified of a site emergency, the *SKI* emergency staff is called in. The emergency procedures require that inspectors be located; on the plant site, at the local County, and at the Radiation Protection Institute (*SSI*) emergency centre. *SKI* functions in such an event are to monitor the event on site and to provide technical advice to *SSI* and the County Board and other involved authorities. Basic operational questions which *SKI* answers are;

Will there be any radioactive release ?, and if yes, When ?, What is the source term ?, and How long will it last ?

SKI will also investigate the course of events and causes, assess and decide about which further measures need to be taken.

6.29 SWITZERLAND

In case of an accident, it is the responsibility of the nuclear power plant management to ensure that appropriate measures are immediately implemented and that *HSK* and, if necessary, the National Emergency Operations Centre (NAZ) are immediately informed. The technical criteria for initiating appropriate actions are defined in the emergency regulations.

The *HSK* maintains a duty officer service and an internal emergency organisation. The duty officer must be able to receive messages from the plant within 15 minutes. The emergency organisation of the *HSK* must be ready for action within one hour after mobilisation. The *HSK* is responsible for the evaluation of the plant situation and forecast of radiation consequences. When an accident has happened, which could endanger the population through high radioactivity, the Government decides on the evaluations and recommendations of the Emergency Organisation for Radioactivity *(EOR).*

6.30 UKRAINE

In case of radiation accident, the Ministry of Environmental Protection of Ukraine creates the committee of accident investigation. It may enlist the services of proper experts, if necessary.

In order to obtain efficient information from NPPs, the controller's office is available within the Ministry of Environmental Protection in Ukraine. It monitors the situation during 24 hours. This service is ready to receive and to transmit the most valuable information in a moment.

6.31 UNITED KINGDOM

A very serious occurrence will result in *NII* implementing its emergency procedures and sending teams of inspectors to be located on the site, the local off-site centre, other emergency centres and to the Government's national response centre. The functions of *NII* in such an event are to monitor events on the site and the actions taken to restore plant safety and to provide advice to the Government Technical Advisor (GTA).

The GTA is appointed by the Government and would be selected from one of *NII's* Deputy Chief Inspectors. The GTA reviews advice from the *NII*, together with advice from the National Radiological Protection Board and others about radiological consequences of the occurrence. The GTA acts as the principal advisor to the police and other authorities handling the off-site response for the duration of the occurrence and in relation to the immediate follow-up activities. This function is undertaken at the local off-site centre.

The Government co-ordinates its response through the national response centre which is located either in London, in the case of a very serious occurrence in England or Wales, or in Edinburgh, in the case of a very serious occurrence in Scotland. These responses are described in more detail in the document "Arrangement for Responding to Nuclear Emergencies" published by *HSE*.

Following the achievement of control over the emergency, *NII* will then be involved in assessing proposals to secure and subsequently return the nuclear facility to normality using its powers under the license conditions.

6.32 UNITED STATES

During an incident at a licensed facility, the licensee is responsible for mitigating the consequences of the incident and for providing appropriate protective action recommendations to State of local officials, or both. Federal response activities are co-ordinated with State and local government and licensee response efforts. As Federal Technical Co-ordinator, *NRC* recommends to the Governors of affected States any additional actions needed to protect the public. The *NRC* monitors the incident in order to be ready to give advice to the licensee based on *NRC*'s Assessment of the plant situation, and obtains needed expertise and equipment. As a follow-up action, Incident Investigation Teams (see Chapter 4.12) may investigate significant operational events. The *NRC* dispatches a team to the site from its regional office for significant incidents and all *NRC* activities are co-ordinated from the licensee Emergency Operations Facility near the site by the Regional Administrator.

CHAPTER 7 - INSPECTORATE PERSONNEL

This chapter provides information on the relative size of the countries nuclear programme and a brief description of the regulatory staff with emphasis on personnel utilised to perform inspections. (Chart are provided in Annex IV and V). Included is a look at the qualification and training requirements for inspectors, training period and required experience of candidates, the level of responsibility afforded the inspectors within their organisations, and the extent of their authority. Also included is the size of the inspection staff, outside experts or specialists utilised during inspections, etc.

7.1 ARGENTINA

Regulatory inspections are performed by qualified personnel to cover all the relevant aspects of nuclear safety, radiation protection, safeguards and physical protection.

The resident inspectors and technical support staff are graduated engineers with experience in areas like safety assessment, design, reactor control, reactor physics, and radiation protection. All of them are recruited with the basic annual course of radiological and nuclear safety approved. Inspectors and safety analysts within the same group is highly experienced and their joint work is very valuable.

The *ARN* permanent staff is 70% with university degree in science and engineering

7.2 ARMENIA

ANRA has a staff of 25 people. Eight specialists are inspectors. Basic educational level of the inspectors on *ANRA* is 100% graduate engineers or a corresponding degree. The inspectors are trained in professional courses, workshops and by exchange of experience.

7.3 AUSTRALIA

Australia has no nuclear power programme and only one operating research reactor rated at 10 MW(th). There are a total of six staff involved in regulatory activities including three senior engineers with extensive nuclear experience, one senior health physicist, one engineer/physicist, and one technical officer. Each of these staff tend to concentrate on certain specific plant areas and carry out inspections in these areas. As a general rule only four staff carry out plant inspections, a senior engineer, the radiation physicist, the engineer/physicist and the subprofessional.

Because of the small size of the Nuclear Safety Bureau (*NSB*), there are no specific qualification requirements for inspection staff, as such, as these staff are also involved in most of the other work of the *NSB*. The senior engineers have post-graduate qualifications in nuclear engineering and the senior health physicist also has a post-graduate degree. Inspection staff have previous experience in nuclear plant operation, design or maintenance, and most have experience in nuclear regulation within Australia and in USA or UK. In general, training of the inspection staff is on-the-job with attendance from time to time at training courses provided by the reactor operating organisation for its staff. Currently, outside consultants are not used to perform inspections.

7.4 BELARUS

Within Promatomnadzor there are two units directly involved in nuclear and radiation safety regulation; the Nuclear and Radiation Safety Inspectorate, which has a staff of 15 people, and the Department for Nuclear and Radiation Safety Regulation, which has a staff of 3 people. Basic educational level of all specialists of the regulatory authority is graduate engineers (100%). The inspectors are trained in the professional courses, seminars, workshops and through exchange of experience.

7.5 BELGIUM

Qualification and Training

Legal ministerial license for dedicated inspectors requires:

- University degree in Nuclear Engineering
- Three (3) years of nuclear experience.

Additional training by *AVN* includes:

Belgian regulations

- Safety analysis
- Nuclear power plant systems
- Nuclear power plant processes and operation
- Radiation protection
- Work in a foreign nuclear power plant (12 - 16 weeks)
- Simulator training (6 weeks).

Retraining is provided in:

- Radiation protection
- Simulator (1 week / year)
- Topics in safety problems,
- National of International missions (OSART, ASSET, etc.).

Inspector responsibilities include:

- Verify the compliance with the licensee, including emergency planning
- Follow-up of all plant modifications and projects; associated conformity checks.
- Follow-up and check of 10-year safety re-assessments.
- Verify the application of the operating experience.

7.6 BRAZIL

The Reactor Co-ordination of the Licensing and Control Superintendence is composed of 40 technical personnel graduated in science or engineering, most with M.Sc degrees and a few with Ph.D degrees, both in the nuclear field. All members of the staff perform safety assessment, safety audits and inspections in their field of specialisation

7.7 BULGARIA

The *AUAEPP*'s staff is 92 people, 49 of them are inspectors. The basic educational level of the inspectors is engineer (with university or institute diploma). For each inspector individual training programme is provided, depending on his background and experience.

7.8 CANADA

There are approximately 130 inspectors in all who cover all sectors of the Canadian nuclear industry. Of these, 27 are resident at the 6 NPPs. The number of inspectors there varies between 3 and 9, depending on the number of reactor units at the plant. Other inspectors from head office with specialist expertise in areas such as radiation protection, quality assurance, security and emergency preparedness also conduct NPP inspections. Some of these however are not dedicated to NPPs as their expertise lends itself to other areas of *AECB* jurisdiction such as research reactors and fuel fabrication facilities.

Resident inspectors are required to have a university degree in science or engineering and extensive experience in the nuclear industry. Inspectors should also have a sound knowledge of reactor safety philosophy. A skill profile has been defined for inspectors that is divided into 5 categories: communication, plant specific, technical, procedural/administrative, and corporate and legal. Approximately 10% of the yearly resources for a resident office are to be devoted to the training of inspectors.

The authority of resident inspectors extends to approving or requesting various changes that may take place at NPPs, and placing actions on licensees to address safety issues that emerge from such activities as document review and inspections. Head office specialists, inspectors, or management also may have a role depending on the technical area or significance of the issue.

7.9 CHINA

The *NNSA* has a staff of 30 inspectors in the headquarters and 20 inspectors in the regional offices for the supervision of nuclear power plants, research reactors and fuel cycle facilities.

The inspectors have education background of bachelor degree (70%) or master degree (30%) in the filed of nuclear technology and science, with at least 5 years engineering experience. The training policies, management, guidelines and programme are defined by the *NNSA* for inspectors. Training courses include the following topics: Nuclear Engineering, Nuclear Safety Regulations, Inspection, Assessment Skills, Basic Course on Nuclear Safety Technology, Nuclear Installation, System and component Knowledge, Accident Analysis, Emergency Preparedness, Radiation Protection, and On-the-Job Training for the Inspection of the Special Nuclear Installation. After training, the inspector has to pass the final examination and be authorised by the *NNSA*.

7.10 CZECH REPUBLIC

SÚJB currently has 82 inspectors and 47 technical and administrative support staff. Thirty-nine inspectors are inspectors of nuclear safety (7 of them are directly located on the NPP sites), 40 of radiation protection (30 of them are located in Regional Centres) and 3 inspectors are engaged in the field of emergency preparedness. Chairman of the *SÚJB* plays a role of chief inspector. All inspectors have to be a university graduate. In addition, inspectors of nuclear safety must have at least 3 years experience in the nuclear field, from this at least 6 months at a nuclear facility, and inspectors of radiation protection at least 3 years experience in the field of radiation protection or application of ionising radiation sources and from it at least 1 year of experience in specific institutions. In addition, all inspectors have to go through specialised training courses and pass a special examination. Training and qualification requirements are indicated in *SÚJB* Internal Instruction, "Qualification and Professional Training for Inspectors of *SÚJB*".

Inspectors report information to the Headquarters office. The inspectors authority derives particularly from Act No. 287/1993, as amended by Act No. 85/1995, and Act No. 28/1984. Major authorities of the inspectors given by acts are as follows:

- Inspectors are authorised to enter into buildings where controlled activities are carried out, or where controlled equipment, objects and materials are located, and to demand necessary documents and information,

- In case of deviations from approved documentation, especially from Limits and Conditions of safe operation, they are authorised to stipulate the time limit until which the Responsible Organisation shall develop necessary measures, as well as the schedule for remedying such deviations,

- If these deviations jeopardise nuclear safety or radiation protection, inspectors can impose upon the Responsible Organisation that the necessary measures are taken immediately,

- Inspectors are authorised to order that technical audits, checks or tests of equipment, machines or the systems are performed, if that is necessary to verify nuclear safety,

- Inspectors are authorised to check on the professional competence of the selected personnel, especially on the proficiency in Limits and Conditions, and selected operating procedures,

- If an operator does not submit to such check or fails to succeed, inspectors can revoke the person's license for the job and transmit the case for final decision to the officer who originally granted the license.

7.11 FINLAND

STUK has a staff of approximately 70 inspectors for the supervision of nuclear power plants and fuel cycle facilities. Basic educational level of the inspectors of *STUK* is: approximately 20% engineers, 70% graduate engineers (diploma) or a corresponding degree, and 10% with a higher degree. There are training policies and guidelines for the training of inspectors.

7.12 FRANCE

The inspectors are high level engineers recruited from two sources mainly :

- civil servants from administrative technical bodies (75%), with experience in technical tests and monitoring in the nuclear and non nuclear fields ;

- engineers from CEA (Commissariat à l'Energie Atomique) (25%), with extensive practical experience in nuclear, often specialists in areas like control and instrumentation, chemistry of uranium, fire-fighting, radioactivity measurements, plutonium technology etc.

From an administrative standpoint, the *CEA* engineers are attached to *DSIN* or *DRIRE*s.

In most cases, the inspectors make their inspections together with engineers from the *IPSN* safety analysis department. These engineers are either dealing with follow up of the concerned plant, or specialists of the topic dealt with during the inspection. Assistance from them is generally also provided for the preparation of the inspections. Co-operation between the safety analysis department and the inspectors is highly beneficial, since it enables the latter to take advantage of the safety analysis department's know-how and the former to have access to the indispensable source of information constituted by inspection feedback.

Regulations give the inspector full power to enter, inspect and collect evidence, but enforcement is carried out by the director of *DSIN*. Enforcement may be carried out by the director of the corresponding *DRIRE* if pressure vessels regulations are concerned.

At the end of 1995, 200 civil servants and *CEA* engineers were working in *DSIN* or in the nuclear divisions of the *DRIRE*s, 115 of them being nuclear inspectors ; besides, about 350 *IPSN* people work permanently for *DSIN*.

7.13 GERMANY

Within the regulatory body of a state (Land) approximately 5 to 10 man-years per nuclear power plant unit and year are spent for inspection and supervision. Typically one to three inspectors are in charge of inspections regarding nuclear safety of one nuclear power plant unit. Inspection regarding e.g., radiation protection, often is delegated to subordinate governmental agencies. In addition, supervision

for industrial safety and environmental matters, as legally required for all types of industrial activities is carried out by other competent agencies.

In general, for all supervisory and inspection programmes independent experts are assigned by the Länder authorities for examination of reports, reported events, calculations, technical specifications, safety assessments for modifications and for conducting or assessing in-service inspections. In most cases, Technische Überwachungsvereine *(TÜV's)* are assigned as expert organisations. There are several *TÜV*-Organisations in Germany, historically assigned to and working mainly in the individual federal Länder. Recent developments go for the formation of larger organisations (holdings, Ltd., Corporates) serving the needs of several Länder. Including non-nuclear inspection programmes (e.g., for cranes, fire protection, pressure vessels, etc.), which are also carried out by *TÜV*-personnel, a total manpower of approximately 30 to 40 man years per nuclear power plant unit each year is spent for inspection by experts. This does not, however, include safety assessments and expertises for major modifications, for which a license is required.

During refuelling outages, the presence of regulatory inspection personnel and experts at the plant is increased. On average, about 30 experts performing inspections and recurrent tests are constantly present at the site during the outage.

The inspectors of the regulatory body are in possession of a university degree (e.g., engineering, physics, chemical engineering) and have several years of practical experience in industry, research centres, with technical expert organisations or in licensing bodies. Personnel of technical expert organisations *(TÜV),* who are contracted as experts hold university degrees in technical fields or technical engineering degrees. For special inspections, e.g., pressure vessel inspection according to the Pressure Vessel Regulation Ordinance, state authorised and licensed inspectors are assigned, also within the *TÜV* organisations. The inspectors are trained in professional courses, symposia, workshops, simulator training courses and, as guests, during actual operation of nuclear facilities, and by exchange of experience.

The inspectors authorised by the supervisory authorities, as well as experts consulted by them, have access to the nuclear installations, and may carry out necessary examinations and request pertinent information.

7.14 HUNGARY

The total manpower of *HAEC* NSI is approximately 40, technical staff members of total are 30. Basic graduational requirement of technical workers is technical university or other high level technical degree.

At selection of applicant to the technical staff graduational level, working practices and experiences, knowledge of foreign languages are considered.

Generally the training procedure of newcomers depends on their graduation, working practices and experiences.

Newcomers applied by *NSI* directly after being graduated have to participate in entire basic training courses organised by NPP training department for their newcomers and have to obtain practices and experiences within real circumstances together with the operational staff of the NPP. Each newcomer has to pass two exams.

First of exams qualifies candidates on public administration skills:

- legal background of public administration,
- governmental procedures.

Second of exams qualifies candidates in inspector skills:

- legal background of *NSI* and its activities,
- safety codes,
- standards,
- general safety questions,
- knowledge in licensing and control.

Retraining programs widely cover international, national and *NSI* organised training courses on advanced inspector skills, for examples:

- specific safety questions,
- knowledge in using of PSA,
- safety culture,
- experiences of occurrences, etc.

Comprehensive training procedures are revised periodically. On-the-job training methodologies are just being developed.

7.15 INDIA

The *DRI&E* regulatory inspection programme for nuclear power plants presently covers 2 units of operating BWRs, 8 units of operating PHWRs and 4 PHWR units under construction. It also covers the nuclear research reactors.

DRI&E personnel who organise and implement regulatory inspection programmes are mostly graduate engineers having training and long experience in Nuclear Power Plants. All the *DRI&E* inspections personnel are engineering or science graduates and are involved in Design Safety Review for *AERB* clearances at pre-operational stages of nuclear power plants.

7.16 ITALY

Regulatory inspections can be performed only by qualified nuclear inspectors with the status of judiciary police. Usually inspectors have a University degree in Science and Engineering with additional experience in safety and radiation protection activities. Additional training by *ANPA* includes: Italian regulations, safety analysis, nuclear power plant processes and radiation protection activities.

Inspectors are vested with wide powers of investigation regarding access to documents concerning safety and health protection. They are empowered to check the proper working of equipment, to obtain full information concerning safety and protection of workers and the public, and lastly, to ensure that technical requirements during operation are complied with. Inspectors identify and verify deviations and report through a formalised process.

Inspection results are recorded in numbered reports and filed in a special file on the inspected installation. The inspection reports are regularly analysed within the Regulatory organisation in order to keep up to date, the plant safety review, establish any necessary regulatory actions, and to reframe as may be advisable, the subsequent inspection programme.

Initiation of corrective actions and enforcement is performed under the authority and jurisdiction of the regulation and specific licenses; enforcement actions are taken by the *ANPA* headquarters.

7.17 JAPAN

Qualification of “Senior Inspector” is given to University graduates of Engineering programmes who have completed 2 years job experience and specialised training on the basis of legal qualification conditions. Curriculum includes; laws, regulations, standards, methods of inspection, structure and functions of power generating machinery and equipment, safety design, evaluation, and other related topics.

In *JAPEIC* on the job training and specialised training are also executed as described previously. In general, University graduates of Engineering programmes need more than 6 years, including experience as other inspectorates and are qualified through examinations.

NUSTEC qualifies inspectorate through the specialised training in addition to the above practical experience and years.

7.18 KAZAKSTAN

Basic education level of the inspectors of *KAEA* is an engineer with an institute diploma.

All inspectors have additional of 3 to 4 years minimal relevant experience in the atomic industry or otherwise. For inspectors, a competence profile is specified, individualised training programmes are provided and once every 3 years they are examined.

There is one resident inspector of the *KAEA* on each nuclear installation. About 15 persons overall, are involved in inspection activities of the *KAEA*.

7.19 REPUBLIC OF KOREA

There are approximately 150 inspectors in the *KINS* Head Office. In addition, the *KINS* has 8 resident inspectors for the 11 power reactors presently licensed to operate and for 5 power reactors being constructed. All inspectors are University graduates and most have a PhD or Masters degree. Also most Inspectors have over 5 t 10 years experience in the nuclear field. inspectors receive various kinds of training that would be required for regulatory inspections periodically.

7.20 MEXICO

All personnel of the verification Department, have an Engineering degree and some have a Masters Degree in Nuclear Engineering. Additional training includes (depending on the specialisation or responsibilities): Nuclear Regulation, Radiation Procedures, BWR Technology and Simulator, Quality Assurance, etc.

7.21 THE NETHERLANDS

The first-line inspector (generalist) has to have a bachelor degree or equivalent and minimal 3 or 4 years relevant experience in the industry or otherwise. His training programme consists of:

- a basic course in nuclear engineering (6 weeks).
- accompany the experienced inspectors on-the job (5 - 10 times).
- visit to a nuclear power plant in the neighbour countries (2 - 3 weeks).
- self-study
- internal training regarding the organisation of the regulatory body and its legal capabilities.

The second-line inspectors (specialist) must have a masters degree or equivalent and in addition to the training programme of the first-line inspectors, follow advanced courses in their specialism.

All inspectors have full access to the nuclear installations at all times to inspect, to gather information and to initiate corrective actions. Enforcement actions are taken by the headquarters.

7.22 PAKISTAN

DNSRP currently has a staff of 12 inspectors in the headquarters and 4 inspectors at the regional offices for the supervision of nuclear power plant. More staff is due to be added shortly.

7.23 RUSSIA

The Gosatomnadzor's staff is approximately of 2000 people. Nearly half of them are inspectors. The basic educational level of the inspectors is engineer (with university or institute diploma). For inspectors, individualised training programmes are provided depending on their background and experience. Inspectors are included in site (resident) inspections and regional inspections. Normally, site-inspection includes a number of inspectors equal to the number of units on the plant plus a head of inspection. Regional inspections perform most of the licensing procedures and co-ordinate the activities of site-inspections.

7.24 SLOVAK REPUBLIC

The Nuclear Regulatory Authority of the Slovak Republic includes 40 inspectors, 7 of them are directly located on the NPP sites. All inspectors are university graduates. They have at least 9 years experience in the areas related to design, construction, commissioning, operation, decommissioning, research or manufacturing of nuclear facilities, their components and systems. In addition, the inspectors should have competed a special professional programme on the laws, standards, regulations, methods of inspections including practical and professional training on-site. For the purpose of the execution of state supervision it is required:

- fulfilment of the prescribed qualification requirements,
- successful verification of the professional capabilities to execute working activities,
- certificate on acquisition of the professional capabilities to execute specific activities,
- additional professional preparation (courses and training to fulfil the work execution requirements and qualification upgrading).

7.25 SLOVENIA

Entry qualifications of the inspectors are university degree in engineering or science and 8 years of relevant experience. Additionally, inspectors are trained in Slovenian legislature and administrative procedures, nuclear technology, nuclear and radiological safety, simulator training, and on-the-job training with foreign inspectors.

The practice is, although this is not required by law, that all new inspectors pass the basic nuclear technology course followed by the course of Westinghouse technology (KRSKO is a 2 loop Westinghouse PWR design) and simulator course, which are organised by the US *NRC*. Special attention is devoted to regular training of inspectors through courses, workshops, and meetings.

The legislation gives the inspectors full power to perform inspections. He can stop operation of the plant in case safety is jeopardised.

7.26 SOUTH AFRICA

Inspectors are selected according to individual competency which encompasses their experience, specialist knowledge, training and qualifications within their area of expertise. Examiners are usually ex-plant licensed operators with extensive knowledge of the plant, systems and the training simulator. All staff are trained in licence compliance requirements, risk philosophy, PRA and inspection system management. Training is supplemented with visits to overseas plants, IAEA courses and regulatory interchanges with other countries. Inspectors have specific authorities granted by the legislation which allows them to enter plant areas, access documents and under certain circumstances initiate stoppage of activities.

7.27 SPAIN

To obtain access to Technical Direction positions, a University degree is required in Engineering or Scientific fields, different examinations on safety, radiation protection, regulation matters, have to be successfully passed and three months (approximate) of practices.

As there is not any separation between evaluation and inspection staff, training is not inspection specific. Courses are given for different specialities. General courses helpful for inspection activities such as; Radiation Protection, Quality Assurance, Simulator Courses, NPP components, etc., are provided.

Senior Resident Inspectors (two per site) are selected among the *CSN* staff with sufficient experience (more than 5 years). In 1996 there are 12 inspectors assigned to nuclear power plants plus about 120 specialists for conducting nuclear inspections.

7.28 SWEDEN

The Inspectors are engineers within different fields (electrical, mechanical. etc.), some of who have masters degrees. *SKI* tries to recruit personnel with extensive plant and/or control room experience.

For the inspectors, a competence profile is specified. Individualised training programmes are provided depending on the inspectors background and experience. The programmes include such elements as: Plant and system knowledge. Engineering and nuclear safety. Inspection and investigation techniques. Legal aspects, etc.

In *SKI's* department of inspection, there are over 15 Inspectors. For special and team inspections, specialists from other departments in *SKI* may be utilised. Persons responsible for inspecting nuclear installations have full powers in the performance of their duty as regards access to buildings and documents, questioning of those in charge and making recommendations.

7.29 SWITZERLAND

The inspection personnel belong to *HSK* as the governmental organisation, and also to private organisations (e.g., for mechanical components, civil structures, and some for radiation monitoring). The *HSK* does not have people, who are full time inspectors. Supervising duties are carried out by different sections. The Co-ordination and Inspection Section has the duty to co-ordinate inspection activities. Each site has a site inspector who is a member of this section. About 70 persons are overall involved in inspection activities of the *HSK*. They include some 20 persons from private organisations.

Inspectors and regulators in the *HSK* are identical. Typical qualification is a BS or MS degree and several years of experience in nuclear or non-nuclear industries. Supplemental training in reactor technology and safety is provided in the first year.

7.30 UKRAINE

The Ministry of Environmental Protection staff is approximately 450 people. The inspection activities have two trends: the ecological trend and the nuclear one. The Nuclear inspection includes 60 inspectors. The basic educational level of the inspectors is engineer (with university or institute diploma).

The employment of the inspectors is realised on a competitive basis. The inspectors' training is realised according to the individualised programmes depending on their experience and skills.

The inspectors engaged in nuclear and radiation safety conduct the inspections of nuclear facilities, check the documentation, submitted by operation organisations (licensee) before maintenance of the units, as well as after preventive maintenance, co-ordinate the inspection activities on the site.

7.31 UNITED KINGDOM

Inspectors are all technically or professionally qualified. Typically they hold chartered engineer or equivalent status and have suitable experience in an appropriate field. Internal training programmes cover legal and other activities to ensure that an Inspector is competent to inspect and enforce legislation.

NII currently has 145 Inspectors and 89 administrative support staff. Fifty Inspectors are engaged in site inspection duties, 58 in assessment, 16 in project management and 21 in strategy and other related duties. There are also a number of inspectors located elsewhere in *HSE* providing advice on policy matters.

Every Inspector has wide enforcement powers including, if needed, the power to immediately prohibit an unsafe activity. Normally, enforcement powers are only used following consultation with senior inspectors. Inspectors are solely responsible for the assessment of the quality of the sites, and common standards arise from guidance, from joint inspections and through discussions with other Inspectors. *NII* does not employ non-inspectorial technical or professional staff. Outside experts or specialists are rarely contracted by *NII* to perform inspections but are sometimes contracted to provide assistance or advice on particular assessment issues.

The Health and Safety Commission also has a group of nuclear experts, called the Advisory Committee on the Safety of Nuclear Installations (ACSNI), which provides advice on matters which may be referred to it or it has decided to take an interest in. NII makes presentations to ACSNI and considers its advice.

7.32 UNITED STATES

The *NRC* has 181 Resident Inspectors for the 109 power reactors currently licensed to operate. In addition, there are 196 inspectors in headquarters and the four regional offices. On a case-by-case basis (usually for design related inspections) contractor personnel with specialised expertise may be used.

Historically, *NRC* resident and region-based staff have spent a yearly average of approximately 2,700 hours in direct on-site inspection activities at each reactor. Direct inspection effort in FY 1996 was approximately 300,000 hours for all plants, which is approximately five percent more than the hours planned.

NRC Inspection Manual, Chapter 1245, “Inspector Qualifications,” indicates training and qualification requirements for inspectors. To supplement their experience, *NRC* Inspectors complete reactor system courses at the *NRC* Technical Training Centre, which include experience in operating and responding to events on plant simulators. Inspectors also receive training in inspection and incident investigation practices. *NRC* Inspectors report information to the Regional and Headquarters offices. Commitments by licensees to specific courses of action are confirmed in writing by *NRC* Regional Administrators. Orders to licensees requiring specific actions or changes to license conditions must be issued by Headquarters.

REFERENCES

The following references are provided as a contact for obtaining further information or details about the inspection practices within the contributing countries.

(NOTE: Addresses, phone numbers and names provided in this section represents current information, ***as of 30 June 1997***. Since this information is subject to changes due to re-organisations, advancements, etc., the reader should take these occurrences into account.)

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MEXICO

Comision Nacional de Seguridad Nuclear *(CNSNS)* Dr. Barragan No. 779 Col. Narvarte CP 03020 Mexico D.F. Tel: +52 5 590 41 81 Fax: +52 5 590 61 03	Direct Contact: Mr. Luis Miguel Gutierrez Ruiz Comision Nacional de Seguridad Nuclear *(CNSNS)* Dr. Barragan No. 779 - 3 piso Col. Vertiz Narvarte CP 03020 Mexico D.F. Tel: +52 5 590 41 81 Fax: +52 5 590 61 03

THE NETHERLANDS

Ministerie van Sociale Zaken en Werkgelegenheid *(SZW)* Nuclear Safety Department *(KFD)* Anna van Hannoverstraat 4 P.O. Box 90804 2509 LV Den Haag Tel: +31 70 333 5546 Fax: +31 70 333 4018	Direct Contact: Mr. E.C. des Bouvrie Ministerie van Sociale Zaken en Werkgelegenheid *(SZW)* Nuclear Safety Department *(KFD)* Anna van Hannoverstraat 4 P.O. Box 90804 2509 LV Den Haag Tel: +31 70 333 5493 Fax: +31 70 333 4018 e-mail: edbouvrie@minszw.nl

PAKISTAN

Directorate of Nuclear Safety and Radiation Protection (*DNSRP*) Pakistan Atomic Energy Commission P.O. No. 1912, Islamabad Tel: +92 51 9204417 Fax: +92 51 9204112	Direct Contact: Mr. Jawad A. Hashimi, Director General Directorate of Nuclear Safety and Radiation Protection (*DNSRP*) Pakistan Atomic Energy Commission P.O. No. 1912, Islamabad Tel: +92 51 9204417 Fax: +92 51 9204112

RUSSIA

Federal Nuclear and Radiation Safety Authority of Russia (Gosatomnadzor of Russia) Taganskaya str. 34 109147 Moskow Tel: +7 095 272 4710 Fax: +7 095 278 8090	Direct Contact: Mr. Gennady Poltarakov North-European District Gosatomnadzor of Russia 2a, Malaj Monetnaj St. Petersburg 197101 Tel: +7 81269 61314 Fax: +7 81269 61314

SLOVAK REPUBLIC

Nuclear Regulatory Authority of the Slovak Republic *(ÚJD SR)* Bajkalská 27, P.O. Box 24 820 07 Bratislava Tel: +42 7 522 1531 Fax: +42 7 293 603	Direct Contact: Mr. Alexander Duchác, Director Nuclear Regulatory Authority of the Slovak Republic *(ÚJD SR)* Okruzná 5 918 64 Trnava Tel: +42 805 510 549 Fax: +42 805 501 530

SLOVENIA

Slovenian Nuclear Safety Administration *(SNSA)* Vojkova 59 1000 Ljubljana Tel: +386 61 172 1100 Fax: +386 61 172 1199	Direct Contact: Mr. Marjan F. Levstek Head, Section of Inspection Control Slovenian Nuclear Safety Administration *(SNSA)* Vojkova 59 1000 Ljubljana Tel: +386 61 172 1123 Fax: +386 61 172 1198 e-mail: marjan.levstek@rujv.sigov.mail.si

SOUTH AFRICA

Council for Nuclear Safety *(CNS)* P O Box 7106 HENNOSPMEER 0046 Tel.: +27 12 663 5500 Fax: +27 12 663 5513	Direct Contact: Mr. A.C. Hall Project Manager (Licensing) P.O. Box 46055 KERNKRAG Cape Town Tel: +27 21 553 1970 Fax: +27 21 553 2060 e-mail: sam_parish@cns.co.za

SPAIN

Consejo de Seguridad Nuclear *(CSN)* Calle justo Dorado 11 28040 Madrid Tel: +34 1 3460 100 Fax: +34 1 3460 588	Direct Contact: Mr. Jesus Gil, Head of the Office of Inspection Consejo de Seguridad Nuclear *(CSN)* Calle justo Dorado 11 28040 Madrid Tel: +34 1 3460 152 Fax: +34 1 3460 588 e-mail: jgh@csn.es

SWEDEN

Swedish Nuclear Power Inspectorate *(SKI)* S-106 58 Stockholm Tel: +46 8 698 8400 Fax: +46 8 661 9086	Direct Contact: Mr. Staffan Forsberg, Head Department of Inspection Swedish Nuclear Power Inspectorate *(SKI)* S-106 58 Stockholm Tel: +46 8 698 8431 Fax: +46 8 661 9086 e-mail: staffan@ski.se

SWITZERLAND

Swiss Federal Nuclear Safety Inspectorate *(HSK)* CH-5232 Villigen-*HSK* Tel: +41 56 310 38 11 Fax: +41 56 310 39 07	Direct Contact: Mr. Hans-Günter Lang, Head, Section Co-ordination of Supervision of NPP's Swiss Federal Nuclear Safety Inspectorate *(HSK)* CH-5232 Villigen-*HSK* Tel: +41 56 310 39 13 Fax: +41 56 310 38 54 e-mail: lang@hsk.psi.ch

UKRAINE

Ministry of Environmental Protection and Nuclear Safety Nuclear Safety Authority 11/1 Observatorna street Kiev 254 053 Tel: +38 044 229 83 83 Fax: +38 044 226 24 28	Direct Contact: Mr. Andrei Kononenko Nuclear Regulatory Administration (NRA) 11/1 Observatorna street Kiev 254 053 Tel: +38 044 246 82 57 Fax: +38 044 212 10 96 e-mail: bobsr@mhsgw.gan.kiev.ua

UNITED KINGDOM

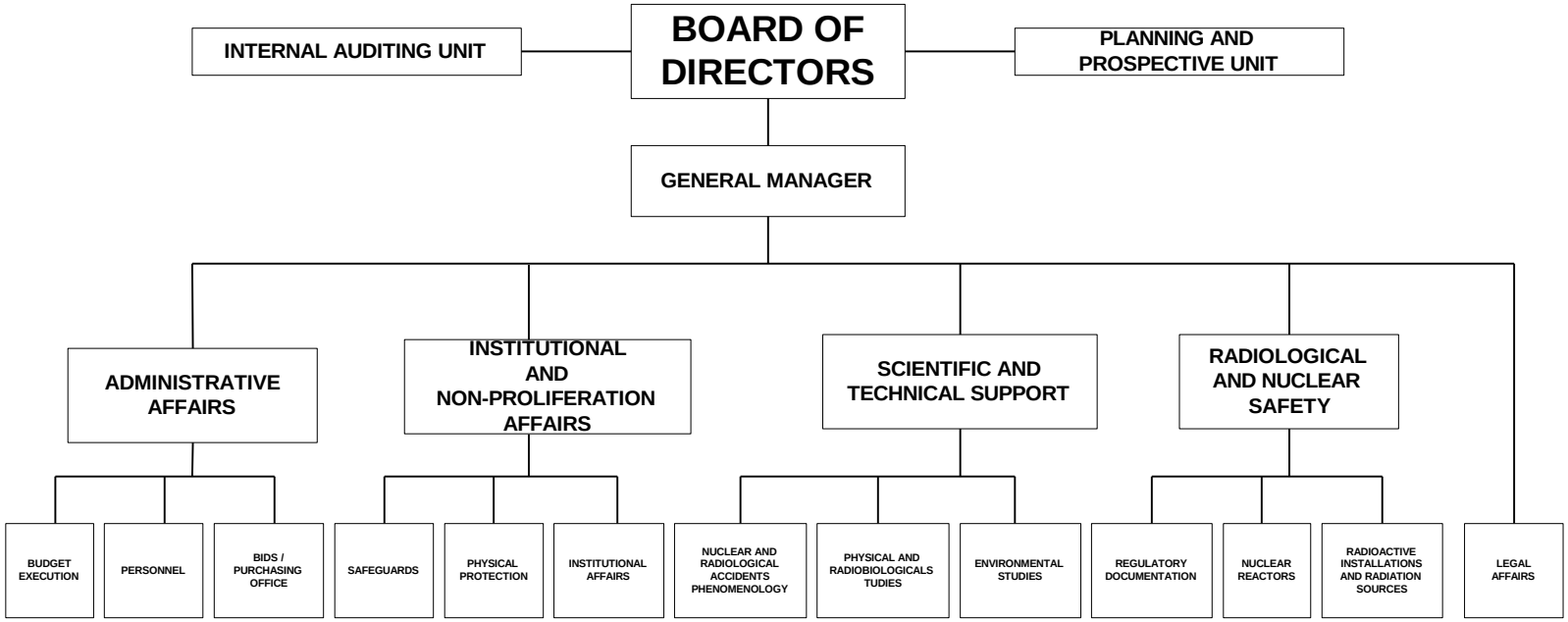
HM Nuclear Installations Inspectorate *(NII)* Rose Court 2 Southwark Bridge London SE1 9HS Tel: +44 171 717 6000 Fax: +44 171 717 6717	Direct Contact: Mr. Thomas Warren H.M. Superintending Inspector Health & Safety Executive *(HSE)* Nuclear Installations Inspectorate *(NII)* St. Peter's House Balliol Road Bootle, Merseyside L20 3LZ Tel: +44 151 951 4240 Fax: +44 151 922 5980 e-mail: tom.warren@hse.gov.uk

UNITED STATES

US Nuclear Regulatory Commission *(NRC)* Washington DC 20555 Tel: +1 301 415 7000 Fax: +1 301 415 2260	Direct Contact: Mr. Michael R. Johnson, Chief Inspections Program Branch US Nuclear Regulatory Commission *(NRC)* Washington DC 20555 Tel: +1 301 415 1241 Fax: +1 301 415 8333 e-mail: mrj1@nrc.gov

