



**Convention on  
Nuclear Safety**

**Fifth Italian National Report**

2010



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*This National Report was drafted on behalf of the Italian Government by  
the Institute for Environmental Protection and Research (ISPRA).*



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## Section A. Preface



This National Report, pursuant to Article 5 of the Convention on Nuclear Safety which entered into force on 24 October 1996, describes the official actions that the Government of the Republic of Italy, as a Contracting Party to the Convention since 15 April 1998, has taken in order to fulfil its obligations as specified in Articles 6 through 19 of the Convention.

This Report is the fifth National Report. It represents a revision to the fourth Report submitted by Italy on October 2007 for the fourth Review Meeting of April 2008.

This fifth National Report was prepared in accordance with the “Guidelines Regarding National Reports under the Convention on Nuclear Safety”. It contains updated information on matters covered in the first, second, third and fourth Reports, noting significant changes occurred in national laws, regulations and practices. This Report also addresses topics of interest identified in the previous Report during the fourth Review Meeting.

Nuclear installations covered in this National Report are land based civil nuclear power plants under the jurisdiction of the Republic of Italy complying with the definition given under the Article 2i. It has to be considered that such compliance is quite formal; in fact all Italian plants have been definitively shut down about 20 years ago and all the fuel elements have been removed permanently from the reactors’ core of each plant.

Revised decommissioning plans have been submitted after 1999 when a single step decommissioning strategy was adopted. Authorisations to the overall decommissioning plans established by the nuclear Act have not yet been granted mainly due to the lack of a national site for waste storage. Nonetheless, as referred in the introductory section, some decommissioning related activities, not involving parts or components of nuclear islands, have already been performed and are in progress on the basis of authorisations granted according to specific provisions of the nuclear Act.

It is to be noted how, in the light of the Italian plants’ state, all the safety matter dealt with in this Report falls in the scope of the Joint Convention.

It has to be mentioned that in 2009 the Italian Government decided to restart a new nuclear programme. To this aim a new law establishing the necessary legislative provisions was promulgated in July 2009. A few implementation Decrees have been issued, others are in the process of being prepared. At the date of the present report no application has been submitted yet for siting and construction of new installations.

This National Report was prepared on behalf of the Italian Government by the Department for Nuclear, Technological and Industrial Risk of the Italian Institute for the Environmental Protection and Research (ISPRA), that is the Italian National Regulatory Body.



## Section B. Introduction



### **Introductory Remarks**

This Report is intended to provide an updating of the Italian National Reports issued in 1998, 2001, 2004 and 2007. To organise its content, the following aspects have been considered:

- the changes in policy as well as in national nuclear safety laws, regulations and practices since 2007, when the Fourth National Report was issued;
- the topics identified in the previous Report during the fourth Review Meeting;
- the need of providing an updated general picture of the national situation taking into account all the changes intervened since the first report.

The above considerations led to prepare a self standing document. To this aim, the Report provides a general update of the “article-by-article review”, as applicable to the Italian scene, with Annexes integrating the pieces of information provided in the main text.

### **Italy’s Nuclear Activities Policy**

Since the abandonment of nuclear power followed to the referendum of November 1987 and the consequent definitive shut-down of the four Italian nuclear power stations (i.e. Garigliano, Latina, Trino and Caorso), no significant change of policy has occurred on the matter until 2009 when the Government decided to reopen the nuclear option by envisaging the construction of new installations in the coming years. To this aim a new legislation was promulgated in July 2009 (Law n. 99) to regulate the process to start a new nuclear programme. In order to be effective, this Law requires several implementation decrees which are currently under preparation by the involved ministries.

The present report will describe in general terms the main provisions of the new legislation. Due to the fact that the updating process of the legislation to underpin the restart of the nuclear programme is still in progress and does not affect the set of norms applicable to nuclear installations in its scope, the present report will not perform a compliance assessment of the new acts in front of the Convention obligations. Most of the report will therefore deal with the situation related to existing Nuclear Installations and to the related decommissioning programmes.

In the past years specific policy statements were issued by the Government to address the need of keeping up-to-date competences and capabilities on nuclear installations safety related matters by National State R&D Organisations, as well as by the National Regulatory Body, Universities, State owned companies and selected Industries. These policies were essentially aimed at maintaining effective nuclear infrastructures suitable to ensure a safe operation of the decommissioning activities, safe management of spent fuel and radioactive waste, investigation of safer nuclear plants concepts and participation in international debate on nuclear safety. In addition, a proper consideration was given to keep up structures and technical competencies in

order to maintain adequate emergency preparedness capabilities, in particular in relation to nuclear accidents potentially affecting reactors located in the neighbouring countries.

Moreover, it must be said that the new governmental orientation toward nuclear power stimulated the national debate and several initiatives in the frame of Utilities, Industries, Universities, Standardisation Committees.

With regard to the safe management of existing NPPs, as referred in the previous Reports, since 1999 all the liabilities and assets connected to nuclear power belonging to the National Electricity Company (ENEL S.p.A.) were assigned to a newly established Company, named SOGIN (Società Gestione Impianti Nucleari) S.p.A., whose shareholder is the Ministry of Economy, while the strategic and operational guidelines are given by the Ministry of Economic Development. On 2003, also the fuel fabrication and experimental fuel cycle installations were assigned to SOGIN; such facilities are now, at different levels, under decommissioning. The primary mission of SOGIN is the decommissioning of all Italian nuclear installations and facilities according to a single step strategy, as well as the safe management of the spent fuel and radioactive waste. According to Legislative Decree 31/2010, related to the siting, construction and operation of new nuclear facilities and of radioactive waste storage facilities, SOGIN is also responsible for the construction and operation of the national radioactive waste storage facilities. A special fund allocation for financing all these activities is ensured by means of a specific levy on the price of the electricity.

Until 1999, a safe enclosure strategy had been adopted for the safe management of the NPPs after their definitive shutdown. Following the subsequent governmental decision to move into a decommissioning strategy involving the dismantling of structures and components in the span of 20 years time period, new plans have been submitted by the licensee to the involved authorities for authorization. At present, regulatory processes are well advanced and the respective authorizations are expected to be granted in a near term. It is to be noted that the Italian legislation regulates the decommissioning of nuclear installations as a comprehensive set of actions where authorisations can be granted either in several steps (phases) or in a single phase leading up to planned and definite intermediate states. The multiple phase approach, however, is accepted on condition that the proposed subdivision into phases is shown to be part of an overall decommissioning plan leading up to a final site release and defining, inter alia, the destination of resulting radioactive material. In addition, the subject rule requires that the decommissioning plans are authorised also on the basis of the results of the environmental impact assessment, which clearly implies a longer licensing process.

On the other hand, the experience resulting from the management of NPPs shutdown since many years clearly indicated some other priorities before starting the bulk of the dismantling activities. In particular there was the need to remove the spent fuel still present in the pools and to manage (conditioning and storage), the waste already existing on the sites, generated by the past operation. To this aim, as discussed more in detail in the following sections, the transfer of



the spent fuel abroad for reprocessing is in an advanced phase and several projects aimed at the conditioning of existing waste and at the construction of temporary waste storage facilities on the sites are in progress or have been proposed. These facilities are in several cases also intended to accommodate decommissioning waste for the period between the completion of their conditioning process and their transfer to the national repository.

Law provisions establish the possibility to authorize specific activities related to decommissioning and dismantling before the approval of the overall decommissioning plan, provided benefits to safety and radiation protection are properly demonstrated and the overall decommissioning plan has been submitted. On this basis, several preliminary decommissioning activities have been therefore conducted on the sites and others are in progress. These activities are mainly related to the treatment and conditioning of existing waste, to the decontamination of some systems and components, to the removal of piping isolation, to the modification of obsolete equipment to the preliminary dismantling of systems and components. They are however not related to the nuclear island whose dismantling is strictly connected to the availability of adequate storage capacity for the resulting materials.

As discussed in the forth Report, difficulties were encountered by the Government in finalising the national site for waste storage localisation and, in the absence of a defined perspective, some Local Administrations opposed the construction of on-site temporary radioactive waste storage facilities. This caused some delay in the timing of the decommissioning and dismantling activities and is making the authorization process of the decommissioning plans more complex.

A new legislative decree issued on February 2010 (n. 31) identified new general procedures and licensing steps also for the siting of the national storage facility for nuclear wastes; such decree has been designed and issued with the purpose to overcome the past difficulties.

The status of the activities at the four nuclear installations reported in the Annex 1 clearly reflects the discussed difficulties.

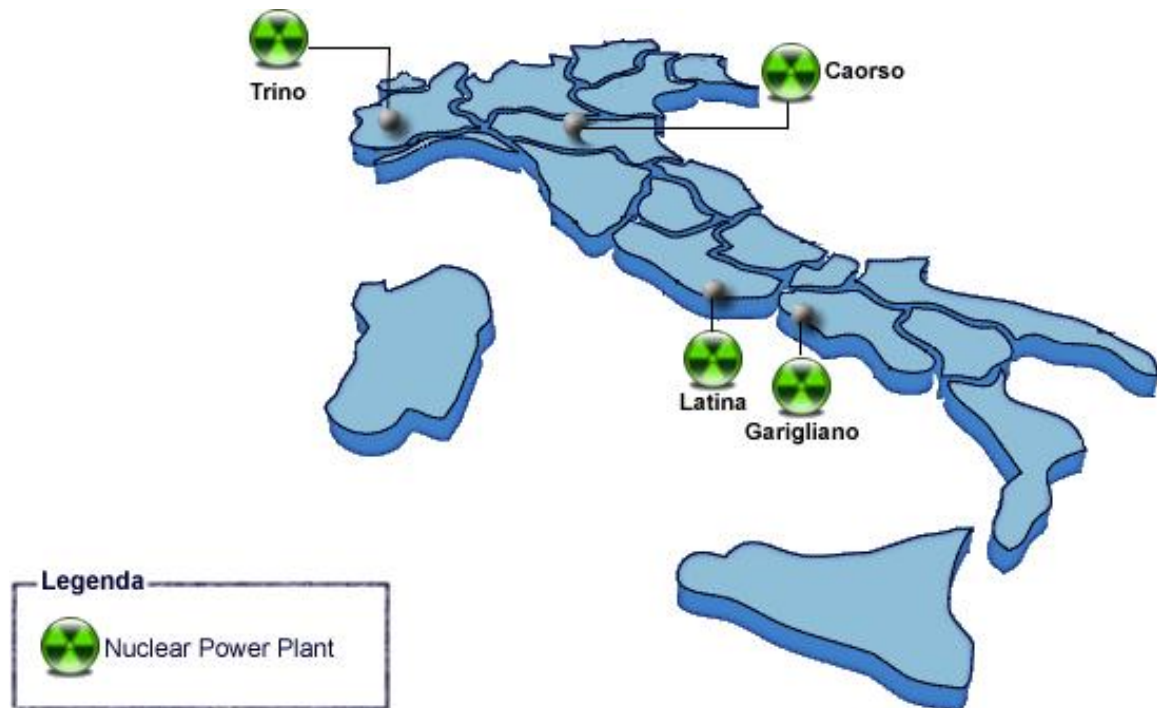


Figure 1: Location of Italian NPPs

## Policy Developments

### Decommissioning policy

The current national decommissioning policy was established in 2004 when the Ministry of Economic Development (i.e. Ministerial Decree of December 2004) updated strategic objectives assigned to SOGIN according to the following main actions:

- a) treatment and conditioning into certified form, in a 10 year time frame, of all liquid and solid wastes, ready to be delivered to the national repository;
- b) completion of all the actions needed for satisfying existing spent fuel reprocessing contracts;
- c) feasibility evaluation of temporary export of the spent fuel existing in NPPs' and in interim storage sites, for its reprocessing - evaluation of the short and long term costs, of the safety and environmental protection requirements and of the time needed - implementation of the necessary actions;
- d) a single step decommissioning of all nuclear power plants and nuclear fuel cycle facilities in a 20 years time frame, pending the operation in due time of the temporary and final repository of radioactive waste.

In the context of the on going authorization process of the NPPs decommissioning plans, the Regulatory Body (now ISPRA, APAT at the time) took the position that before the start up of dismantling activities of the nuclear island, in the case of unavailability of a national facility for

radioactive waste storage, the licensee will have to provide an on site interim storage with capacity adequate to the amount of the wastes foreseen to be produced. The building and operation of such interim storage need to be authorized by the competent Italian authorities.

#### Spent fuel management policy

Since the beginning of its nuclear programme, Italy had pursued the option of reprocessing abroad the spent fuel produced in its NPPs. After the political decision to stop all nuclear power activities, the shipments abroad of spent fuel for reprocessing were suspended with the last shipment to UK occurred in 2005, in the frame of a service agreement already in place.

The opposition of local communities and authorities to the choice of the on-site dry storage (Ministerial Decree of May 2001 and December 2004 above mentioned), led the Government to reconsider the option of reprocessing abroad all the spent fuel still present (Directive of the Ministry of Economic Development, March 2006).

In particular, apart from the Uranium/Thorium fuel stored at the ITREC facility, SOGIN was charged to establish reprocessing agreements for all the remaining spent fuel presently stored in Italy, including the Italian part of spent fuel resulting from the Superphoenix experience.

Such a decision has become a part of the Inter-Governmental Agreement signed with the French Government on November 26, 2006, followed by a contract that SOGIN S.p.A. assigned to Areva Nc on May 9, 2007.

Waiting for the transfer abroad for reprocessing, the spent fuel is being maintained in the storage pools. With regard to the NPPs, spent fuel has been completely removed from the Caorso site during the past three years. It is still present in the Trino site and will be transferred abroad by 2012. Its safe management continues to be performed according to existing licence conditions and technical specifications. The latest decisions and agreements on this matter are presented below.