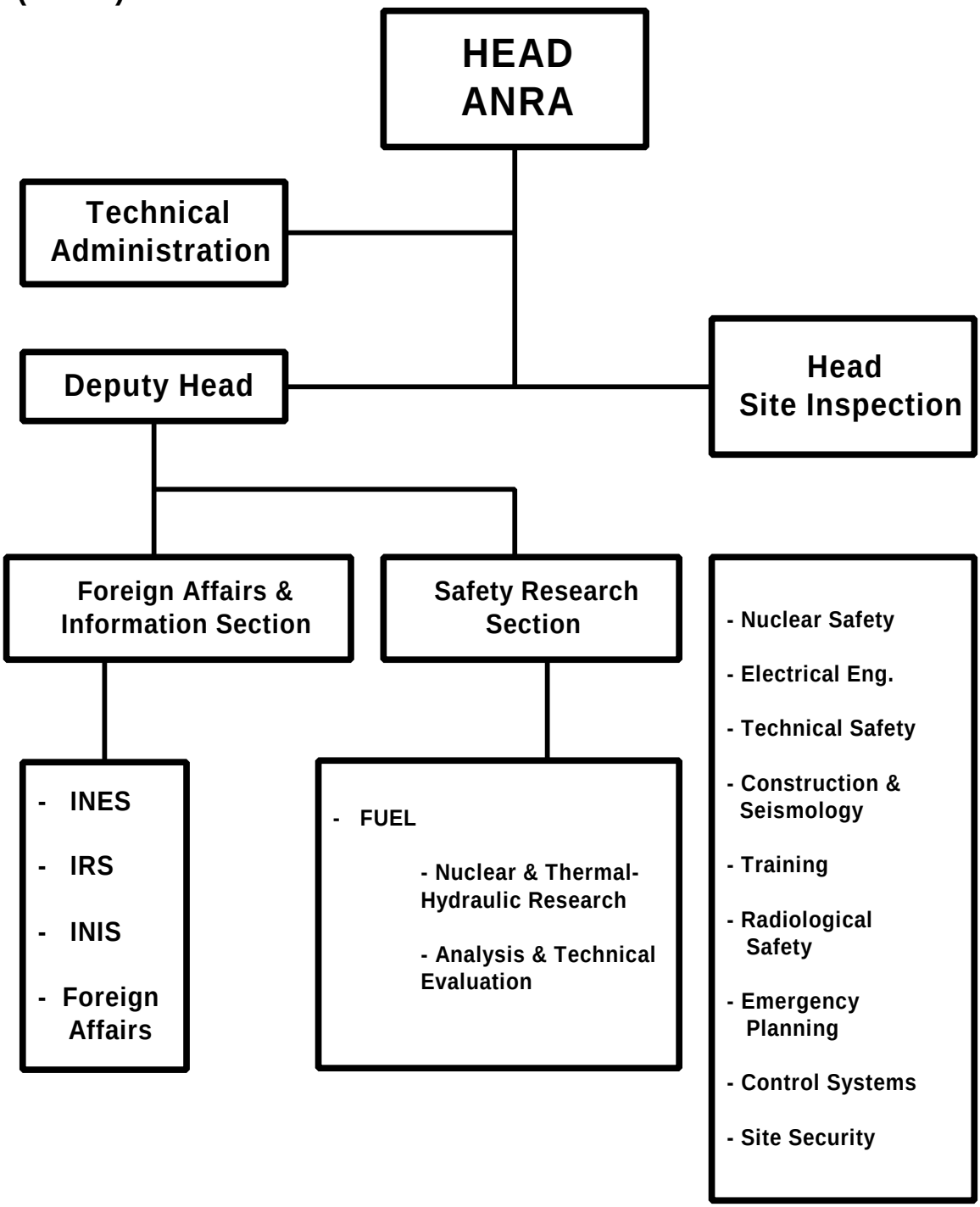
ANNEX I - REGULATORY AUTHORITY ORGANISATIONAL STRUCTURE

ARGENTINA
Auttoridad Regulatoria Nuclear



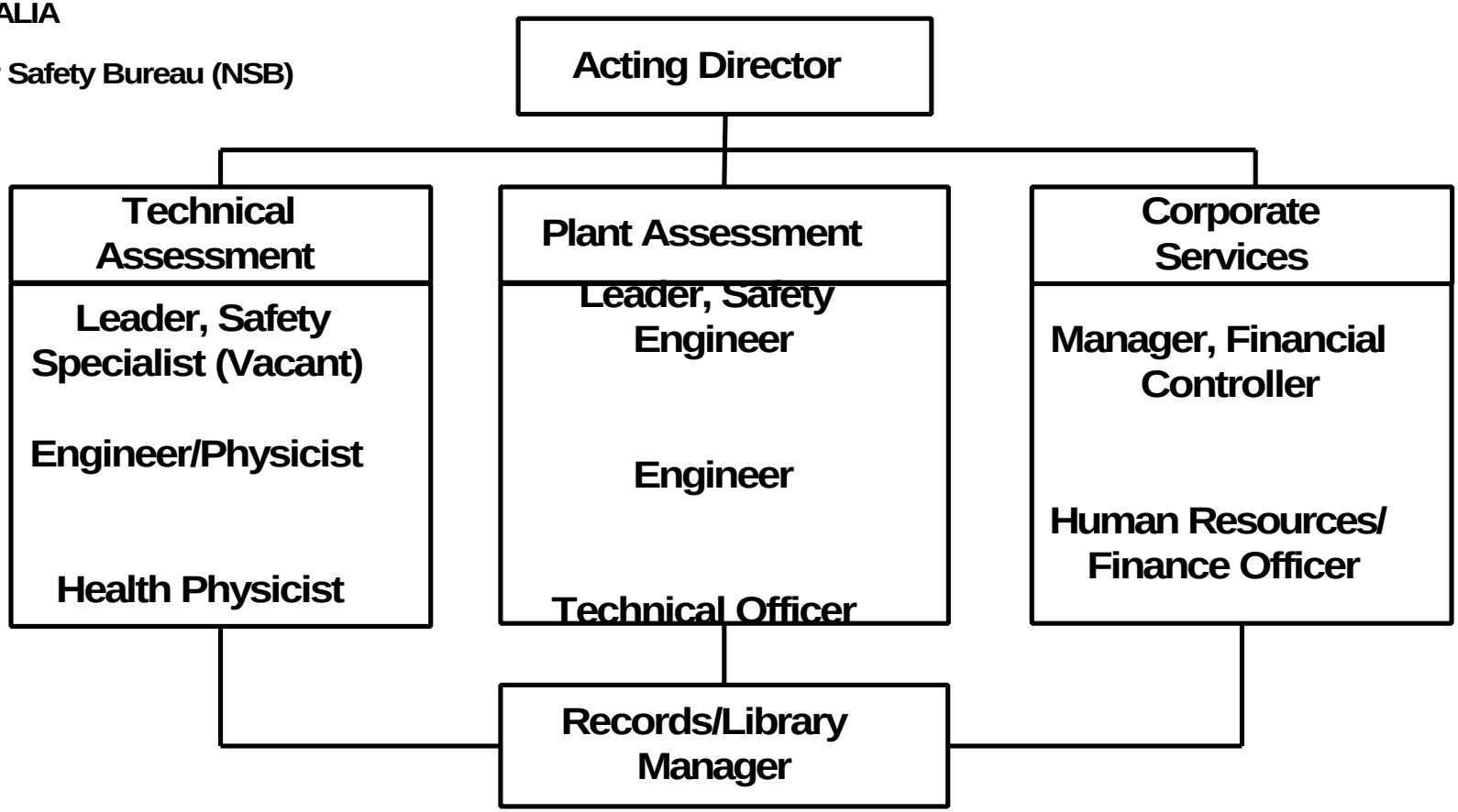
Armenia

Armenian Nuclear Regulatory Authority (ANRA)

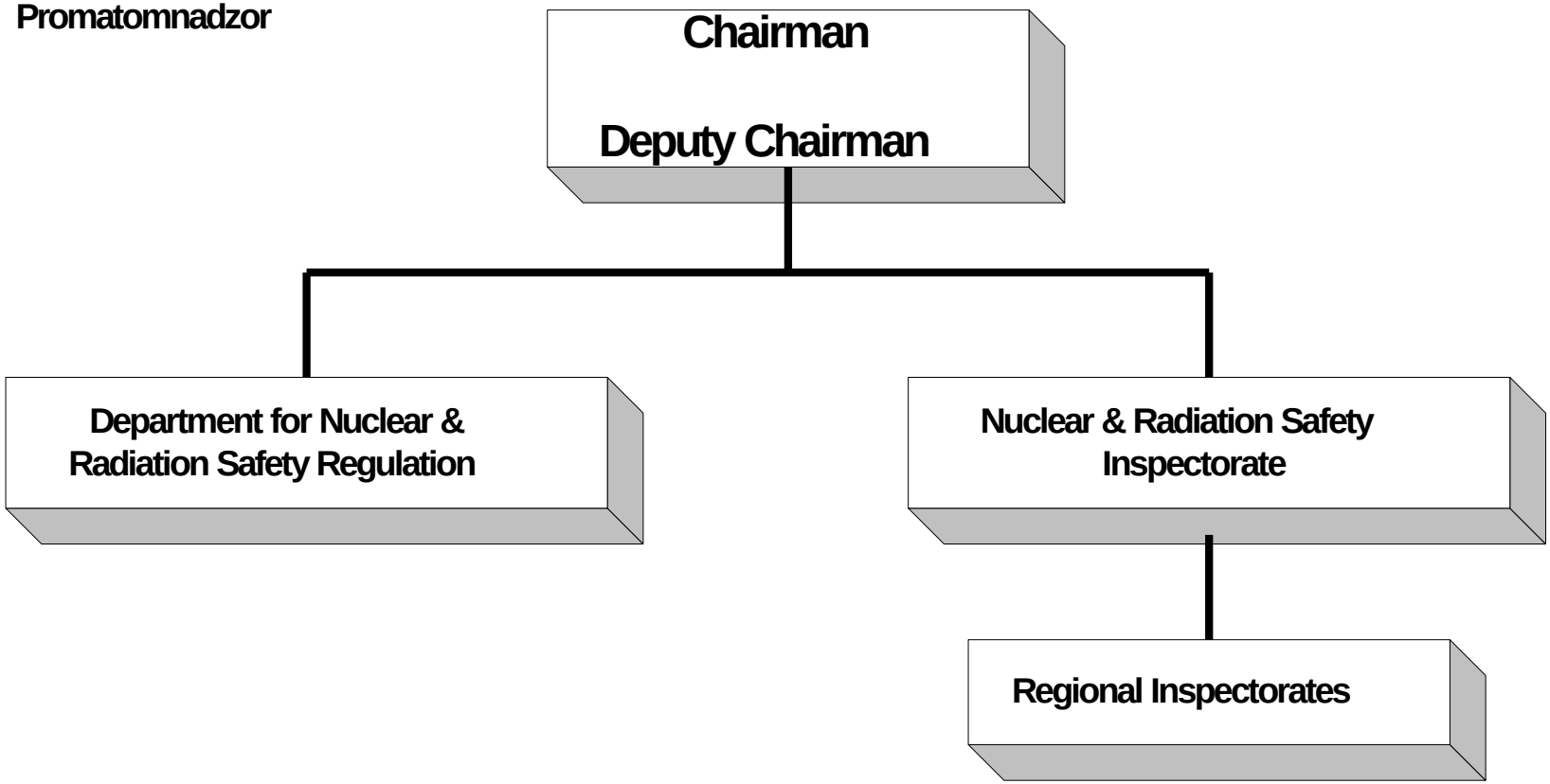


AUSTRALIA

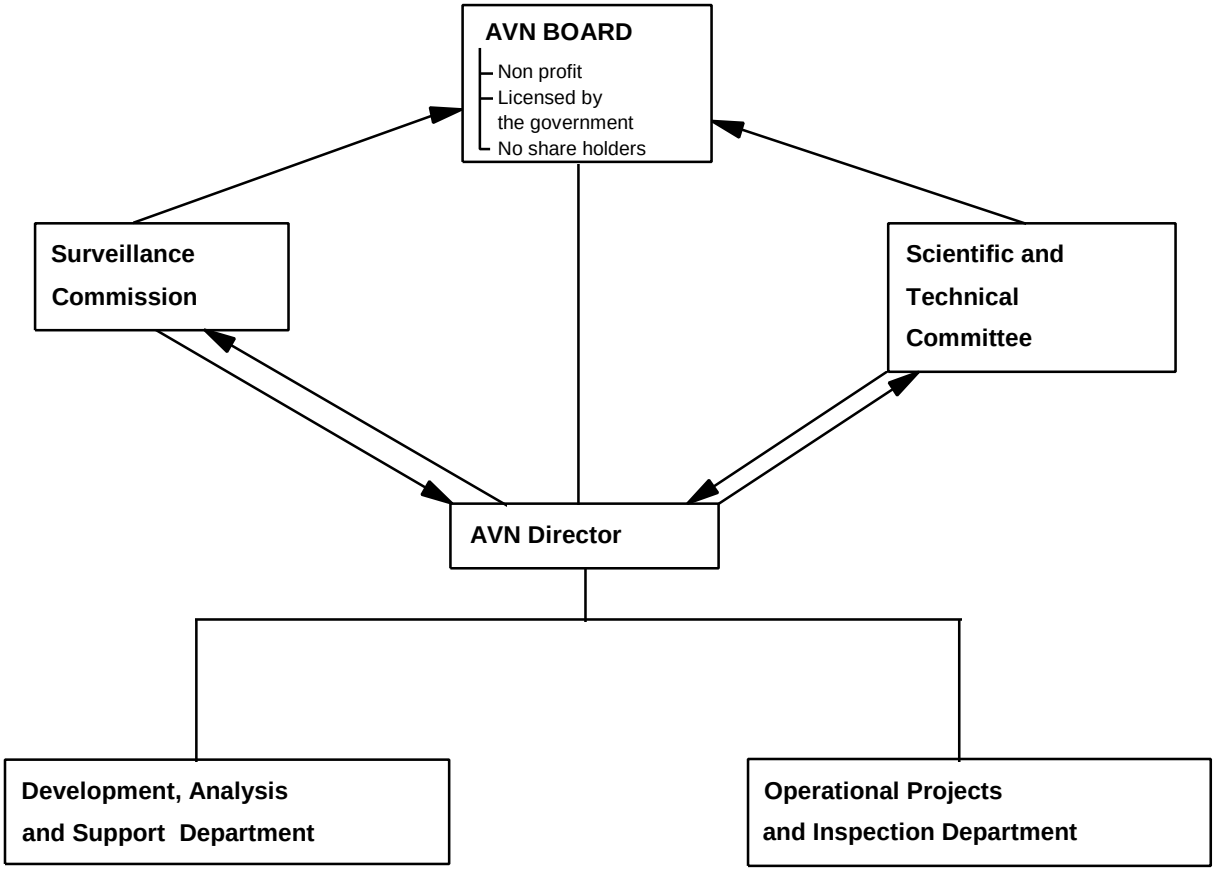
Nuclear Safety Bureau (NSB)



BELARUS
Promatomnadzor

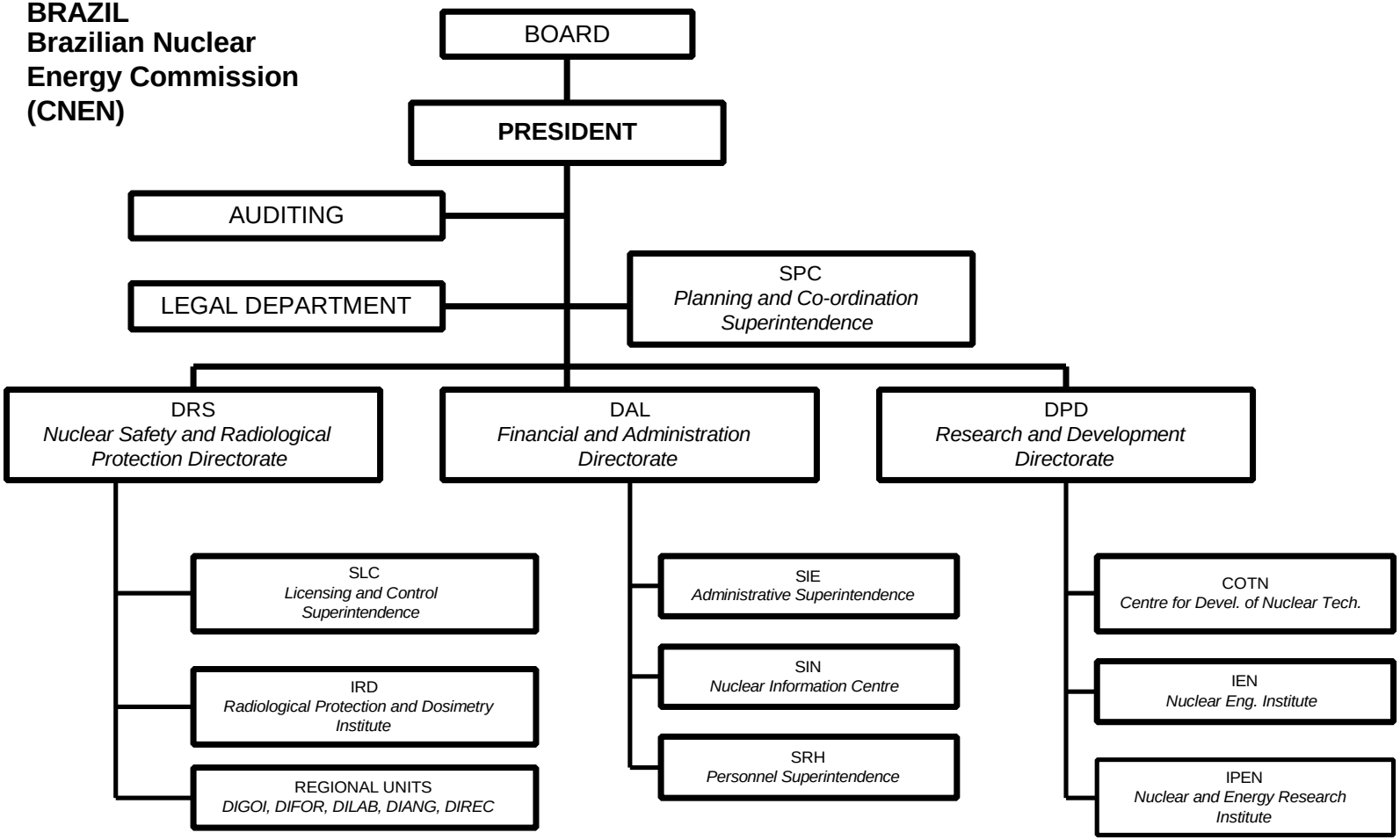


BELGIUM
AIB-Vinçotte Nuclear (AVN)



Department	Section
DAS (Development, Analysis, Support)	DRF (Documentation, Rules, Feedback)
	IOP (International Operational Projects)
	TR (Training & Reporting)
	ARD (Assessment and Research & Development)
	MTP (Mid Term Projects)
OPI (Operational Projects and Inspections)	PPI (Power Plant Inspections)
	ONI (Other Nuclear Installations)
	NIS (Nuclear Inspection Support)
	NNP (National Nuclear Projects)

BRAZIL
Brazilian Nuclear Energy Commission (CNEN)

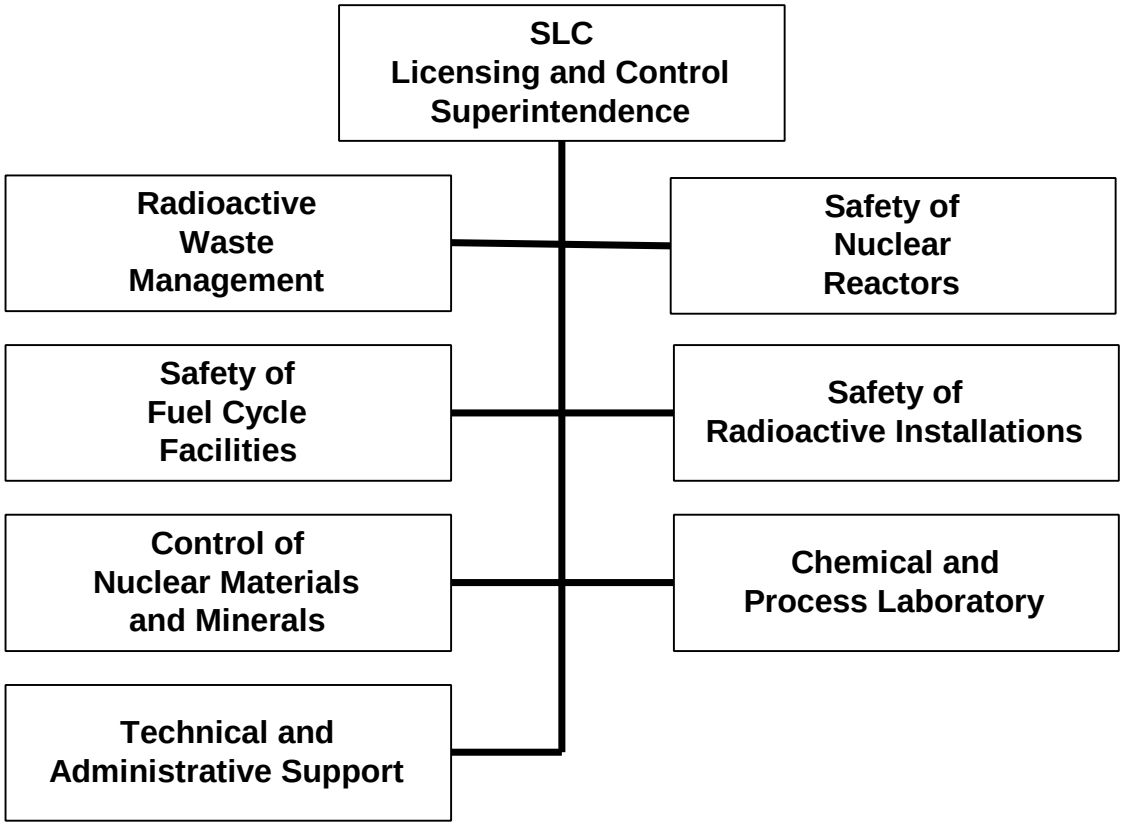


BRAZIL (cont'd)

Brazilian Nuclear Energy Commission (CNEN)

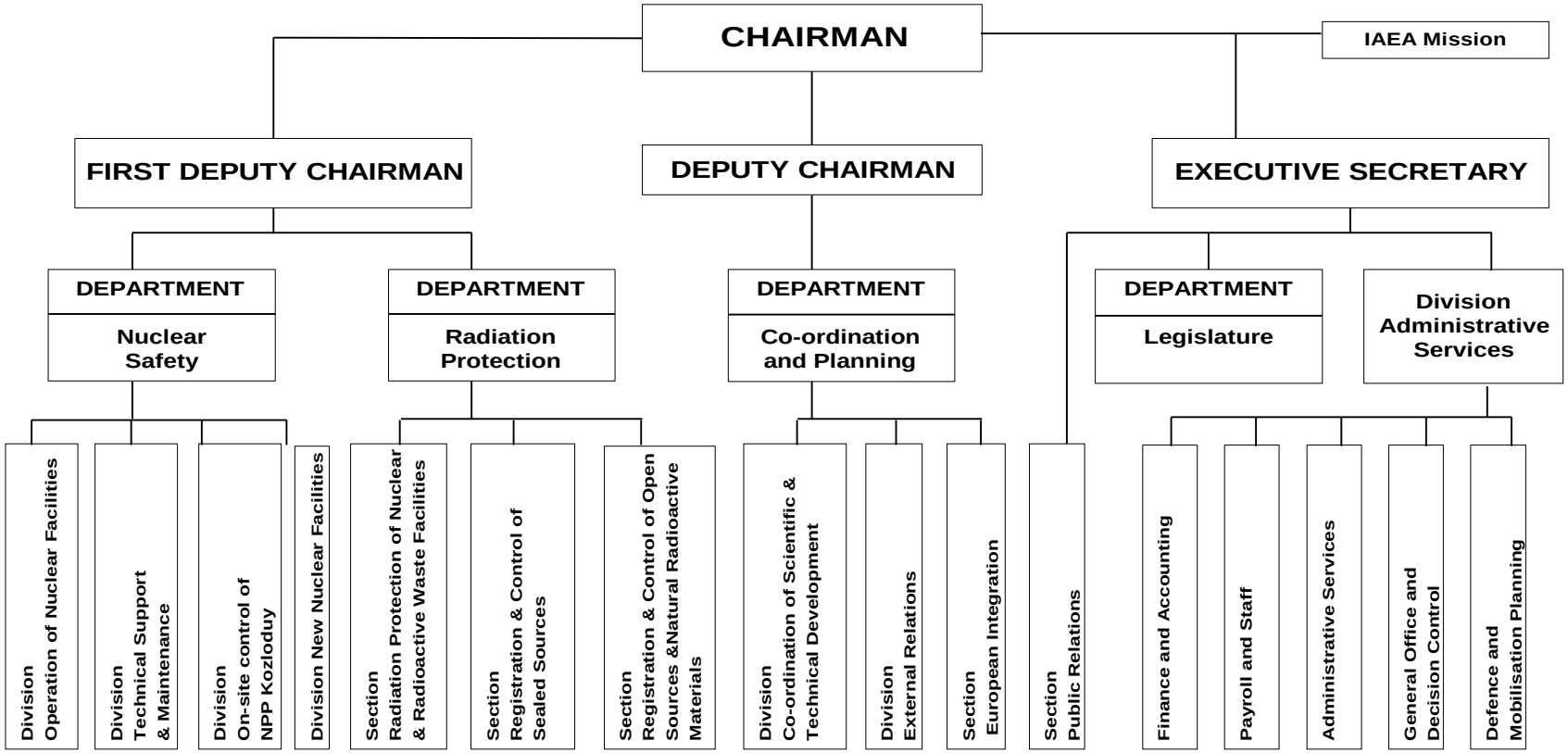
Staff: 182

LICENSING AND CONTROL SUPERINTENDENCE

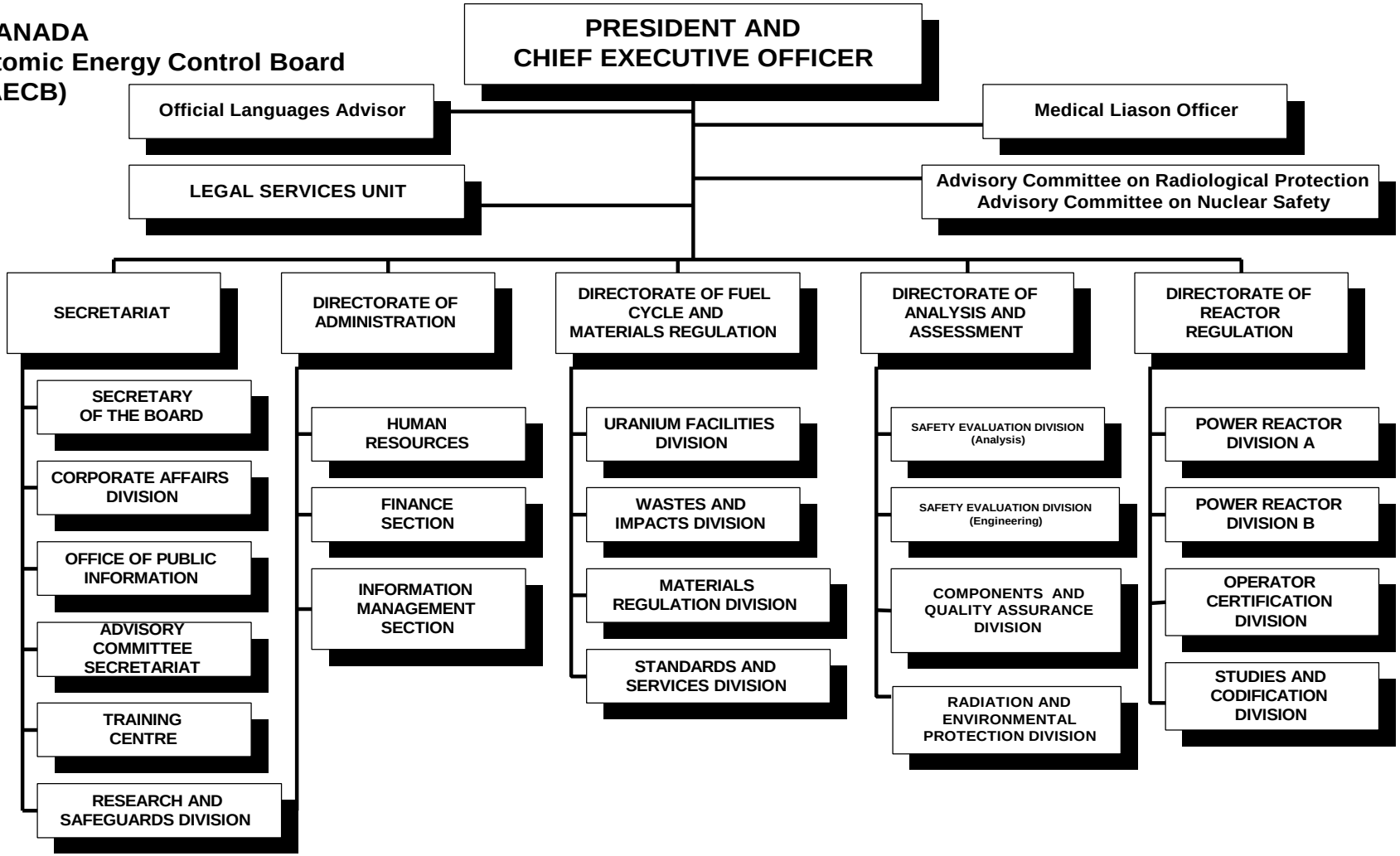


BULGARIA

Committee on the Use of Atomic Energy for Peaceful Purposes (AUAEPP)

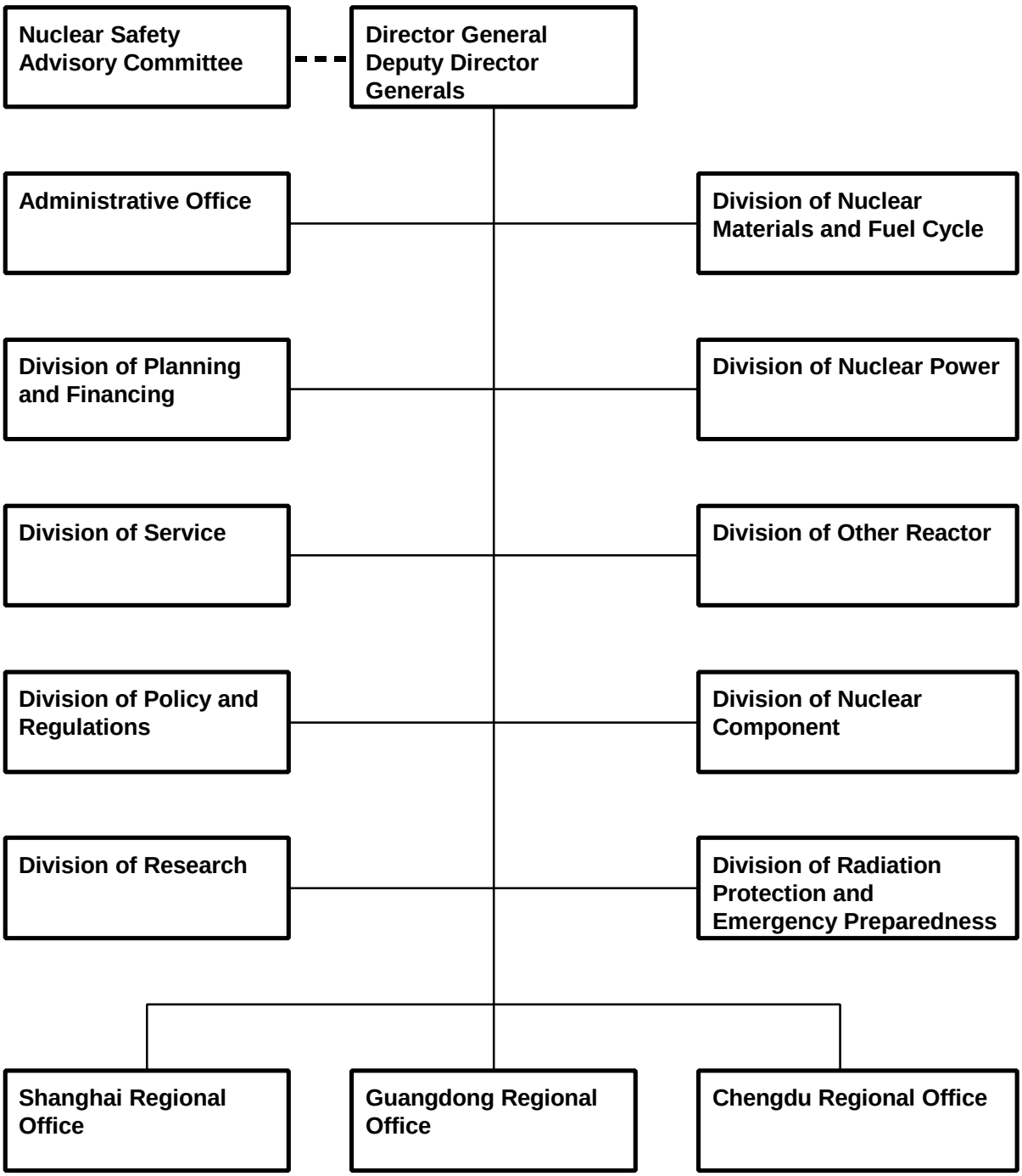


CANADA
Atomic Energy Control Board
(AECB)

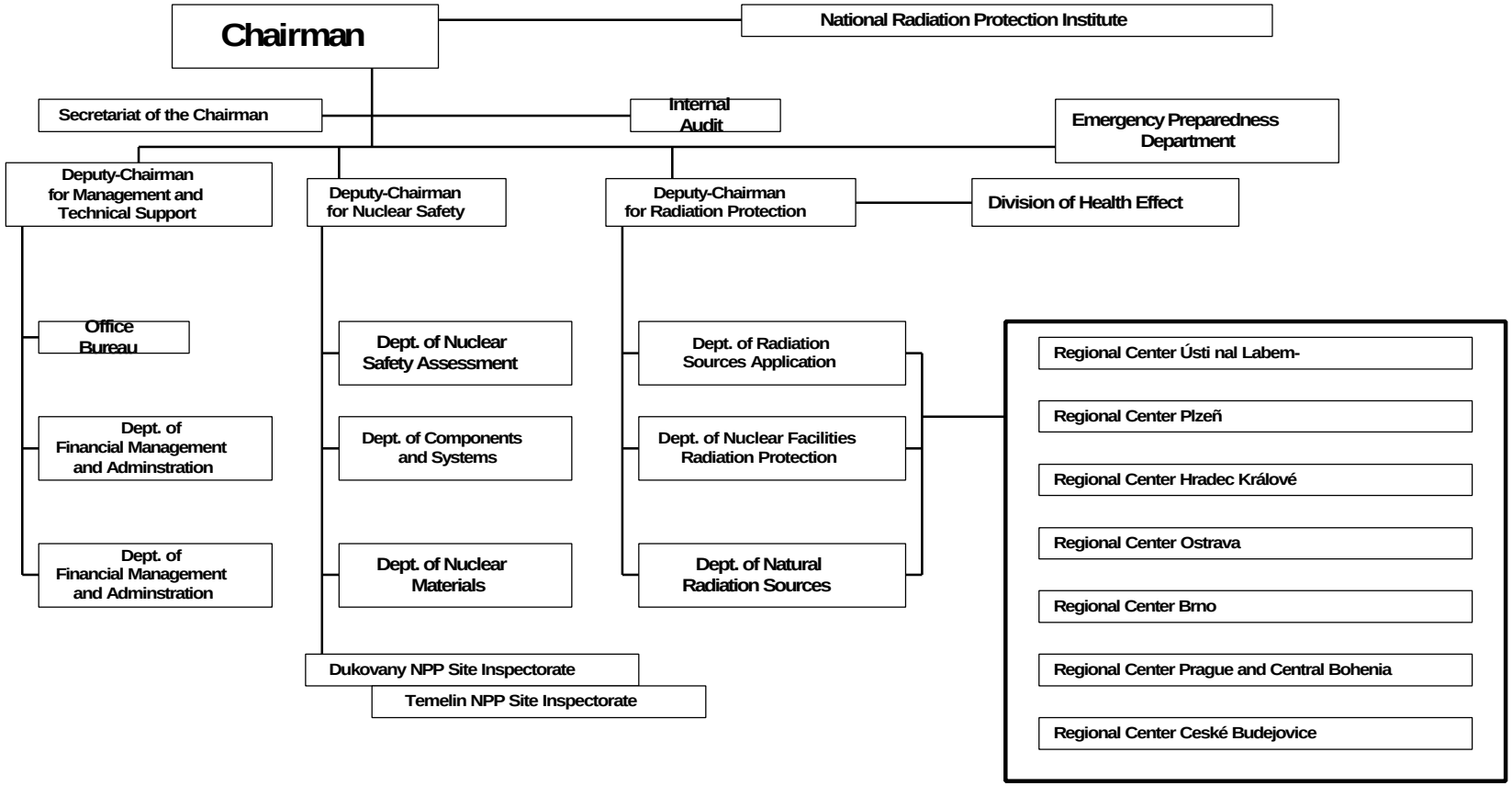


CHINA

National Nuclear Safety Administration (NNSA)

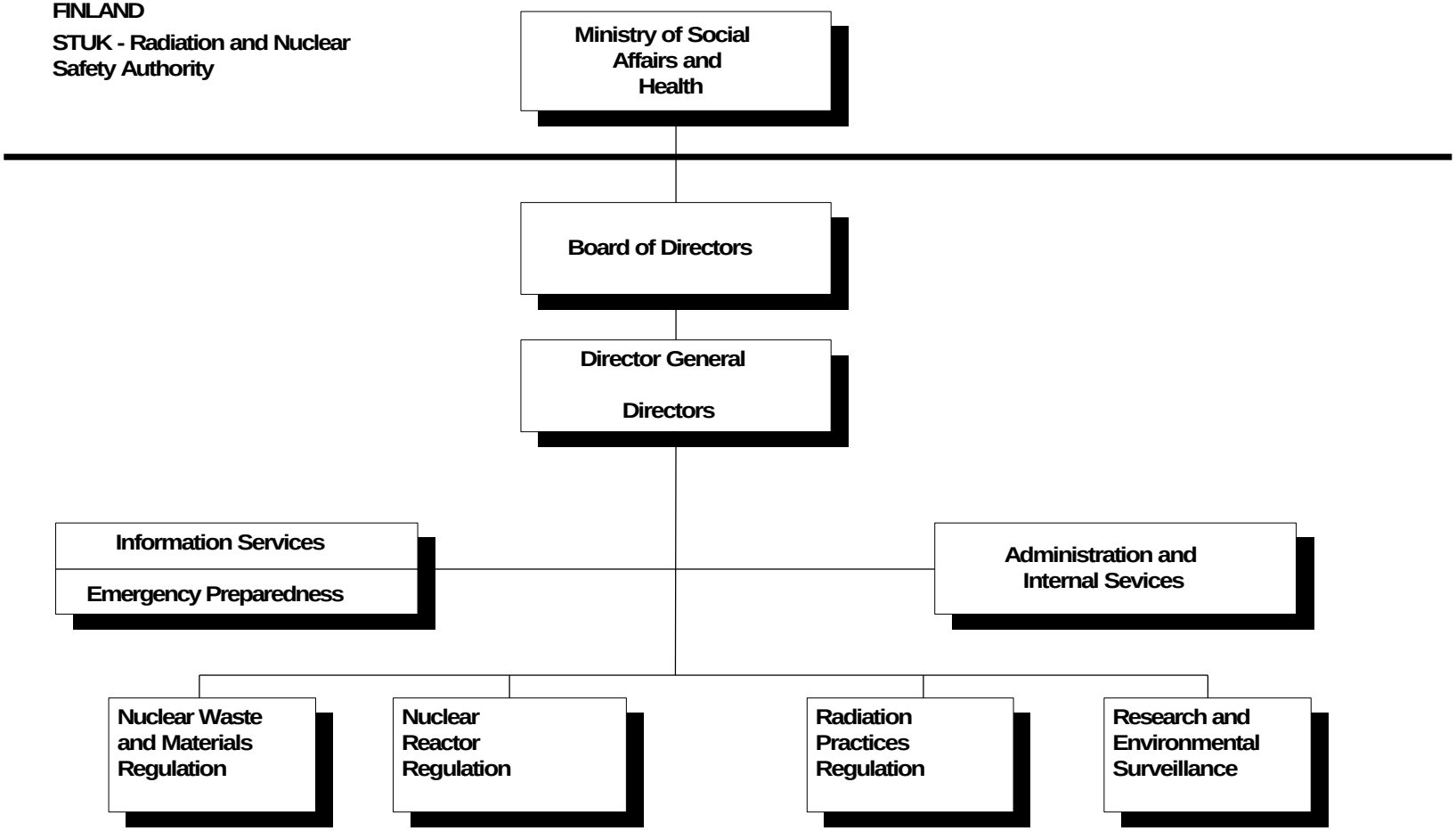


CZECH REPUBLIC
State Office for Nuclear Safety (SÚJB)



FINLAND

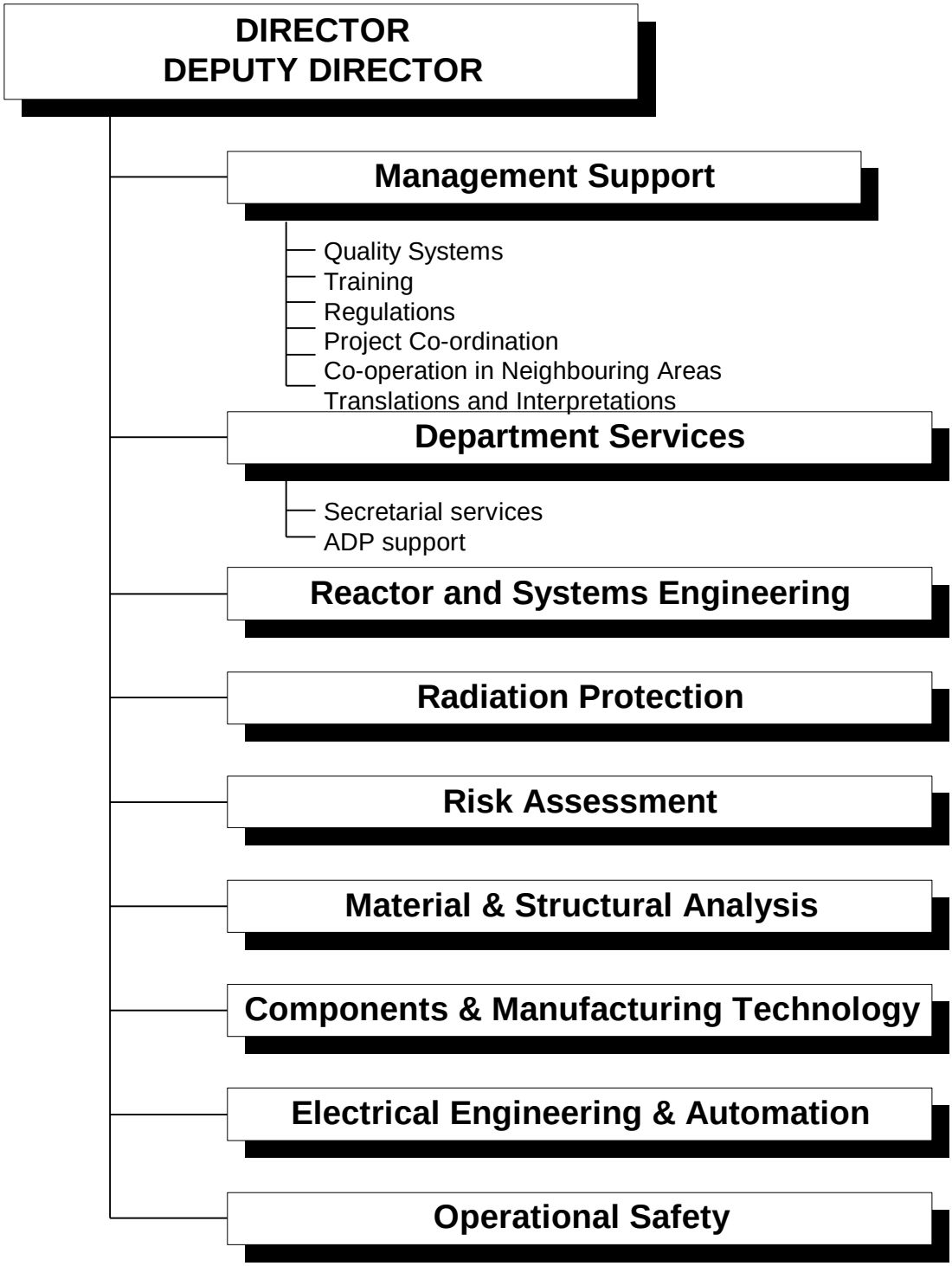
STUK - Radiation and Nuclear Safety Authority



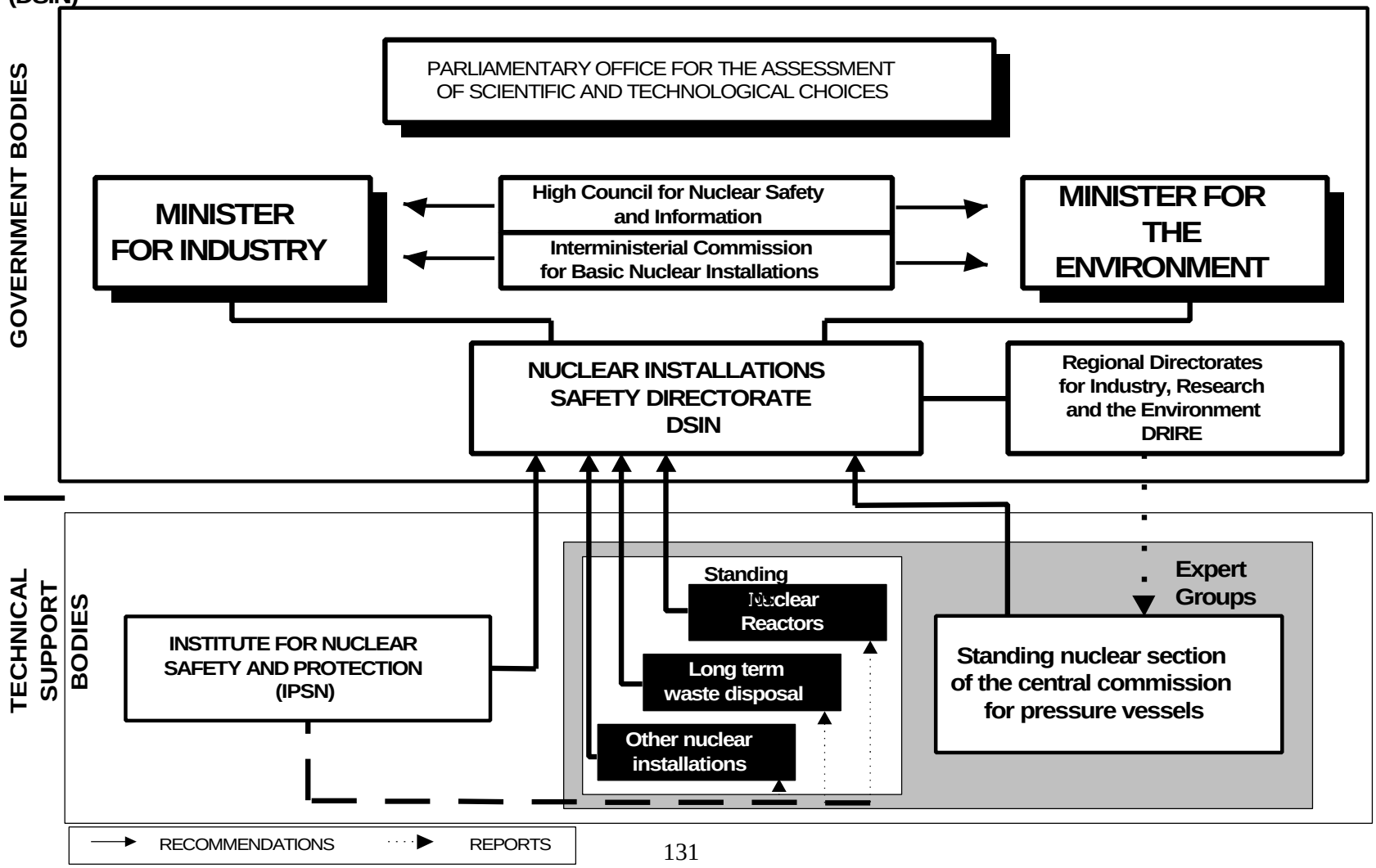
FINLAND (cont'd.)

STUK - Radiation and Nuclear Safety Authority

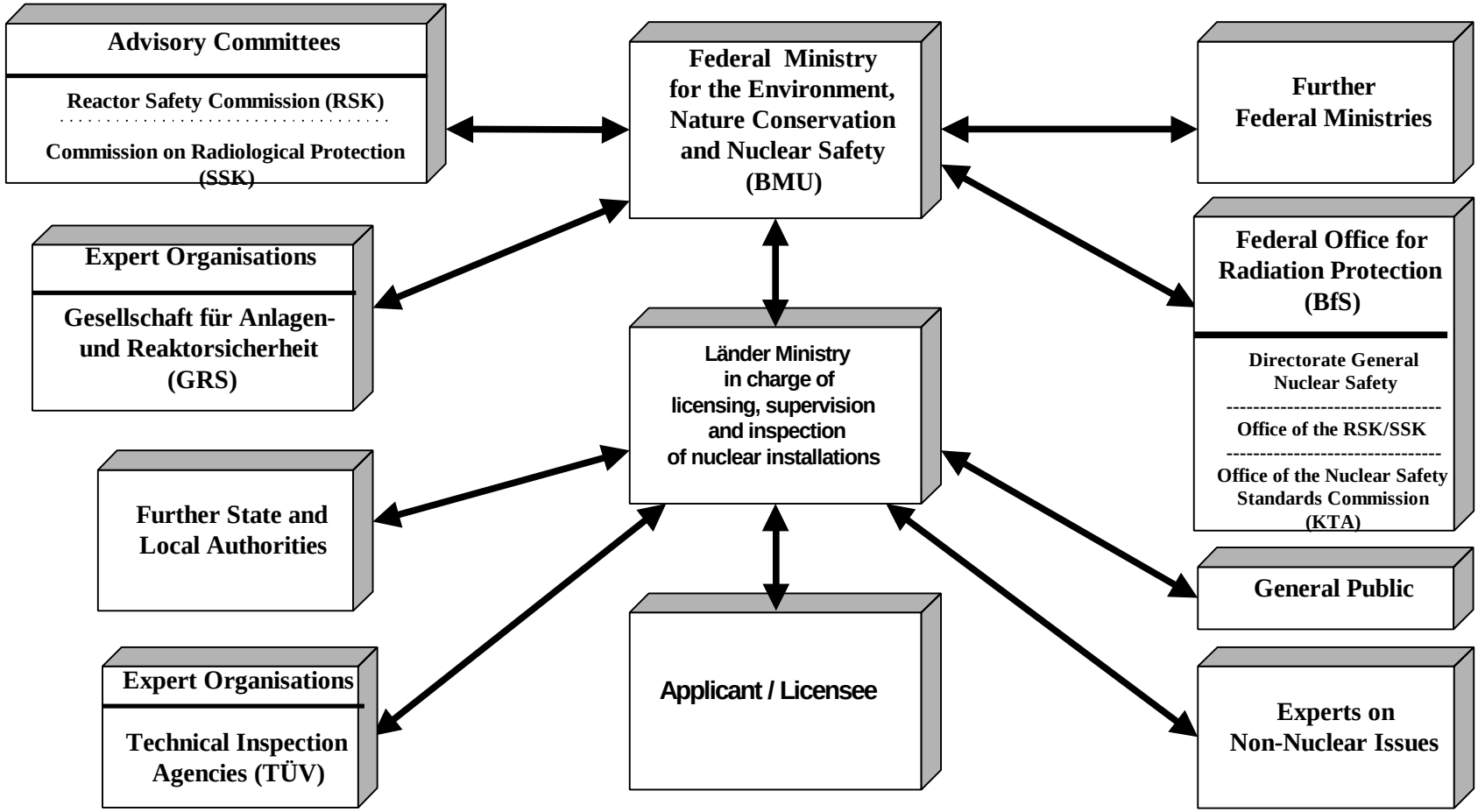
Nuclear Reactor Regulation



FRANCE - Nuclear Installations Safety Directorate (DSIN)

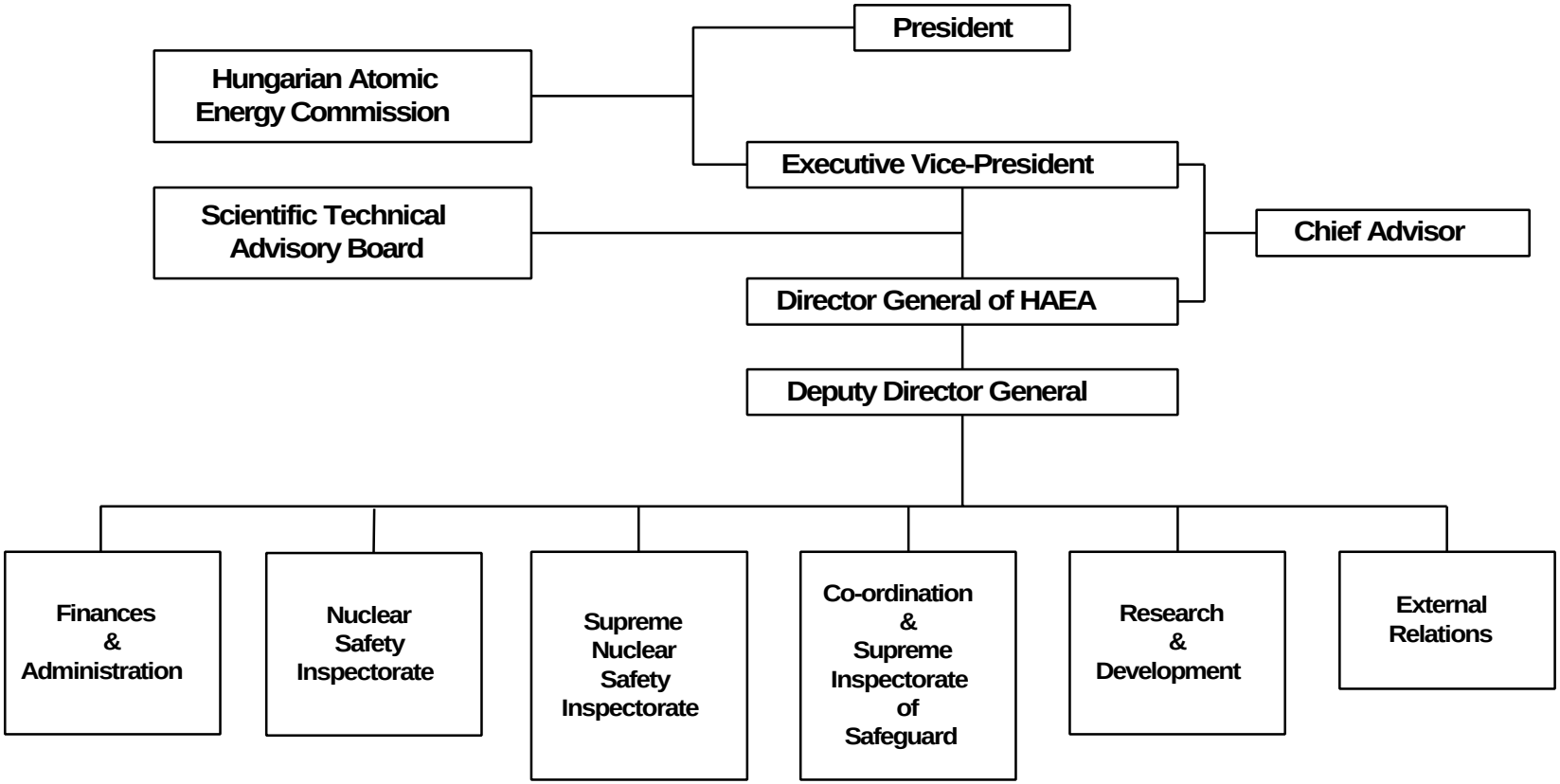


GERMANY

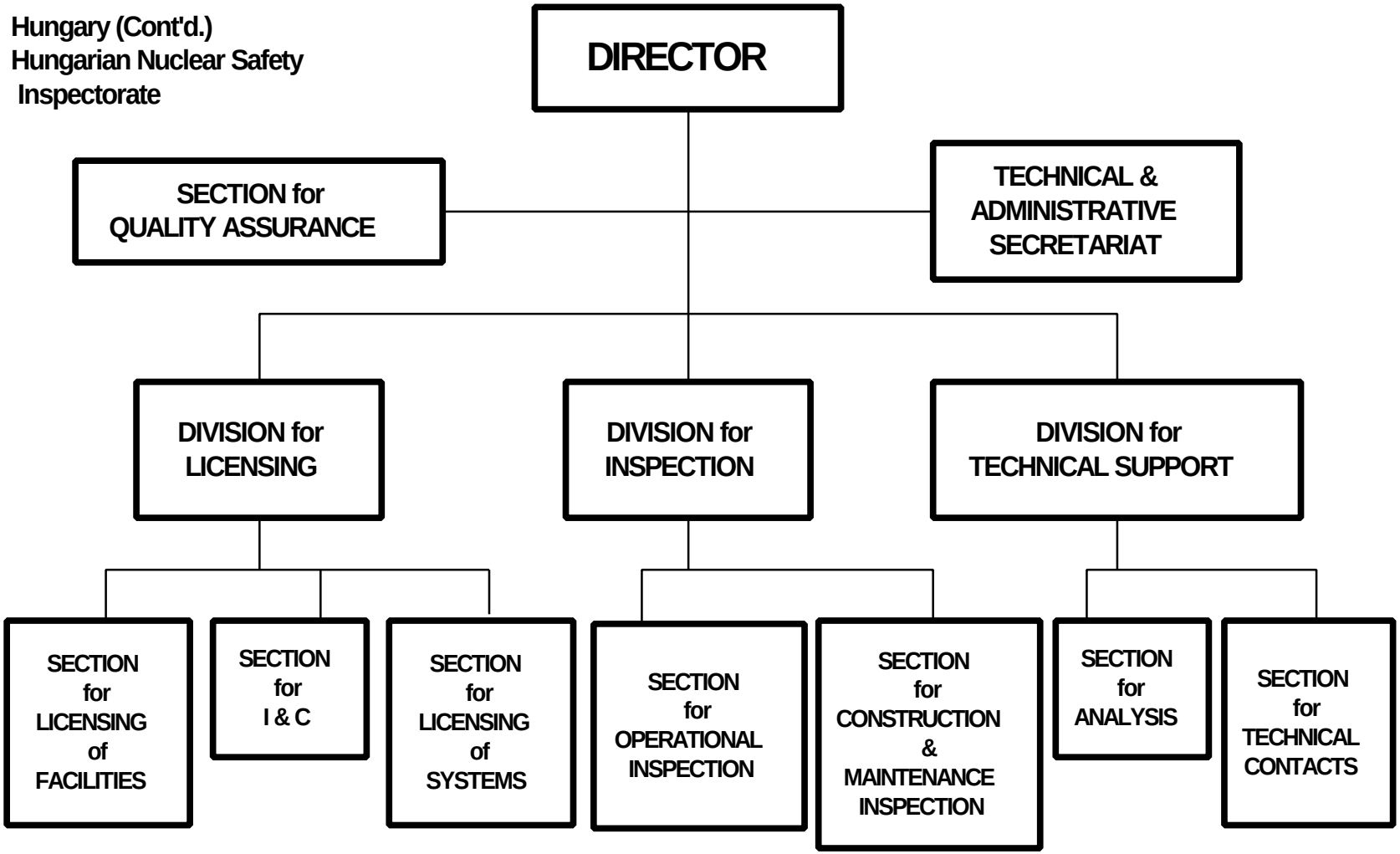

Advisory Committees
Reactor Safety Commission (RSK)
Commission on Radiological Protection (SSK)
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
Further Federal Ministries
Expert Organisations
Gesellschaft für Anlagen- und Reaktorsicherheit (GRS)
Federal Office for Radiation Protection (BfS)
Directorate General Nuclear Safety
Office of the RSK/SSK
Office of the Nuclear Safety Standards Commission (KTA)
Länder Ministry in charge of licensing, supervision and inspection of nuclear installations
Further State and Local Authorities
General Public
Expert Organisations
Technical Inspection Agencies (TÜV)
Applicant / Licensee
Experts on Non-Nuclear Issues

HUNGARY

Hungarian Atomic Energy Commission (HAEC) and Hungarian Atomic Energy Authority (HAEA)

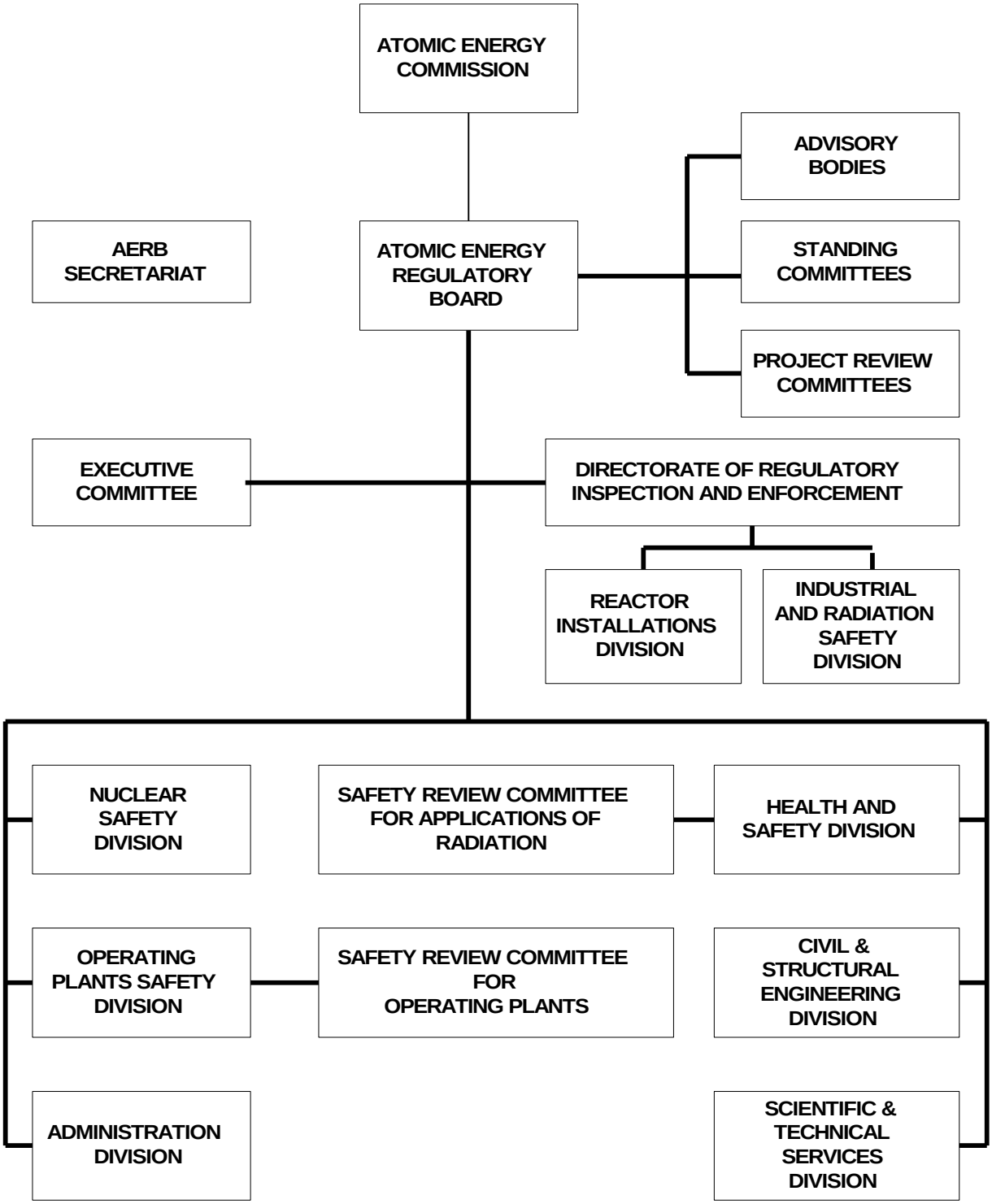


Hungary (Cont'd.)
Hungarian Nuclear Safety Inspectorate

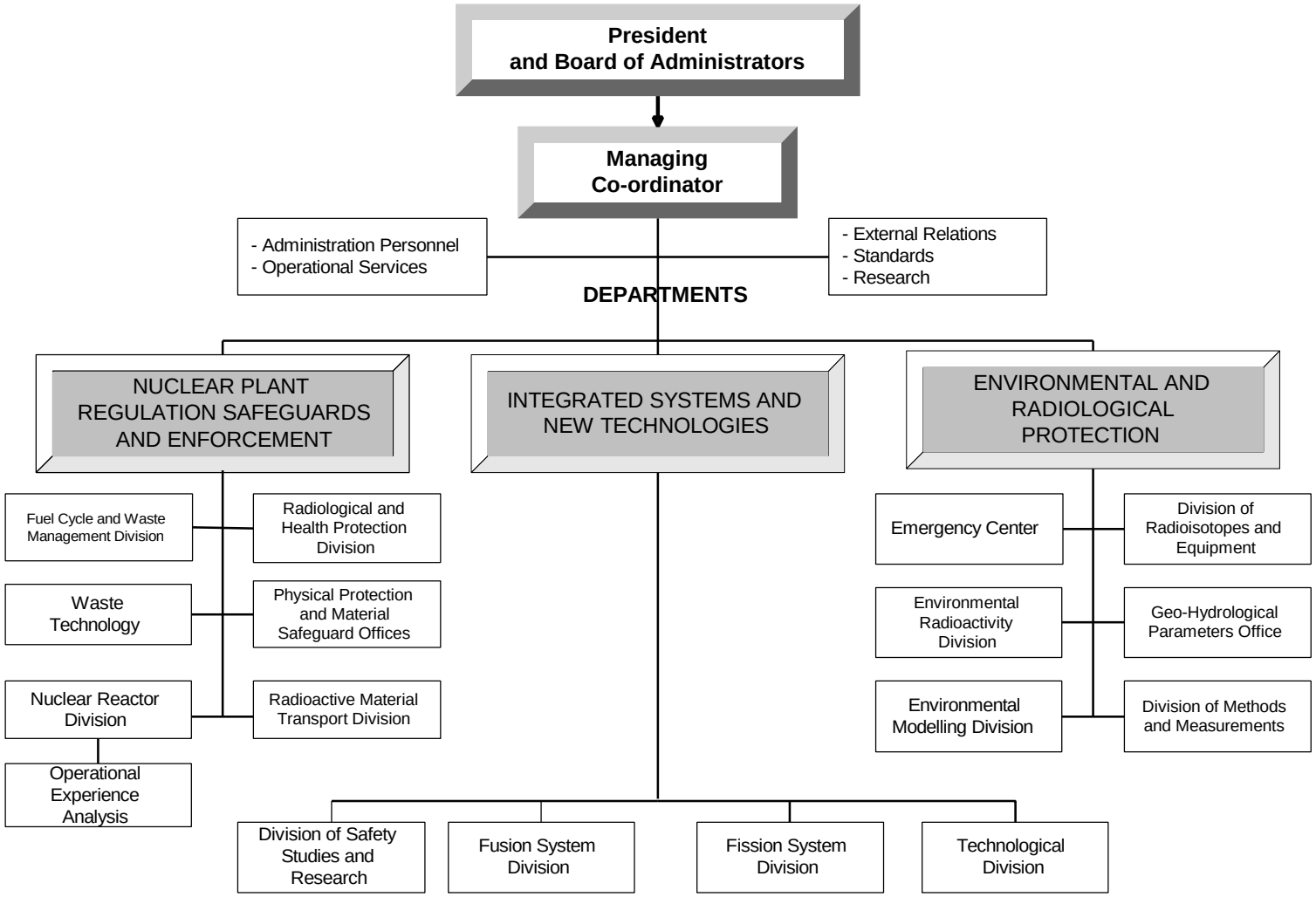


INDIA

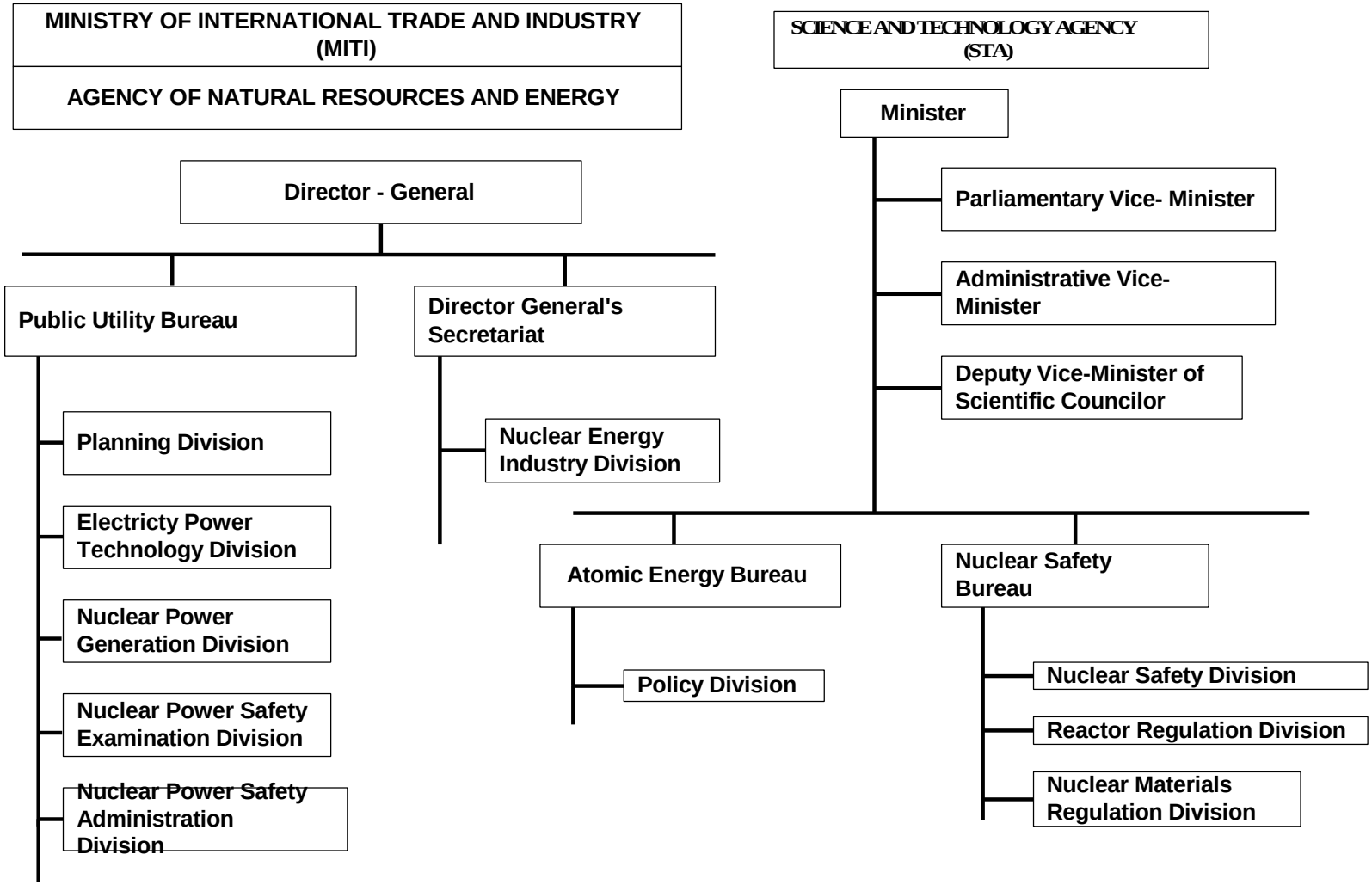
Atomic Energy Regulatory Board (AERB)



ITALY
National Agency of Environmental Protection (ANPA)