#### Radioactive waste management policy

Most of the radioactive waste existing in Italy has been produced in the past operation of the nuclear installations. The main additional waste to be managed in the future will come from the decommissioning activities, as well as from the re-entry in Italy of the high and intermediate level conditioned waste resulting from the reprocessing abroad of the remaining spent fuel. At present, almost all the waste originated by the past nuclear programme is stored in the site of each individual installation where it was generated.

Several initiatives were taken in the past years to investigate the possible solutions for the localisation of a national storage facility. For instance, on April 2003 the Government established a Working Group with the mandate to identify the criteria for the siting and the realisation of a final repository, taking into consideration both the hypotheses of a surface and a subsurface repository, and considering the following operative objectives:

- retrievability of the waste;
- long term safety;
- institutional control period no less than 300 years;
- data records to keep memory of the repository also after the institutional control;
- dose level to the population not higher than 0,01 mSv/year.

A document with the selection criteria for the site was prepared by the Group and presented to the Conference of the Regions.

Later on, in February 2008 the Ministry of Economic Development established a working group having the mandate to define the type of a centralized storage facility for the disposal of intermediate and low level waste radioactive waste and the medium term storage of high level waste as well as methodology and procedures for site selections. The group produced its report in September 2008.

L.ve Decree n. 31/2010 establishes a new procedure for siting, construction and operation of the national storage facility. Waiting for the implementation of this new procedure and for the availability of a national facility, radioactive waste are being stored in the nuclear installations of origin. Action plans are in progress to enhance the safety level of waste by implementing specific treatment and conditioning projects, by refurbishing existing buildings or by realizing new storage facilities on the sites. New facilities will also be used to ensure temporary storage capacity for waste resulting from decommissioning activities.

#### Latest Developments

##### Spent fuel and waste management strategy

As result of the implementation of the above mentioned contract between SOGIN and AREVA in the past three years all the spent fuel stored in the pool of the Caorso NPP has been transferred to France. The transfer of the spent fuel stored in the Trino NPP will be completed by 2012. Residual wastes will be returned to Italy starting by 2020.

This Agreement provides indeed relevant elements of the Government new policy. By implying specific commitments to the Italian Government, it has the potential to overcome difficulties so far encountered (i.e.: selection of a site for the localisation of national waste storage facility and type of facility, construction of on-site temporary storage facilities) and then to expedite the implementation of the decommissioning operations as discussed in the following section on Programme of nuclear activities. The Agreement calls also for reviewing the current legislative provisions on the matter established in the above referred Laws n. 368/2003 and n. 239/2004. In this regard the above mentioned Legislative Decree 31/2010 establishes also the new procedure for the localization and the construction of a national repository for the disposal of low and intermediate radioactive waste and the long term storage of high level waste, and assigns to SOGIN the role of the Implementer responsible for the construction and operation of the

national repository. Legislative Decree 31/2010 also assigns SOGIN the role to propose areas suitable for the localization of the facility based upon criteria established by the IAEA and the new national Agency for Nuclear Safety and taking into account results of Strategic Environmental Evaluation.

#### Legislative and regulatory framework

In the past three years the following developments regarding the legislative and institutional framework have taken place.

In the frame of a general reorganization of administrations under the aegis of the Ministry of Environment, in 2008 the National Institute for Environmental Protection and Research (ISPRA) was established (Law 133/2008) by merging the previous Agency for Environmental Protection and Technical Services (APAT) with other administrations operating in the field of environmental protection. As a consequence of that also the functions and duties as Regulatory Body in the nuclear field previously assigned to APAT were transferred to ISPRA. These functions and duties are fulfilled by the Nuclear Department of the Institute.

Law 99/2009 established new provisions in the field of energy and delegated the Government to promulgate new legislative decrees in order to reorganize the framework regulating the localization in the national territory of new installations for the production of nuclear energy. The Law established also some principles and criteria to be reflected in the legislative decrees such as:

- a high level of nuclear safety to ensure protection of population and environment;
- the prevision of compensations to local communities hosting a nuclear installation in their territory;
- the need to require the licensees of new plants to implement due provisions for waste management and decommissioning at the end of life;
- the need to make the best use of technical data available to Universities, research and environmental organizations;
- the licensing process to be characterized by a single State authorization (EIA and SEA are anyhow required), with the agreement of the so called "Unified State-Regions Conference";
- the license decrees to be issued by the Ministry of Economic Development, with the agreement of the Ministry for the Environment, Land and Sea and the Ministry of the Transports and Infrastructures;
- the costs of regulatory controls to be sustained by the applicants and licensees;
- the controls to be transparent to the public;
- the possibility to perform regulatory controls with the support of European technical safety organizations;

- the prevision of a one step licensing process;
- the recognition that approvals granted during the last decade in OECD countries or in countries with whom bilateral agreements in the field of nuclear energy have been established are valid, providing the approval of the nuclear safety Agency;
- prevision of a decommissioning fund for new installations;
- provision of diffused information to public;
- identification of fines and punishments in case of violations.

In addition, Law 99/2009, in Article 29, establishes a new Nuclear Safety Agency with the role of Regulatory Body. The Agency will be made by the structure of the Nuclear Department of ISPRA and by resources from the Agency for New technologies, energy and sustainable development (ENEA), a governmental organization which, among other duties in the field of energy and environmental protection, performs research in the nuclear field and which also operates research reactors and some radioactive waste treatment and storage installations. The same Article 29 states that the Nuclear Department of ISPRA continues to perform the functions of regulatory body until the operating rules of the new Agency are issued by a Decree of Prime Minister.

In particular, in the area of the peaceful use of nuclear energy, the duties of the new Agency are related to the issuance of technical rules and to the approval and control of activities. Moreover, the Agency is charged of the control of the management and storage of wastes coming from NPPs, medical and industrial facilities, of the inspection activities on construction, operation and safeguards.

The Agency will be the only national authority responsible for nuclear safety and radiation protection and:

- its advise is obligatory and binding for any authorization released by public administrations;
- its inspectors are authorized to gain access to installations and documents, and to take part in the testing activities as required;
- can require the submission of data, information and documents;
- can assess fines, suspend licenses and propose its repeal;
- inform the public;
- defines and control the procedures that licensees have to implement for the plants dismantling or for the waste management.

The Agency will have a President nominated by the President of Republic based upon the proposal of the Prime Minister and a board of four members. Two members will be designated by the Ministry of Economic Development and two by the Ministry of Environment.

The proposed candidates have to be approved by Parliamentary Commissions.

### **National Nuclear Programmes Pertaining to Nuclear Installations - Main Safety Issues**

As referred in the previous fourth Report, the four Italian NPPs, definitely shut-down in 1987, after a long period of safe storage, are to be decommissioned according to a single step decommissioning strategy.

Being the decommissioning plans not yet approved, the four NPPs remain nuclear installations according to Article 2i of the Convention.

On the basis of the mentioned Government policy, the National Nuclear Programme regarding these NPPs establishes a plan for their decommissioning; other domestic nuclear facilities and their associated spent fuel and radioactive waste management systems are also going to be decommissioned.

Major elements of these Programmes are the implementation of the mentioned Agreement signed with France on the reprocessing of spent fuel still present in the Italian facilities.

In fact this Agreement establishes a national road map for enacting all the modifications and integrations to existing legislative provisions as necessary to rule the implied matter (e.g. selection of a national site for a waste storage facility) and to execute all the construction works in order to have facilities ready and operational according to a time schedule to be established for the re-entry of the high and intermediate level waste packages.

Representative intermediate steps of such a road map are:

- Completion of the overall delivery of the spent fuel to Areva Nc in 2012;
- Review of national legislation on the matter starting on 2008;
- Assignment of duties to the Organisation responsible for the identification of the national site and the construction of the repository (surface and reversible) on 2009;
- Final decision on the site by the Ministry of Economic Development and the Conference State-Regions on 2012;
- Starting of operation of national facility for radioactive waste storage and final time schedule for re-entry in Italy of containers of conditioned waste of 3<sup>rd</sup> category on 2018;
- Re-entry in Italy of waste packages to start on 2020 and to be completed on 2025.

As specified above, the first three steps of the roadmap can be considered as fulfilled or proceeding as scheduled. However, some milestones established by the new Law of 2009 have now some delay.

With regard to the Regulatory Body, it must be said that all steps stated in the already quoted Law n. 99/2009 for the actual establishment of the new Nuclear Safety Agency still have to be accomplished, while the ISPRA's Nuclear Department which is currently fulfilling the role of Regulatory Body, is suffering the progressive retirement of several senior experts without any replacement. Such a situation, which has the potential of soon leading to a limitation of the Regulatory Body capability to properly fulfill its duties and responsibilities, requires urgent corrective actions.

In the last report, in relation to the safety of the NPPs, it was referred about a programme established by SOGIN to respond to specific requests of the regulatory body. This programme was aimed at maintaining an high level of safety in nuclear installations and in the other relevant nuclear facilities before and during decommissioning and dismantling activities. SOGIN initiative therefore consisted of a strategic project aiming at a general safety review of each installation and facility, primarily addressed to safety management issues and to the updating of the safety case. Primary objectives of this project regarded the following three areas:

- plant status with analysis of each plant and identification of activities having safety priority;
- plant safety documentation and technical management;
- safety culture, involving the issue of questionnaires to the personnel and other internal assessment activities.

For each area there are planned actions to be implemented and a dedicated budget. It must be said that, due to frequent organisational changes, to the significant resources to be devoted to the spent fuel transfer abroad and to the occurrence of some unexpected situations in nuclear sites (identification of radioactive contamination traces in some areas) the programme has not evolved as planned and additional efforts are necessary for the future. As far as Nuclear Installations are concerned some objectives have however been achieved mainly regarding the clarification of the site personnel organisation duties and the performance of safety relevant activities as referred below.

In the framework of the authorisation process, the assessment of the decommissioning plans by ISPRA is now in progress and is running along with the licensing process of activities related to radioactive waste and spent fuel management.

### **List of Nuclear Installations in Italy**

A short description of the status of the four NPPs is reported in Annex 1.

Background historical information on Italian Nuclear Programme are summarised in Annex 2.

### **Italian Participation in International Activities to Enhance Nuclear Safety**

As referred in the previous Reports, Italy has traditionally been active in international nuclear cooperation within IAEA, OECD/NEA, EU and FORATOM as well as in bilateral contexts. An active contribution to these activities is considered to be important to keep up-to-date the national competencies and capabilities in the safety and in the technology of nuclear installation as well as to promote the maintaining and the updating of the nuclear safety culture at national level.



### Regulatory Body

In this context, the international cooperation provides also a significant contribution to the quality of the national safety and radiation protection regulatory work. The experienced cooperation has primarily regarded regulatory issues dealt with in the International Organisations contexts.

In addition, ISPRA is a member of the Western European Nuclear Regulators Association (WENRA) and has actively participated in the comparison of safety requirements of the different member countries, against agreed reference levels, as basis for harmonisation.

Together with all the other WENRA Members, ISPRA has used the outcomes from this project for establishing the national action plan to correspondently update its basic safety regulations. Such action plan mainly addresses issues related to decommissioning and waste management and, for this reason, its schedule strongly depends from the issue of the “reference levels” on those matters.

ISPRA expects that the international participation and the related feedback on the national rules and practices will require increased resources during the next years as nuclear regulation, while still being a national responsibility, becomes more and more subject to international constraints. Important driving forces here are the explicit policies within IAEA and other international organisations for development of common safety standards and regulatory practices enlargement as well, as at EU level, the forthcoming entry into force of the nuclear safety Directive and the next adoption of the Directive on the management of spent fuel and of radioactive waste. The latter in conjunction with the future additional EU enlargement.

### International support programmes

Italy has continued its technical participation in international programmes of assistance to the eastern European Countries in the frame of TACIS, now INSC, extended to Mediterranean Countries, and in the frame of IPA (Instrument for Pre Accession to European Union).

In addition to the ISPRA cooperation in the regulatory assistance projects, the national nuclear industry participated both in realisation activities already in progress (e.g.: Ansaldo for Rumanian Chernavoda units) and in international tenders for the realisation of new nuclear installations (e.g. ENEL for Bulgarian Belene and Rumanian Chernavoda) and of NPPs on-site assistance programmes (e.g. SOGIN for Armenia/Medzamor, Mexico/Laguna Verde).

More recently, following an inter-governmental agreement concluded with France on 2009 for a cooperation on nuclear technologies, ENEL signed an agreement with EDF to participate (with a share of 12,5%) in the construction of the new EPR plant at Flamanville. A MoU committed ENEL and EDF to implement an equal joint venture for developing, constructing and putting into operation 4 EPR units in Italy.

ENEL participation in abroad nuclear activities includes the 66% of Slovenske Elektrarne, (including Mochovce 3 and 4 under construction), and of 92% of Endesa, Spain.

The national participation in the international nuclear research projects is primarily ensured by ENEA, involved in particular in EU research programmes.

## Section C. Compliance with articles 4 to 19



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**Article 4. Implementing measures**

Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.

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The Italian Legislative and Regulatory framework has been long in force (since the early 60<sup>ties</sup>), as discussed in detail in the first four Reports and summarized in the present Report. Being this framework quite complete and updated according to the development of the national nuclear programme no further step is deemed necessary because of the Convention.

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**Article 5. Reporting**

Each Contracting Party shall submit for review, prior to each meeting referred to in Article 20, a report on the measures it has taken to implement each of the obligations of this Convention

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The present Report constitutes the fifth Italian Report issued in compliance with Article 5 of the Convention.