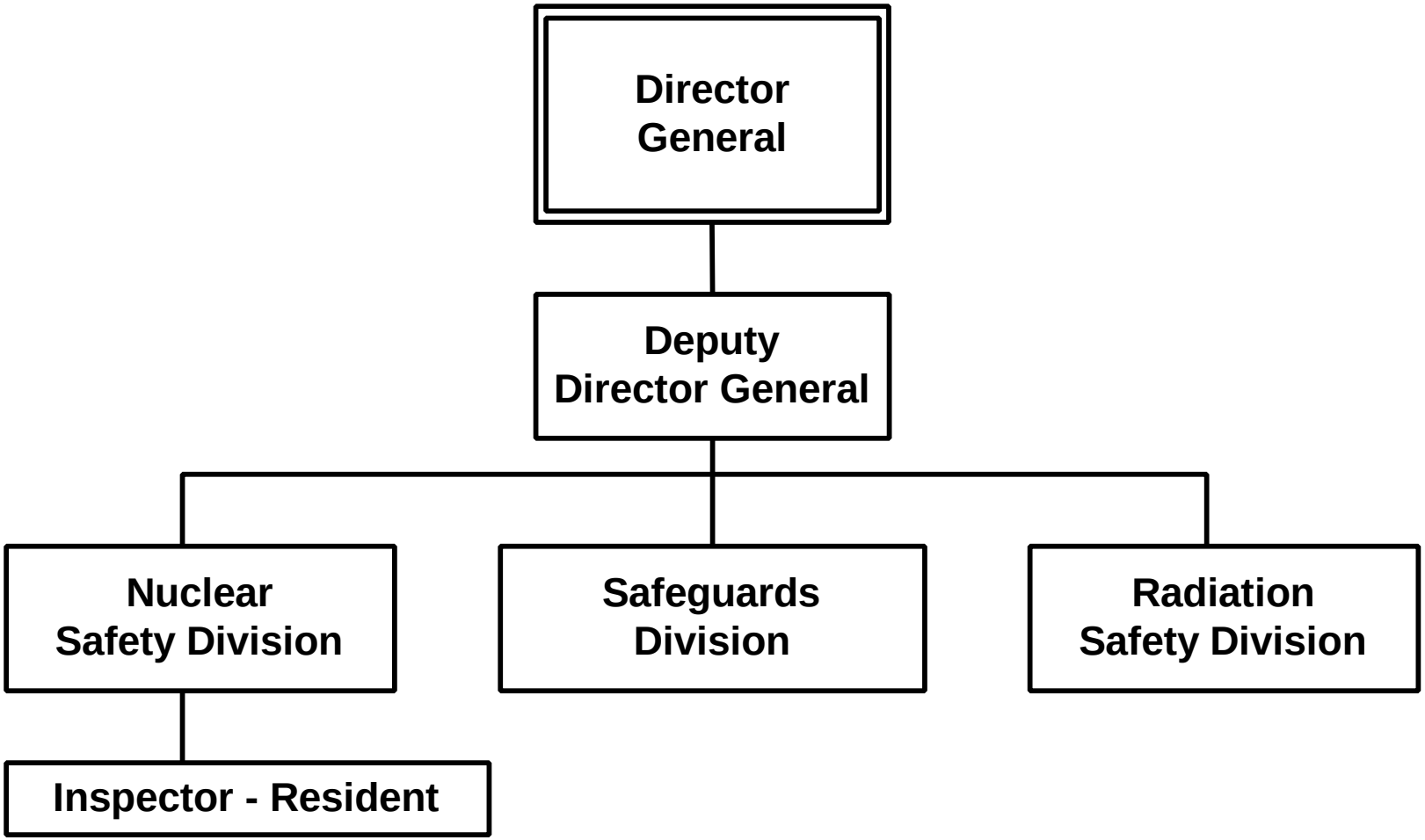


JAPAN

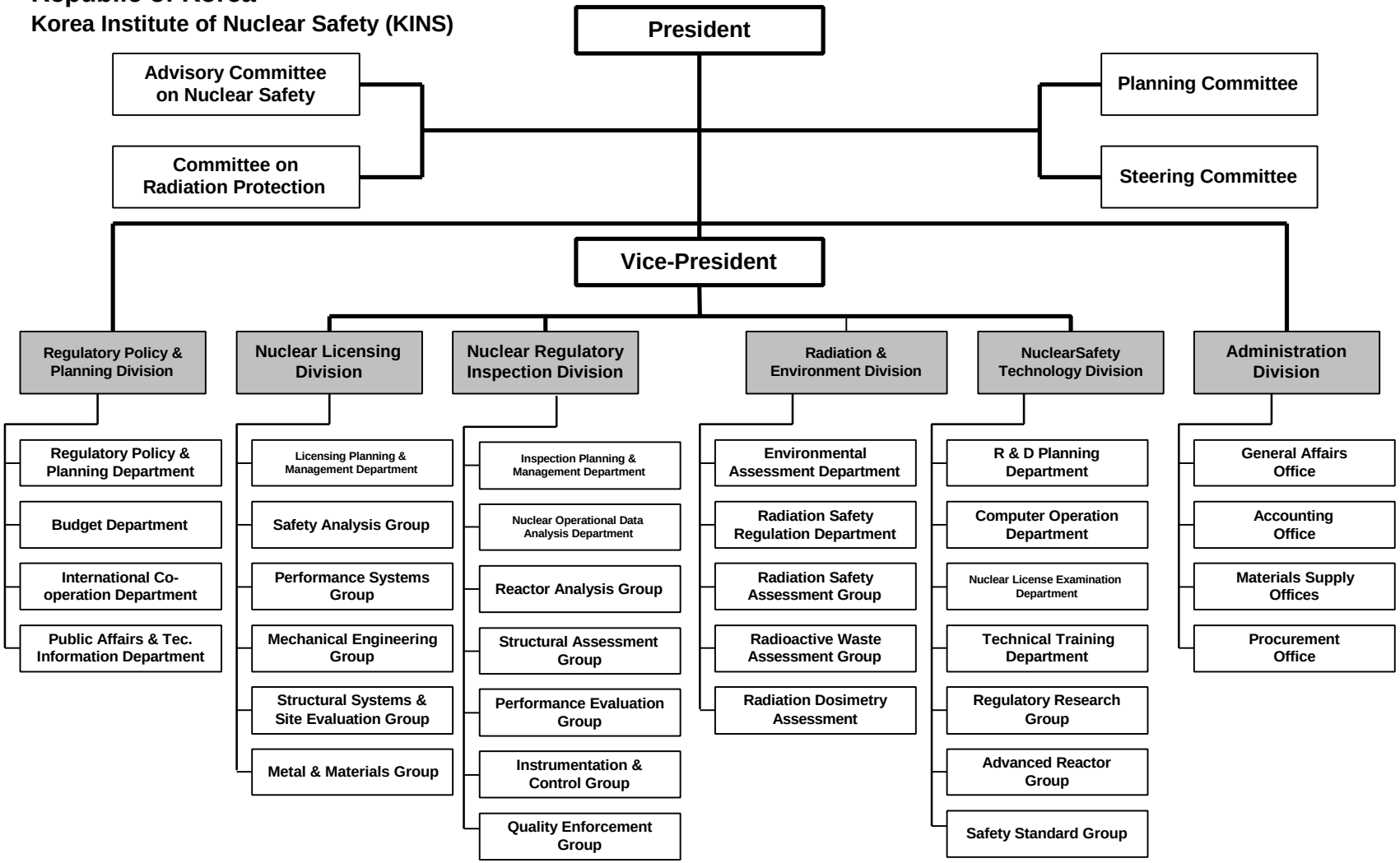

MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY (MITI)
AGENCY OF NATURAL RESOURCES AND ENERGY
Director - General
Public Utility Bureau
Planning Division
Electricty Power Technology Division
Nuclear Power Generation Division
Nuclear Power Safety Examination Division
Nuclear Power Safety Administration Division
Director General's Secretariat
Nuclear Energy Industry Division
SCIENCE AND TECHNOLOGY AGENCY (STA)
Minister
Parliamentary Vice- Minister
Administrative Vice-Minister
Deputy Vice-Minister of Scientific Councilor
Atomic Energy Bureau
Policy Division
Nuclear Safety Bureau
Nuclear Safety Division
Reactor Regulation Division
Nuclear Materials Regulation Division

Kazakstan

Kazakstan Atomic Energy Agency (KAEA)

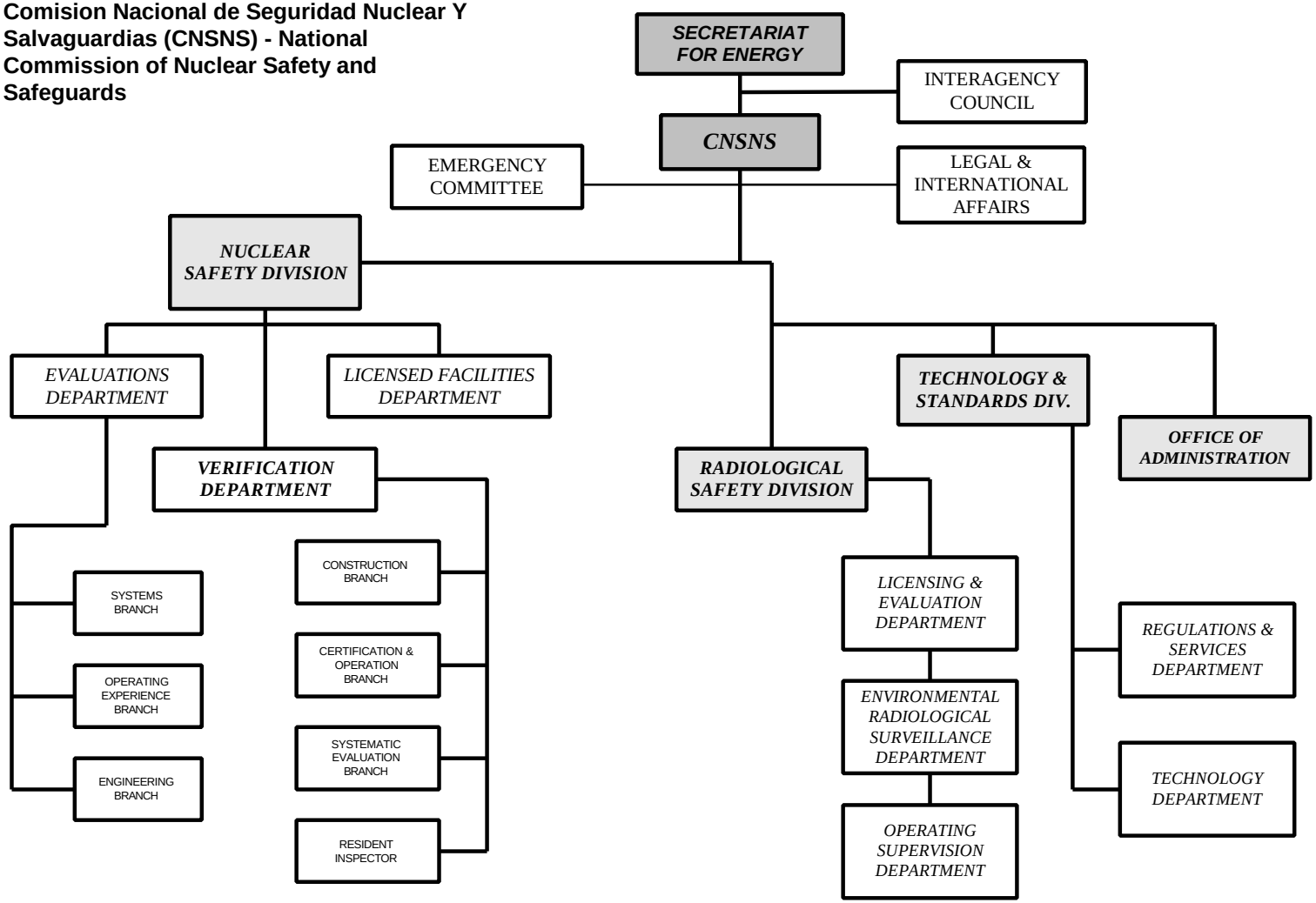


Republic of Korea
Korea Institute of Nuclear Safety (KINS)

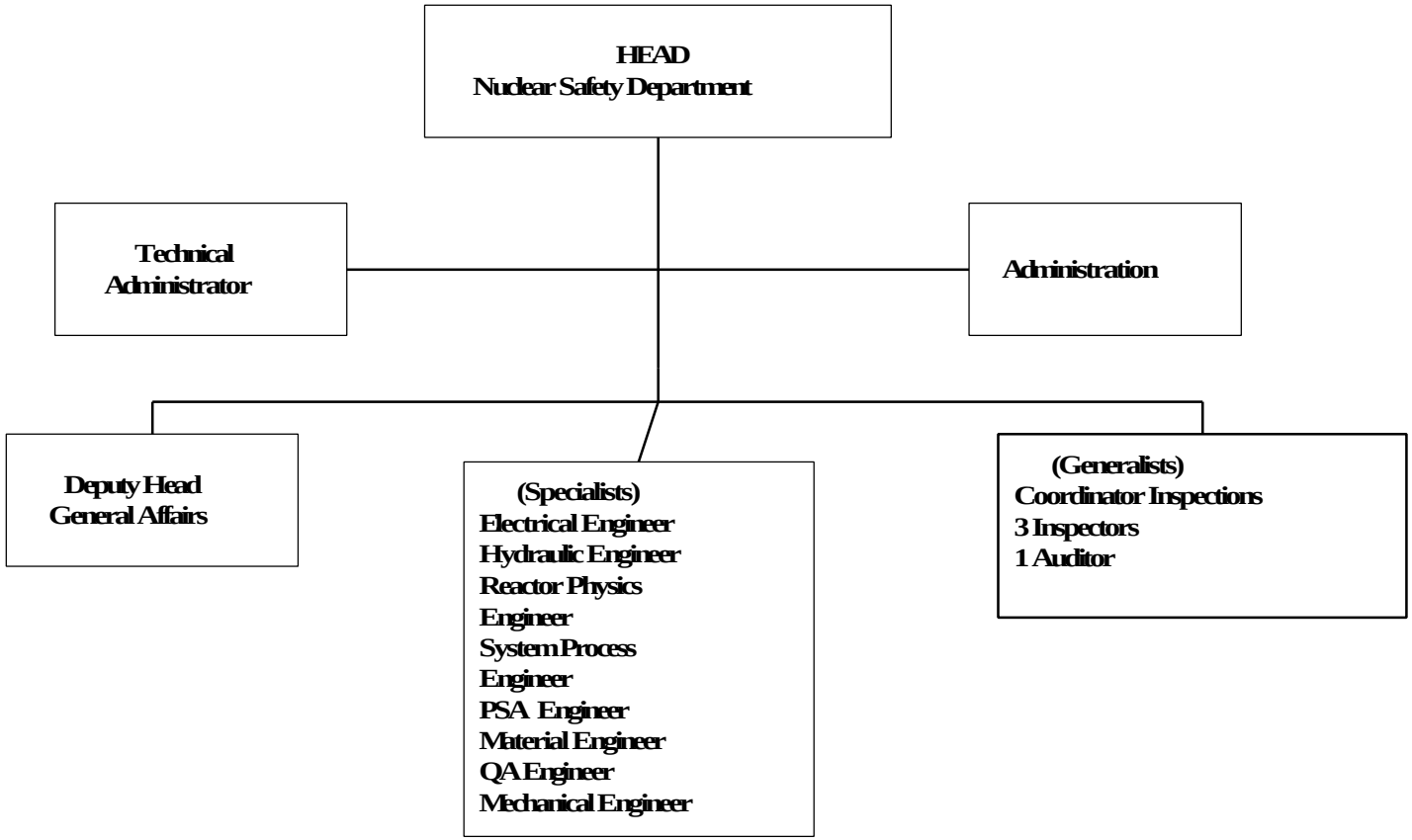


MEXICO

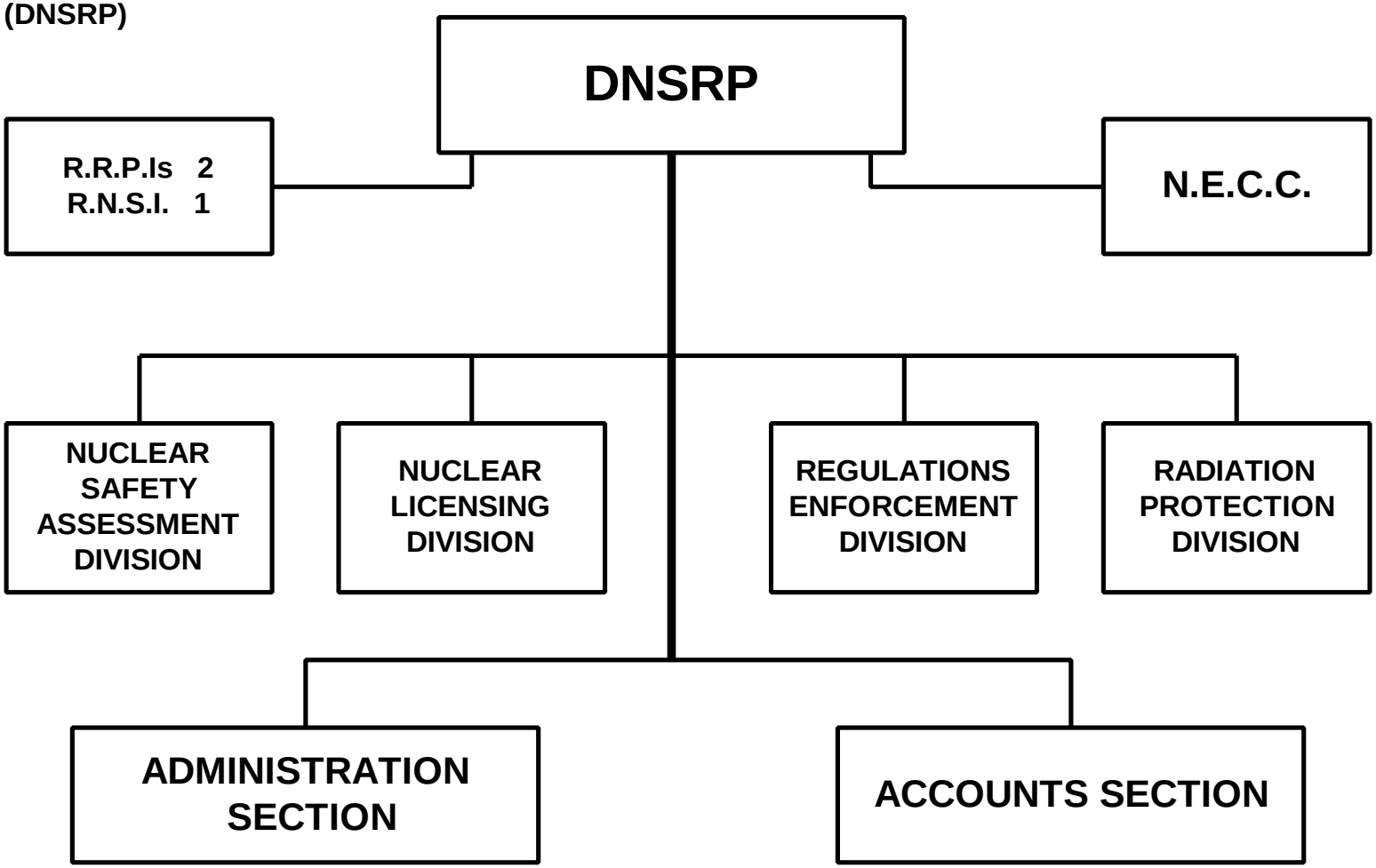
Comision Nacional de Seguridad Nuclear Y Salvaguardias (CNSNS) - National Commission of Nuclear Safety and Safeguards



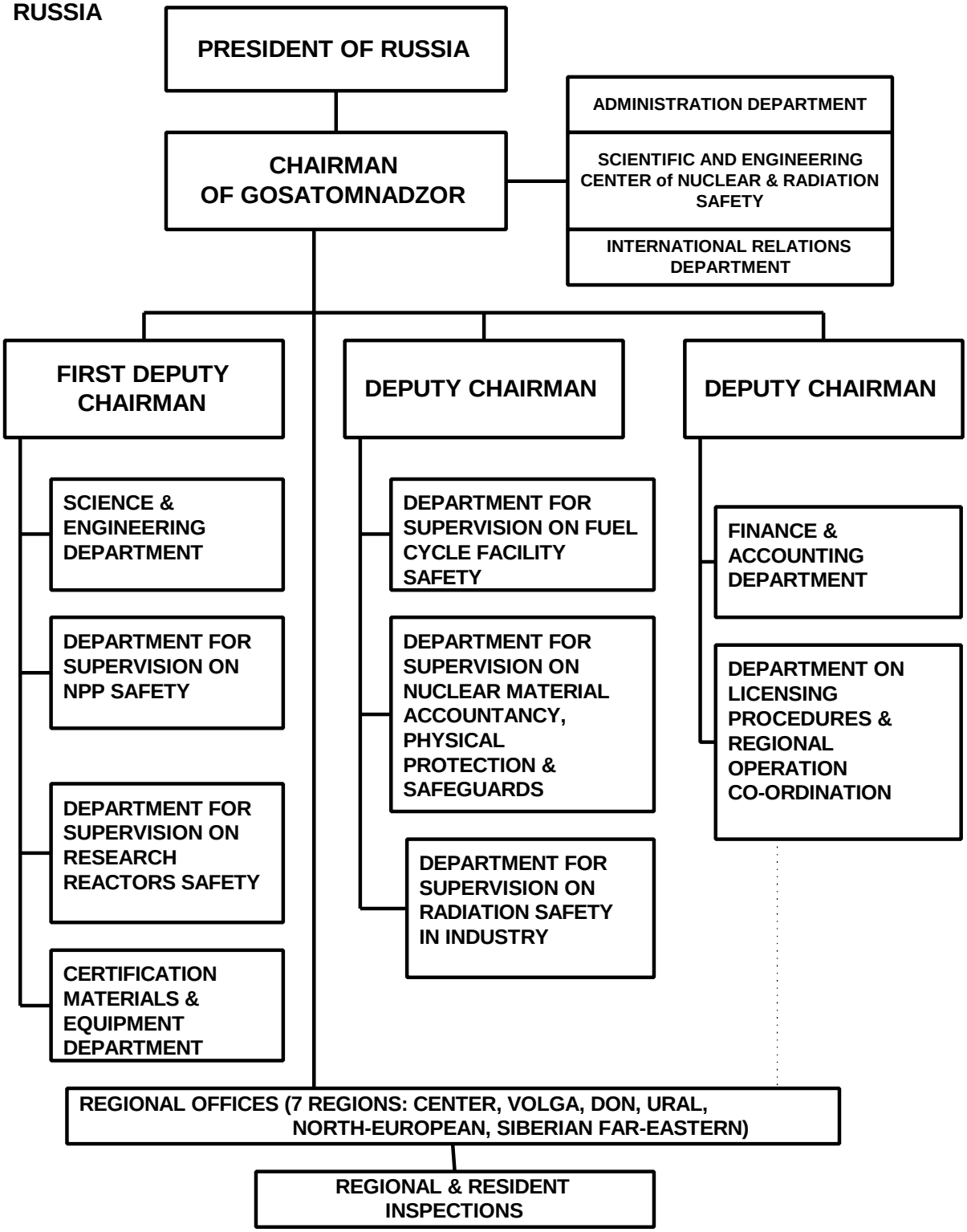
THE NETHERLANDS
Nuclear Safety Department (KFD)



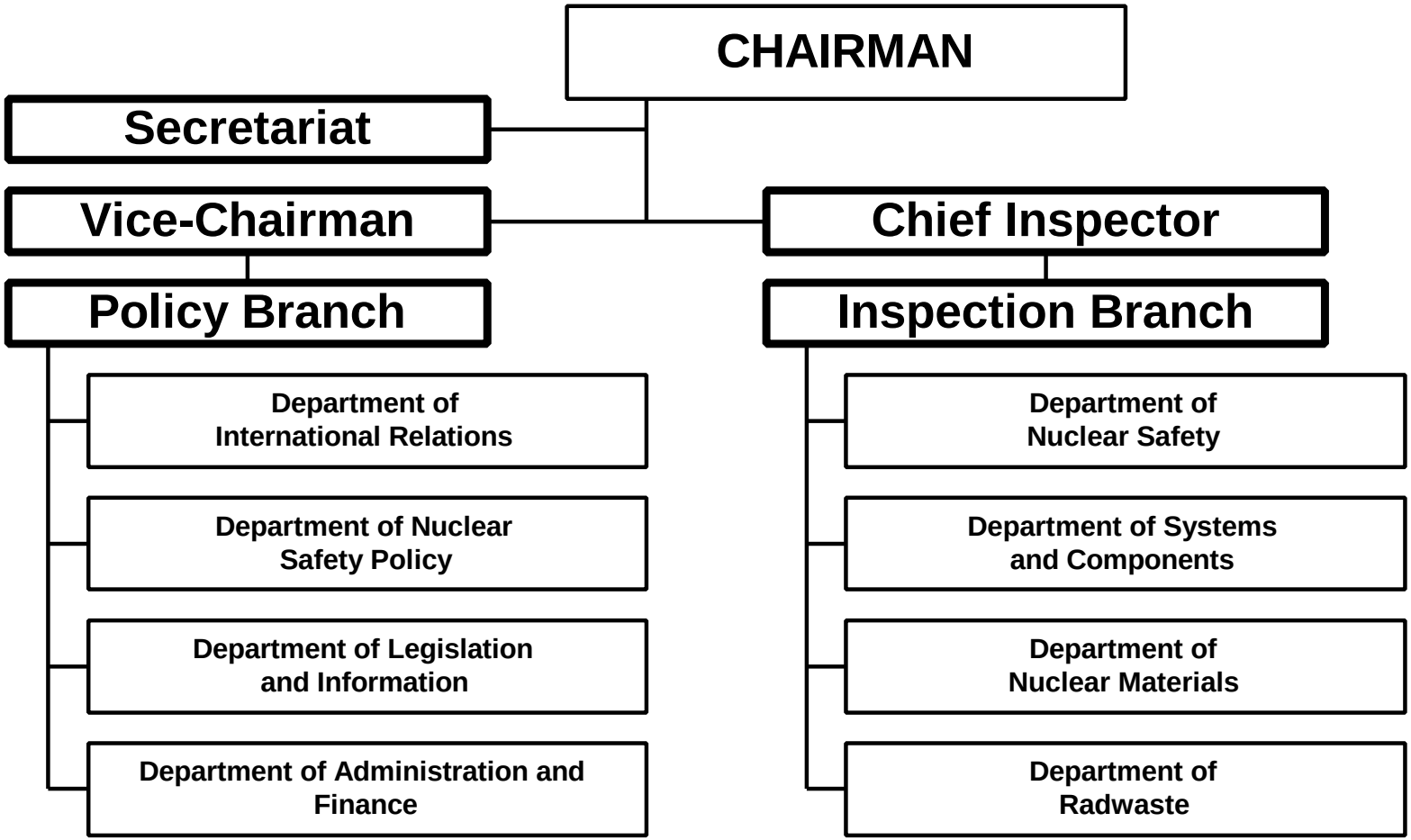
PAKISTAN
Directorate of Nuclear Safety and Radiation Protection (DNSRP)



RUSSIA

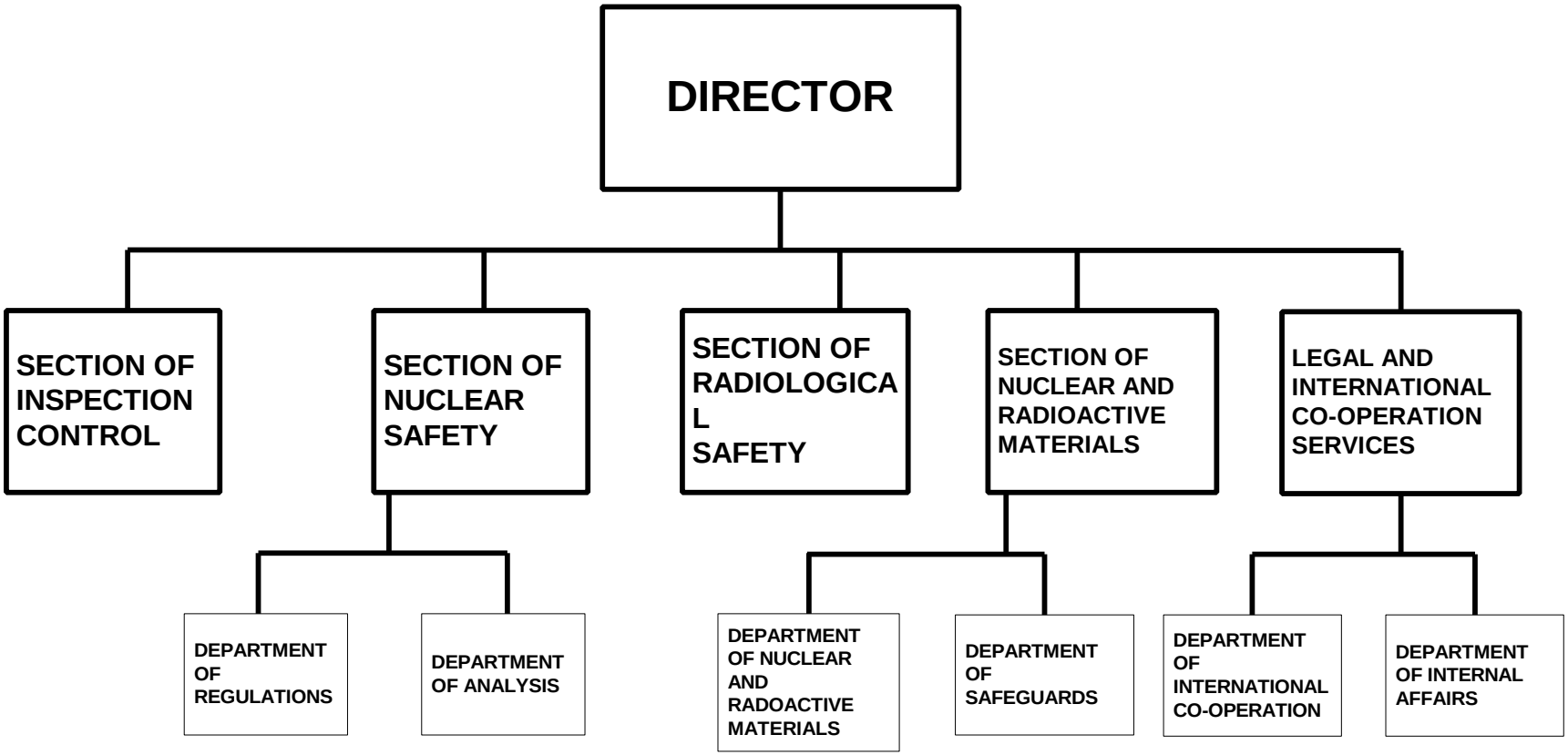

PRESIDENT OF RUSSIA
CHAIRMAN OF GOSATOMNADZOR
ADMINISTRATION DEPARTMENT
SCIENTIFIC AND ENGINEERING CENTER of NUCLEAR & RADIATION SAFETY
INTERNATIONAL RELATIONS DEPARTMENT
FIRST DEPUTY CHAIRMAN
DEPUTY CHAIRMAN
DEPUTY CHAIRMAN
SCIENCE & ENGINEERING DEPARTMENT
DEPARTMENT FOR SUPERVISION ON NPP SAFETY
DEPARTMENT FOR SUPERVISION ON RESEARCH REACTORS SAFETY
CERTIFICATION MATERIALS & EQUIPMENT DEPARTMENT
DEPARTMENT FOR SUPERVISION ON FUEL CYCLE FACILITY SAFETY
DEPARTMENT FOR SUPERVISION ON NUCLEAR MATERIAL ACCOUNTANCY, PHYSICAL PROTECTION & SAFEGUARDS
DEPARTMENT FOR SUPERVISION ON RADIATION SAFETY IN INDUSTRY
FINANCE & ACCOUNTING DEPARTMENT
DEPARTMENT ON LICENSING PROCEDURES & REGIONAL OPERATION CO-ORDINATION
REGIONAL OFFICES (7 REGIONS: CENTER, VOLGA, DON, URAL, NORTH-EUROPEAN, SIBERIAN FAR-EASTERN)
REGIONAL & RESIDENT INSPECTIONS

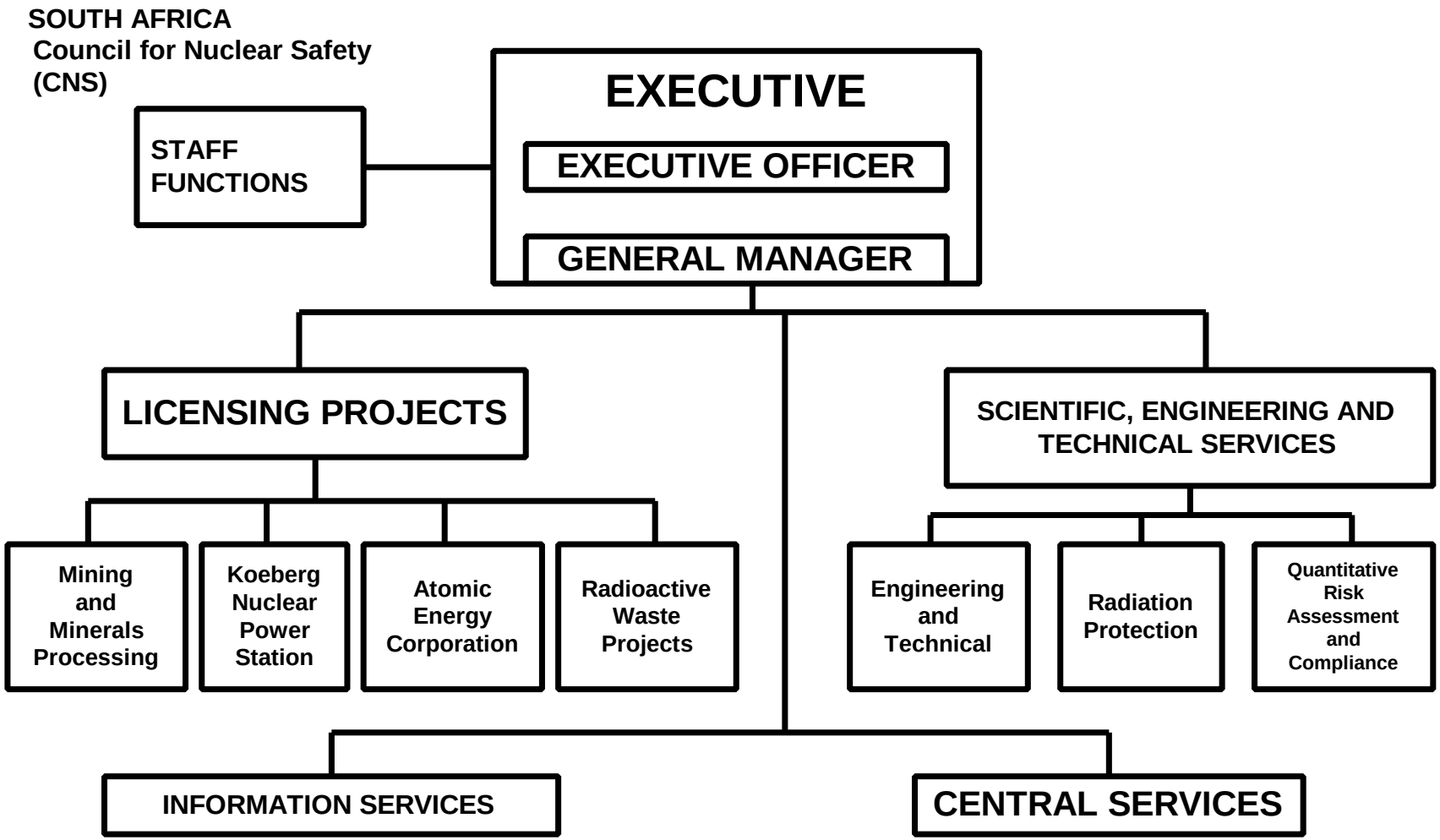
Slovak Republic
Nuclear Regulatory Authority of Slovak Republic (ÚJD SR)



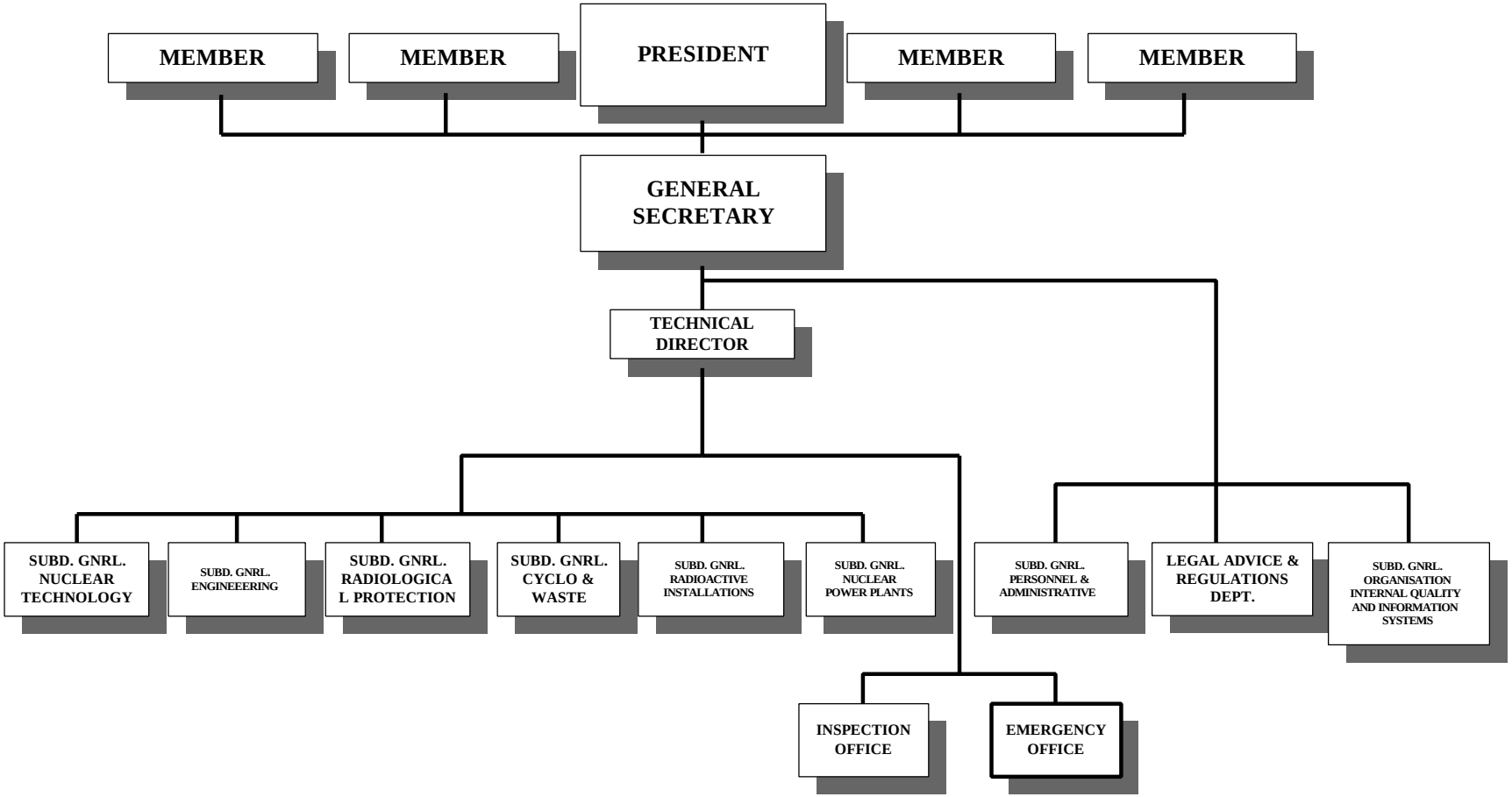
SLOVENIA

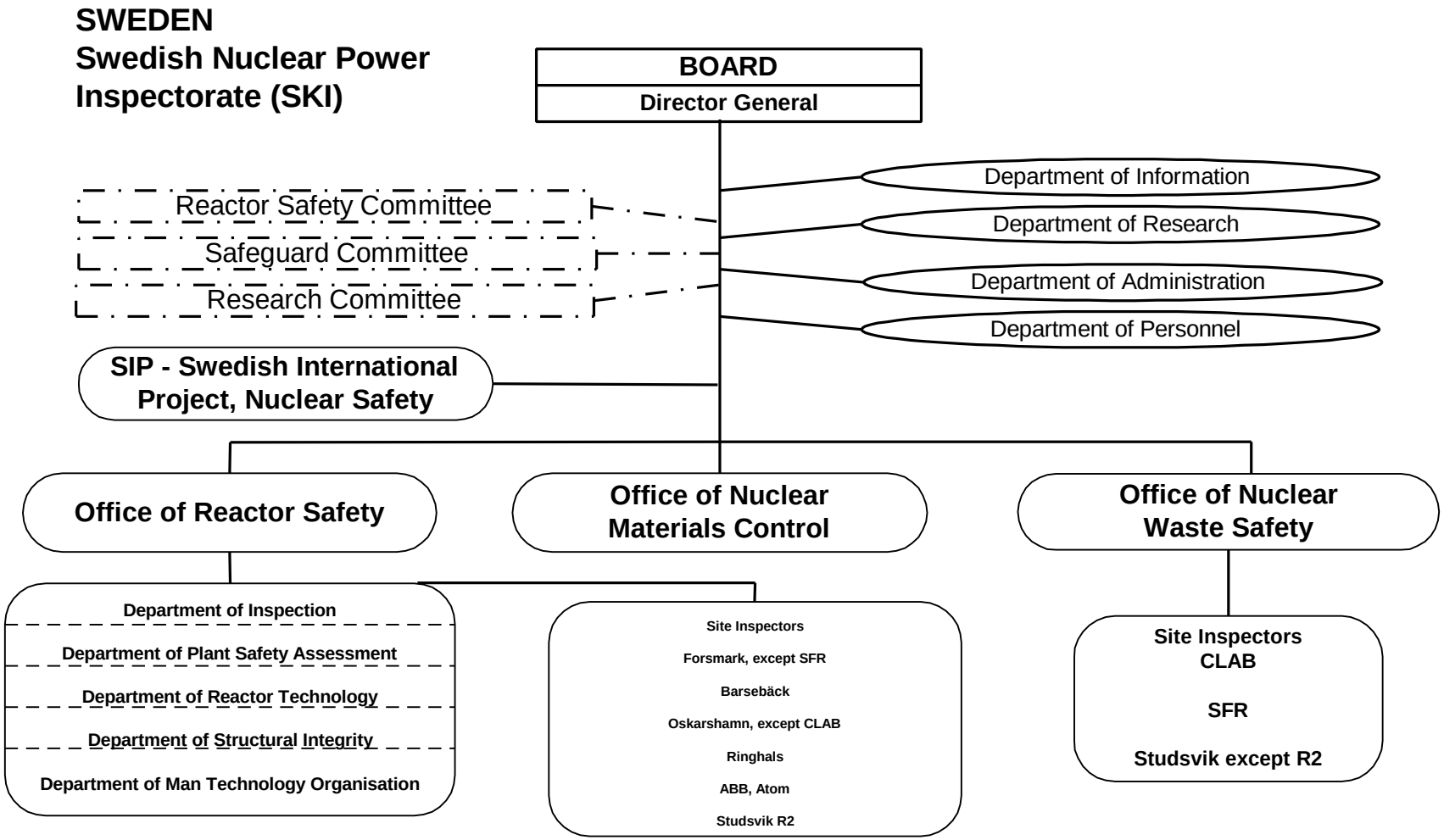
Slovenian Nuclear Safety Administration (SNSA)



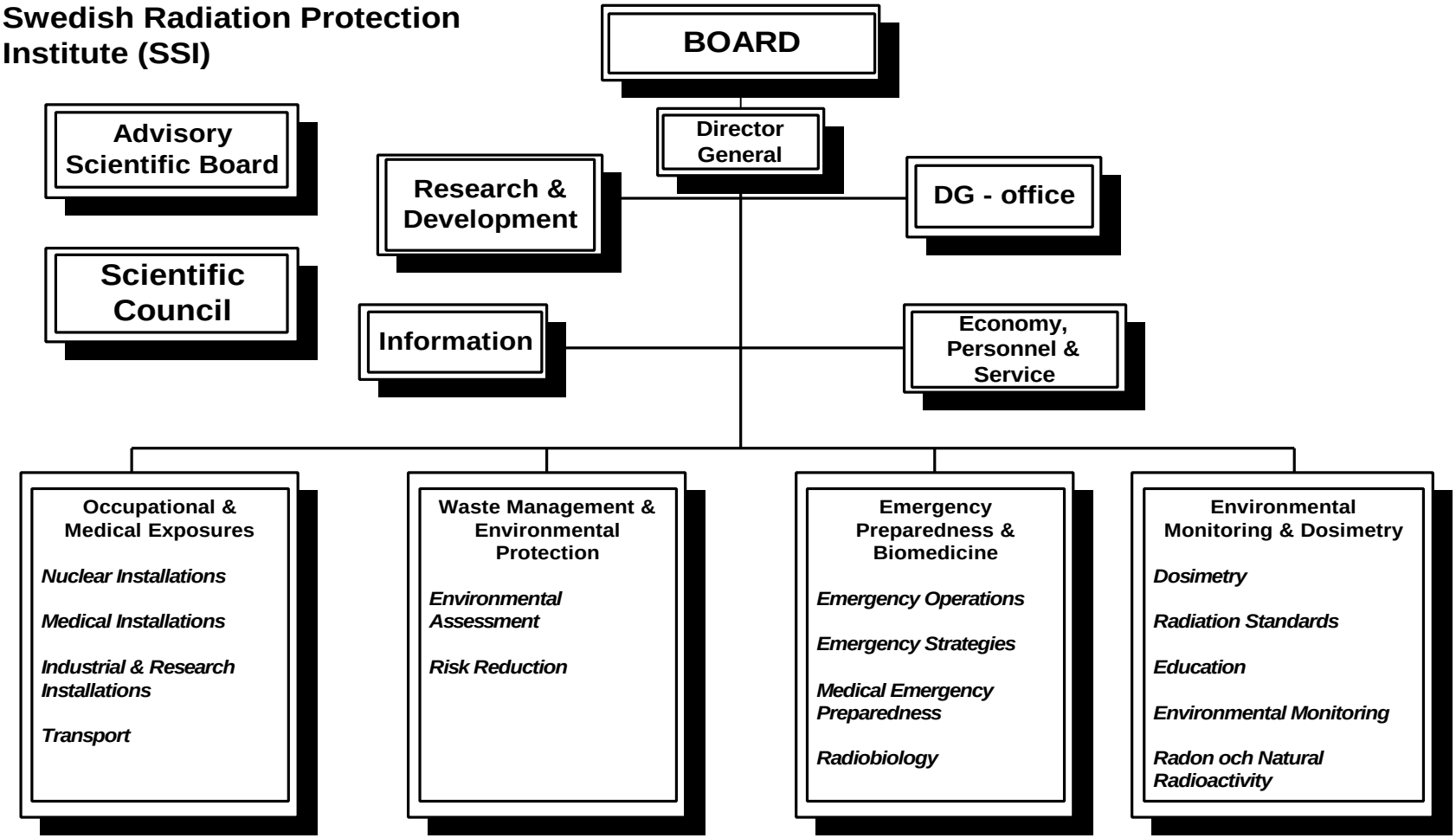

SOUTH AFRICA
Council for Nuclear Safety
(CNS)
STAFF FUNCTIONS
EXECUTIVE
EXECUTIVE OFFICER
GENERAL MANAGER
LICENSING PROJECTS
SCIENTIFIC, ENGINEERING AND TECHNICAL SERVICES
Mining and Minerals Processing
Koeberg Nuclear Power Station
Atomic Energy Corporation
Radioactive Waste Projects
Engineering and Technical
Radiation Protection
Quantitative Risk Assessment and Compliance
INFORMATION SERVICES
CENTRAL SERVICES

SPAIN
Consejo de Seguridad Nuclear (CSN) - Nuclear Safety Council

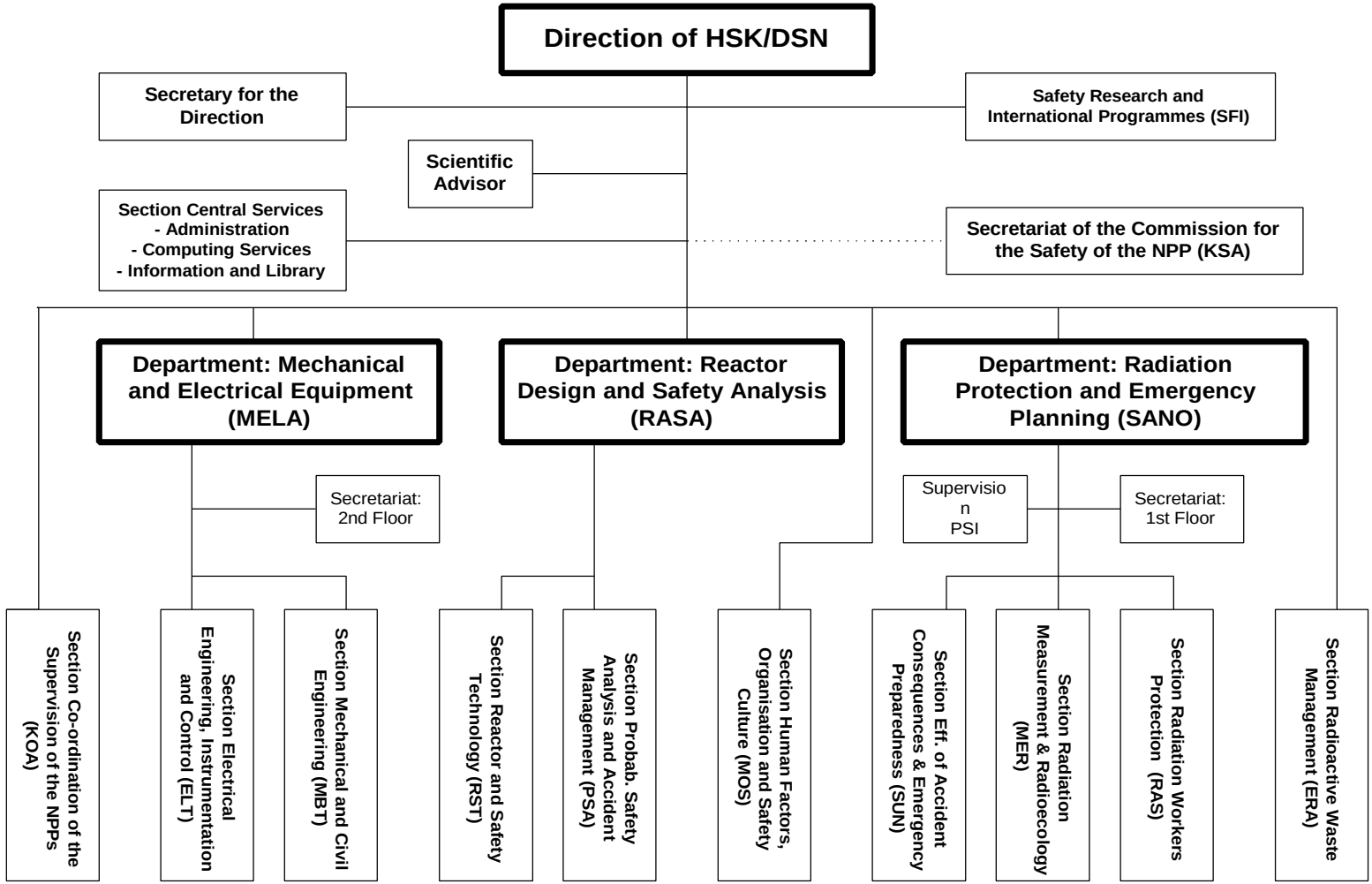



SWEDEN
Swedish Nuclear Power Inspectorate (SKI)
BOARD
Director General
Department of Information
Department of Research
Department of Administration
Department of Personnel
Reactor Safety Committee
Safeguard Committee
Research Committee
SIP - Swedish International Project, Nuclear Safety
Office of Reactor Safety
Office of Nuclear Materials Control
Office of Nuclear Waste Safety
Department of Inspection
Department of Plant Safety Assessment
Department of Reactor Technology
Department of Structural Integrity
Department of Man Technology Organisation
Site Inspectors
Forsmark, except SFR
Barsebäck
Oskarshamn, except CLAB
Ringhals
ABB, Atom
Studsvik R2
Site Inspectors
CLAB
SFR
Studsvik except R2

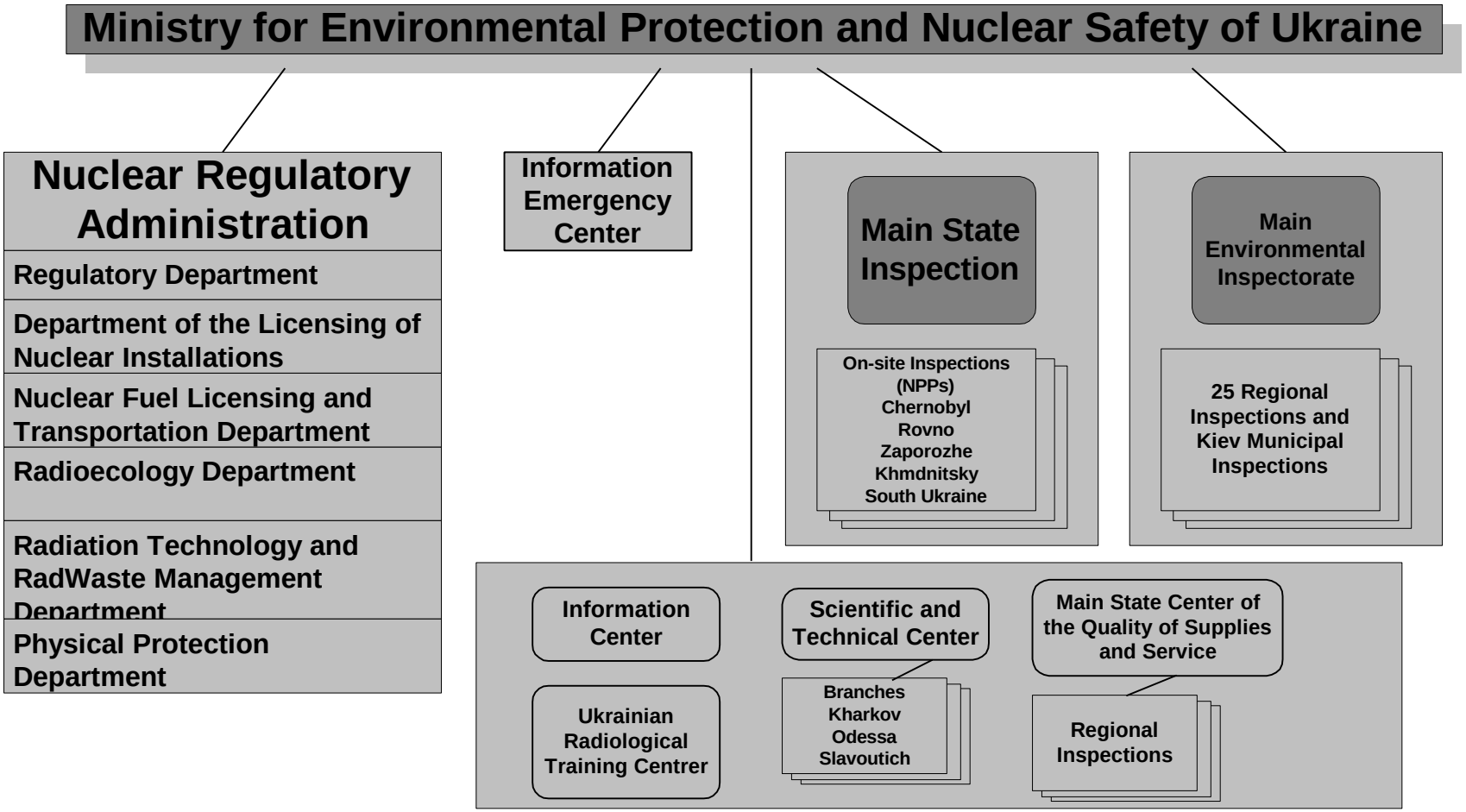
SWEDEN (Cont'd.)
Swedish Radiation Protection Institute (SSI)



SWITZERLAND
Swiss Federal Nuclear Safety Inspectorate
(HSK)



UKRAINE


Ministry for Environmental Protection and Nuclear Safety of Ukraine
Nuclear Regulatory Administration
Regulatory Department
Department of the Licensing of Nuclear Installations
Nuclear Fuel Licensing and Transportation Department
Radioecology Department
Radiation Technology and RadWaste Management Department
Physical Protection Department
Information Emergency Center
Main State Inspection
On-site Inspections (NPPs)
Chernobyl
Rovno
Zaporozhe
Khmdnitsky
South Ukraine
Main Environmental Inspectorate
25 Regional Inspections and Kiev Municipal Inspections
Information Center
Ukrainian Radiological Training Centrer
Scientific and Technical Center
Branches
Kharkov
Odessa
Slavoutich
Main State Center of the Quality of Supplies and Service
Regional Inspections

UNITED KINGDOM

Nuclear Installations Inspectorate (NII)

Chief Inspector

Division 1

Strategy & Resource Management

Unit 1A - Finance & Planning
Unit 1B - CI Office
Unit 1C - Strategy
Unit 1D - Management Services
Unit 1E - Nuclear Safety Research
Unit 1F - Reactor Projects
Unit 1G - Chemical Plant Projects
Unit 1 H - Human Resources

Division 2

Head of Assessment & Standards

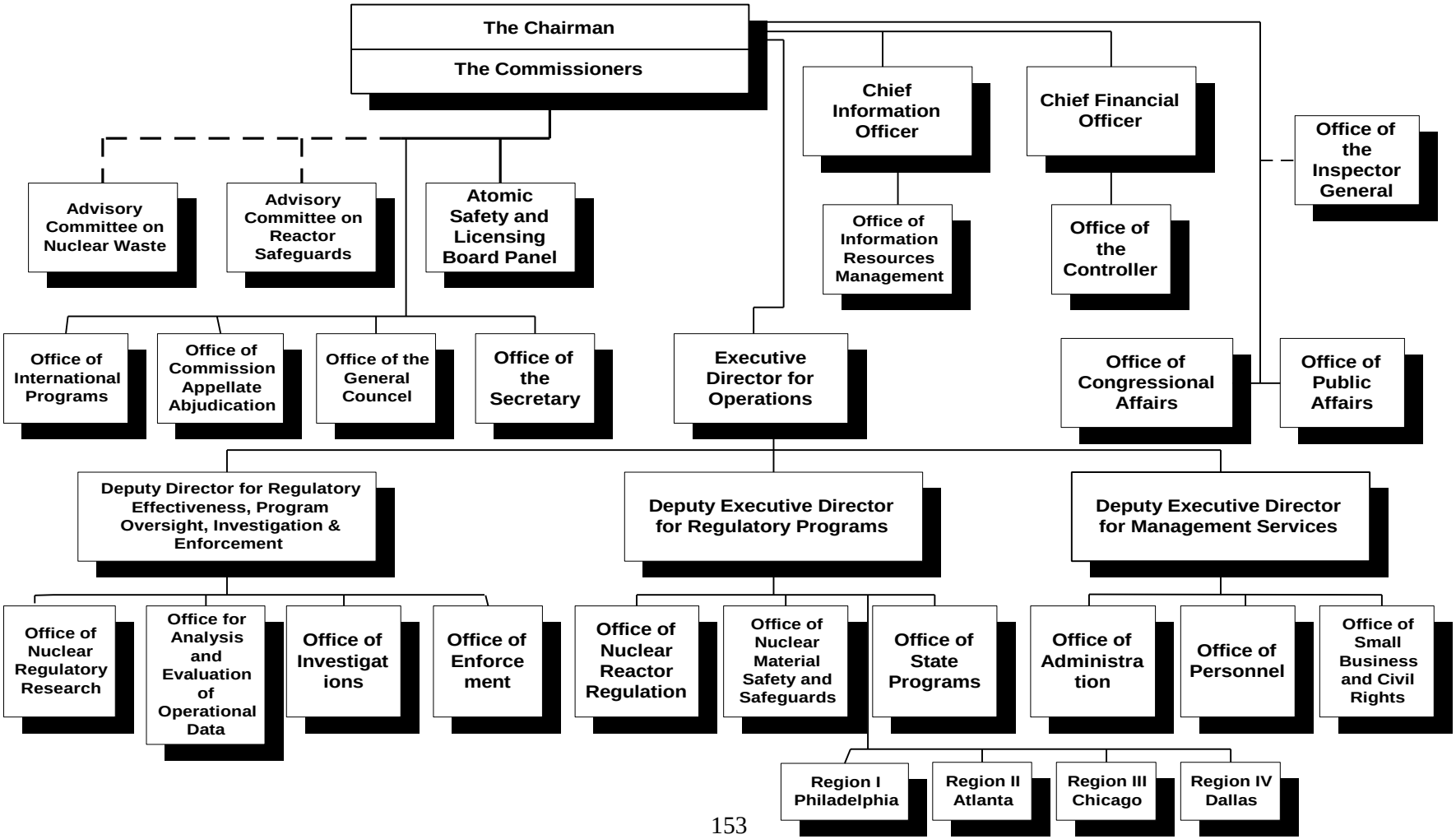
Unit 2A - Accident Analysis
Unit 2B - Mechanical & Process Engineering
Unit 2C - Radiological Protection
Unit 2D - Electrical, Control & Instrumentation
Unit 2E - Structural Integrity
Unit 2F - Civil Engineering & Hazards
Unit 2G - Management of Safety

Division 3

Head of Inspection & Enforcement

Unit 3A - BNFL Sites
Unit 3B - Magnox Electric Sites
Unit 3C - Nuclear Electric & Scottish Nuclear Sites
Unit 3D - Ministry of Defence Sites
Unit 3E - Atomic Energy Authority & Decommissioning Sites
Unit 3F - Research Reactor & other Minor Sites and Inspection Co-ordination

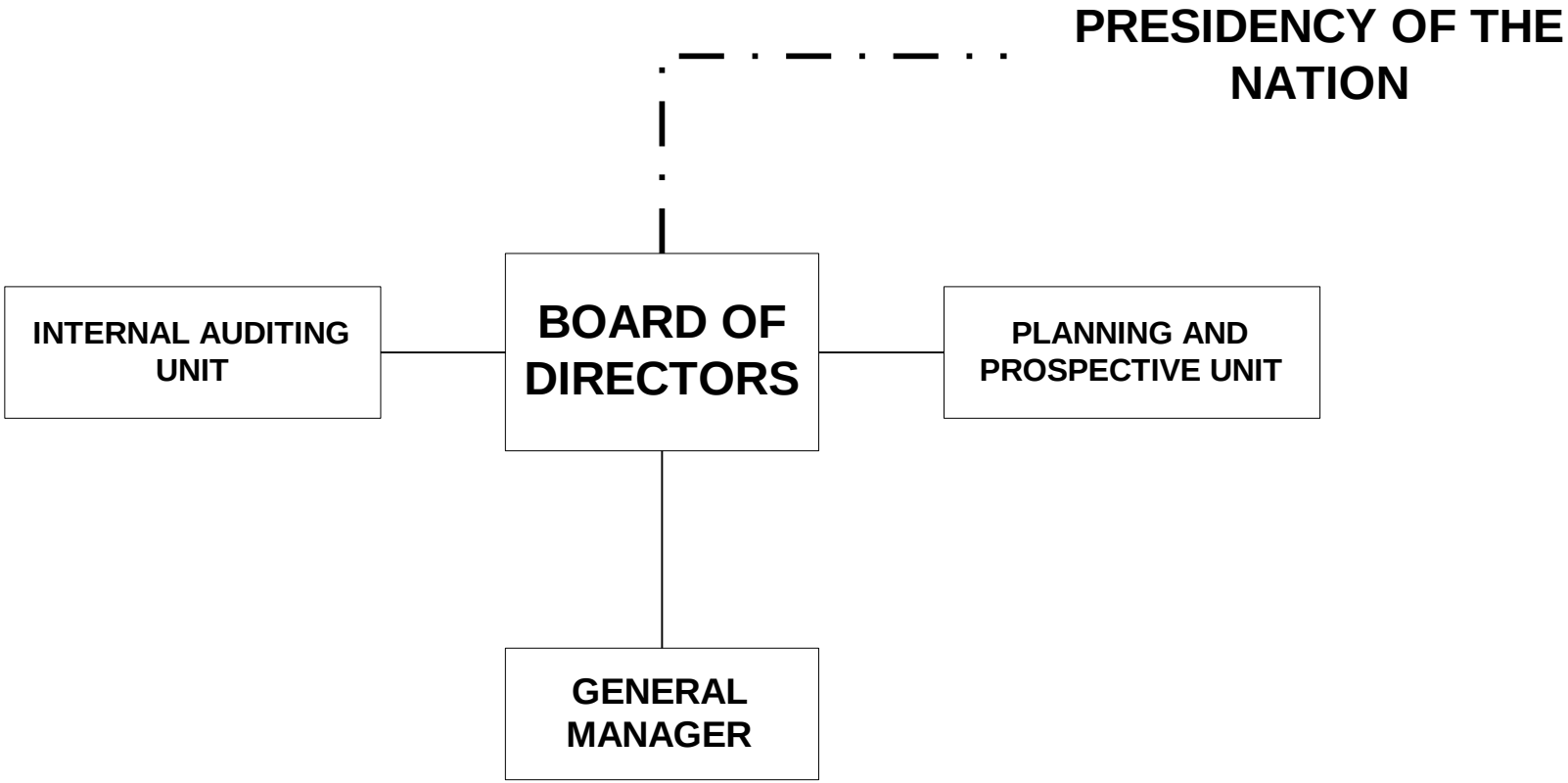
UNITED STATES
Nuclear Regulatory Commission (NRC)



ANNEX II - GOVERNMENTAL ORGANISATIONAL STRUCTURE

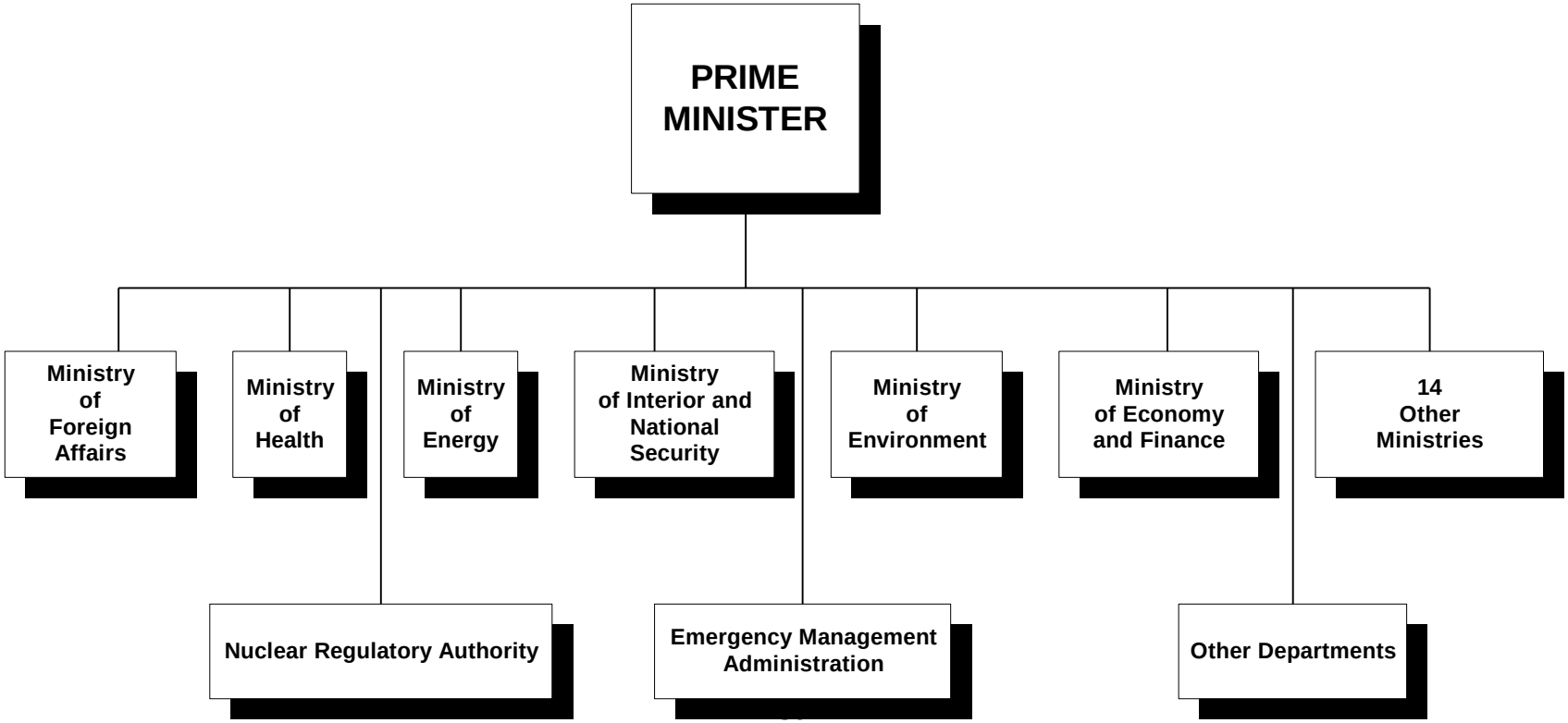
NOTE: Due to various circumstances (e.g., complexity, unavailability, etc.), it was not possible to obtain charts for all contributing countries. Therefore, the reader is advised that information on missing charts should be requested from the referenced organisation

ARGENTINA


PRESIDENCY OF THE NATION
INTERNAL AUDITING UNIT
BOARD OF DIRECTORS
PLANNING AND PROSPECTIVE UNIT
GENERAL MANAGER

ARMENIA

Governmental Organisational Structure



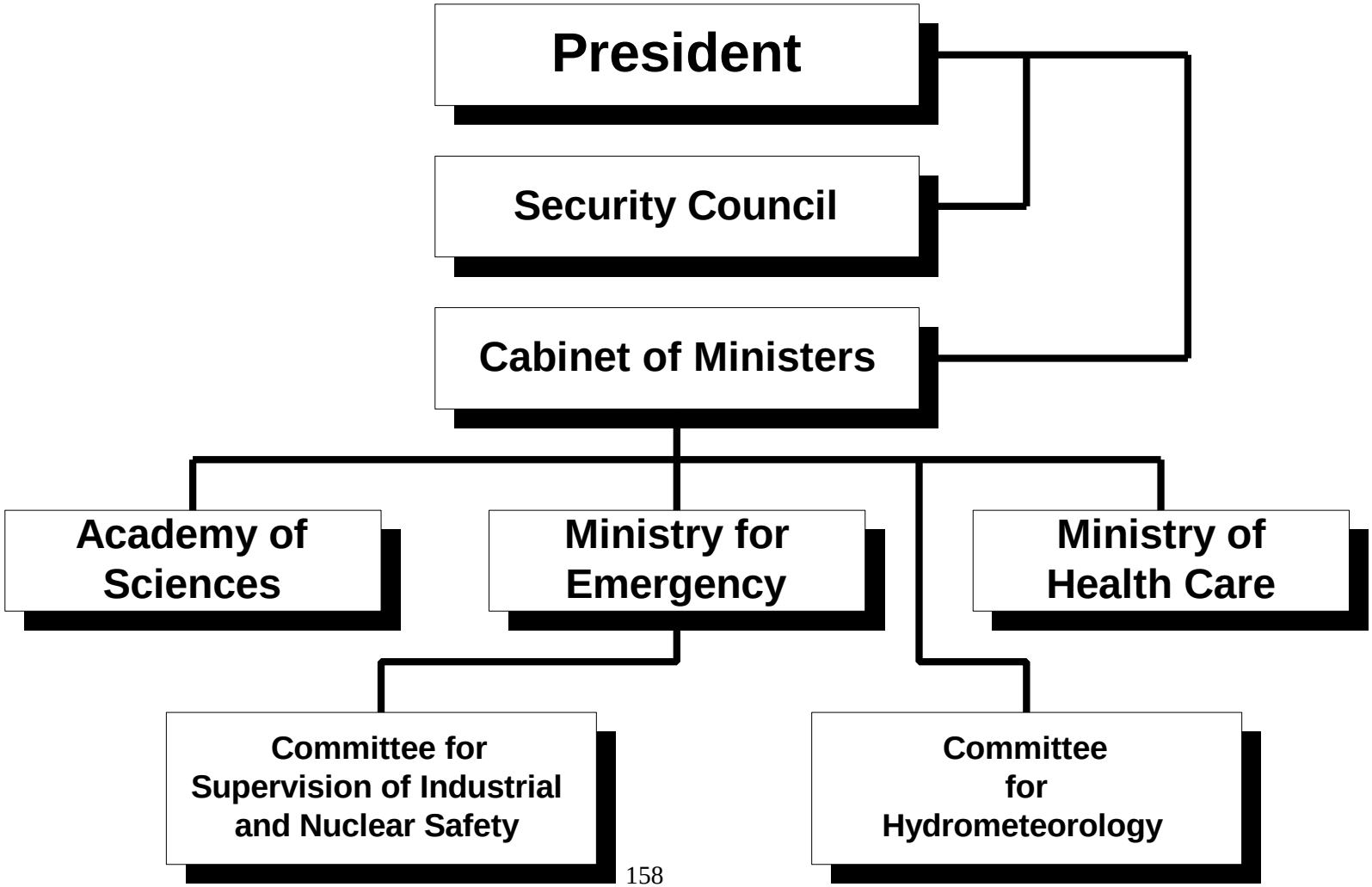
AUSTRALIA

Federal Department of Health and Family Services

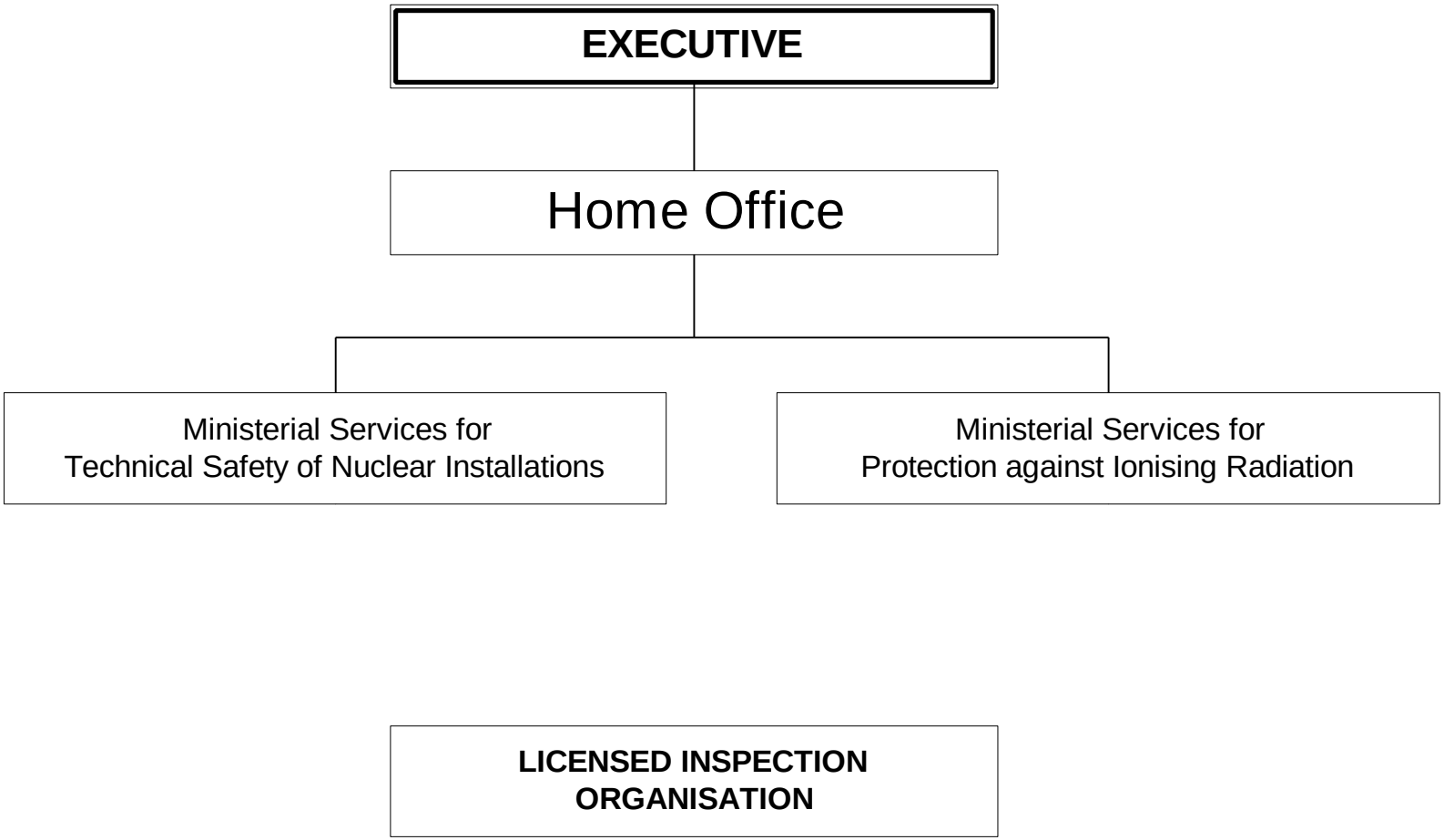
Therapeutic Goods Administration

Nuclear Safety Bureau

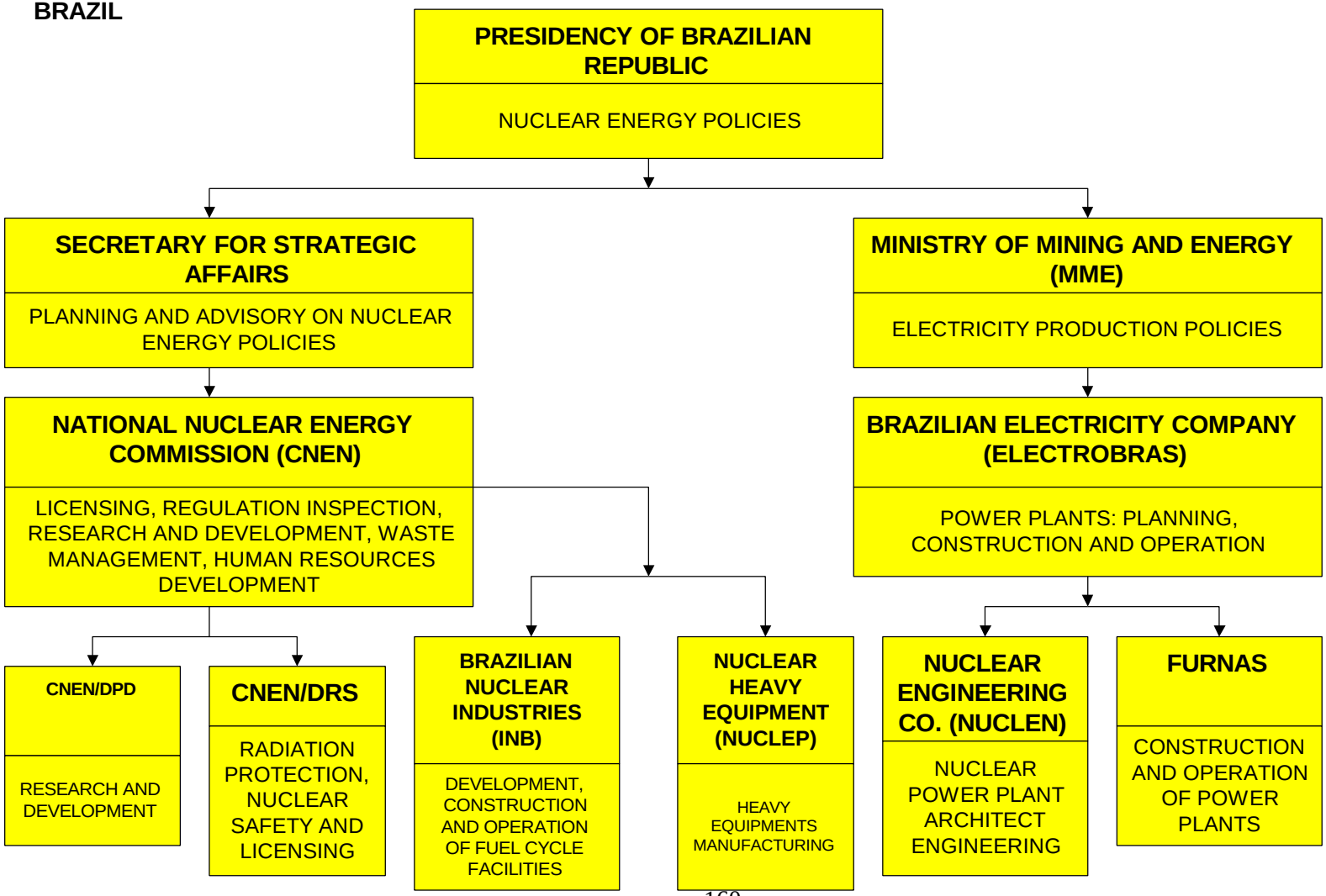
BELARUS


President
Security Council
Cabinet of Ministers
Academy of Sciences
Ministry for Emergency
Ministry of Health Care
Committee for Supervision of Industrial and Nuclear Safety
Committee for Hydrometeorology