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## **Article 6. Existing Nuclear Installations**

Each Contracting Party shall take the appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives as well as the social, environmental and economic impact.

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### **6.1 Overview of major events since the last Report**

As clearly indicated in this Report, Italy decided the shutdown of its NPPs 20 years ago. The installations were not shutdown for specific safety reasons but following a decision of the Government taken on the basis of the results of a national referendum.

Safety issues currently of concern for the four Italian NPPs are therefore those related to decommissioning activities as well as to the safe management of spent fuel and waste which are covered under the Joint convention on the safety of spent fuel and radioactive waste management.

In order to provide a more complete picture of the state of existing installations, some details are hereinafter described.

In this above mentioned context, in 2007 ISPRA required SOGIN to update the overall assessment of the safety status for all the nuclear installations and other nuclear facilities. SOGIN developed a strategic safety project, involving also external organisations, regarding the three mentioned areas of plant safety status and priorities, plant safety documentation and safety culture.

The activity of the safety project ended in 2009 after that following nuclear installation have been scrutinized: Garigliano NPP, Casaccia laboratories, Saluggia fuel reprocessing facility and Trisaia fuel reprocessing facility. Due to the limited resources allocated the activities were mostly focused on no-NPP installation for which the safety status could rise more concerns. In fact a project test case, developed for Garigliano NPP, demonstrated that the NPPs, formerly operated by ENEL, comply very well with the safety concepts.

Common to all outcomes is the need for new resources capable to replace the personnel, with wide experience, leaving for retirement.

The results of such a project, which form the basis of SOGIN plans, will be supervised by the Regulatory Body.

As an example of the subject project implementation, the specific activities planned for the case of Garigliano NPP are hereinafter summarised.

#### 6.1.1 Plant safety priorities

- Construction of new storage facilities and refurbishing of existing buildings at NPPs sites for temporary storage of radioactive waste;
- Removal of asbestos from the reactor building;
- Rehabilitation of radioactive waste system;
- Rehabilitation of electric distribution system.

#### 6.1.2 Plant safety documentation

- Drafting of procedure and database for the maintenance activities management;
- Drafting of new surveillance procedures;
- Updating of the Operating Manual;
- Issuing of the Operation Rules;
- Completion of an overall review of the FSAR;
- Drafting of a new QA programme;
- Drafting of technical specification for the radioactive waste system;
- Drafting of technical specification for the auxiliary systems of the reactor building.

#### 6.1.3 Safety culture

Methods of assessing safety culture which comply with proved international practices (e.g. SCART technique) are being implemented. In such a context, questionnaires have been circulated to the personnel of all the nuclear installations, interviews of the personnel have been completed, lists of quantitative performance indicators have been finalised, the final report has been issued together with a list of proposed actions to continue to measure the safety culture level and to, eventually, take the proper countermeasures.

Safety culture is implemented and improved by a complex combination of education, training, behaviours and attitudes, Company commitments, etc.. Therefore, a consolidated and distinctive set of Key Performance Indicators (KPI) has not yet been defined at international level. In addition, a decommissioning process involves some specific challenges to manage the transition phases and to maintain the safety culture of the personnel and that of the Contractors' personnel.



SOGIN, together with a number of other initiatives, has implemented a set of KPI that are going to be part of the self-assessment program on safety culture and will be used to decide any necessary corrective action. Such KPI were derived from the available information in the literature or from bilateral contacts with other Companies and have been adapted to the current SOGIN situation, practices and priorities.

These KPI include:

- Number of training days on nuclear safety related subjects;
- Number of potential safety related issues identified by personnel and formally or informally reported;
- Number of Technical Specification violations;
- Number of identified Company procedure violations;
- Number of visits of Top Managers on the sites specifically on safety related issues;
- Number of internal and external communications by the Top managers where safety is clearly indicated as a Company priority;
- Number of meeting-days on safety related operational experience review;
- Number of training hours for Contractor personnel involved in activities in controlled areas and/or on safety related equipment.

#### 6.1.4 Safety Management System (SMS)

SMS is planned in relation to the activities having priority with regard to the current national nuclear programme (decommissioning and radioactive waste management) and building on the existing organization requirements for the Licensee. From a regulatory point of view the consideration of SMS requirements will be done in the context of the national action plan to update technical guides as follow up of the WENRA harmonization process. It must however be underlined that specific provisions already exist in the legislative system, which require that the on-site organization of the Licensee has to be approved by the Regulatory Body. Such an approval is granted on the basis of a specific document (i.e. Operating Organisation rules) which has to clearly define all roles and competences of the on-site organization of the Licensee having relevance to safety. The submission and approval of this document is required in any phase of the NPP life, including decommissioning. In addition to that for each site a QA programme is requested. The basis of the SMS are going to be IAEA and WENRA Reference Level. Implementation of many concepts of SMS is binding, being requested by legislative provisions (see Operating Organisation rules).

In the years 2007-2009 the Operating Organization Rules of the four NPPS have been updated and approved by the Regulatory Body. They envisage an organization tailored to ensure a high level of safety and radiation protection during decommissioning activities. Key feature of the new operating Rules are:

- a clear allocation of responsibilities at management and operational level;
- a proper exploitation of interfaces among safe management of the installation and performance of decommissioning activities;
- qualification of personnel;
- strategic plan for ensuring qualified human resources;
- management of contractors activities.

New QA programmes have been submitted, based on Management System Manual which already keep the new IAEA Requirements as reference.

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**Article 7. Legislative and Regulatory Framework**

1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations.
  2. The legislative and regulatory framework shall provide for:
    - i. the establishment of applicable national safety requirements and regulations;
    - ii. a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a licence;
    - iii. a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences;
    - iv. the enforcement of applicable regulations and of the terms of licences, including suspension, modification or revocation.
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**7.1 Nuclear safety legislation and regulatory framework**

The current Italian legislative and regulatory framework related to nuclear safety and radiation protection is the result of an evolution of rules and provisions that begun in the early 60<sup>ties</sup> and that took into account the experience of licensing and operation of NPPs of different types and generations and of other nuclear installations.

The Italian regulatory system is made up of three types of rules of different legal force depending on their origin:

- legislation proper, that is Acts and legislative decrees, and governmental or ministerial decrees;
- technical guides;
- technical standards.

**7.1.1 Legislation and ministerial decrees.**

In the Italian regulatory system the source of legally binding rules must be either an act of Parliament or a Legislative Decree issued by the Government thus empowered by Parliament. The Government can also issue governmental or ministerial decrees binding in law. The practice of laying down numerical limits and minute regulations in decrees issued by the Executive is very frequent in particular areas relative to Radiation Protection. An important feature of legally binding rules concerning Nuclear Safety and Radiation Protection in Italy is that contravention to obligations by operators and/or users constitutes a misdemeanour and

entails a penal sanction; compliance can be enforced by means of criminal proceedings after due process of law.

The main corpus making up, inter alia, the Italian system are itemised below, as regards Acts and Legislative decrees:

- **Act no. 1860 of 31 December 1962:** published in the Italian Republic's Official Journal no. 27 of 30 January 1963, as amended by the President's Decree no. 1704 of 30 December 1965 and by the President's Decree no. 519 of 10 May 1975;
- **Presidential Decree no. 185 of 1964:** "Safety of plants and protection of workers and general public against the risk of ionising radiation associated to the peaceful use of Nuclear Energy replaced in 1996 by the Legislative Decree no. 230/1995, described below;
- **Act no. 393/1975:** which contains Administrative rules on the selection of the site for NPPs;
- **Presidential Decree no. 1450/1971:** which contains Requirements and procedure for the acquisition of the operational personnel licences;
- **Presidential Decree no. 519/1975:** "Civil responsibilities in the field of nuclear safety";
- **Legislative Decree no. 230 of 17 March 1995:** published in the Supplement to Italian Republic's Official Journal no. 136 of 13 June 1995, which has been in force in Italy since January 1st 1996 - and replaces the Presidential Decree no. 185/1964, the previous radiation protection act -, implements six EURATOM Directives on radiation protection (EURATOM 80/836, 84/467, 84/466, 89/618, 90/641 and 92/3). Legislative Decree no. 230/1995 needs a series of Government and Ministerial Decrees;
- **Legislative Decree no. 241 of 26th May 2000:** which has transposed European Union (EU) directive 96/29/Euratom laying down basic safety standards for the radiation protection of workers and the public; the standards laid down in the directive incorporate the 1990 Recommendations of the International Commission on Radiation Protection (ICRP) into EU radiation protection legislation. Legislative Decree no. 241/2000 has modified and integrated Legislative Decree no. 230 of 1995, the latter constitutes the main piece of legislation laying down radiation protection requirements for workers and the public;
- **Legislative Decree no. 257 of 9th May 2001:** which modified certain details in Legislative Decree no. 241/2000 of 2000 concerning requirements for notification and authorisation of non nuclear installations where ionising radiation is used for industrial, research and medical purposes;
- **Legislative Decree no. 23 of 20th February 2009:** which has transposed EU directive 2006/117/Euratom on the supervision and control of shipments of radioactive waste and spent fuel; Legislative Decree no. 23/2009 has modified pertinent administrative provisions previously contained in Legislative Decree no. 230/1995 concerning the

transboundary shipments of radioactive waste. Legislative Decree no. 230/1995 now contains new provisions on the supervision and control of shipments of spent fuel.

Legislative Decree no. 230/1995 as modified by Legislative Decrees no. 241/2000, no. 257/2001 and no. 23/2009, now contains thirteen Technical Annexes which make almost all of the provisions entered into force since of 1st January 2001.

A series of Governmental and Ministerial Decrees have also been made in implementation of the Act no. 1860/1962 and the Legislative Decree no. 230/1995.

The main functions of the Regulatory Body, as better identified under article 8, were in the past entrusted to the Directorate for Nuclear Safety and Health Protection (DISP) of CNEN, later on ENEA. Such functions, together with staff, technical structures, equipment and financial resources of DISP, were transferred to ANPA and to APAT, now ISPRA, which is therefore now discharging the main functions of National Regulatory Body, among its other duties concerning the Environment Protection field.

The Acts of legislative force on the institution and subsequent re-organisations of the Regulatory Body are listed below:

- **Act no. 933/1960:** on the establishment of the National Committee for Nuclear Energy (CNEN);
- **Act no. 84/1982:** on the establishment of the State Agency for new technologies, energy and environment (ENEA);
- **Act no. 61/1994:** on the establishment of the National Agency for the Environment Protection (ANPA).
- **Legislative Decree n° 300/1999 and President of the Republic Decree n°207/2002:** on the establishment of APAT, by merging ANPA with other national Technical Services;
- **Act no. 286/2006:** on the reorganisation of APAT as a legal entity of public administration, endowed with new institutional Organs;
- **Act no. 133/2008:** on the establishment of the Institute for the Environmental Protection and Research (ISPRA).

#### 7.1.2 Technical guides

This issuing of technical guides is assigned in Law to the National Agency for the Protection of the Environment and Technical Services (APAT), now ISPRA, by article 153 of the Legislative Decree no. 230/1995.

Technical guides contain recommendations and are a tool to implement rules of good practice. A set of 28 technical guides have been issued on Safety and Radiation Protection matters ranging from licensing procedures to detailed technical guidance.

In addition, the existing wealth of international recommendations, such as those reported in IAEA (International Atomic Energy Agency) and ICRP (International Committee on Radiological Protection) publications, is largely used in the Italian system.

The list of the most important Technical Guides is reported in Annex 3. There is a programme to update these technical guides in the near future, essentially based on the national action plan established in the framework of WENRA activities. Technical guides for decommissioning activities as well as interim storage facilities construction and operation are in progress and the issue of a first internal draft has contributed to the review activities.

### 7.1.3 Technical standards

These standards are mainly published by UNI (Ente Nazionale Italiano di Unificazione), the Italian National Standards Body. Selected standards are listed in Annex 3.

Other Standards often used were those published by CEI (Comitato Elettrotecnico Italiano) and by ISO (International Standards Organisation).

Standards documents are developed within an Expert Group and approved by UNI and/or CEI Technical Committees.

Standards developed within the above mentioned Bodies are intended to reflect the broad consensus of industry and research experts in the specific fields. These standards are thought to represent industrial good practice.

Moreover, in the design, construction and operation of nuclear installations, other rules such as the ones concerning fire fighting, pressure components integrity, labour and health apply. Among the other, foreign technical standards are often adopted and endorsed, on a case by case basis.

A wider list of the main different rules which comprise national Legal and Regulatory framework is reported in Annex 3.

## 7.2 National safety requirements and regulations for radiation safety

Information reported under article 7.1 and in Annex 4 provide a comprehensive picture of the national safety requirements and regulation for radiation safety.

## 7.3 Licensing System

Article 6 of Law n. 1860/1962 establishes that the operation of nuclear installations has to be authorized by the Ministry of Industry (now Ministry of Economic Development). Authorization is granted according to provisions established in Title VII of the Legislative Decree n. 230 of 1995, based upon the technical advice of APAT, now ISPRA, which is formulated as result of the assessment of the safety case filed by the applicant. Title VII also define the licensing procedure relevant for each phase of the nuclear installation life (i.e. from siting to decommissioning). In relation to the current status of all the nuclear installations, the decommissioning licensing procedure is hereinafter described in detail.

### 7.3.1 Licensing process for decommissioning

As far as decommissioning activities are concerned, the licensing procedure is established in articles 55-57 of Title VII of the Legislative Decree n. 230/1995

The decommissioning of a nuclear installation are subject to prior authorisation by the Ministry of Economic Development in accordance with other relevant Ministries (Ministries of Environment, Interior, Labour, Health) and the Region concerned, the advice of ISPRA is

sought under law in order to determine technical specifications applicable to the installation. The technical advice of ISPRA takes into account observations expressed by different involved Ministries as well as relevant local authorities.

A separate Environmental Impact Assessment evaluation is performed under the coordination of the Ministry of Environment and Territory, acting in consultation with the Ministries of Interior, Labour and Health, ISPRA and the region concerned. Furthermore, any specific management and storage activity of the radioactive waste which will be generated during decommissioning will require, on the bases of a specific decommissioning licence condition, the approval by the Regulatory Body.

Scheme in Fig. 1 represents the licensing process for the decommissioning nuclear installations in Italy.

The authorisation can be issued for intermediate phases leading up to a planned final state. This possible subdivision into intermediate phases must be shown to be part of an overall decommissioning plan, to be attached to the application for the authorisation concerning the first phase. For each phase the above bodies are sent a plan of the operations to be carried out and a description of the state of the installation, which will primarily include:

- an inventory of the radioactive materials;
- a description of the state of the installation itself at the end of the specific phase;
- a safety analysis concerning the operations to be carried out and the state of the installation itself at the end of the specific phase;
- the intended destination of the resulting radioactive materials;
- an assessment of the radiological impact to the environment of the decommissioning operations;
- a radiation protection programme also for emergency conditions.

In the decommissioning plan the licensee is also required to analyse the situations in which general requirements coming from the operation rules or specific technical specifications will be no longer needed, as well as the systems (safety and non safety related) whose operability is no longer requested.

After receiving the documentation, the other bodies (Ministries of Environment, Interior, Labour, Health, and the Region concerned) transmit their observations to ISPRA that elaborates a safety and radiation protection assessment, taking in due consideration such observations, and identifies conditions and specifications. Taking ISPRA assessment into account, the other administrations send ISPRA their final observations. After seeking the advice of the National Technical Commission<sup>1</sup> set up under article 9 of the Decree no. 230, ISPRA sends its advice,

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<sup>1</sup> Technical Commission for Nuclear Safety and Health Protection established at ISPRA headquarter with a role of giving ISPRA an independent advice on safety and health protection issues in relation to the main stages of licensing procedures and to emergency plans. Members of this Commission are appointed by the Ministries of Environment, Territory and Sea, of Economic Development, Employment, Health, Interior, Infrastructures, ENEA and ISPRA. When



together with technical specifications, to the Minister of Economic Development, who grants the authorisation prescribing compliance with technical specifications proposed by ISPRA.

Decommissioning operations are carried out under ISPRA surveillance; at the end of the decommissioning operations, the licensee shall send ISPRA an assessment on the operations and the state of the site and of the environment.

After obtaining the advice of ISPRA and of the other bodies on the final assessment, the Ministry of Economic Development can issue specifications concerning the state of the site and of the environment at the end of the decommissioning operations.

Some items characteristic of the Italian decommissioning situation may be highlighted. It is to be firstly noted that the described authorisation process clearly envelopes all possible decommissioning strategies. The earliest applications complying with the Legislative Decree 230/95 referred to a first stage ("safe enclosure"), although it had to be considered as part of an overall decommissioning plan. New applications submitted by late 2001 asking for authorization to the nuclear installations decommissioning were instead intended to cover in a single step the overall programme of activities.

To this respect, it must be mentioned that Italian regulations define decommissioning as "the whole planned actions up to the final dismantling or in any case up to unconditional release (release of site and/or buildings with no radiological constraints)".

Another feature of the Italian administrative system is that a plurality of bodies have a role in the licensing; in fact, each administrative body has to be a guardian of the public interest from its own view point; furthermore, in the Italian system licenses, permits and authorisations are granted by Ministries, even though Agencies or Institutes such as ISPRA play the role of State instruments to which care and supervision of highly technical matters are confided.

On the other hand, the licensing procedure involves the need for ISPRA to collect the opinion of four Ministries (Environment, Interior, Labour, Health), as well as of the region concerned, integrating all the contributions in its assessment; this procedure must be reiterated twice, before ISPRA can deliver its assessment to the National Technical Commission, take its advice into account and deliver its comments for the final act to be performed by the Ministry of Economic Development.

One can note that this system provides for a high degree of guaranty even though ways have to be found to make it sufficiently agile and converging, while maintaining its essential feature of seeking the opinion of all public bodies concerned.

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necessary, other specialists are appointed by the Chairman of the Commission. For matters under the competence of other Public Scientific Organisations and Administrations (e.g. Italian National Institute of Health, National Research Council), in compliance with article 9 of the Legislative Decree 230/1995, those Organisation and Administrations are invited to sit in the Commission through a designated representative.

It has to be mentioned that, in order to start the decommissioning activity, a further permission is needed from the Ministry of the Environment, Land and Sea, that is the Environmental Compatibility Statement, required by the Law n. 349 issued on July 8, 1986.

#### **7.4 Regulatory Inspection and Assessment**

The purpose of the regulatory inspections during the NPPs life (from the construction to the decommissioning) is to verify the fulfilment of the rules coming from the Legislative Decree no. 230/1995 and of the technical specifications which are part of the licence conditions for the specific plant.

According to Art. 10 of the Legislative Decree no. 230/1995, inspections are performed by ISPRA inspectors having the authority to enter any area of the installation, as well as to have access to any relevant documentation. In case of infringement of specific rules of the nuclear act and licence conditions, including technical specifications, ISPRA inspectors are entitled to report to the public attorney of the jurisdiction which the installation belongs to. The purpose of such inspections is to verify the fulfilment of binding rules having legal relevance. Plant walk-down are also frequently performed by other ISPRA technicians with the purpose of achieving data, information and other technically relevant elements to be evaluated with respect to technical regulations. Inspection activities may be ordinary (planned in advance for each technical area) or extraordinary.

ISPRA has general inspection powers for installation falling under the provisions of the Act and the Decrees. In the fulfilment of their duties, ISPRA inspectors are vested with police powers, that is, they even have power of seizure on sources or installations deemed to be non compliant with relevant provisions laid down in law.

Apart from ordinary powers given to police, other authorities such as Labour Inspectorate, local Health bodies and regional Agencies for the Protection of the Environment are vested with competence in the fields entrusted to their surveillance.

The Italian compliance and inspection system is based upon the fact that legislation provides for penal sanctions in cases of non compliance; penalties are meted out by the Courts at the instigation of the Office of Public Prosecution to which inspectors are required under law to communicate every case of non compliance.

#### **7.5 Enforcement**

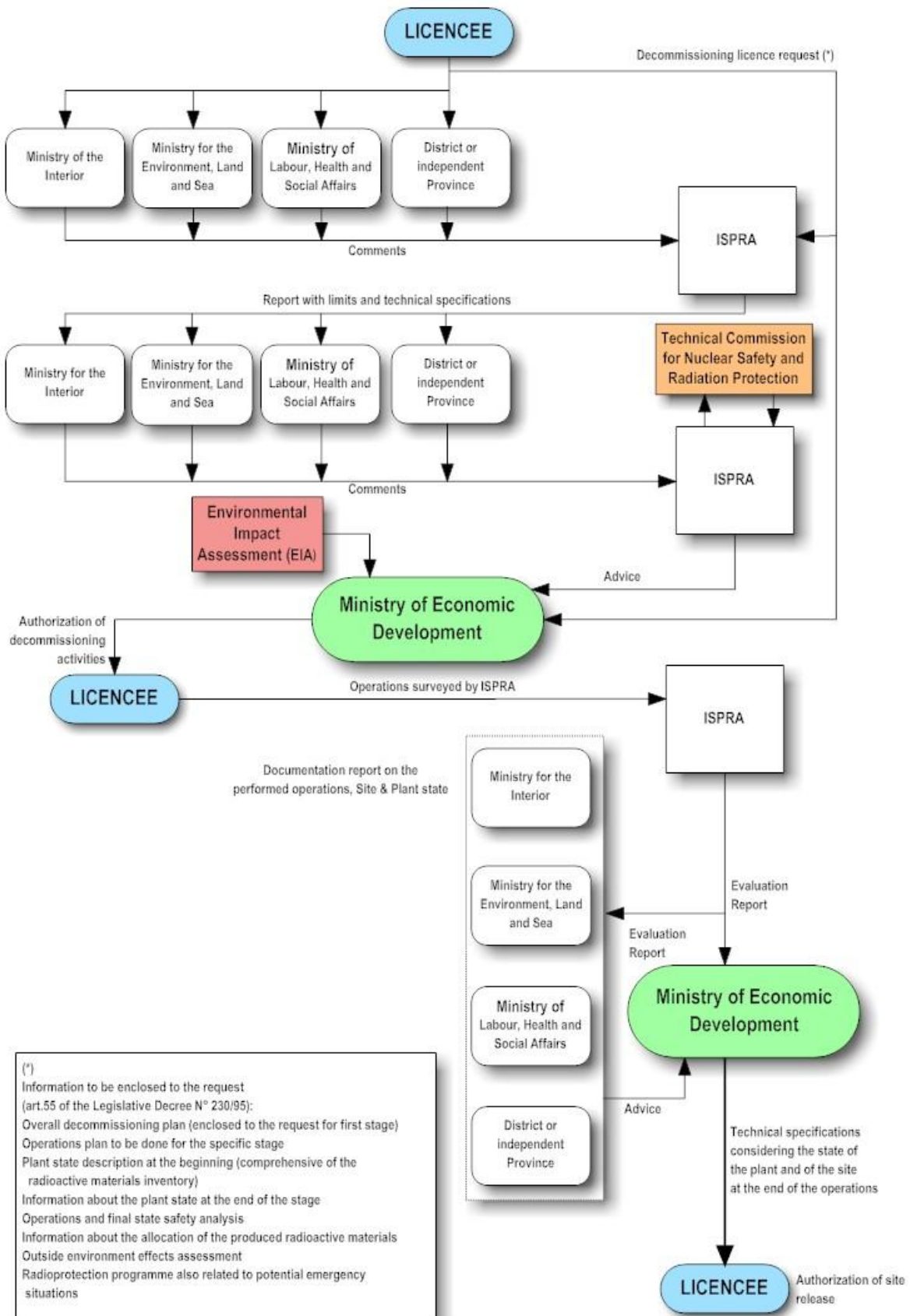
Article 58 of Legislative Decree n. 230/1995 establishes the procedure according to which, in case of non compliance with the conditions attached to the licence, the Ministry of Economic Development can suspend or revoke the licence or the authorization.

Enforcement of applicable regulations and of licence conditions is ensured on the bases of the sanction system as established in Title V of the Law n. 1860 and in Title XI of Legislative Decree 230/1995. According to Art. 10, ISPRA Inspectors have the authority to request any information they deem relevant to ascertain the compliance of the activities performed at the nuclear installations with the requirements established in the Legislative Decree and in the licence conditions. Inspectors are entitled to report the results of their inspections to the public attorney of the jurisdiction the nuclear installation belongs to.

#### **7.6 Assessment of Compliance**

The current national legal framework related to safety and radiation protection at nuclear installations is considered fully adequate.

LICENCING PROCESS SCHEME FOR EACH DECOMMISSIONING STAGE ACCORDING TO THE LEGISLATIVE DECREE N° 230/95



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**Article 8. Regulatory Body**

Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.

Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy.

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**8.1 Authorities responsible for the application of the legislative framework**

The key regulatory functions (rulemaking, licensing, assessment, inspection and enforcement) related to nuclear safety and radiation protection matters, including also NPPs construction and operation as well as safe management of spent fuel and radioactive waste, are exploited in Italy by the following main bodies:

- a) The Ministry of Economic Development, in this report defined as the Licensing body, is the authority which grants the licence/authorization for nuclear activities (from the design and construction to the decommissioning and waste disposal) and for major practices involving the use of ionising radiation sources. Authorizations are granted on the basis of the technical advice provided by the Regulatory Body (ISPRA – National Institute for Environmental Protection and Research), and taking into account the advice provided by the Ministries for the Interior, Labour, Health and of the Region where the installation is located, after the issuing of the environmental compatibility statement provided by the Ministry of the Environment, Land and Sea, when applicable;

ISPRA – Nuclear Department, in this report defined as the Regulatory Body, is the Governmental body entrusted with the role of regulatory authority responsible for the assessment and the inspection activities on nuclear installations, as well as for approving detailed designs of specific activities related to the construction of nuclear facilities, which are part of the general construction licence granted by the Ministry of Economic Development or to the implementation of a plant modification. ISPRA supervises the compliance with the requirements established in the law and in the Ministerial authorization decrees throughout its inspection activity. ISPRA inspectors are entitled by the law with the proper authority to request the licensee any information deemed necessary to ascertain compliance with legal requirements and licence conditions. In case of infringements, ISPRA inspectors reports to the Public Attorney of the jurisdiction the installation belongs to. ISPRA is also the competent body entitled to support the Governmental rule-making function in the field of nuclear safety and

radiation protection. ISPRA is also entitled to issue technical guides pertaining the different operational aspects of the regulatory process. In the course of the process for assessing license applications, a “Technical Commission on Nuclear Safety and Radiation Protection”, is entitled to formulate an independent technical advice, asked by and provided to ISPRA. The Technical Commission is composed of experts designated by various Ministries (Interior, Health, Environment, Land and Sea, Economic Development, Labour and Infrastructure), by ISPRA, by ENEA and by the Regions where the nuclear activities are exploited. The Regulatory Body functions in ISPRA are effectively performed by a specific Nuclear Department even if financial resources at moment available are judged to be not fully adequate.