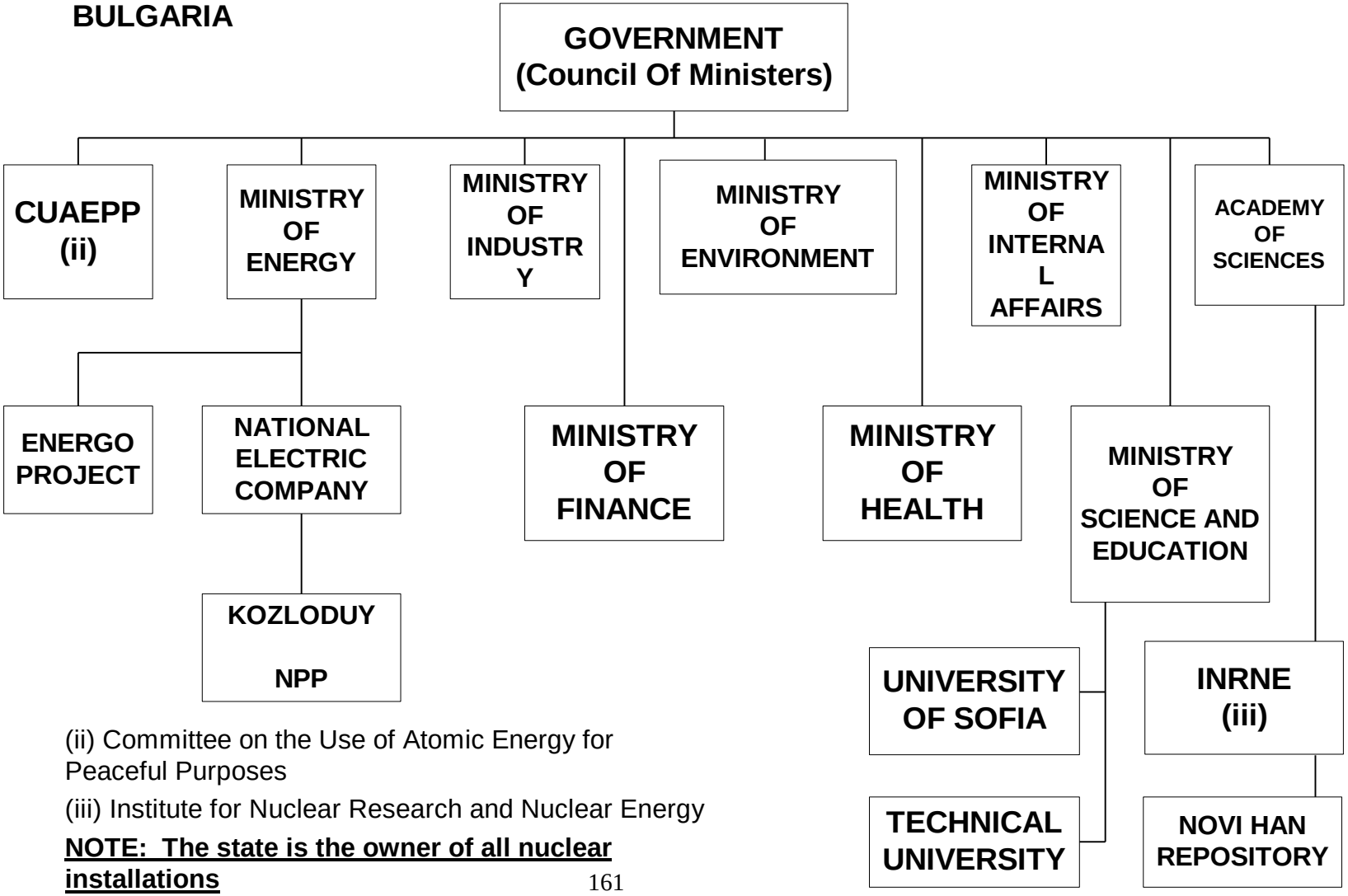
BELGIUM


EXECUTIVE
Home Office
Ministerial Services for
Technical Safety of Nuclear Installations
Ministerial Services for
Protection against Ionising Radiation
LICENSED INSPECTION
ORGANISATION

BRAZIL


PRESIDENCY OF BRAZILIAN REPUBLIC
NUCLEAR ENERGY POLICIES
SECRETARY FOR STRATEGIC AFFAIRS
PLANNING AND ADVISORY ON NUCLEAR ENERGY POLICIES
MINISTRY OF MINING AND ENERGY (MME)
ELECTRICITY PRODUCTION POLICIES
NATIONAL NUCLEAR ENERGY COMMISSION (CNEN)
LICENSING, REGULATION INSPECTION, RESEARCH AND DEVELOPMENT, WASTE MANAGEMENT, HUMAN RESOURCES DEVELOPMENT
BRAZILIAN ELECTRICITY COMPANY (ELECTROBRAS)
POWER PLANTS: PLANNING, CONSTRUCTION AND OPERATION
CNEN/DPD
RESEARCH AND DEVELOPMENT
CNEN/DRS
RADIATION PROTECTION, NUCLEAR SAFETY AND LICENSING
BRAZILIAN NUCLEAR INDUSTRIES (INB)
DEVELOPMENT, CONSTRUCTION AND OPERATION OF FUEL CYCLE FACILITIES
NUCLEAR HEAVY EQUIPMENT (NUCLEP)
HEAVY EQUIPMENTS MANUFACTURING
NUCLEAR ENGINEERING CO. (NUCLEN)
NUCLEAR POWER PLANT ARCHITECT ENGINEERING
FURNAS
CONSTRUCTION AND OPERATION OF POWER PLANTS

BULGARIA

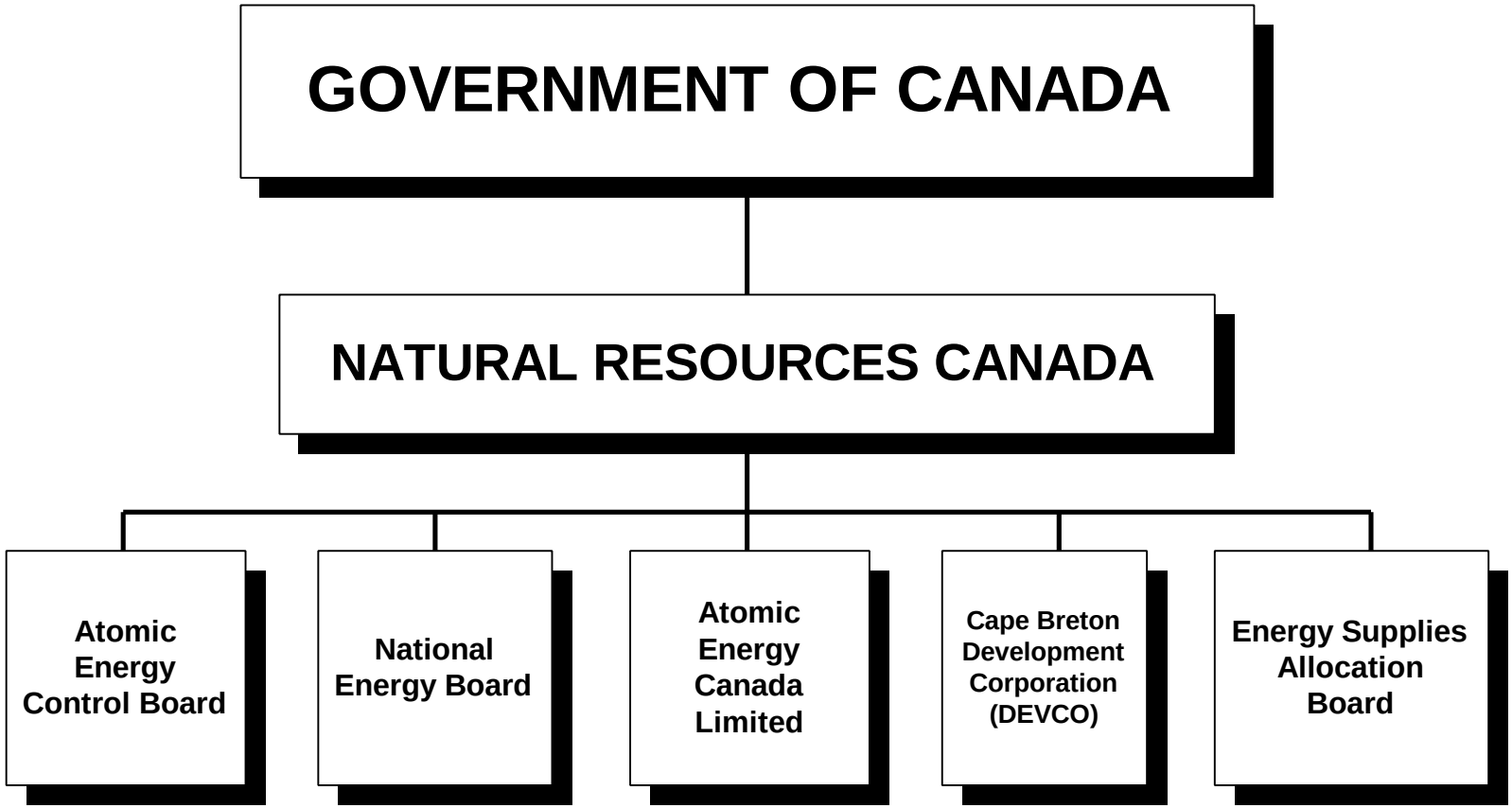


(ii) Committee on the Use of Atomic Energy for Peaceful Purposes

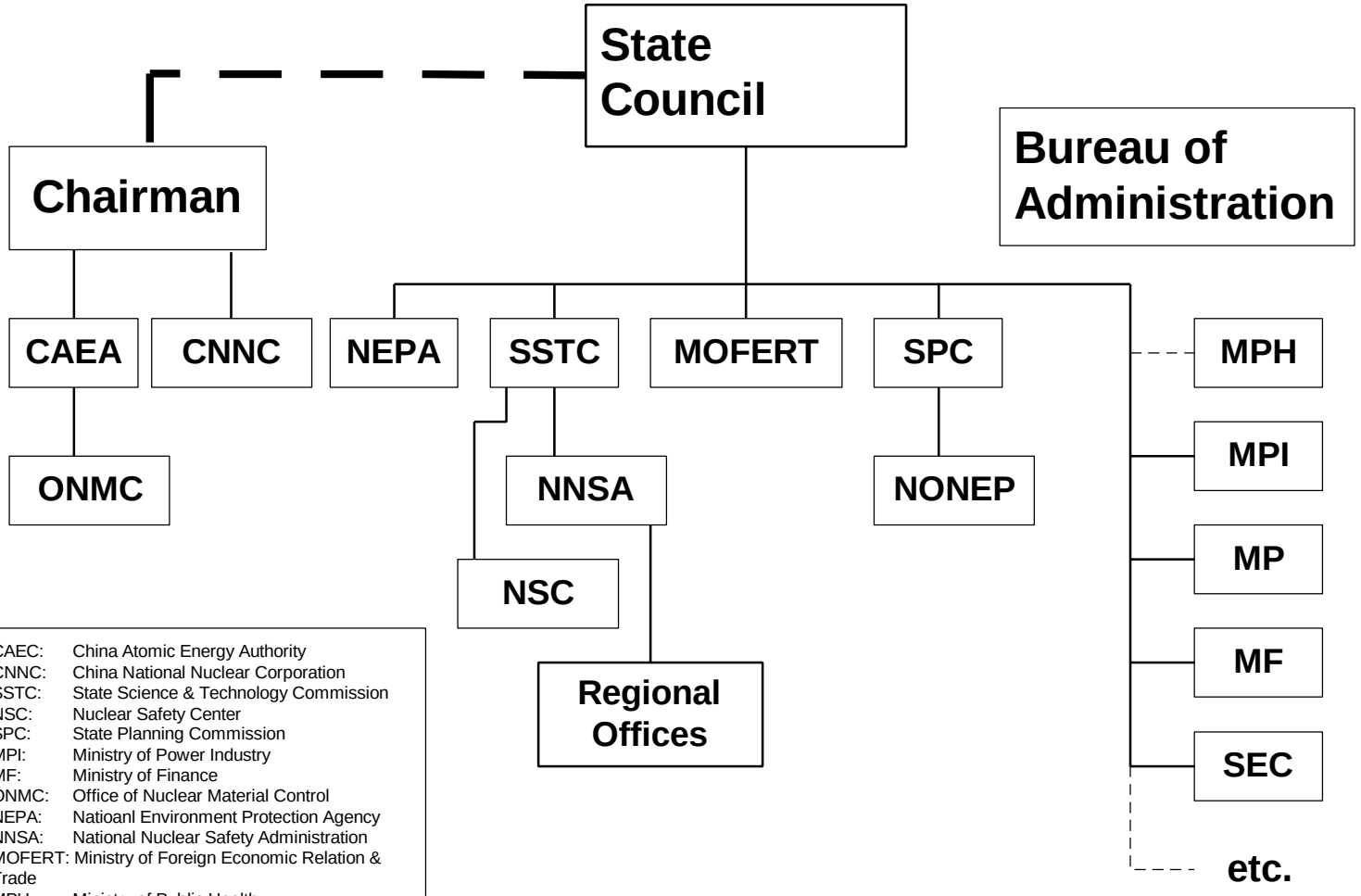
(iii) Institute for Nuclear Research and Nuclear Energy

<u>NOTE: The state is the owner of all nuclear installations</u>

CANADA


GOVERNMENT OF CANADA
NATURAL RESOURCES CANADA
Atomic Energy Control Board
National Energy Board
Atomic Energy Canada Limited
Cape Breton Development Corporation (DEVCO)
Energy Supplies Allocation Board

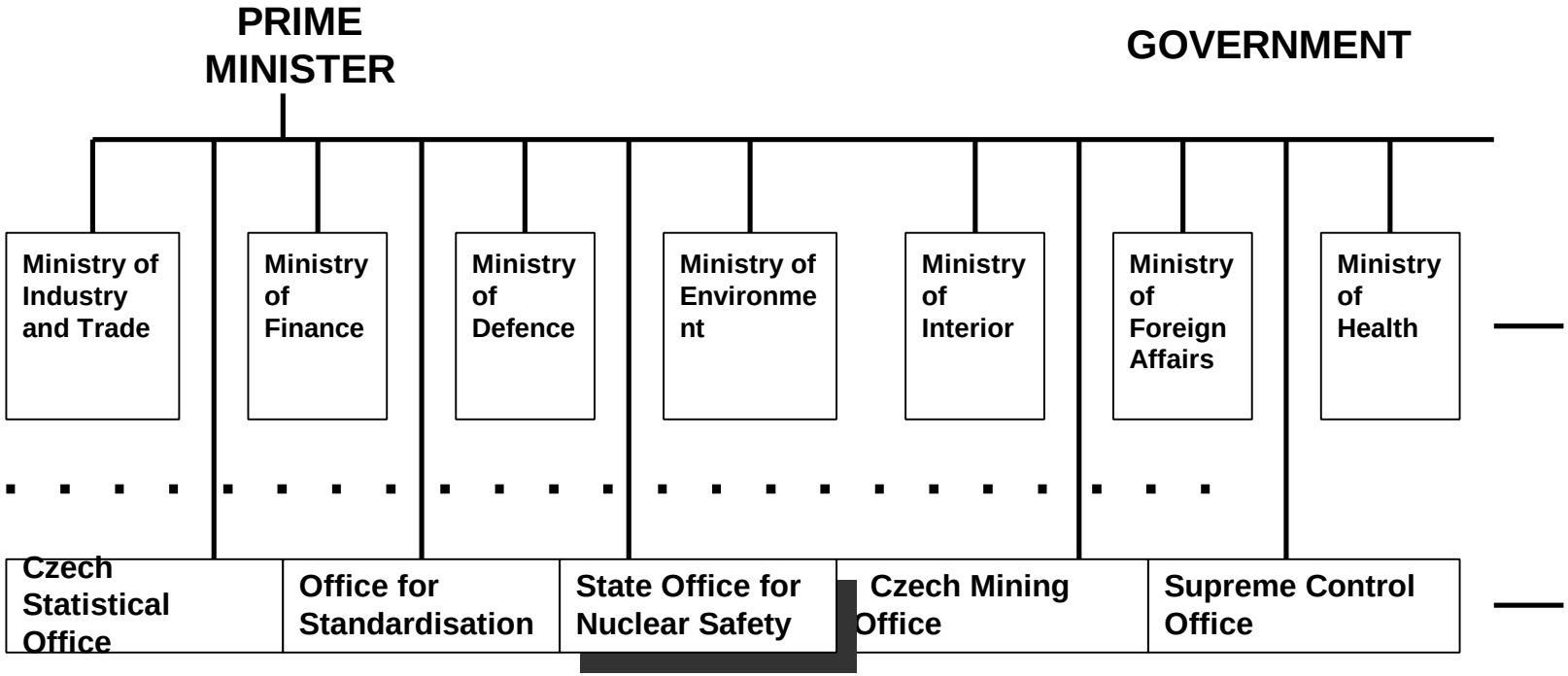
CHINA



CAEC: China Atomic Energy Authority
CNNC: China National Nuclear Corporation
SSTC: State Science & Technology Commission
NSC: Nuclear Safety Center
SPC: State Planning Commission
MPI: Ministry of Power Industry
MF: Ministry of Finance
ONMC: Office of Nuclear Material Control
NEPA: Natioanl Environment Protection Agency
NNSA: National Nuclear Safety Administration
MOFERT: Ministry of Foreign Economic Relation & Trade
MPH: Ministry of Public Health
MP: Ministry of Personnel
SEC: State Education Commission

CZECH REPUBLIC

Statute of the State Office for Nuclear Safety within the State Administration



and remaining Central Agencies of the State Administration

FINLAND

MINISTRY OF THE INTERIOR

- protection of the general public in emergency conditions

MINISTRY OF SOCIAL AFFAIRS AND HEALTH

- administrative and budget matters of STUK
- administrative authority for use of radiation

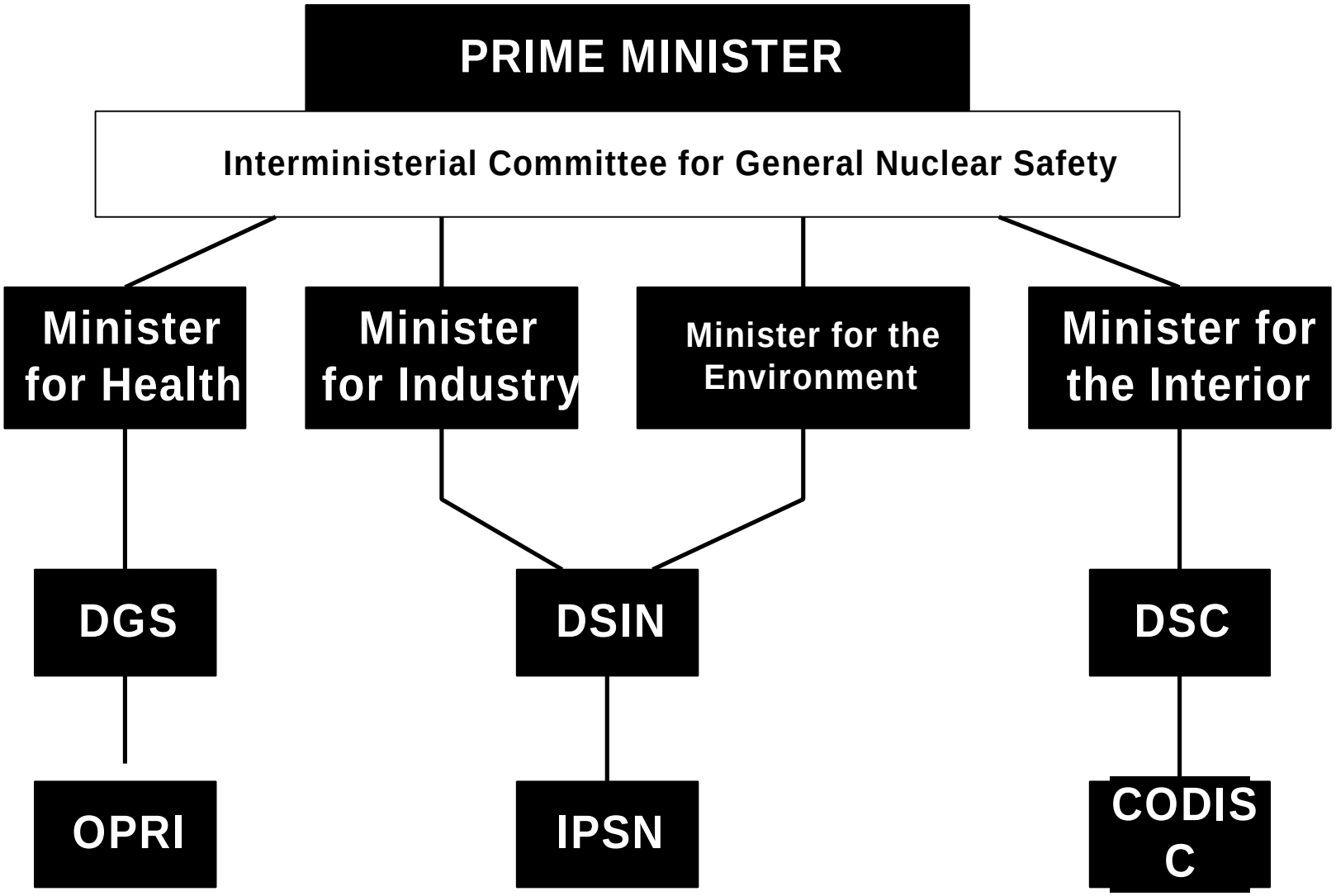
MINISTRY OF TRADE AND INDUSTRY

- administrative authority for the use of nuclear energy

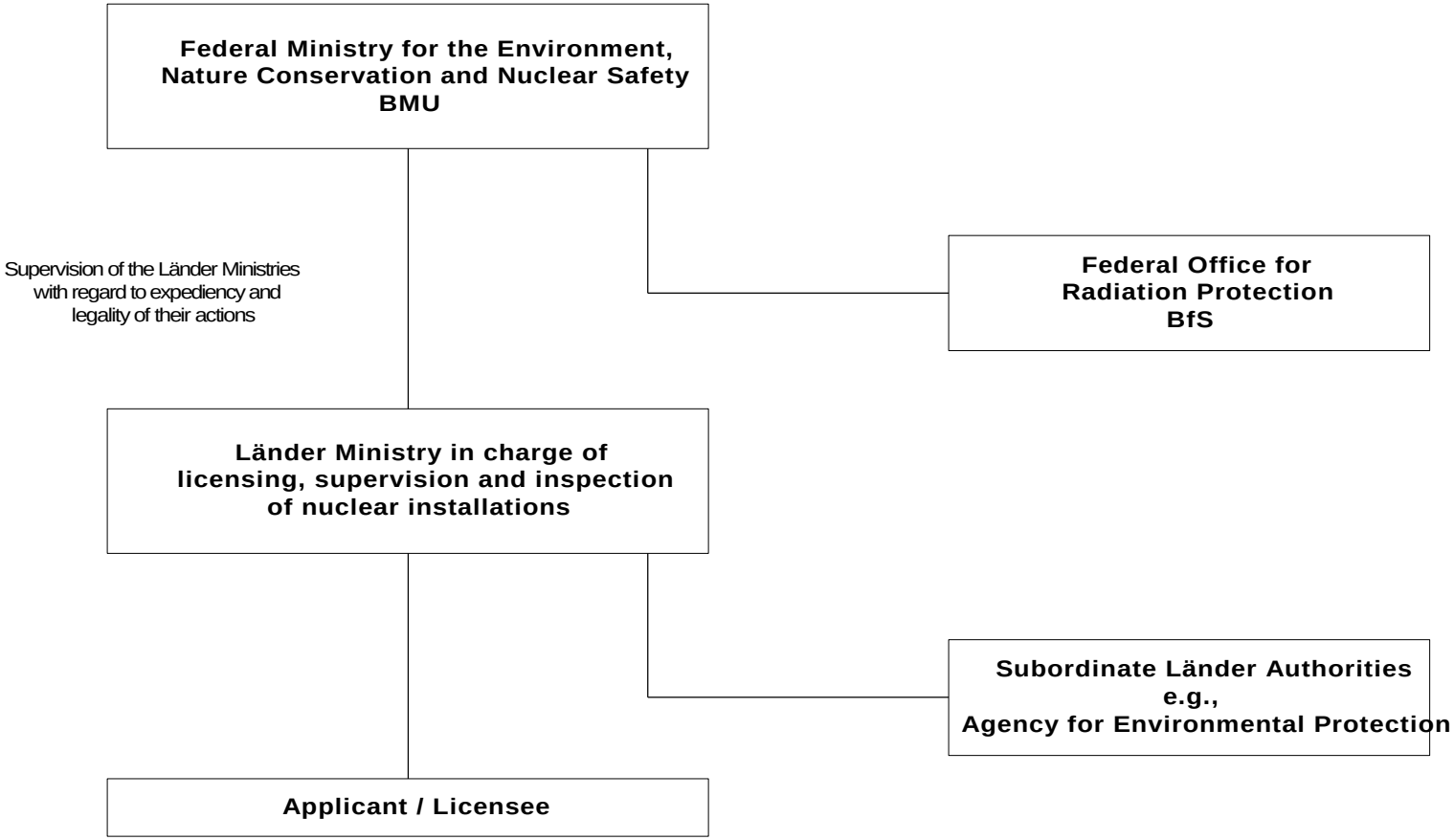
STUK - Radiation and Nuclear Safety Authority

- independent regulatory and research organisation

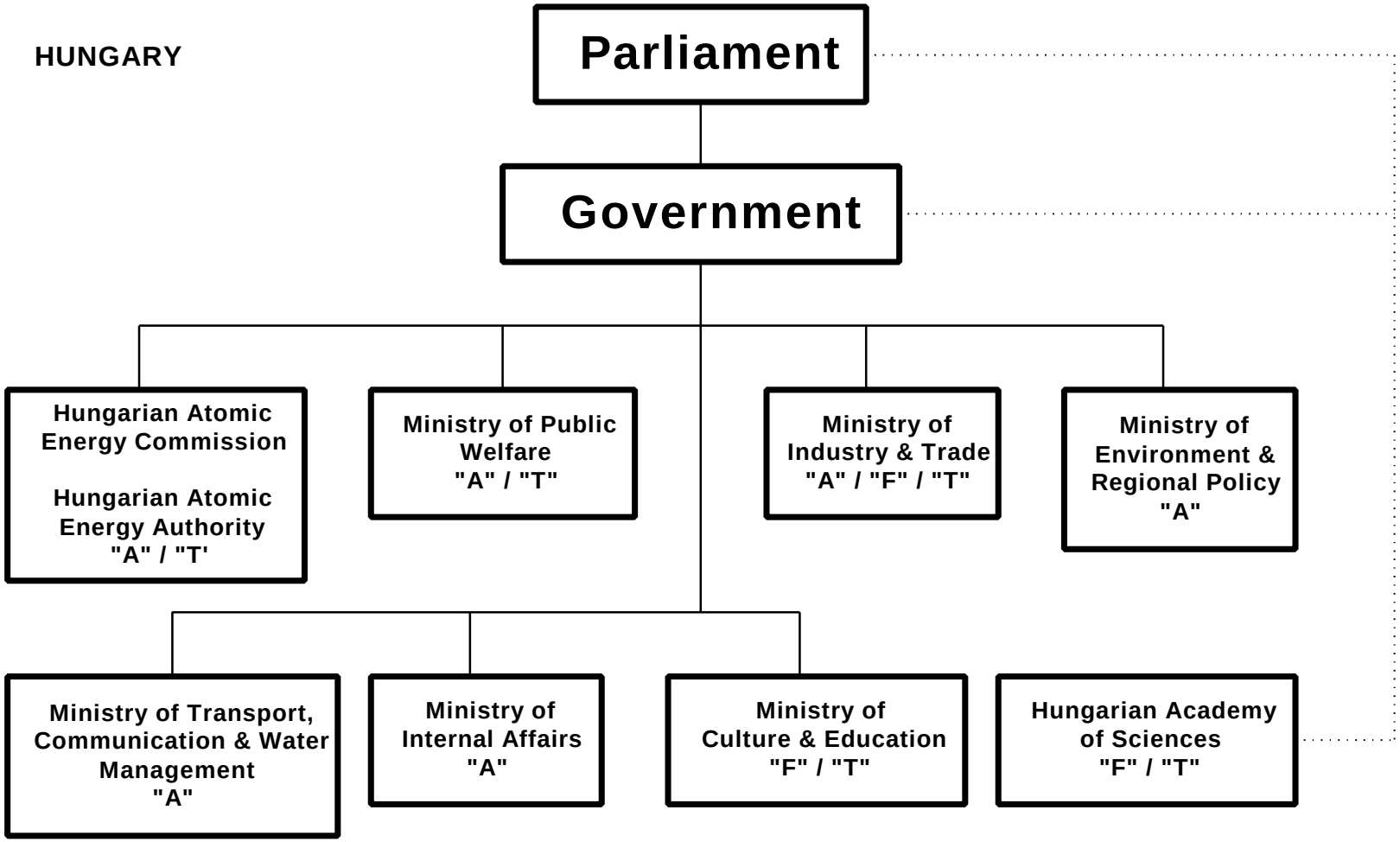
FRANCE


PRIME MINISTER
Interministerial Committee for General Nuclear Safety
Minister for Health
Minister for Industry
Minister for the Environment
Minister for the Interior
DGS
DSIN
DSC
OPRI
IPSN
CODISC

GERMANY **[Number of Federal States (Länder) in Germany: 16]**

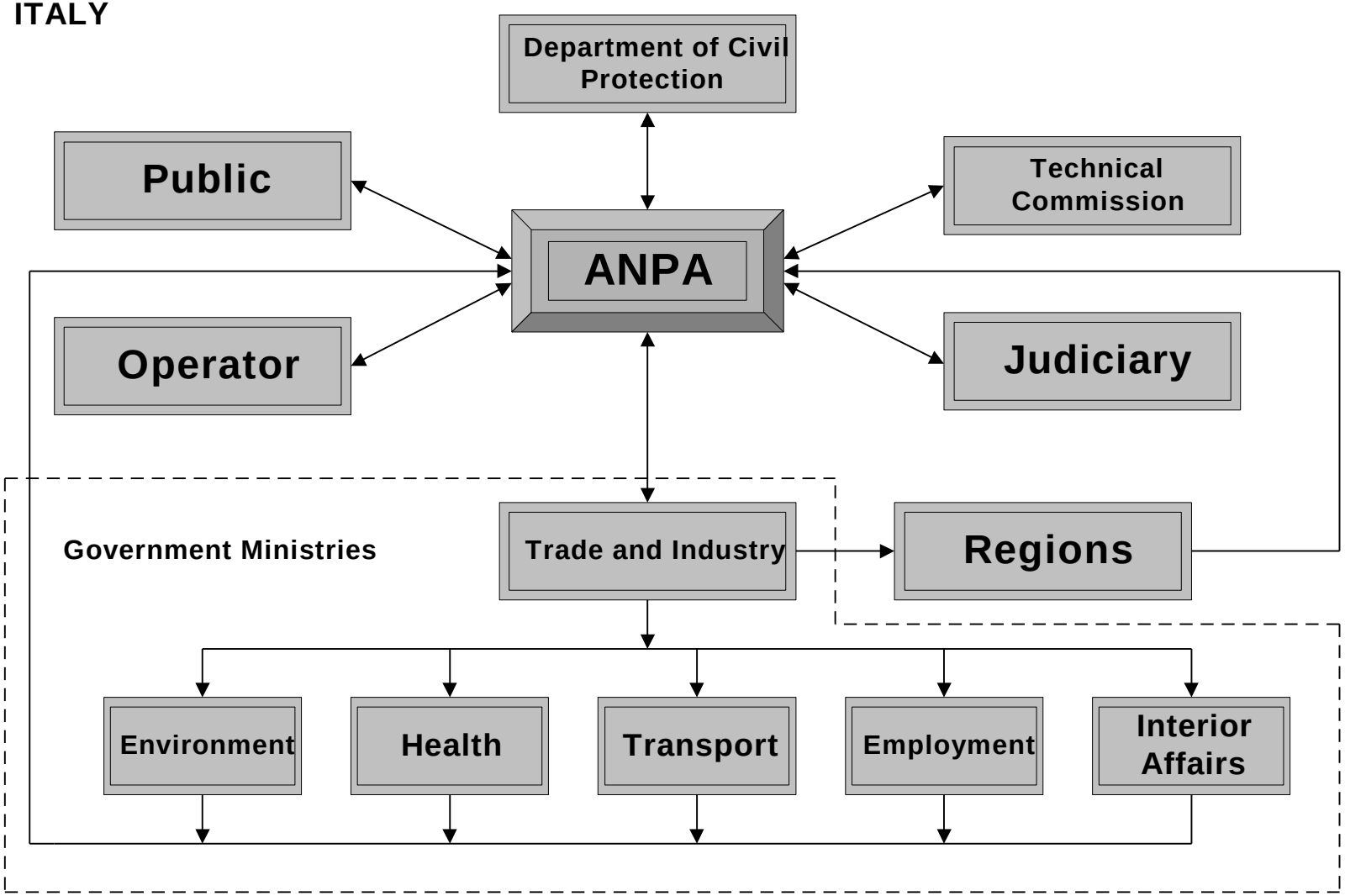


HUNGARY

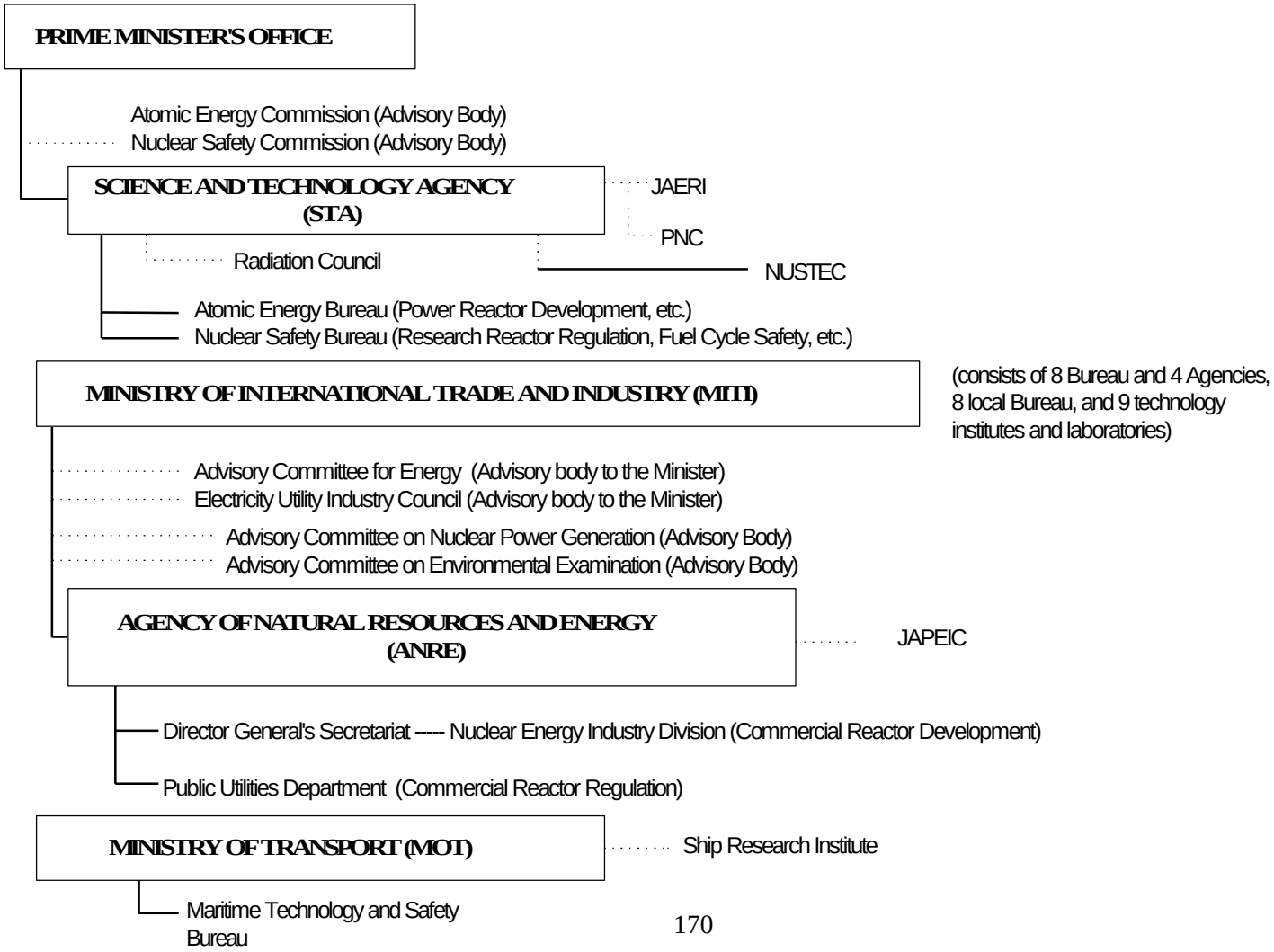


'A" = Authority "F" = Nuclear Facility "T" = Technical Support

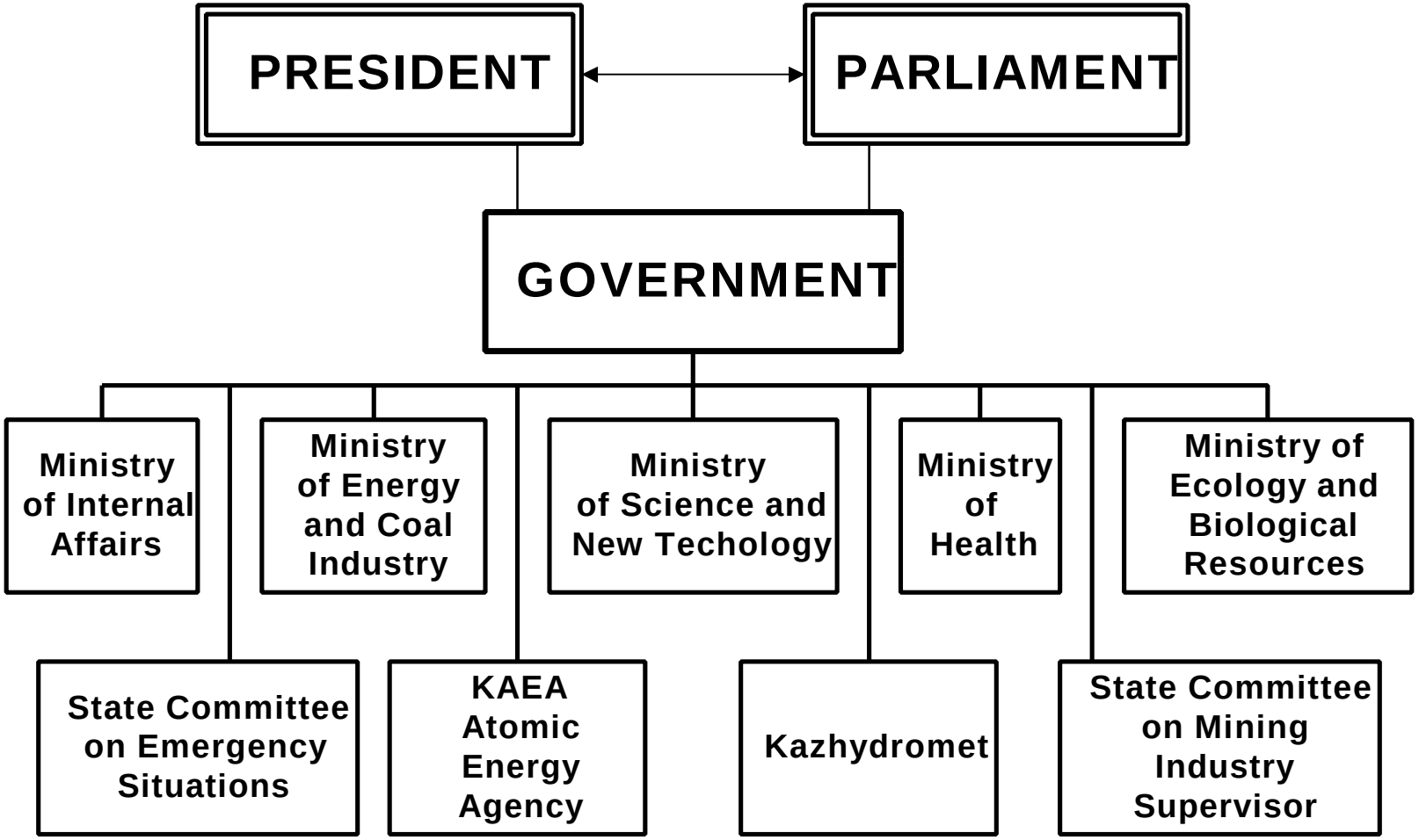
ITALY


Department of Civil Protection
Public
Technical Commission
ANPA
Operator
Judiciary
Government Ministries
Trade and Industry
Regions
Environment
Health
Transport
Employment
Interior Affairs

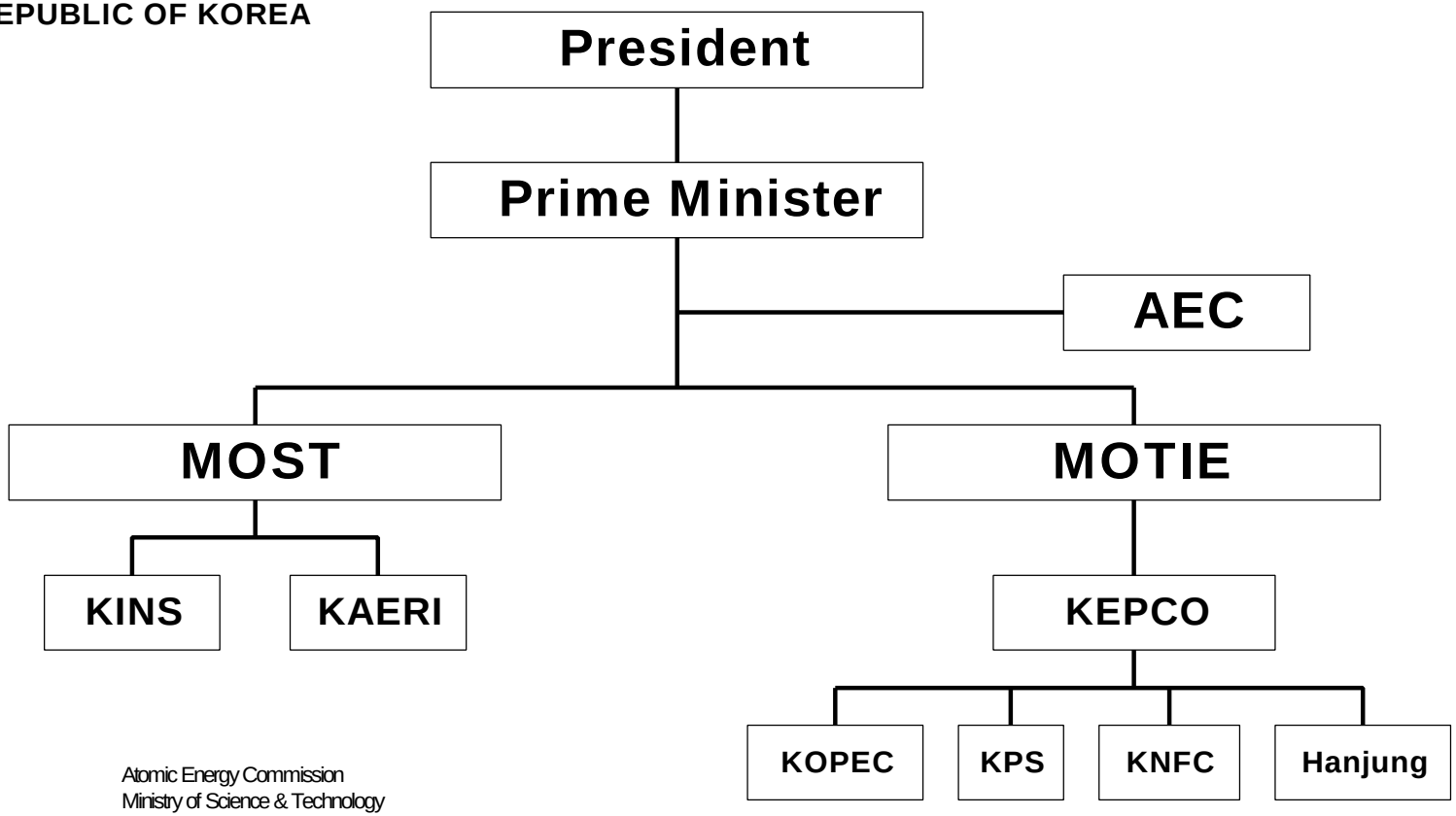
JAPAN


PRIME MINISTER'S OFFICE
Atomic Energy Commission (Advisory Body)
Nuclear Safety Commission (Advisory Body)
SCIENCE AND TECHNOLOGY AGENCY (STA)
JAERI
PNC
Radiation Council
NUSTEC
Atomic Energy Bureau (Power Reactor Development, etc.)
Nuclear Safety Bureau (Research Reactor Regulation, Fuel Cycle Safety, etc.)
MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY (MITI)
(consists of 8 Bureau and 4 Agencies, 8 local Bureau, and 9 technology institutes and laboratories)
Advisory Committee for Energy (Advisory body to the Minister)
Electricity Utility Industry Council (Advisory body to the Minister)
Advisory Committee on Nuclear Power Generation (Advisory Body)
Advisory Committee on Environmental Examination (Advisory Body)
AGENCY OF NATURAL RESOURCES AND ENERGY (ANRE)
JAPEIC
Director General's Secretariat ---- Nuclear Energy Industry Division (Commercial Reactor Development)
Public Utilities Department (Commercial Reactor Regulation)
MINISTRY OF TRANSPORT (MOT)
Ship Research Institute
Maritime Technology and Safety Bureau

KAZAKSTAN

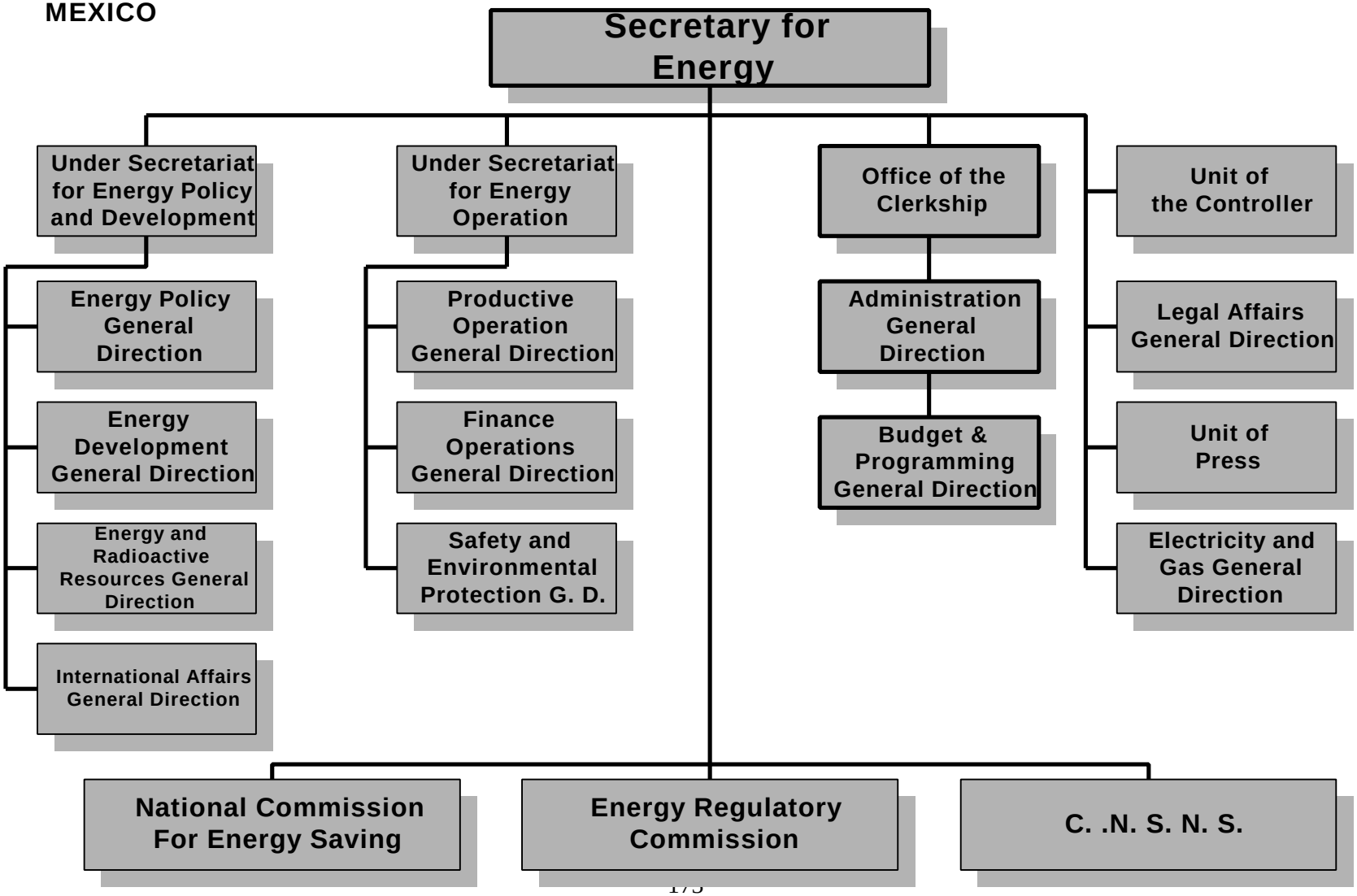

PRESIDENT
PARLIAMENT
GOVERNMENT
Ministry of Internal Affairs
Ministry of Energy and Coal Industry
Ministry of Science and New Techology
Ministry of Health
Ministry of Ecology and Biological Resources
State Committee on Emergency Situations
KAEA Atomic Energy Agency
Kazhydromet
State Committee on Mining Industry Supervisor

REPUBLIC OF KOREA

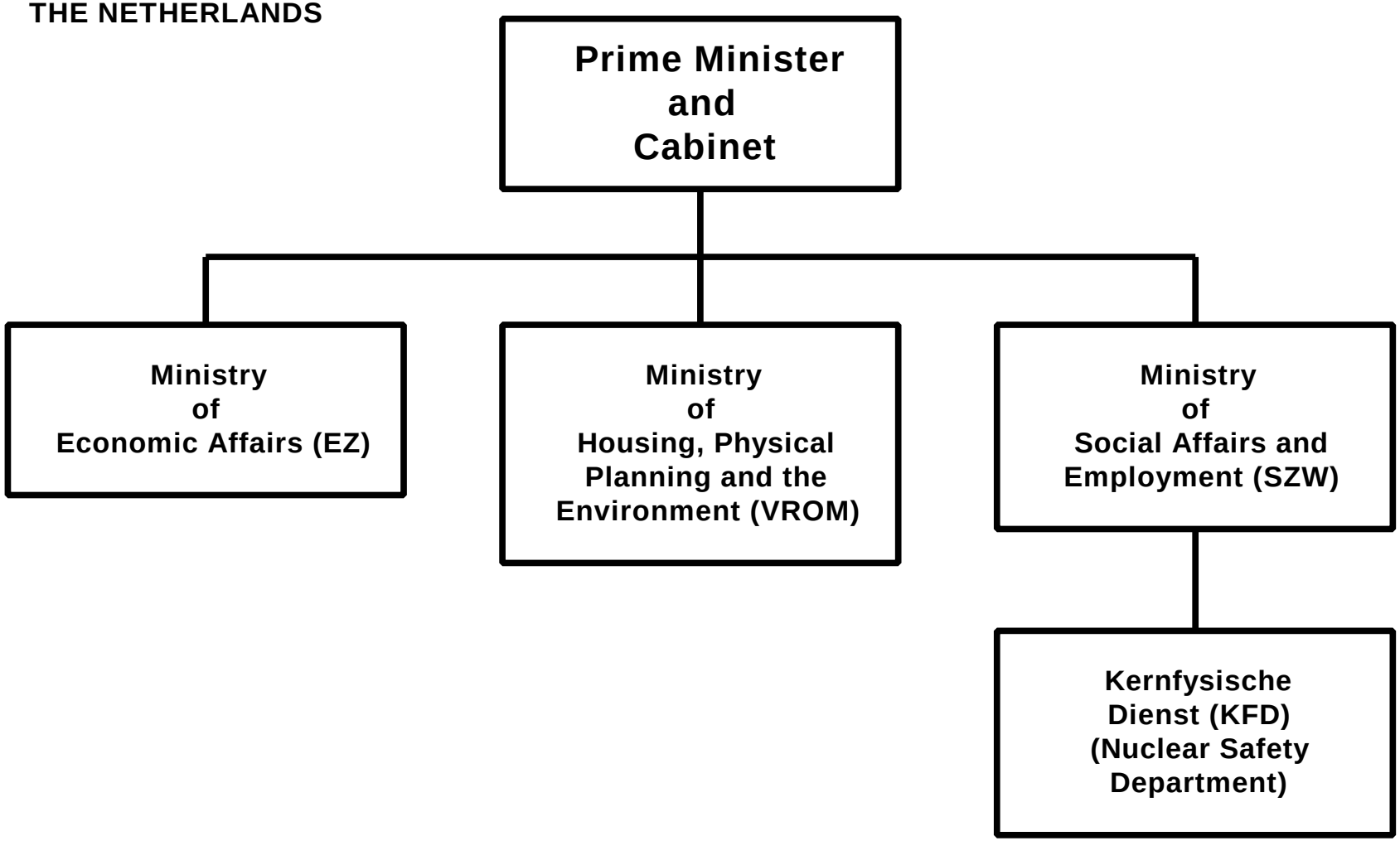


AEC:	Atomic Energy Commission
MOST:	Ministry of Science & Technology
MOTIE:	Ministry of Trade, Industry and Energy
KINS:	Korea Institute of Nuclear Safety
KAERI:	Korea Atomic Energy Research Institute
KEPCO:	Korea Electric Power Corporation
KOPEC:	Korea Power Engineering Corporation
KPS:	Korea Power Plant Services Company
KNFC:	Korea Nuclear Fuel Company
Hanjung:	Korea Heavy Industries & Construction Co. Ltd. (Previously called KHIC)

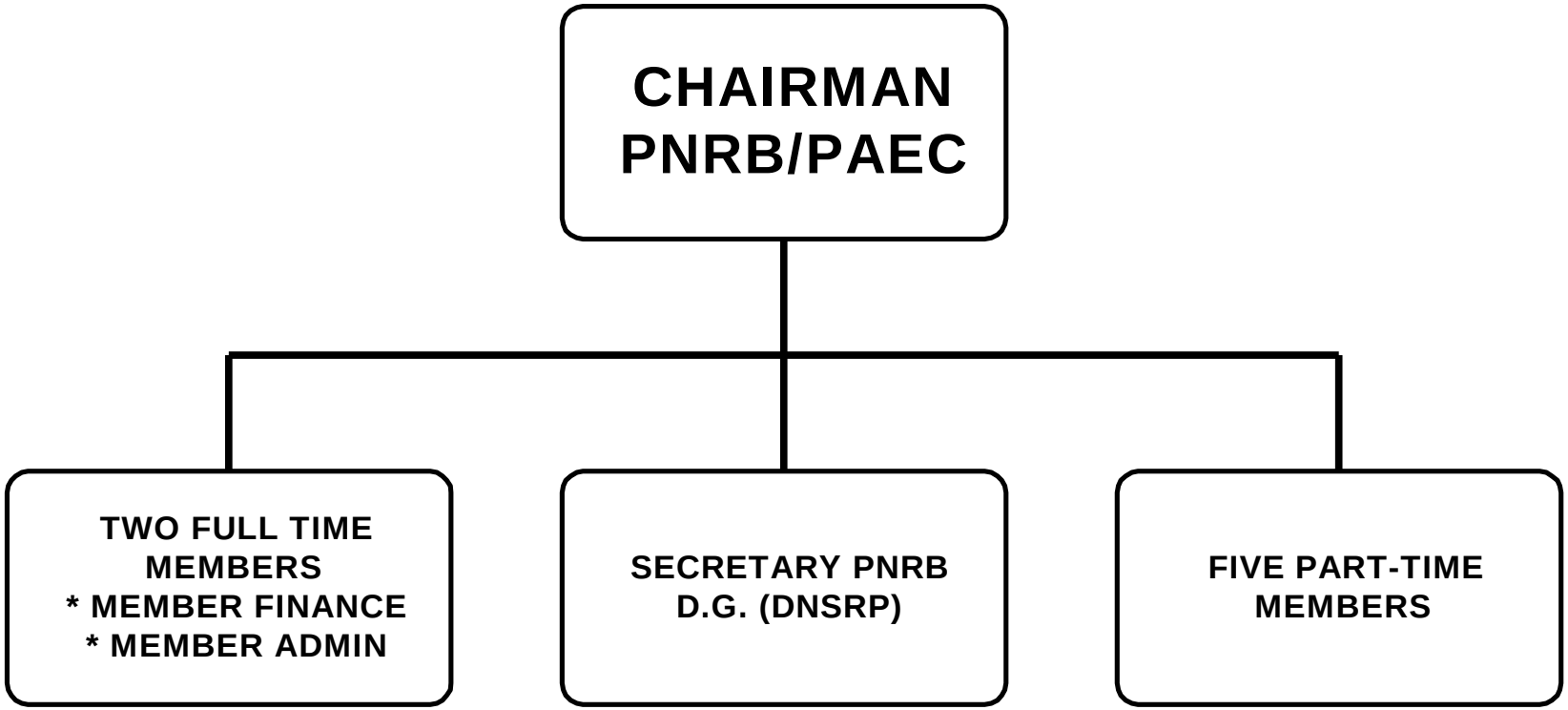
MEXICO


Secretary for Energy
Under Secretariat for Energy Policy and Development
Under Secretariat for Energy Operation
Office of the Clerkship
Unit of the Controller
Energy Policy General Direction
Energy Development General Direction
Energy and Radioactive Resources General Direction
International Affairs General Direction
Productive Operation General Direction
Finance Operations General Direction
Safety and Environmental Protection G. D.
Administration General Direction
Budget & Programming General Direction
Legal Affairs General Direction
Unit of Press
Electricity and Gas General Direction
National Commission For Energy Saving
Energy Regulatory Commission
C. .N. S. N. S.

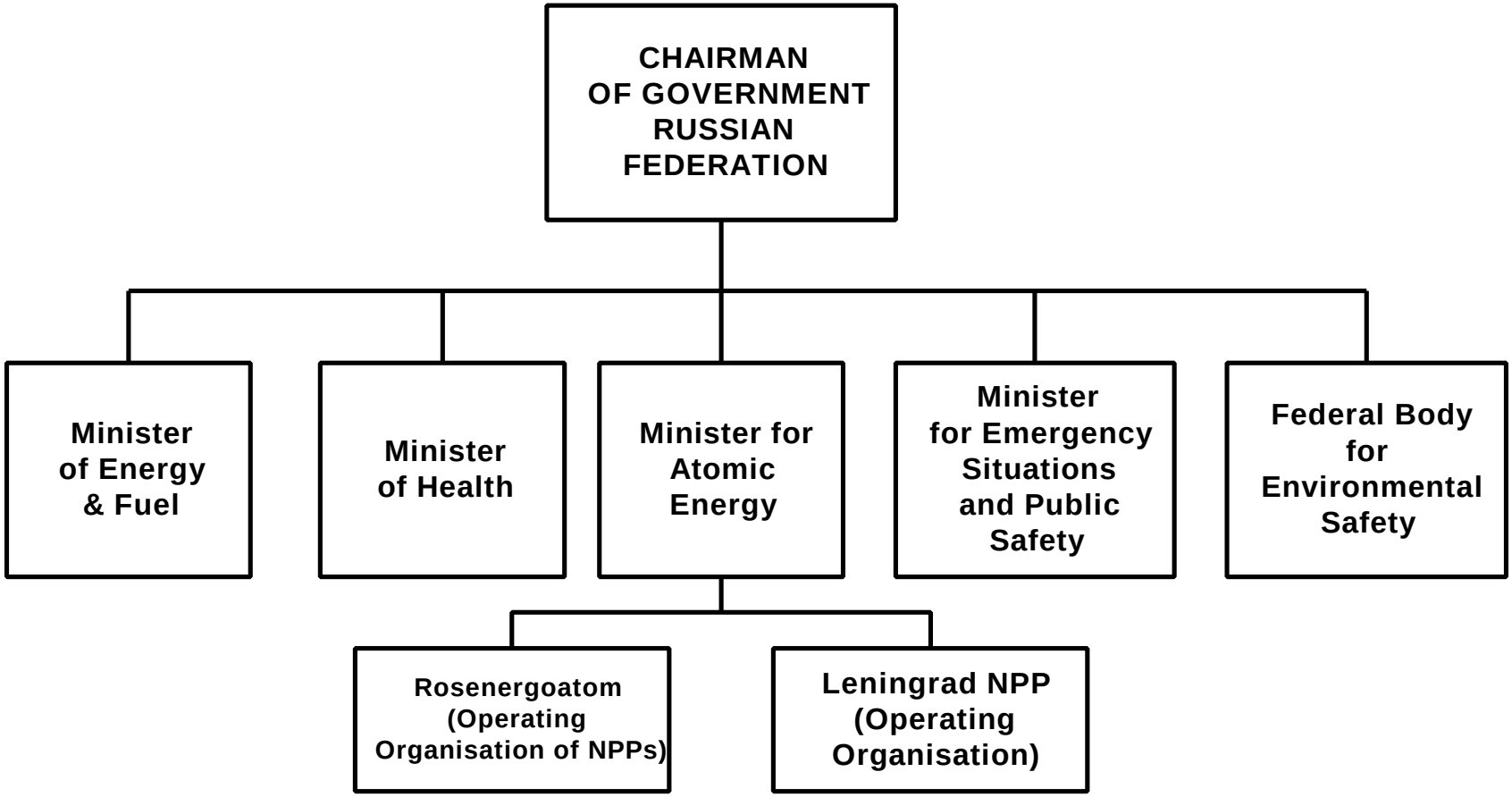
THE NETHERLANDS



PAKISTAN

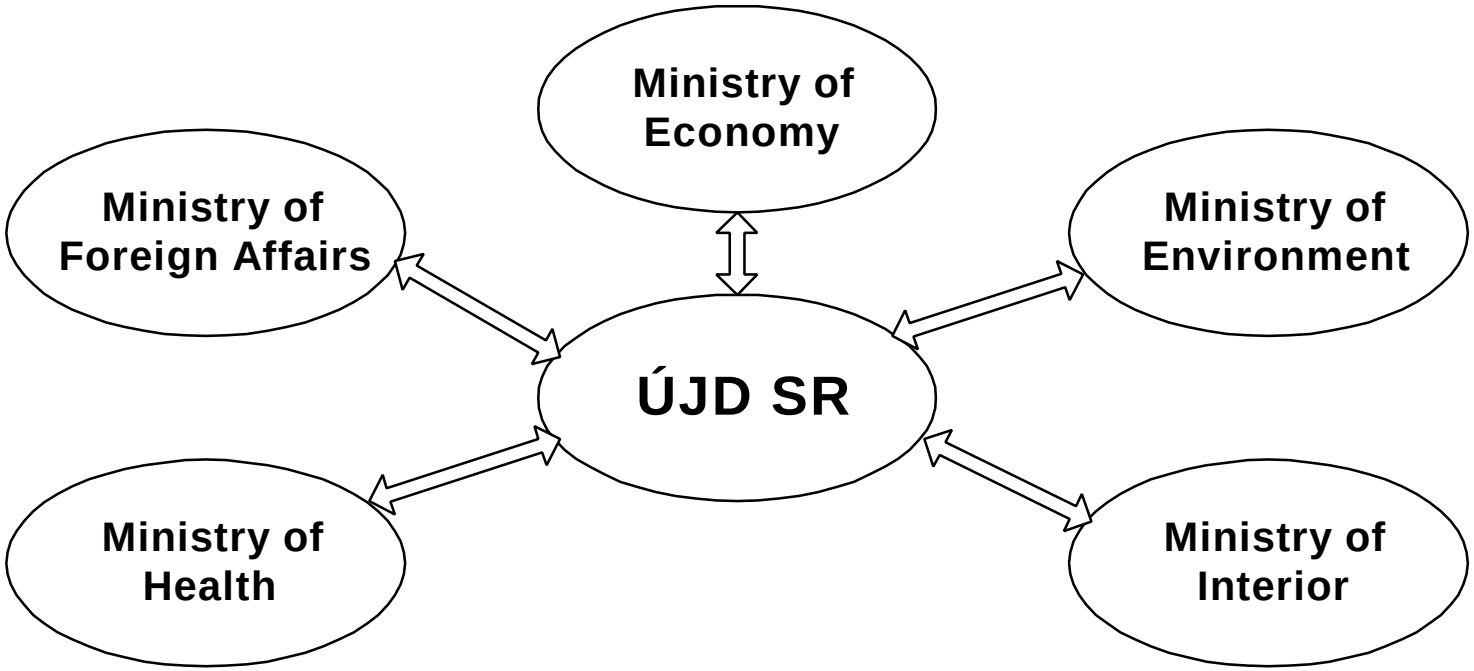

CHAIRMAN
PNRB/PAEC
TWO FULL TIME MEMBERS
* MEMBER FINANCE
* MEMBER ADMIN
SECRETARY PNRB
D.G. (DNSRP)
FIVE PART-TIME MEMBERS

RUSSIA

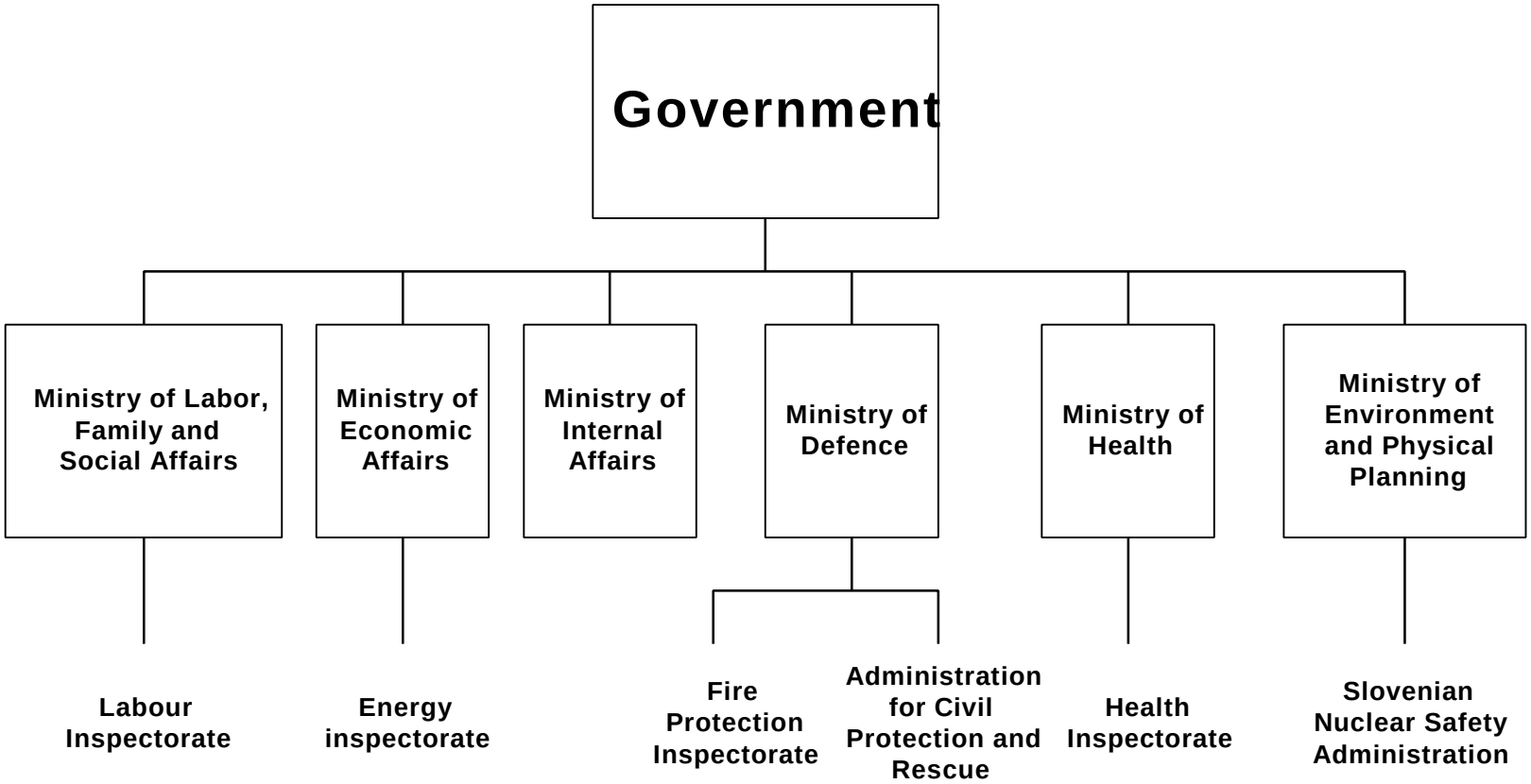

CHAIRMAN OF GOVERNMENT RUSSIAN FEDERATION
Minister of Energy & Fuel
Minister of Health
Minister for Atomic Energy
Minister for Emergency Situations and Public Safety
Federal Body for Environmental Safety
Rosenergoatom (Operating Organisation of NPPs)
Leningrad NPP (Operating Organisation)