## **8.2 Independence of the regulatory function**

The national nuclear Implementer involved in the decommissioning and in the spent fuel and radioactive waste management is SOGIN S.p.A., whose sole shareholder is the Ministry of Economy and Finance, while the strategic and operational policies are given by the Ministry of Economic Development.

As previously said, licences are granted by the Ministry of Economic Development on the basis of the independent technical advice of ISPRA. ISPRA performs its regulatory functions in a fully independent and autonomous manner. ISPRA is, in fact, a Governmental Agency reporting to the Ministry of Environment, Land and Sea.

Moreover, any approval of specific technical designs and activities are performed by ISPRA, that has to keep the advice of a Technical Commission as described above.

As already said, ISPRA is also entitled to issue technical guides on specific aspects related to the regulatory process.

## **8.3 Assessment of Compliance**

On the bases of what is reported in this section it may be concluded that Italy has adequate provisions to fulfil its obligations under Art. 8 of the Convention related to independence of the regulatory body.

With regard to financial and human resources assigned to the Regulatory Body, there is confidence that appropriate actions will be undertaken by the Government to overcome the reported difficulties in the context of involved Institutions reorganization.

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**Article 9. Responsibility of the licence holder**

Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.

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**9.1 Responsibility of the licence holder**

According to the Law no. 1860/1962 and the Presidential Decree no. 519/1975, the primary responsibility for safety is assigned to the operating organisation.

Therefore the operating organisation is responsible of all the activities having direct influence on safety performed during design, construction, commissioning, operation as well as of all the activities performed during decommissioning and management of spent fuel and radioactive waste.

The regulatory system in place also ensures that appropriate supervision activity is exploited by ISPRA to verify that the licensee holder meets its responsibility.

**9.2 Ensuring that the license holder meets its responsibility for safety**

The system of controls provided for in the Italian rules uses four tools:

1. the analysis of the safety reports and other relevant documents, the analysis on the results of tests and measurements, the performance of additional or repeated tests;
2. the inspection system, in order to verify compliance with applicable rules and constraints at all stages from design to operation of facilities as well as during the phases of decommissioning and during all stages of the management of the spent fuel and radioactive waste;
3. the performance of periodic audits to the Applicant and to the Licensee for the purpose of verifying, inter alia, that Licensee maintains the capability in terms of staffing and competences adequate to completely undertake the activities during the lifetime of the facility from siting to decommissioning. Periodic audits to Architect Engineers, Vendors, Manufacturers, and Suppliers in general were also conceived as an indirect tool of control of the Applicant and of the Licensee activities;
4. the sanctions in case of incompliance either with provisions in Law or prescriptions in the licensing acts range from penal to administrative measures. The former can entail deprivation of freedom and fines, the latter consists in suspensions or revocation of the licences in worst cases. The penal sanctions are applied by Courts following reports from Inspectors that have Police power in the Italian system. The administrative measures are applied by the Ministry of Economic Development. Before applying the administrative

measures, the Ministry can issue an injunction to comply with applicable regulations and technical specifications.

### **9.3 Assessment of compliance**

On the basis of what discussed about, it is considered that there are adequate provisions in the Italian legislative system to comply with the obligations of this article of the Convention.



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**Article 10. Priority to safety**

Each Contracting Party shall take the appropriate steps to ensure that all organizations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety.

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With regard to the fulfilment of the requirement under this article of the Convention, it is to be firstly considered that Italy is a Contracting Party that relinquished the operation of its nuclear installations since 1987. In this way, any potential conflict between production and safety has been removed. All the national Organisations have continued to operate with the only aim of maintaining the safety of the shut-down nuclear installations in view of their decommissioning.

The principle of priority to safety is addressed by requirements on: Quality Assurance, Operating Organisation rules and Authorisation procedures. Moreover, in the frames above, the licensees are required to issue appropriate documents on their policies on quality, environment and safety, establishing due priority to such topics.

It is anyhow recalled that also at the time of the development of the nuclear programme, the legislative framework and the Italian regulatory practice that have been long in use even before the publication of IAEA Safety Fundamentals, stimulated all the involved national Organisations to be committed to reaching and maintaining the highest priority in safety matters. Example of regulatory tools are:

- Legislative Corpus itself, which imposes a multi-step licensing process;
- General design criteria, requiring, inter alia, the application of the defence in depth principle;
- Regulatory guides, as referred in Annex 3;
- Preliminary, Intermediate and Final Safety Reports;
- Detailed designs;
- Quality Assurance Programmes;
- Safety relevant works Operational Rules;
- Technical Specifications;
- Operating Manual (e.g.: Procedures for normal and emergency condition);
- State exams for Operator Licences and State Certification for Plant Managers;
- Periodic assessment and reporting of performances;
- Inspections.

Since the inception of the Italian Nuclear Programme, the license holder operate, maintain and modify the systems of the nuclear power station by assigning the highest priority to the nuclear

safety and so keeping the consequential risk to the public as low as reasonably achievable, economic and social considerations being taken into account; this basic principle was implemented even before it was laid down, significantly in art. 2 of Legislative Decree no. 230/1995.

All the national Organisations having competence in the nuclear field are involved in International forum dealing with nuclear safety. Consequently, the latest international achievements have been implemented in Italian applications.

Moreover, various Organisations, dealing with nuclear legislation and/or regulations, such as Ministries, the Technical Commission for Nuclear Safety and Health Protection, besides ISPRA itself, each give close, independent scrutiny to the documentation submitted by the applicant and to ISPRA safety evaluations. On the operation side, the License holder is required by Law to set up a special Plant Council of Delegates at each nuclear installation site, which has the responsibility to examine all the relevant decisions (e.g.: plant hardware or procedures modifications), in order to identify their safety relevance.

Today, the actual implementation of the priority to safety principle to the Italian nuclear installations regards mainly the management of shut-down plants and the associated activities of decommissioning and of the spent fuel and radioactive waste management. The safety procedures at the designer and operator are today mainly addressed in the activities of modification of existing systems and of construction of new systems and facility for the proper radioactive waste management.

An example of a recent safety commitment by the Licence holder SOGIN is related to the established strategic safety project, initiated on the basis of a specific request by the regulator (ISPRA), described in Article 6.

### **10.1 Assessment of compliance**

Based on information reported above it may be concluded that Italy meets the requirements of this Article of the Convention.

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**Article 11. Financial and human resources**

1. Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear installation throughout its life.
  2. Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of qualified staff with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear installation, throughout its life.
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**11.1 Financial resources**

When the nuclear power plants were still into operation the National Electricity Company (ENEL S.p.A.) started to set aside funds for the decommissioning on the basis of autonomous decision. The early shut down of these plants prevented the possibility to set aside all the necessary financial resources. When in 1999, all the liabilities and assets connected to nuclear power belonging to ENEL were assigned to the newly established company SOGIN S.p.A (Società Gestione Impianti Nucleari), new financial resources were found to finance the additional decommissioning cost according to the decided new strategy. From January 2000 the financial resources are made of a levy on the price of the electricity together with the previous ENEL funds that have been transferred to SOGIN S.p.A. which is responsible for performing decommissioning and waste treatment activities for all nuclear installations and other relevant nuclear facilities.

Every year SOGIN has to submit to the National Authority for the Electricity and Gas an updated report on technical and economic plan of the global decommissioning project. The yearly reports have also to contain an update of the decommissioning plan and cost estimate. The levy on kWh, paid from the final users, are adjusted every 3 years on the basis of the content of the yearly reports. In this way, possible additional costs due to changes of strategies and the activities needed for safety reasons, can be endorsed by the National Authority for Electricity and Gas. Efficiency criteria related to the program management and to the progress of activities are taken into account in performing such adjustments.

The main component of the total decommissioning costs is the waste management and, in particular, the waste disposal cost, which strongly depends on the fees that are required for the disposal in the final repository. The following activities were taken into account in the decommissioning scope:

- On-site storage of fuel;

- Decontamination for conditional, unconditional recycle, re-use or release;
- Volume reduction (e.g. compaction) for radioactive waste materials;
- Packaging of historic/operational waste, e.g. sludge, ion-exchange resins;
- Removal of reactor/fuel cycle facility building;
- Removal of conventional plant buildings, e.g. turbine hall;
- Disposal of radioactive waste;
- Disposal or recycling of non-radioactive waste material;
- Final site surveys;
- De-licensing of the site.

## 11.2 Human Resources

Since the inception of the Italian Nuclear Programme, the licence holder was committed to provide human resources throughout the entire life of the plant in order to ensure a safe operation.

It is important to highlight that the ongoing process of retirement by the experienced staff at several nuclear installations might create difficulties to the national nuclear activities, even if SOGIN, the implementer of the national decommissioning activities, recently started a recruitment of young professionals to cope with the problem.

Italian Laws state that the operating personnel for the NPPs must follow an appropriate training programme and their capacity to operate in a NPP must be certificated. Qualified positions in the staff of the NPPs are approved by the Regulatory Body together with the Operation Rules. To certificate the operator qualification, many examinations must be get through by the single person. The responsible of health physic must be member of the "health physic association" at level 3 (the highest one).

Implementation of additional concepts associated to the SMS will be required by ISPRA through the updating of pertinent Technical Guides.

Today, staff qualification requirements for decommissioning and radioactive waste and spent fuel activities are the main focus of human resources management. Technical and operating staff undertake training regarding technical and legal issues, according to the specific policy of SOGIN S.P.A. established at corporate level. Moreover, staff qualification for the performance of any safety-related activity is among the relevant aspects that are assessed during the licensing process. In nuclear installations and facilities, only licensed personnel can operate. In such installation the Operation Rules, required by the Italian law, establishes requirements about the organization and the roles of the technical and operating staff, to ensure a safe management of the installation (even regarding the activities related to waste management and dismantling operations) in ordinary and emergency conditions.

Among the main objectives of the mentioned safety strategic project by the Implementer SOGIN, many internal activities related to human resources training were carried out by the SOGIN “Radiological Protection and Nuclear Safety School”, established in February 2008.

The School was specifically created to ensure the diffusion, development and consolidation of the radioprotection and nuclear safety culture. The fundamental goal was and is to promote shared and adequate behaviours among the personnel operating in the decommissioning activities and, by doing so, to contribute to the enhancement of the safety standards.

In April 2010 the Radiological Protection and Nuclear Safety School was awarded the ISO 9001:2008 certification by the DNV (Det Norske Veritas) for its teaching activities in the field of radioprotection and nuclear safety.

Main courses at the school are: Radiation Protection for qualified personnel (5 weeks), Radiation Protection for new employees (1 week) General nuclear safety from design to testing (1 week) Management of radioactive materials and radiological characterization of the plant (1 Week) Assessment of Environmental Impact Internal and external dosimetry, Nuclear Safety Culture (2.5 days). Italian Radiation protection regulations.

In 2009 about 400 participants of SOGIN personnel attended the course.

Among the main objectives of the mentioned recent safety strategic project by the Implementer SOGIN, there are many internal activities planned related to human resources.

### **11.3 Assessment of compliance**

Based on information reported above it may be concluded that the Italian licensee is going to overcome the lack of resources outlined in the previous Report and is actively operating in the area of training/retraining, and then Italy meets the requirements of this Article of the Convention.

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## **Article 12. Human factors**

Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installation.

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### **12.1 Methods to prevent, detect and correct human errors**

The important role of human performance in all phases of the life of a nuclear installation from design and operation until shut-down and decommissioning, has always been focused as an important safety concern. Adapted to the scope of the current national nuclear programme regarding the management of shut-down plants and the associated activities of decommissioning and spent fuel and radioactive management, these aspects include:

#### Safety relevant work Organization Rules

Operation Rules, on-site Organisation Chart, Roles and Responsibilities as summarised under the managerial and organisational issues in the following section.

#### Procedures development

The procedures development, in particular for the emergency situations, is performed by taking into the human factors issue. Procedures are verified with respect to technical accuracy, written correctness and usability.

#### Operator Training

SOGIN technical and operating staff undertakes training regarding technical and legal issues as dealt with in the previous paragraph on the human resources.

#### Good understanding and clarity of Technical Specifications (TS)

While dedicating a particular care in writing the TS, a great emphasis is given to human factors principle in order to ensure a clear understanding to TS requirements. From the human factors point of view, particular attention is devoted to exclude conflicting interpretation of TS requirements and to provide the associated technical bases.

### **12.2 Managerial and organizational issues**

According to the Italian law, the licensee must provide the Regulatory Body with organisational rules related to safety relevant works to be carried out in the installations. This document has to

specify the organisation and functions of the staff under both normal and abnormal conditions, including the physical and medical surveillance of radiation protection at all modes of operation. It has to be approved by the Regulatory Body after consultation with the Technical Commission for Nuclear Safety and Radiation Protection.

The Italian Regulatory Body has defined a Technical Guide on the contents of the safety relevant work Organisation Rules with several specific criteria for the approval of the Operator's document.

Safety of a nuclear installation, also in decommissioning phase, requires, from the human factors point of view, the maximum order in the methods of operation. This in order to avoid a state, also partial, of "organisational confusion", due to significant lacks in the design of the human system or in the supervisory system, that are the frequent root cause of many accidents. Criteria of the Italian Regulatory Body require that the activities, relevant for the safety, are clearly defined, and properly assigned. These activities must also be executed according to predetermined and written procedures, carefully recorded, regularly supervised, and the whole system readily corrected when necessary.

### **12.3 Role of the Regulatory Body and of the Operator regarding Human Performances issues**

The Italian Regulatory Body, in the frame of its general duties, is also responsible for the controls on the training system and conducts the examinations on SOGIN operators working in nuclear installations.

ISPRA established criteria for a self-corrective quality system, that has to be effective at various levels along the vertical axis of the operating organisation.

#### Plant Management Level

The institution of an Advisory Council on Safety (also called "Plant Council of Delegates") is required on each plant. This Council is formed by plant technicians supervising the most relevant activities (e.g.: operation, maintenance, radiation protection) supporting the Plant Superintendent with the following consultative functions, according to the Italian Law:

- a) to review any proposed modification to the plant or to part of it and to express evaluations and advice on safety matters;
- b) to review any proposed modification to the operating procedures of the plant and to express evaluations and advice on safety matters;
- c) to review programmes of trials, tests, and other special activities to be carried out on the plant and to express evaluations and advice on safety matters;
- d) to review periodically the overall operation of the plant, and to express opinion and possible recommendations regarding safety and protection;

- e) to lay down the internal emergency drill for the plant and arrange for any necessary modification in consultation with the Provincial Fire Service Headquarters;
- f) to assist the emergency director (person qualified by state examination to the “Direction” of nuclear plant in normal and emergency conditions, in “on call availability shift”) or the plant superintendent in the adoption of the measures which may be necessary to deal with any unusual or abnormal condition which may constitute a danger for persons or things.

Also the recent safety strategic project to be performed by the Implementer SOGIN for responding to the ISPRA request, will ensure that the capabilities and limitations of human performance are taken into account with special regard to decommissioning activities to be performed in the next future.

#### **12.4 Assessment of compliance**

Based on information reported above it may be concluded that Italy meets the requirements of this Article of the Convention.



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**Article 13. Quality assurance**

Each Contracting Party shall take the appropriate steps to ensure that quality assurance programmes are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of a nuclear installation.

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Although the legislative system does not contain specific provisions regarding quality assurance in nuclear installations, QA requirements are detailed in specific Technical Guides issued by the Regulatory Authority in the middle of 70's and at the beginning of 80's, in the frame of a more general programme of development of technical guides to support the regulation of installations of the national nuclear programme. Technical guides are normally used as key references regulatory tools during the Licensing process. They do not have a mandatory character but, in case of non compliance, the licensee is requested to demonstrate that the safety case fulfil alternative equivalent requirements. On the bases of the requirements established in the technical guides, licensees developed proper QA General programmes for conduct of operation and/or Quality Procedures Guidelines/Instructions under the supervision of the Regulatory Body. Reference to a list of the major Technical Guides developed by the Italian Regulatory Body in matter of Quality Assurance is reported in Annex 3.

For installations which have submitted the request of licence for the decommissioning plan, conditions attached to the licence will establish the requirements for the licensee to perform the decommissioning activities according to a QA programme to be submitted and approved by the Regulatory Body.

With regard to new facilities connected to the treatment and the storage of radioactive waste to be realized as preliminary activities for decommissioning, QA requirements (as defined in the Technical Guide n° 4 related to the standard content of applications for detailed design of relevant parts of nuclear installations) are applied. In particular, an adequate demonstration with regard to quality assurance related aspects is requested to be provided by the licensee in the specific safety case, developed according to the Technical Guide n° 1, submitted to support the authorization.

With reference to the current implementation level, it is to be mentioned that the QA system of SOGIN S.p.A., as the main national licensee involved in the management of spent fuel and radioactive waste, is documented through two levels of documentation applicable for all projects:

- *Management System Manual* related to the main organization;

- *Quality Assurance Programme* related to the dismantling activities and operation of each site;
- *Quality procedures/Guidelines Instructions* and a third level of specific documentation for each project, related to Job Order documents.

Also for the establishment and the implementation of Q.A. safety requirements, the process put in place in Italy is a development process similar to the other safety requirements.

### **13.1 Regulatory control**

In addition to the issuing of the above listed Technical Guides, the regulatory control during the licensing process is based on the analysis and review of QA Programmes submitted by the Applicant.

An additional primary tool of Regulatory Control is the possibility to perform periodic audits to the Applicant and to the Licensee.

### **13.2 Assessment of compliance**

Based on information reported above it may be concluded that Italy meets the requirements of this Article of the Convention.

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**Article 14. Assessment and verification of safety**

Each Contracting Party shall take the appropriate steps to ensure that:

- i. comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life. Such assessments shall be well documented, subsequently updated in the light of operating experience and significant new safety information, and reviewed under the authority of the regulatory body;
  - ii. verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions.
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The preservation of high level safety conditions at shut-down plants primarily founds on the maintaining of rules established for operation, even though progressively adapted where required by the plants' state. This means the maintenance of technical specifications commensurate to the plant state, with a conservative attitude in maintaining consolidated practices even when they might be made lighter (Operators' license and Operating Manual).

As referred in the introductory sections, the authorisation process regarding the overall programme of decommissioning applied by SOGIN for each nuclear installation has not yet been completed.

In particular, owing to the said uncertainties on the availability of a national site for waste storage, ISPRA, in the framework of the authorization process in progress, has clearly underlined (e.g.: Garigliano case) the need to identify due hold points in the decommissioning process, to be issued as constraints in the licence. In particular, the actual availability of a national facility for radioactive waste storage shall be a specific condition to be checked in the most appropriate implementation phase, when alternate solutions for a safe management of the decommissioning are still possible. Among the alternative solutions, there are the construction of temporary facilities on site or the shift to a safe enclosure state of the remaining structures (e.g. as in the case of the Latina NPP core graphite structure).

On that basis, being the programmes of decommissioning structured in three main stages (Annex 5) primarily addressed to safety priority interventions and preliminary operations, dismantlement of the nuclear island, final radiological survey and site release, the respective authorizations are going to be granted as:

- a general permit to pursue the overall decommissioning in the frame of a specific set of criteria and constraints;
- specific permits for well defined short term activities;
- a request to present specific projects for the subsequent relevant activities, for which a detailed definition is not yet available.

In this respect, it has to be emphasized that another significant aspect of the current authorization procedure regards the level of details of the documentation that has been provided by SOGIN to support the submitted application. In fact, such a documentation set is considered as a conceptual design where, in addition to a generic description of the plant state, the assessment of the effects on the environment and on the radiological protection, as well as the feasibility and reliability of the proposed operations are presented. This is considered the appropriate level of detail for a licensing process involving Authorities such as Ministries and Local Administrations, in accordance with the applicable articles of the Legislative Decree no. 230/95.

Taking also into account that the planned decommissioning operations will have a long lasting time of development, it is envisaged the need of defining those safety related activities whose detailed designs, with associated safety analysis, have to be submitted to the ISPRA approval.

In fact, for instance, the acceptability of design requirements for facilities to be built (i.e. storage facilities and systems), as well as of dismantling techniques and methods in line with the international state of the art, deserve adequate in depth review.

Moreover, the importance of activities not directly related to interventions on the hardware are not disregarded; in fact ISPRA actions in the last years were also aimed to check that the conditions for a competent, well coordinated intervention of the Organizations involved, based on procedures, are maintained.

In this respect, the already referred safety strategic project developed by SOGIN is an initiative expected to respond also to this ISPRA regulatory concern.

A meaningful example, coming from the recent experience, refers to the complexity of the issue of the release of materials resulting from decommissioning; it is recognised that this activity must be duly prepared, well in advance, both from regulatory side and from licensee side. Appropriate clearance levels have been identified and will be reconsidered in the frame of specific authorisations. Qualified measuring laboratories have to be selected or set up in some cases and on site measuring capabilities of due size have to be timely prepared.

When the overall decommissioning plans will be approved, a new guarantee regime will be established for each station through the specific granted authorisation.

Given the specific situation, it is considered of utmost importance to maintain large margins for on site waste storage. In fact, the routine waste production for long periods, the possible unexpected needs of interventions on dangerous aged structures, the possible interventions on the wastes themselves (re-treatment/conditioning) call for the availability of large spare areas.

With the aim to provide an updating on the measures in place ensuring the maintenance of the safety and radiation protection provisions on all installations, specific information are reported in the Annex 1.

#### **14.1 Assessment of compliance**

Based on information reported above it may be concluded that Italy meets the requirements of this Article of the Convention.

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## **Article 15. Radiation protection**

Each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonably achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.

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### **15.1 Laws and Regulations**

The main Law that regulates radiation protection matters is the Legislative Decree no. 230/1995 and its modifications, as previously described in Article 7.1.

It must be said beforehand that the text of Legislative Decree no. 230/1995 was written in 1990s in order to enact the transposition of six EURATOM directives previously issued by the European Union, of which Italy is a member, and to profit from the wealth of past operational experience in radiation protection. During the preparation of Legislative Decree no. 230/1995, the International Commission for Radiological Protection (ICRP) issued its new recommendations in Publication no. 60 of 1991, of which one of the most important features was new dose limits for workers and public. The Italian Authorities decided to enact the new dose limits recommended by ICRP Publication no. 60 even though the European Union had not yet issued at the time a directive to that effect.

Legislative Decree no. 230/1995 was modified by Legislative Decrees no. 241/2000 and no. 257/2001, in order to implement the Euratom Directive 96/29. The Legislative Decree regulates every aspect of the radiation protection in nuclear installations and in non nuclear installations or facilities (accelerators, irradiators, hospitals and other medical uses of radiation sources); it contains thirteen Technical Annexes. A series of Governmental and Ministerial Decrees have also been issued in implementation of the Legislative Decree no. 230/1995.

The Law established the ALARA principle as required by Euratom Directives and fixes dose limits for workers and public even more restrictive than those required by such a Directive.

A detailed description of the Italian radiation protection system is provided in the Annex 4.

### **15.2 Assessment of compliance**

Based on information reported above it may be concluded that Italy meets the requirements of this Article of the Convention.

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## Article 16. Emergency preparedness

- i. Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency.  
For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.
  - ii. Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.
  - iii. Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.
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### 16.1 On-site and off-site emergency plans

Emergency planning at nuclear installations is regulated by the provisions reported in Sections 115 to 135 of the Legislative Decree n° 230/1995 and subsequent amendments. The above framework must be enlarged with the general legislation governing all cases of accidental events and disasters as reported in the Law n° 225/1992.

With regard to on-site emergency planning above provisions are complemented with those reported in Sections 47 and 49 respectively related to the Plant Operating Manual and to the role of the Plant Council of Delegates which include, among other duties, the preparation of the on site emergency plan. Technical specifications attached to the license regulate the performance of periodic emergency exercises. As a normal practice these exercises are performed under the supervision of representatives of the Regulatory Body.

The organization of the off-site emergency preparedness response differs depending on extension and the type of the consequences of the postulated events.

Regarding off-site emergency planning, if the potential consequences of postulated reference events result to be manageable at local level, the plan is prepared under the authority of the

Prefect of the province where the installation is located, as stated in Sections 118, 119 and 120 of the Legislative Decree n° 230/1995. According to section 117 of the Legislative Decree 230/1995, the technical basis for the plan are established by the Licensee and revised by the Regulatory Body. The plan is prepared taking into account the indications reported in the Law n° 225/92.

At present, each nuclear installation has in place an off-site emergency plan. In few cases, plans are found on the technical bases established for the operation phase of the installation. Available emergency preparedness provisions are therefore sized to ensure a level of protection to the public and the environment beyond the current level of risk of the installation connected to its decommissioning phase. By consulting Regulatory Bodies of neighbouring countries, an updating of the existing technical bases has been recently finalised.

For cases in which potential consequences of postulated reference events could invest larger parts of the national territory, provisions of Section 121 of the Legislative Decree n° 230/1995, related to National Plan on Radiological Emergencies, apply, as discussed in the following point.

## **16.2 National Plan Against Radiological Emergency**

Provisions of Section 121 of the Legislative Decree n° 230/1995 require the preparation of a General National Plan of Protective Measures for Radiological Emergencies under the authority of the Department of Civil Protection. Such a plan is aimed at protecting general public and environment in case of accidents occurring at an Italian installation or at an installation located in a neighbouring country, as well as for emergency situations of undetermined location in the territory.

The current edition of the National Plan for nuclear emergency was approved in March 2010 by the Italian Government. The Plan was prepared by the Department of the Civil Protection of the Council of Ministers and represent the review of the previous 1997 edition.

This revision of the National Plan results from technical and operational factors:

- review accident scenarios taken as reference for planning interventions in case of accidents at NPPs across the border, referring to situations more degraded than those previously considered, in order to identify areas most at risk in case of transboundary releases;
- update the dose intervention levels as required by the current regulations;
- take into account the current legislation on the role of local authorities (Regional Administration and Prefectures) in emergency planning and some recent provisions on civil protection;
- update the framework of the central technical facilities also considering the radiological alarm automatic networks and the reorganization of framework of the regional



environmental laboratories that are part of the national surveillance network of the environmental radioactivity.

#### *16.2.1 Reference accident scenario and consequences assessment*

The national plan adopted in 1997 considered severe accidents, involving core meltdown, but assuming a capacity of the containment system to limit the release to the environment. For the updating of the Plan, the Department of Civil Protection asked ISPRA (responsible according to the law to prepare the technical bases for the plan) to define the new technical basis extending the response capabilities envisaged by the Plan.

The technical bases of the Plan have been assessed taking into consideration an envelope of the accident scenarios used as reference for emergency planning in the countries with NPP close to the Italian border. Particularly, scenarios characterized by core damage and loss of containment were considered. Compared to scenarios of this nature it is still considered reasonable to assume a partially effective capacity of mitigation existing on site.

It is therefore believed that these provisions properly bound conditions potentially related to events occurring to radioactive waste and spent fuel installations in the vicinity of the national territory.