SLOVAK REPUBLIC

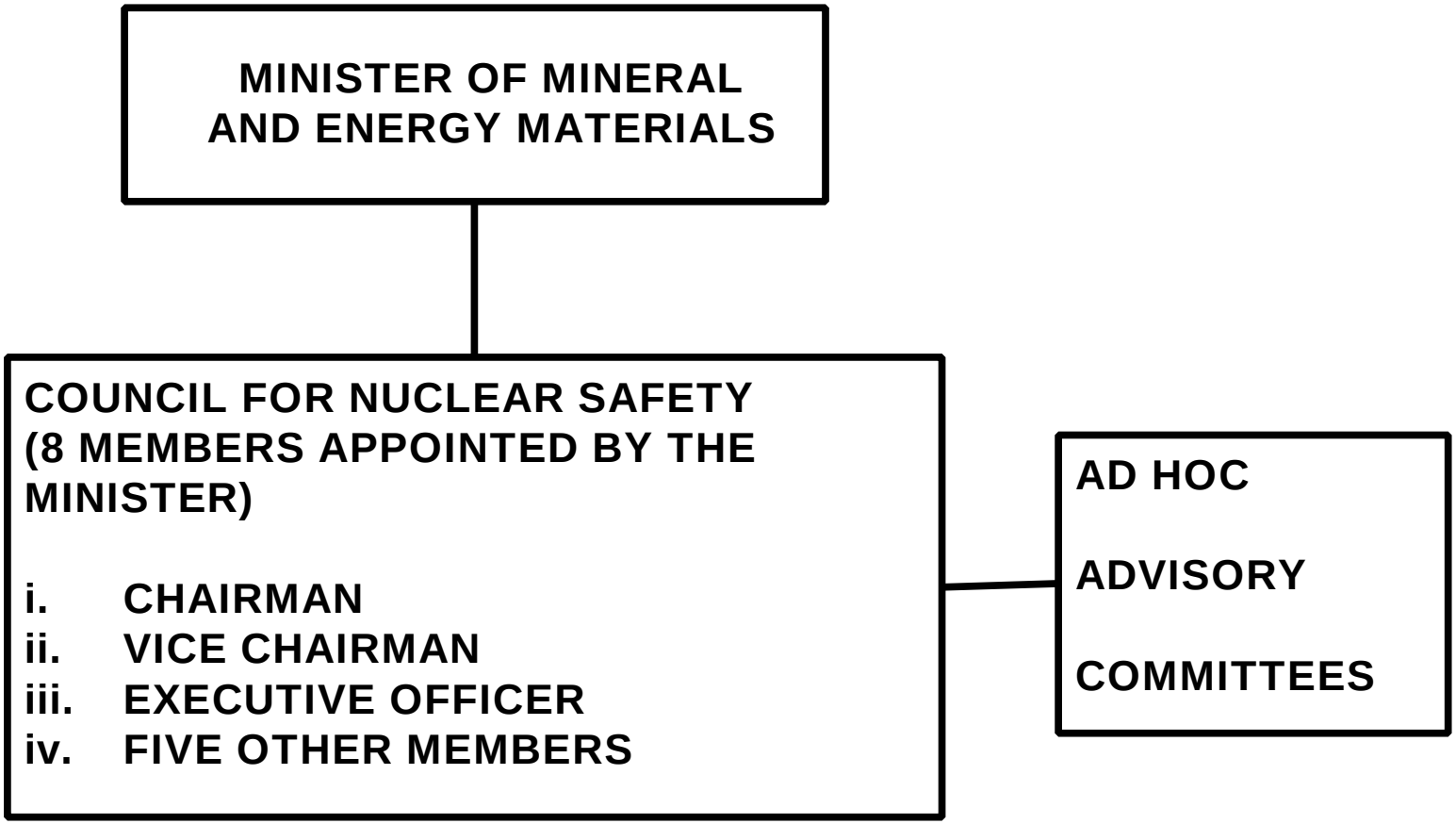
The ÚJD SR belongs to the system of central administrative state offices of the Slovak Republic
The Chairman of ÚJD SR is appointed by the Slovak Government
The ÚJD SR co-operates with other central administrative state offices of the SR



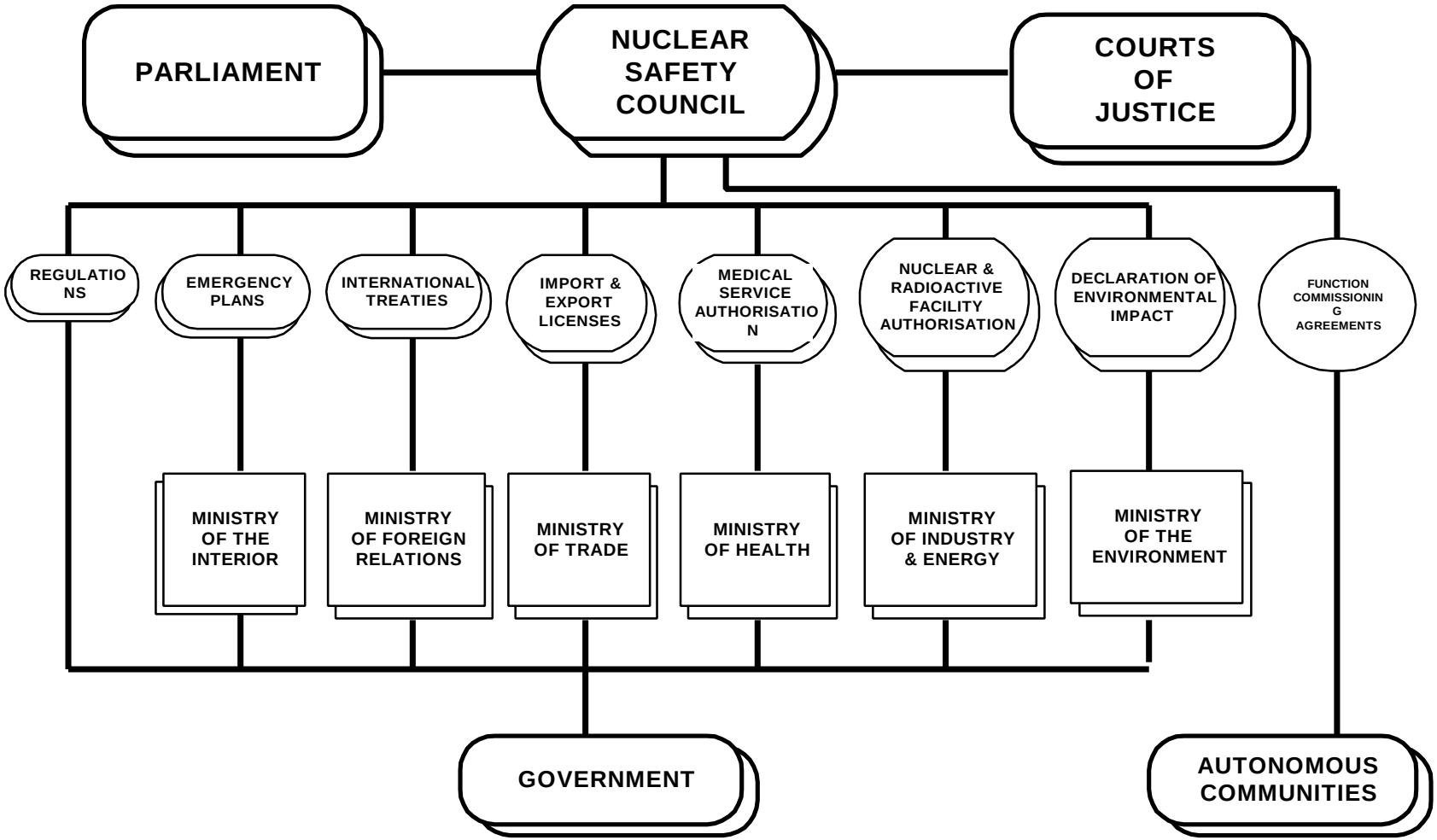
SLOVENIA


Government
Ministry of Labor, Family and Social Affairs
Ministry of Economic Affairs
Ministry of Internal Affairs
Ministry of Defence
Ministry of Health
Ministry of Environment and Physical Planning
Labour Inspectorate
Energy inspectorate
Fire Protection Inspectorate
Administration for Civil Protection and Rescue
Health Inspectorate
Slovenian Nuclear Safety Administration

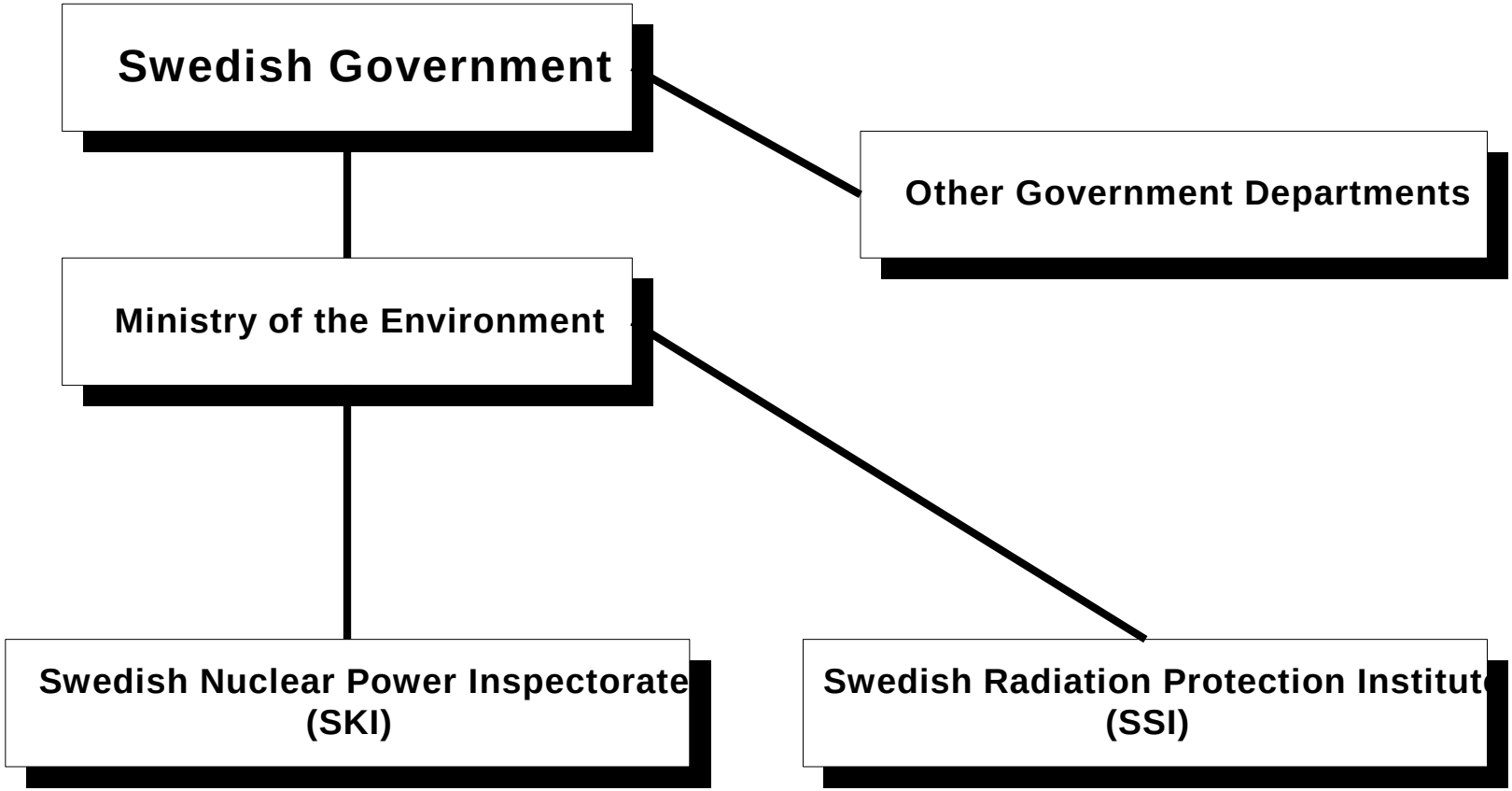
SOUTH AFRICA



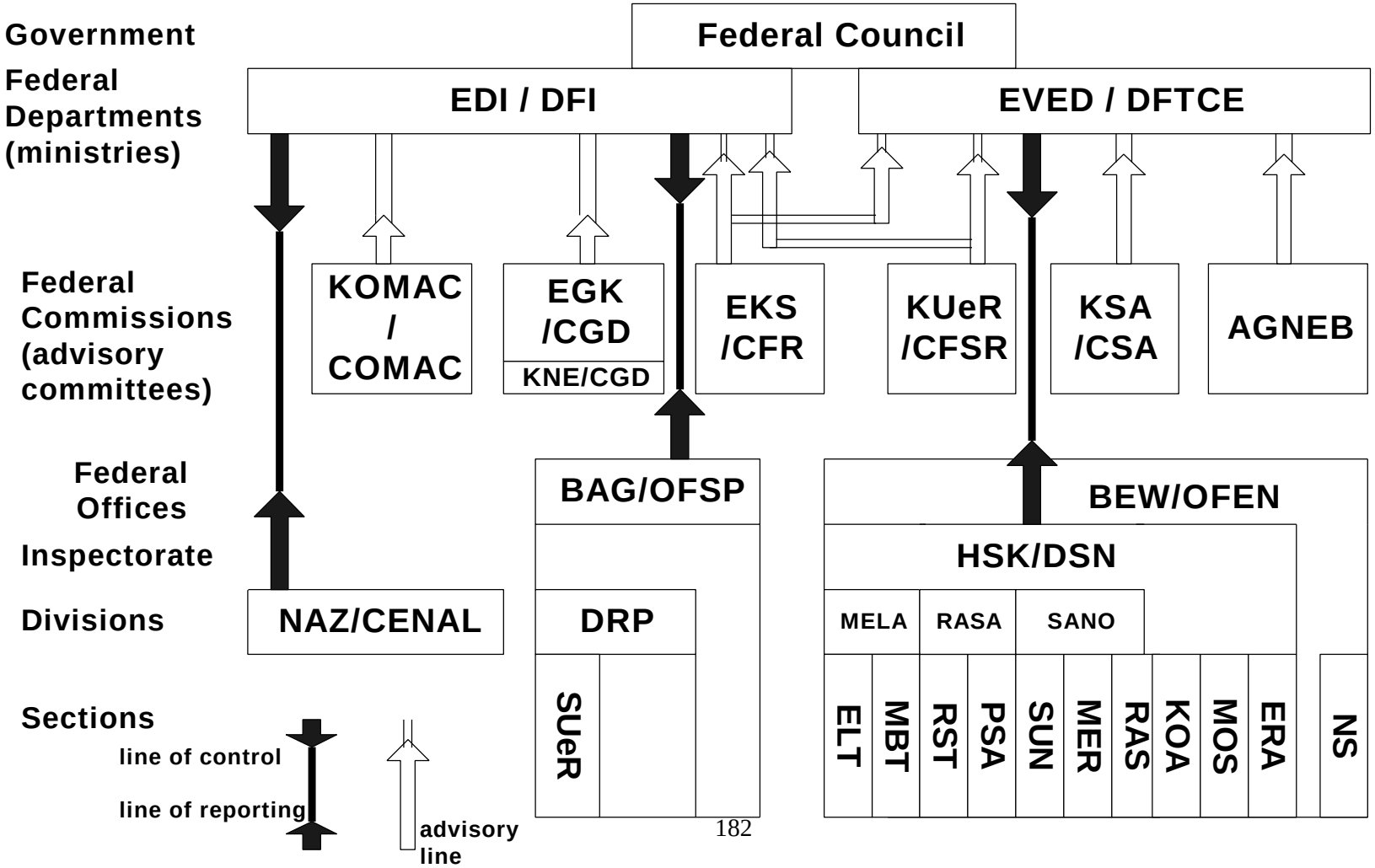
SPAIN


PARLIAMENT
NUCLEAR SAFETY COUNCIL
COURTS OF JUSTICE
REGULATIONS
EMERGENCY PLANS
INTERNATIONAL TREATIES
IMPORT & EXPORT LICENSES
MEDICAL SERVICE AUTHORISATION
NUCLEAR & RADIOACTIVE FACILITY AUTHORISATION
DECLARATION OF ENVIRONMENTAL IMPACT
FUNCTIONING AGREEMENTS
MINISTRY OF THE INTERIOR
MINISTRY OF FOREIGN RELATIONS
MINISTRY OF TRADE
MINISTRY OF HEALTH
MINISTRY OF INDUSTRY & ENERGY
MINISTRY OF THE ENVIRONMENT
GOVERNMENT
AUTONOMOUS COMMUNITIES

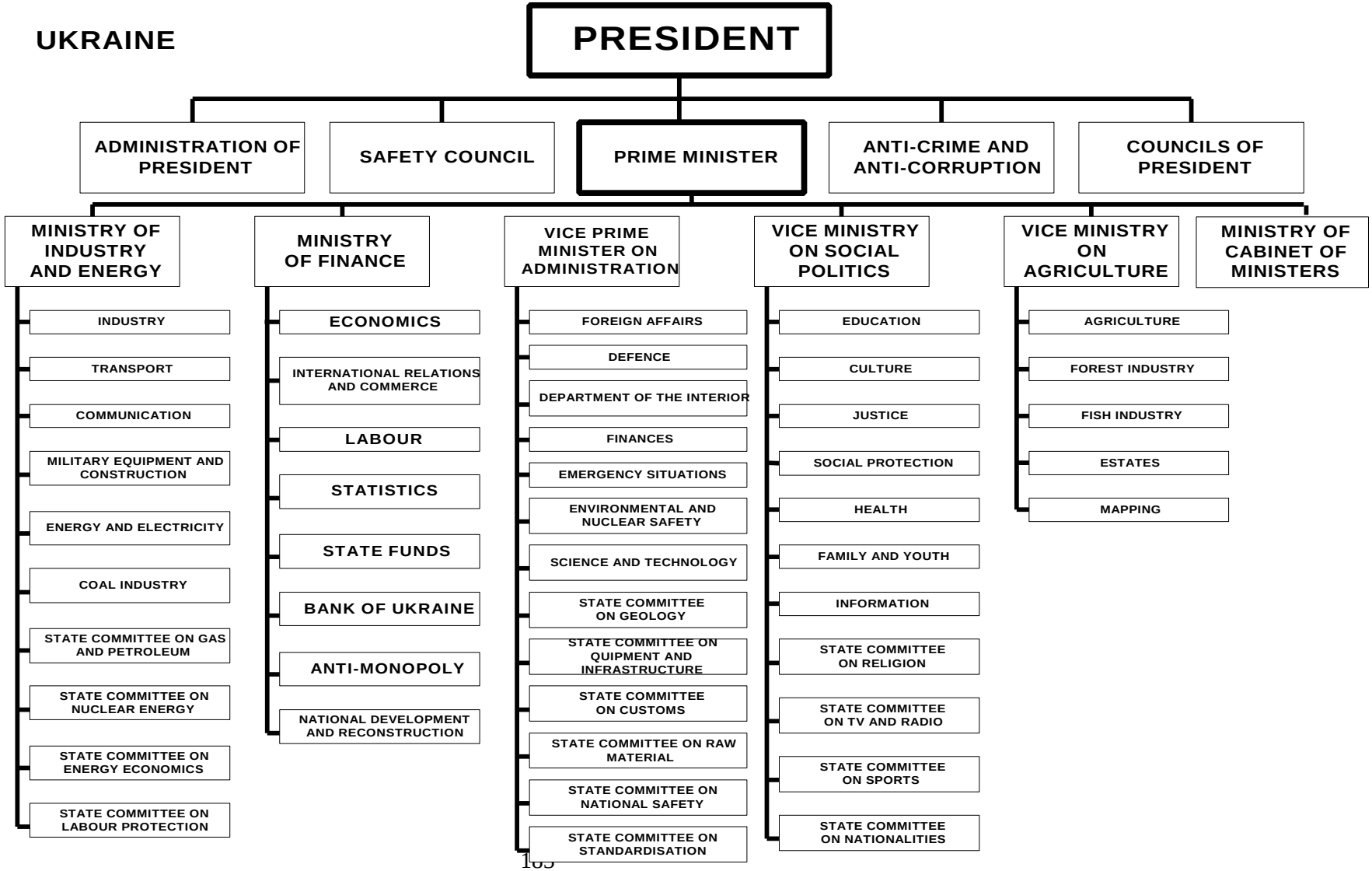
SWEDEN


Swedish Government
Other Government Departments
Ministry of the Environment
Swedish Nuclear Power Inspectorate (SKI)
Swedish Radiation Protection Institute (SSI)

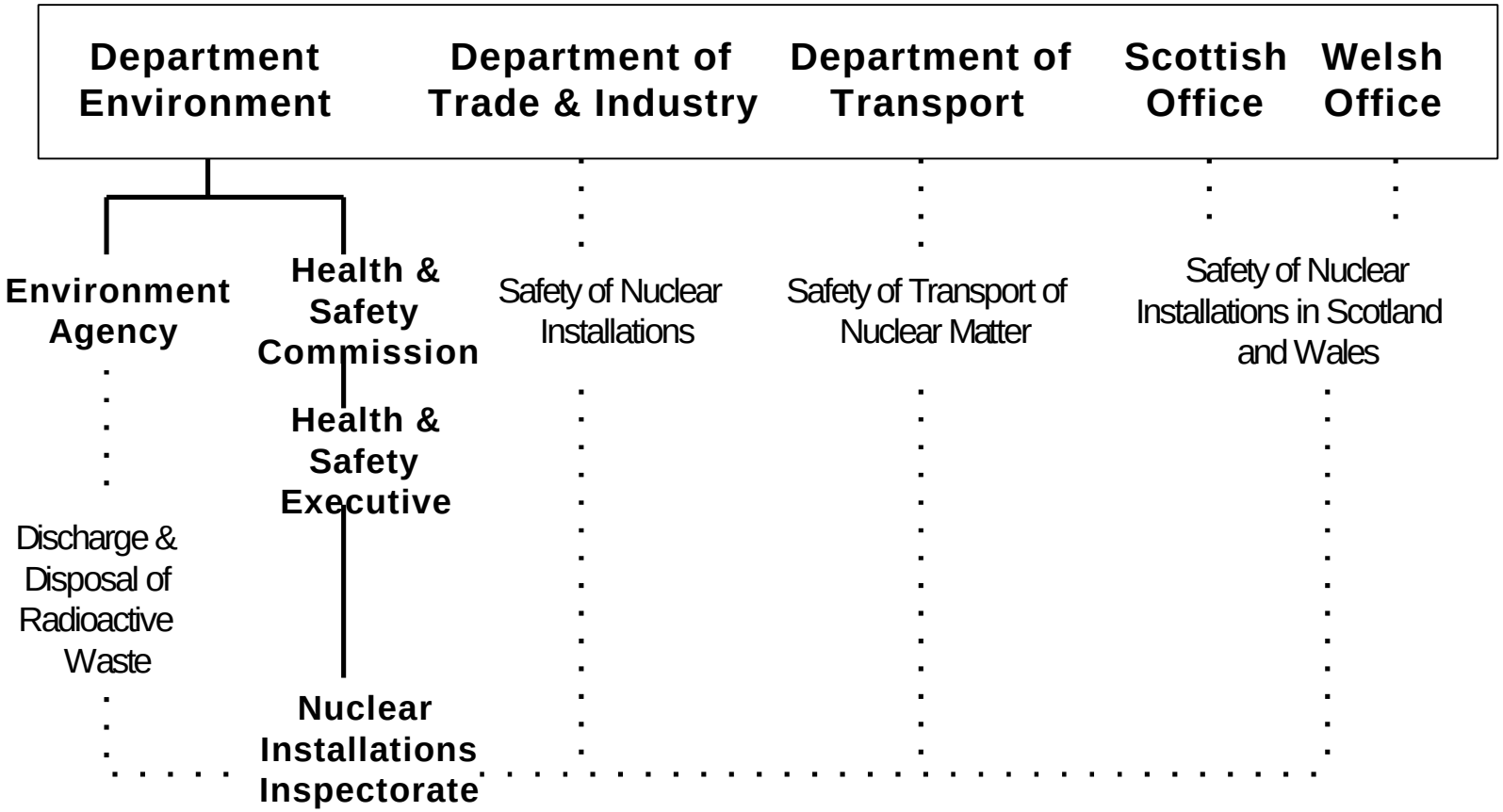
SWITZERLAND



UKRAINE


PRESIDENT
ADMINISTRATION OF PRESIDENT
SAFETY COUNCIL
PRIME MINISTER
ANTI-CRIME AND ANTI-CORRUPTION
COUNCILS OF PRESIDENT
MINISTRY OF INDUSTRY AND ENERGY
INDUSTRY
TRANSPORT
COMMUNICATION
MILITARY EQUIPMENT AND CONSTRUCTION
ENERGY AND ELECTRICITY
COAL INDUSTRY
STATE COMMITTEE ON GAS AND PETROLEUM
STATE COMMITTEE ON NUCLEAR ENERGY
STATE COMMITTEE ON ENERGY ECONOMICS
STATE COMMITTEE ON LABOUR PROTECTION
MINISTRY OF FINANCE
ECONOMICS
INTERNATIONAL RELATIONS AND COMMERCE
LABOUR
STATISTICS
STATE FUNDS
BANK OF UKRAINE
ANTI-MONOPOLY
NATIONAL DEVELOPMENT AND RECONSTRUCTION
VICE PRIME MINISTER ON ADMINISTRATION
FOREIGN AFFAIRS
DEFENCE
DEPARTMENT OF THE INTERIOR
FINANCES
EMERGENCY SITUATIONS
ENVIRONMENTAL AND NUCLEAR SAFETY
SCIENCE AND TECHNOLOGY
STATE COMMITTEE ON GEOLOGY
STATE COMMITTEE ON QUIPMENT AND INFRASTRUCTURE
STATE COMMITTEE ON CUSTOMS
STATE COMMITTEE ON RAW MATERIAL
STATE COMMITTEE ON NATIONAL SAFETY
STATE COMMITTEE ON STANDARDISATION
VICE MINISTRY ON SOCIAL POLITICS
EDUCATION
CULTURE
JUSTICE
SOCIAL PROTECTION
HEALTH
FAMILY AND YOUTH
INFORMATION
STATE COMMITTEE ON RELIGION
STATE COMMITTEE ON TV AND RADIO
STATE COMMITTEE ON SPORTS
STATE COMMITTEE ON NATIONALITIES
VICE MINISTRY ON AGRICULTURE
AGRICULTURE
FOREST INDUSTRY
FISH INDUSTRY
ESTATES
MAPPING
MINISTRY OF CABINET OF MINISTERS

UNITED KINGDOM



United States

Federal Government

The Legislative Branch

The Executive Branch

The Judicial Branch

House of Representatives
Senate

General Accounting Office
Government Printing Office
Library of Congress

President
Vice- President

Supreme Court
Court of Appeals
Federal Judicial Center
Federal Courts
United State Code

FEDERAL AGENCIES & COMMISSIONS

Evironmental Protection Agency (EPA)
Federal Communications Commission (FCC)
Nuclear Regulatory Commission (NRC)
National Aeronautic and Space Administration (NASA)
Small Business Administration (SBA)
United States Postal Service (USPS)

etc.

White House Offices and Agencies

The President's Cabinet

ANNEX III - NUCLEAR CAPACITY

COUNTRY	Number of 'Operating' Nuclear Power Plants	Nuclear Capacity MWe (Net)	Number of 'Operating' Research Reactors	Number of 'Operating' Fuel Fabrication Facilities	Number of 'Operating' Reprocessing Facilities
ARGENTINA	2	1000	6	4	0
ARMENIA	1	440	0	0	0
AUSTRALIA	0	0	1	0	0
BELARUS	0	0	0	0	0
BELGIUM	7	5800	2	2	1[1]
BRAZIL	1	626	0	0	0
BULGARIA	6	3760	1	0	0
CANADA	22	14960	11	2	0
CHINA	3	2100	17	2	0
CZECH REPUBLIC	1	1460	3	0	0
FINLAND	4	2300	1	0	0
FRANCE	56 PWR + 2 FBR	61483[2]	16	5[3]	1
GERMANY	20[4]	22326	6	2	0
HUNGARY	4	1840	2[5]	0	0
INDIA	10[6]	1840	5	3	2
ITALY	0	0	5	1	0
JAPAN	50	42547	14	7	1
KAZAKSTAN	1	70	4	1	0

1. Waste treatment facility
2. PWRs = 60050 Mwe and FBRs = 1433 MWe
3. From enrichment to fuel assembly
4. 13 (PWR) and 6 (BWR) - One PWR out of operation due to court decision.
5. One Training reactor
6. 8 (PHWR) and 2 (BWR)

COUNTRY	Number of 'Operating' Nuclear Power Plants	Nuclear Capacity MWe (Net)	Number of 'Operating' Research Reactors	Number of 'Operating' Fuel Fabrication Facilities	Number of 'Operating' Reprocessing Facilities
KOREA, REPUBLIC of	11	9022	2	1	0
MEXICO	2	1308	1	1 (Pilot)	0
THE NETHERLANDS	1	452	3	0	0
PAKISTAN	1	125	2	1	0
RUSSIA	29	21242	37	2	1
SLOVAK REPUBLIC	4	1760	0	0	0
SLOVENIA	1	632	1	0	0
SOUTH AFRICA	2	1842	1	1	0
SPAIN	9	7396	0	1	0
SWEDEN	12	10378	1	1	0
SWITZERLAND	5	3050	3	0	0
UKRAINE	5	12880	1	0	0
UNITED KINGDOM	34	11686	5	3	4
UNITED STATES	109	99000	44	8	0

ANNEX IV - REGULATORY AUTHORITY STAFFING

COUNTRY	'Total' Number of Personnel in Regulatory Body	'Total' Number of Technical or Professional Staff	'Total' Number of Administrative Staff	'Total' Number of Inspectors	Other
ARGENTINA	240	180	60	55	
ARMENIA	25			8	
AUSTRALIA	9	6	3	4	
BELARUS	21	20		14	
BELGIUM	58	46	12	13	1
BRAZIL(*)[7]	910 (44*)	343 (40*)	567 (4*)	40 *	
BULGARIA	92	73	19	49	8
CANADA	410	297	88	130	25
CHINA	97	84 (NSC)	13	35	
CZECH REPUBLIC	129	31	16	82	
FINLAND	270	200	70	70	
FRANCE	550	350 (IPSN)		115	
GERMANY[8]					
HUNGARY	38	31	7	31	
INDIA	89	59	20	15	10
ITALY	269	189[9]	80	18	
JAPAN[10]	450	400		205	
KAZAKSTAN	24	21	3	15	
KOREA, REPUBLIC of	309	234	75	172	

7. Only includes those personnel involved with Reactor Co-ordination

8. Number of staff is distributed over Bund and Länder authorities and expert organisations.

9. Professional staff working on nuclear regulation is approximately 100; in order to carry out ***ANPA***s task addressed to environmental activities, a number of working groups have been formed using personnel seconded from various divisions; in fact, the principal focus of these working groups is to address environmental problems.

10. Each number indicates the total from both ***MITI*** and ***STA***.

COUNTRY	'Total' Number of Personnel in Regulatory Body	'Total' Number of Technical or Professional Staff	'Total' Number of Administrative Staff	'Total' Number of Inspectors	Other
MEXICO	192	126	66	16	
THE NETHERLANDS[11]	21	16	4	4	
PAKISTAN	121	55	66	16	
RUSSIA	2000		300	890[12]	
SLOVAK REPUBLIC				40	
SLOVENIA	28	23	2	5	3
SOUTH AFRICA	85	74	10	61	
SPAIN	400	250	150	120	
SWEDEN[13]	100	80	20	15	
SWITZERLAND	86	72	14	75[14]	
UKRAINE	450	325	50	60	5
UNITED KINGDOM	234	0	89	145	
UNITED STATES	3120	2335	503	377	

11. The numbers provided reflect only KFD staff.

12. Some members of Technical, Professional and Administrative Staff participate in inspection activities.

13. Only includes SKI personnel.

14. Includes 20 private experts.

ANNEX V - ACRONYMS

The following annexes list a majority of the acronyms denoted within the document. While this list is not intended to be an *"all inclusive"* list, nevertheless, it hopefully provides the reader with an index of acronyms used in the many different countries represented in this report.

Annex 5.1 Country Acronyms

Country	Acronym	Title
Argentina	ARN	Autoridad Regulatoria Nuclear (Nuclear Regulatory Authority)
	CNEA	Comisión Nacional de Energia Atómica (National Atomic Energy Commission)
	ENREN	Ente Nacional de Energia Atómica (National Board of Nuclear Regulation)
Armenia	ANRA	Armenian Nuclear Regulatory Authority
Australia	ANSTO	Australian Nuclear Science and Technology Organisation
	NSB	Nuclear Safety Bureau
	TGA	Therapeutic Goods Administration
Belgium	AVN	AIB-Vinçotte Nuclear
	DAS	Development Analysis Support
	DRF	Documentation, rules, Feedback
	LIO	Licensed Inspection Organisation
	NIS	Nuclear Inspection Support
	OPI	Operational Projects and Inspections
Brazil	CNEN	Comissão Nacional de Energia Nuclear (Brazilian Nuclear Energy Commission)
	SLC	Licensing and Control Superintendence
Bulgaria	AUAEPP	Committee on the Use of Atomic Energy for Peaceful Purposes
Canada	AECB	Atomic Energy Control Board (Commission de contrôle de l'énergie atomique)
	EAG	Event Analysis Group
China	NNSA	National Nuclear Safety Administration
Czech Republic	EAG	Expert Advisory Group
	ERC	Emergency Response Centre
	GCRA	Governmental Commission for Radiation Activities
	NRPL	National Institute for Radiation Protection
	RCRA	Regional Commissions for Radiation Accident
	SÚJB	Státní úrad jadernou bezpecnost (State Office for Nuclear Safety)
Finland	STUK	Säteilyturvakeskus (STUK -Radiation and Nuclear Safety Authority)
	YTO	Ydin Turvallisuus Osasto
	YVL	Ydin Voima Laitos (Nuclear Power Plant Guides)

Country	Acronym	Title
France	CEA	Commissariat à l'Energie Atomique
	DRIRE	Direction Regionale de l'industrie, de la recherche et de l'environnement (Regional Directorates for Industry, Research and the Environment)
	DSIN	Division des installations Nucléaires (Nuclear Installation Safety Directorate)
	EdF	Electricité de France
	IPSN	Institut de Protection et de Sûreté Nucléaire (Institute for Nuclear Safety and Protection)
	OPRI	Office de Protection contre les Rayonnements Ionisants (Office for Protection against Ionising Radiation)
Germany	BfS	Bundesamt für Strahlenschutz (Federal Office for Radiation Protection)
	BMU	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
	GRS	Gesellschaft für Anlagen- und Reaktorsicherheit
	RSK	Reactor Safety Commission
	SSK	Commission on Radiological Protection
	TÜV	Technical Inspection Agencies
Hungary	AERI	Atomic Energy Research Institute
	CERTA	Centre for Emergency Response, Training and Analysis
	HAEC	Hungarian Atomic Energy Commission
	HAEO	Hungarian Nuclear Energy Office
	NSI	Nuclear Safety Inspectorate
	SNSI	Supreme Nuclear Safety Inspectorate
India	AEC	Atomic Energy Commission
	AERB	Atomic Energy Regulatory Board
	DAE	Department of Atomic Energy
	DRI&E	Directorate of Regulatory Inspection
	OPSD	Operating Plants Safety Division
	SARCOP	Safety Review Committee for Operating Plants
Italy	ANPA	Agenzia Nazionale per la Protezione dell'Ambiente (National Agency of Environmental Protection)
	CE	Emergency Committee
	DISP	Directorate of Nuclear Safety and Radiological Protection
	ECC	Emergency Co-ordination Centre
Japan	AEC	Atomic Energy Commission
	JAPEIC	Japan Power Engineering and Inspection Corporation
	MITI	Ministry of International Trade and Industry
	MOT	Ministry of Transport
	NSC	Nuclear Safety Commission
	NUSTEC	Nuclear Safety Technology Center
	STA	Science and Technology Agency
Kazakstan	KAEA	Atomic Energy Agency of the Republic of Kazakstan

Country	Acronym	Title
Korea	KAERI	Korean Atomic Energy Research Institute
	KINS	Korea Institute of Nuclear Safety
	MOST	Ministry of Science and Technology
Mexico	CNSNS	Comisión Nacional de Seguridad Nuclear y Salvaguardias (National Commission of Nuclear Safety and Safeguards)
Netherlands	EZ	Ministry of Economic Affairs
	KFD	Nuclear Safety Department
	SZW	Ministerie van Sociale Zaken en Werkgelegenheid (Ministry of Social Affairs and Employment)
	VROM	Ministry of Housing, Physical Planning and the Environment
Pakistan	DNSRP	Directorate of Nuclear Safety and Radiation Protection
	PAEC	Pakistan Atomic Energy Commission
	PNRB	Pakistan Nuclear Regulatory Board
	RNSI	Regional Nuclear Safety Inspectorate
Slovak Republic	ÚJD SR SNRA	Úrad Jadrového Dozoru Slovenskej Republiky (Nuclear Regulatory Authority of Slovak Republic)
Slovenia	SNSA	Slovenian Nuclear Safety Administration
South Africa	AEC	Atomic Energy Corporation
	CNS	Raad Vir Kernveiligheid (Council for Nuclear Safety)
Spain	CSN	Consejo de Seguridad Nuclear (Nuclear Safety Council)
Sweden	SKI	Statens Kärnkraftinspektion (Swedish Nuclear Power Inspectorate)
	SSI	Swedish Radiation Protection Institute
Switzerland	EOR	Emergency Organisation for Radioactivity
	HSK	Hauptabteilung für die Sicherheit der Kernaniagen (Federal Nuclear Safety Inspectorate)
	KSA	Advisory Commission
	NSA	National emergency Operations Centre
Ukraine	MSI	Main State Inspectorate
	NRA	Nuclear Regulatory Administration
United Kingdom	ACSNI	Advisory Committee on the Safety of Nuclear Installations
	GTA	Government Technical Advisor
	HSC	Health and Safety Commission
	HM NII	HM Nuclear Installations Inspectorate
	HSE	Health & Safety Executive
United States	AIT	Augmented Inspection Team
	ERDA	Energy Research and Development Administration
	IIT	Incident Investigation Team
	NOV	Notice of Violation
	NRC	Nuclear Regulatory Commission

Annex 5.2 General Acronyms

Acronym	Title
ALARA	As Low As Reasonably Acheivable
ASSET	(IAEA) Assessment of Safety Significant Events Team
BWR	Boiling Water Reactor
FY	Fiscal Year
IAEA	International Atomic Energy Agency
ICRP	International Radiation
INES	International
IRS	Incident Reporting System
ISI	In-Service Inspection
LERs	Licensee Event Reports
NDT	Non-Destructive Testing
NPP	Nuclear Power Plant
OSART	(IAEA) Operational Safety Review Team
PSA /PRA	Probabilistic Safety Assessment / Probabilistic Reliability Analysis
PWR	Pressurised Water Reactor
QA	Quality Assurance
RIG	Risk-Based Inspection Guides