Scenarios include the particularly severe accident events, a very low probability, during which, despite several failures of the safety systems and damages of the core, can still assume that:

- for events that originate within the plant, abatement systems and containment, although partially degraded, can continue to provide a barrier which would limit the release to the environment;
- in the event of external origin producing the loss of primary containment system, recovery and mitigation actions could arrest the process of core melting or lead to a partial removal of the radioactive particulate;

The releases calculated in these conditions, are about 10% of the total inventory.

Assuming the envelope source term above, simulation of the atmospheric dispersion were carried out starting from the foreign NPP closer to the Italian border, selected also considering other relevant factors such as orographic configuration and the prevailing winds.

The simulation was performed by using the long-range atmospheric dispersion model running into the ARIES System (Accidental Release Impact Evaluation System) which is operative at the Nuclear Emergency Centre of ISPRA. ARIES was run assuming the particularly unfavourable atmospheric conditions occurred over several years.

Dose assessment suggests sheltering and iodine prophylaxis as possible protective measures to be considered by the Plan for being adopted in some areas. Moreover, the expected ground contamination requires the implementation of a radiological monitoring programme to be

extended on large areas of the country, aimed to control environmental and food matrices for providing the necessary technical basis for any decisions about food production and consumption restrictive measures.

#### 16.2.2 *Operational level of the emergency response*

After the receiving of the notification of a nuclear accident, two operational level are defined by the Plan:

- a Warning Level in case of an accident at a nuclear plant within 200 km from the Italian border, which entails the following main activities:
  - the acquisition of further information about the event and its evolution;
  - activation of the radiological monitoring capabilities at national and local level;
  - public information,
- and an Alert Level, as the evolution of the previous scenario with involvement of the national territory and possible activation of the protective measures. After the declaration of the Alert (by the National Department of the Civil protection) the activities under the Plan are aimed to the following objectives:
  - event monitoring, evaluation of the radiological consequences and full activation of the national and regional radiological monitoring network;
  - activation of the structures of the national service of the Civil Protection;
  - definition and implementation of the protective measures (sheltering, iodine prophylaxis);
  - public information.

#### 16.2.3 *Emergency organization*

On the basis of the identified accidental scenarios and the technical competence, the national Plan determines the ruling structures (competent Authorities) as well as the technical and the operative bodies, both at national and at local levels.

The ruling structure is the Prime Minister (or a delegate) with the support of the Operative Committee of Civil Protection, with representatives of all related national administrative bodies (Department of Civil Protection, Ministry of Interior, Ministry of Health, Ministry of Defence and others).

In case of a national emergency the technical structure is the Centre for Data Elaboration and Evaluation (CEVaD), as stated at art. 123 of Law n° 230/1995, which includes representatives of ISPRA (as coordinator), the National institute of Health (ISS), National Prevention and Workers Safety Institute (ISPESL), National Fire Brigades Department (V.V.F), National meteorological service of the Air Force and representatives of regional laboratories for the

environmental radioactivity surveillance. ISPRA provides also technical and logistic support for CEVaD.

The Centre is entitled to follow the evolution of the radiological consequences of the event in order to provide the Operative Committee of the Civil Protection with the proper recommendations in relation to the protective actions to be undertaken where required.

The Centre is operating according to established procedures contained in an operational manual which have been recently updated and issued as *“Operational manual for the dose evaluation and the environmental monitoring in case of a nuclear and radiological emergencies”*.

The manual describes the tasks of the committee and the procedures used for dose assessments from different exposure pathways during a nuclear and radiological emergency. Reference levels for protective measures implementation are reported. The most significant radiometric data in the management of an emergency are indicated providing the operational guides for the sampling and measurement activities of environmental and food matrices.

The Centre also makes use of important technical support features which are operative at the ISPRA Nuclear Emergency Centre, such as two automatic networks for the environmental radiological monitoring of the gamma dose rate and the airborne radioactive particulate at national level and the aforementioned ARIES computational system—with validated models to estimate the medium and long range dispersion of radioactive contaminants released into the atmosphere in a specific installation located in Europe.

Italian organisations involved in the implementation of national plan, regularly participate in emergency exercises organized at international level by EU, IAEA and OECD/NEA. National exercises have been also undertaken in the past and on the occasion of the updating of the plan a new exercise series, aimed to test the plan, will be organised under the coordination of the Department of Civil Protection.

It is finally to be mentioned that, at international level, Italy has ratified the Convention on Early Notification of a Nuclear Accident (1986) and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1987). Italy has also established proper provisions to fulfill the requirements of European Union Council Decision n° 87/600/Euratom regarding the urgent exchange of information in case of radiological emergency.

### **16.3 Bilateral Agreements**

#### *16.3.1 Agreement with Switzerland*

An agreement is in place between Italian and Swiss Governments since 1990 regulating the prompt exchange of information in case of nuclear accidents. On this basis regular communication drills take place between the national contact points. Negotiations are in

progress to establish an agreement at level of nuclear safety authorities for cooperation on nuclear safety matters.

#### *16.3.2 Agreement between ASN (France) and ISPRA*

A cooperation agreement between the French and Italian nuclear safety Authorities (ASN and ISPRA )was signed on April 2010. The agreement envisages the early exchange of information in the event of a radiological emergency and for the co-operation in the field of the nuclear safety.

In case of an event that could endanger the population of the other country, the Party will notify to the other one the event, its nature, the time and location of its occurrence and any further available information relevant to minimize the radiological consequences on the population of the other country.

The arrangement provides for setting up a joint expert group which will provide a common identification of the set of specific data to be transmitted both at onset of the event and during the evolution of the accident, and the transmission method. The points of contact of the Parties will be available on 24h/7d bases and will be put periodically under test.

As far as the co-operation on nuclear safety matters, the Arrangement provides for the information exchange and cooperation in many areas of the nuclear safety regulatory matters, for example:

- legislation, regulation, safety guides and technical criteria regarding siting, design, construction, operation, decommissioning and waste management;
- licensing, inspection and enforcement procedures;
- regulatory procedure and assessment methodologies related to nuclear safety, radiation protection, quality assurance, emergency planning, environmental impact evaluation, waste management and transportation;
- major public information activities;
- information concerning research and development programs.

#### *16.3.3 Agreement between SNSA (Slovenia) and ISPRA*

Likewise the aforementioned French agreement, a second arrangement was ratified last May by the ISPRA and the Nuclear Safety Administration (SNSA) of the Republic of Slovenia, for the early exchange of information in the event of a radiological emergency and for the co-operation in nuclear safety matters. This Agreement will apply to the notification and provision of information for emergency response in case of the radiological emergencies which include accidents involving facilities or activities referred to in Article 1 of the Convention on Early Notification of a Nuclear Accident and also to exchange of information and cooperation for emergency preparedness and other nuclear and radiological safety matters. Also in the case of

events not specified in the mentioned Article 1 but which are of potential interest, the Party may request information about the nature of the event, its consequences and on the undertaken countermeasures.

#### **16.4 Assessment of compliance**

Based on information reported above it may be concluded that Italy meets the requirements of this Article of the Convention.

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**Article 17. Siting**

Each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and implemented:

- i. for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;
- ii. for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;
- iii. for re-evaluating as necessary all relevant factors referred to in sub-paragraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation;
- iv. for consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing the necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the likely safety impact on their own territory of the nuclear installation.

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Due to the status of the Italian NPPs, which are in a shutdown condition since many years, the requirements set out in the Convention are not directly applicable. It has however to be mentioned that that existing legal provisions (namely Law 1860 of 1962 and the Legislative Decree n° 230 of 1995), provide the adequate basis to comply with the requirements established in this Article of the Convention.

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**Article 18. Design and construction**

Each Contracting Party shall take the appropriate steps to ensure that:

- i. the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defence in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;
- ii. the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;
- iii. the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.

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Due to the status of the Italian NPPs, which are in a shutdown condition since many years, the requirements set out in the Convention are not directly applicable. It has however to be mentioned that that existing legal provisions (namely Law 1860 of 1962 and the Legislative Decree n° 230 of 1995), provide the adequate basis to comply with the requirements established in this Article of the Convention.

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### **Article 19. Operation**

Each Contracting Party shall take the appropriate steps to ensure that:

- i. the initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;
- ii. operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;
- iii. operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;
- iv. procedures are established for responding to anticipated operational occurrences and to accidents;
- v. necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;
- vi. incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body;
- vii. programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies;
- viii. the generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.

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Due to the status of the Italian NPPs, which are in a shutdown condition since many years, the requirements set out in the Convention are not directly applicable. It has however to be mentioned that that existing legal provisions (namely Law 1860 of 1962 and the Legislative



Decree n° 230 of 1995), provide the adequate basis to comply with the requirements established in this Article of the Convention.



## Section D. Topics of interest from the 4<sup>th</sup> review meeting



## **1 The retirements need to be compensated by recruitment. The maintenance of human resource only for decommissioning activities has its own problems**

The set up of a new Nuclear Safety Agency has been decided. In 2009 a Law (n. 99) has been issued; this Law establishes that a new Nuclear Safety Agency has to be created by merging the staff of ISPRA Department dealing with Nuclear Safety and Radiation Protection and a group of experts coming from an Italian public research organization working in the area (ENEA). As reported under Art. 8.3, such a reorganization represents a proper context for Government to take actions overcoming the referred difficulties.

From the Implementer side, also affected by the issue of retirement of qualified personnel, a Programme of recruitment of new personnel which need to be consolidated in the near future has been initiated.

## **2 Local public acceptance of interim storage of waste on site**

The new Law issued in 2009 (n. 99) and the subsequent Legislative Decree n. 31/2010 contain several provisions related to the public acceptance, as follows:

- the new Nuclear Safety Agency has to transparently inform the public about the effects of ionizing radiations, coming from nuclear installations and from the use of nuclear technologies, on the population and on the environment (art. 29, Law n. 99);
- the national storage facility will be constructed together with a “technological park” , made up of research, development and training facilities, waste and spent fuel management infrastructures (art. 25, Legislative Decree n. 31);
- when national chart containing the list of potentially suitable areas is proposed by the Implementer (SOGIN S.p.A.); such a list is published on operator’s web site, together with preliminary general design report and the information has to be published by five national most diffused daily newspapers. In a time frame of sixty days from such publication, Regions, Local Administrations and qualified stakeholders can provide comments and technical proposals (art. 27, Legislative Decree n. 31);
- when the specific site for the installation of the national storage facility and technological park (SF&TP) has been decided, the Implementer (SOGIN SpA.) has to carry out a diffused and capillary information campaign on the following themes: safety, environmental protection, social economic, cultural and district development setback coming from the realization of the SF&TP, established compensating measures (art. 27, Legislative Decree n. 31);
- the Implementer has to provide compensating measures taking the volume and radioactivity inventory into account; such measures will be extended up to an area with 20 km radius (art. 30, Legislative Decree n. 31).

### **3 Availability of national repository**

The already quoted Legislative Decree n. 31/2010, mainly in art. 27, defines the procedures for locating and constructing the new national repository, associated with a technological park (SF&TP). The steps to be made in order to realize a national storage facility are described below, together with the timeframes to perform each of them.

At first, a list of suitable areas is proposed by the Implementer (SOGIN S.p.A.). Such a list should be defined based upon requirements from the IAEA and the new Italian Agency for Nuclear Safety (ASN). SOGIN activity is in an advanced stage of development.

The new provisions also envisage that the Implementer (SOGIN S.p.A.) has to organize a national seminar by inviting the central and local interested Administrations, the Agency for Nuclear Safety, the national associations of Provinces and Municipalities, the Industrial Associations in the involved Provinces, the most representative trade unions in the territory. Technical aspects, in particular related to the fulfillment of the IAEA and ASN requirements, are discussed in depth during the seminar; moreover, economic and territorial opportunities for development, and compensating measures are illustrated.

The list of suitable sites is approved by the Ministry of Economic Development in agreement with. Ministry of the Environment, Territory and Sea Preservation, and of the Ministry of infrastructures and Transports, based upon the advice of the Nuclear Safety Agency.

An overall timeframe of 180 days is established to complete a procedure to identify a selected area. Such a procedure calls SOGIN S.p.A. to invite Regions and local administrations of the potentially suitable areas to communicate their possible interest in hosting the facility. In case of a not positive outcome, an inter institutional committee is set up (including Ministries and Region representatives) to facilitate such an agreement. In case of a further fail to find an agreement, the Council of Ministries, with the participation of the President of the Region, takes the deliberation on the applicable protocol and the Republic President issues a decree that ratifies it. More steps are required if there are several interested areas.

It is then expected an agreement provided by the Unified Conference State-Regions. In case it cannot be reached, the Ministries' Council provides a justified deliberation that takes the already issued protocol into account.

Nine months are available to SOGIN S.p.A. for performing technical surveys in the chosen areas, under the supervision of the NSA, taking the priorities on the suitability of the areas into account. On the final result of the survey, and in particular on the specific site chosen by SOGIN, NSA expresses its binding advice to the Economic Development Ministry, which issues a decree authorizing SOGIN S.p.A. to perform the needed activities, also on the basis of the agreement of the other already quoted Ministries. According to the decree above, the area is

also declared of national strategic interest, is specifically watched and protected and compensating measures are defined.

Not later than 120 days after the decree above, the Implementer submits the application for a single authorization either for construction and for operation to the Ministry of Economic Development (MED), complete with all the needed documents (the list of documents to be submitted is given in art. 28 and includes the design and the safety analysis report). ASN performs its technical evaluations and in no longer than a year period issues its binding advice, that takes into account the results of the Environmental Impact Assessment procedure.

In a thirty days timeframe after having received the ASN advice, the MED convenes representatives of the other Ministries involved, the concerned Region and other interested parties and Administrations that had not yet expressed their advice (Conference of involved services), in order to reach an agreement on the design.

If no agreement is reached with some concerned local Administration in the context of the Conference above, even after an additional time eventually allowed by the Prime Minister, the Council of Ministries, with the participation of the President of the Region, takes the deliberation in substitution of the agreement.

In a thirty days time frame, the Ministry of Economic Development, having obtained the agreement of the Ministry of the Environment, Territory and Sea Preservation, and of the Ministry of infrastructures and Transports, issues a decree containing the unified authorization. The decree is published in the Official Journal and on websites of the concerned Ministries and of the ASN.

In a thirty days time frame, the Ministry of Economic Development, having obtained the agreement of the Ministry of the Environment, Territory and Sea Preservation, and of the Ministry of infrastructures and Transports, issues a decree containing the unified authorization. The decree is published in the Official Journal and on websites of the concerned Ministries and of the ASN.

#### **4 Bilateral emergency preparedness agreements with neighboring countries**

As reported in section 16.3, arrangements for cooperation on the emergency preparedness and nuclear safety matters have been recently signed by the Italian Nuclear Regulatory Authority, ISPRA, and the Nuclear Regulatory Authority of France and Slovenia. In particular ISPRA concluded a bilateral agreement on the subject matter with ASN of France on April 2010 and with SNSA of Slovenia on May 2010.





## Section E. Planned activities to improve safety



### **Complete transfer of spent fuel for reprocessing**

The transfer of spent fuel stored in the SFP of Caorso NPP for reprocessing to Le Hague, corresponding to about 75% of the overall mass (tHM) still on the Italian territory, has been completed on June 2010. The transfer of the remaining spent fuel from Avogadro Storage Facility and Trino NPP) will start by the end of the current year be completed on 2012.

### **Treatment and conditioning of existing waste and construction of on-site storage facilities**

Several activities are in progress and planned in the NPPs to treat, condition and store radioactive waste. As far as the construction of the on-site storage facilities at Latina e Garigliano sites is concerned, the authorisation has been granted as well as the building license by the respective municipality. Construction of both the on-site storage facilities is well in progress. Construction of the Latina on-site system for sludges treatment is in progress. For Garigliano NPP the dismantling of the chimney, already approved, will be performed. Activities for the construction of an on-site system for resins treatment at Trino NPP is under regulatory review. A similar system will be proposed for Caorso NPP.

### **Decommissioning plans**

Regulatory review of Decommissioning plans for Garigliano and Trino NPPs is close to be completed. The decommissioning license for these two NPPS is envisaged by mid 2011. Decommissioning license for Caorso and Latina NPPs will follow by 2012.

### **Implementation of latest safety management concepts**

As reported under paragraph 6.1, on 2009 a new Management System Manual adopted by SOGIN, the Implementer of the national decommissioning activities, was certified to be in compliance with the ISO 9001:2008 norms. Because of the requirements fixed by such a certification, the Safety Management System of the national Implementer can be considered as evolving to adhere to an integrated management system model complying with the IAEA GS-R-3 requirements.



## Section F. List of acronyms



<b>AFR</b>	Away From Reactor
<b>ALARA</b>	As Low As Reasonably Achievable
<b>ANPA</b>	National Environmental Protection Agency
<b>APAT</b>	National Agency for the Environment Protection and Technical Services
<b>BWR</b>	Boiling Water Reactor
<b>CEI</b>	Comitato Elettrotecnico Italiano
<b>CEVaD</b>	Centre for Data Elaboration and Evaluation
<b>CIPE</b>	Inter-Ministerial Committee for Economic Planning
<b>DISP</b>	Nuclear Safety and Health Protection Directorate
<b>ENEA</b>	Agency for New Technologies, Energy and Environment
<b>ENEL</b>	National Electricity Company
<b>GCR</b>	Gas Cooled Reactor
<b>IAEA</b>	International Atomic Energy Agency
<b>ICRP</b>	International Commission on Radiological Protection
<b>ISPESL</b>	National Prevention and Workers Safety Institute
<b>ISPRA</b>	National Institute for Environmental Protection and Research
<b>LWR</b>	Light Water Reactor
<b>NEA</b>	Nuclear Energy Agency of OECD
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PUN</b>	Italian Nuclear Unified Project
<b>PWR</b>	Pressurised Water Reactor
<b>QA</b>	Quality Assurance
<b>SOGIN</b>	Nuclear Installations Management Company
<b>TC</b>	Technical Commission for Nuclear Safety and Health Protection
<b>TMI</b>	Three Mile Island NPP
<b>TS</b>	Technical Specification
<b>UNI</b>	Ente Nazionale Italiano di Unificazione
<b>WENRA</b>	Western European Nuclear Regulators Association





## Section G. Annexes



## Annex 1 – List and status of nuclear installations in Italy

The main general data of the four Italian nuclear installations are reported in the following table.

Name & Location	Type	Owner	Install. EI.P. (MWe)	Date of start up		Shut down
				First criticality	Comm. Operation	
Garigliano	BWR	(Enel) SOGIN	160	05/06/1963	01/01/1964	08/08/1978
Latina	GCR	(Enel) SOGIN	210 (160) <sup>2</sup>	27/12/1962	01/01/1964	26/11/1986
Caorso	BWR	(Enel) SOGIN	882	31/12/1977	28/11/1981	24/10/1986
Trino	PWR	(Enel) SOGIN	270	21/06/1964	01/01/1965	21/03/1987

### A.1.1 Garigliano NPP

The Garigliano NPP is located in a curve on the left side of the homonymous river, making the border between the regions of Campania and Lazio, about 7 km from the Tyrrhenian Sea, in the territory of Sessa Aurunca (CE). The plant construction ended in 1963, the commercial operation took place from 1964 to 1978 and, presently, the plant is under decommissioning.

The Garigliano NPP has been designed as a dual cycle BWR plant, 506 MWt, 160 Mwe. The main nuclear components are the reactor vessel, the steam drum separator, the associated risers and downcomers tubing, two U-tubes steam generators. The nuclear island is enclosed in a iron-made spherical containment, 22 mm thickness, with penetrations for water-steam connections to the turbine building.

The dual cycle operation consisted in sending the water-steam mixture from the reactor outlet, through the risers, to the drum for higher pressure steam separation; after that, part of the separated water was directed to the steam generators for lower pressure steam generation from feedwater, the other part of the drum water, mixed with part of the feedwater, was circulated again through downcomers to the reactor inlet; that is, the feedwater was partly directed to the steam generators and partly to the steam drum separator.

In 1978, since structural problems had been discovered in the steam generators and given the short residual life of the plant, the owner (ENEL) took the decision for plant decommissioning. In this regard the Ministry of Industry, now Ministry of Economic Development, issued in 1985 a license for the plant decommissioning.

In 1985-1987, the nuclear fuel (about 300.000 TBq) was carried out from the plant, to the Avogadro pool in Saluggia (VC), for long term wet storage. Furthermore, extensive radwaste management activities related to low level solid technological contaminated radwaste were

<sup>2</sup> the power was reduced with respect to the design value

accomplished through treatment process with compactation and supercompactation, high level liquid process radwaste (from the reactor water chemical cycle) through conditioning with cementation, and activated solid wastes through cementation. The generated wastes have been stored in the turbine building and in other structures in the plant site.

Another important activity was directed to reach the safe storage condition of the reactor building (the so called CPP – Custodia Protettiva Passiva): extensive decontamination of accessible areas and equipment was performed, many systems and equipment were disconnected or deenergized, the nuclear components and process circuits were voided from operating fluids, their openings and penetrations were closed, fire loads in the containment were reduced to a minimum, an internal sealed zone including the containment rooms with nuclear components, served with a passive filtered ventilation, was established in the containment to maintain the confinement of the residual radioactivity and to avoid diffusion outside.

In 2001, on the basis of the Government decision to change the decommissioning strategy from safe the storage to a single step decommissioning of all nuclear installations in Italy, an overall decommissioning plan was issued for Garigliano NPP. Later on, other projects have been issued and in particular, a project to build a new 4-modules structure in the plant site for the temporary storage of existing wastes (about 500 TBq) and the future wastes from the single step decommissioning (about 700 TBq).

The Garigliano NPP is currently operated by SOGIN under the above mentioned safe storage licence, issued in 1985, and the associated Technical Specifications issued by the Regulatory Body (ENEA/DISP, now ISPRA). Plant operation is performed based on Surveillance Rules, Technical and Management Procedures of the Operation Manual, under a quality system regime.

Preparatory decommissioning activities are performed in the wait of a new license for a single step decommissioning. The preparatory activities met strong local opposition, mainly based on unavailability of a national radwaste storage facility, causing significant delays of realization activities. On the other hand, the new decommissioning license requires an overall decommissioning plan to be agreed by the competent Authorities. In this regard ISPRA, issued in 2006 its conditioned agreement on nuclear safety and radiation protection, while the licensing procedure on environmental conformity has been completed more recently by the competent authority (with ISPRA support) with the issue of the required agreement. Because of the significant time passed, ISPRA will provide an updating of its agreement for the issue of the decommissioning license by the Ministry of the Industry.

In the last years, the plant Operator performed the following general activities:

- a) Ordinary management to maintain the plant safety according to Technical Specifications;
- b) Development of the overall decommissioning plan and development of new projects for plant decommissioning and for the preservation of high level safety conditions;

- c) Contracting and implementation of the projects under its surveillance activity;
- d) Extraordinary maintenance interventions to guarantee the integrity of safety functions against degradation phenomena in obsolescent equipment after long operating life.

In addition to the licensing process of the overall decommissioning plan, some details of the activities performed since the third Report are hereinafter given:

- a further phase of removal of asbestos from the turbine building has been completed (the last phase will regard the turbine itself);
- completion of the new controlled access Implementation is in progress for the following projects:
  - removal of asbestos from the containment;
  - adaptation of the so called "ex-diesel" pre-existing building in a structure for temporary storage of radwaste;
  - realization of the "D1" new 1-module structure for temporary storage of radwaste (deriving from change of the 4-modules project previously mentioned),
- Implementation has to begin for the following approved projects:
  - demolition of the stack and erection of a new one;
  - voiding of underground trenches used for storage of technological radwaste (this project was approved in 2002 but was suspended in the wait of suitable radwaste storage structure).
- The following projects already approved by the Regulatory Body have not been implemented because of the lack of permission by local authorities:
  - Construction of new liquid radwaste storage tanks (changed as reported below);
  - Construction of a 4-modules structure for temporary storage of radwaste (already mentioned and changed as reported above).
- The following projects are still under regulatory assessment:
  - improvement of the turbine ventilation;
  - adaptation of pre-existing radwaste system;
  - demolition of tower water storage system and realization of new water supply system;
  - adaptation of the plant electrical distribution system

Other relevant activities made in regard of plant decommissioning or maintaining the plant safety include: updating of the plant SAR, fire prevention and protection programme, updating of plant operation and management documentation, improvement or replacement or restoration of obsolescent equipment (i.e. fire lines and pumps, liquid radwaste discharge line, change of on-site electrical power sources).



#### A.1.2 Trino NPP

The “Enrico Fermi” NPP, a 270 MWe PWR plant supplied by Westinghouse, is located in the northern Italy, in the territory of Trino (VC), on the left side of the PO river. It was operated by Enel from 1965 to 1987, this operational period was regular, except two prolonged interruptions for implementation of important interventions for plant safety. After indefinite shutdown, established in consequence of Chernobyl accident, the decision was taken to put the plant in the safe storage condition (also named CPP – custodia protettiva passiva) in view of future decommissioning. In 1992 the reactor was defuelled. All fresh fuel and most of irradiated fuel was successively removed from the plant. A limited amount of spent fuel is still present in the spent fuel pool of the plant.

The spent fuel pool is a steel lined concrete structure (14,7x 10,3 x 11 m). Spent fuel racks are located inside with enough room for 162 fuel assemblies and 150 control rods or other in core components.

At present, in the pool, there are 47 spent fuel assemblies (8 MOX and 39 UO<sub>2</sub>).

In the Trino NPP there were significant activities for CPP involving mainly conventional parts, and to put out of service systems not any more required for safety.



Following the change of the decommissioning strategy (December 1999), a comprehensive plan for a single step decommissioning of Trino has been submitted in 2001 for license by SOGIN (new plant Implementer in place of ENEL).

Subsequently, in the wait of the ISPRA agreement, further significant activities have been performed: removal of conventional parts, removal of asbestos, radwaste characterization and treatment, decontamination of steam generators, implementation of a new water supply system for the plant independent from the Po river.

Currently the plant is in the situation that it is kept in the safety state while the required surveillance and maintenance activities are performed, furthermore in view of decommissioning the following important activities are implemented under operator surveillance:

- modification of containment ventilation system;
- removal of material and equipment, located inside the controller zone of the plant, that are demonstrated to have no content of radioactivity.

Other relevant activities made in regard of plant decommissioning or maintaining the plant safety include: updating of the plant SAR, fire prevention and protection programme, updating of plant operation and management documentation.

At present the radioactive waste (about 1050 m<sup>3</sup>, 330 m<sup>3</sup> of which is still to be conditioned) is stored in the two storage facilities of the NPP site. Some semi-liquid radioactive waste (resins and sludges) have still to be conditioned.

On the basis of a strategic review of the decommissioning programmes, SOGIN has recently assigned priority to the decommissioning of Trino NPP. For the issue of the decommissioning license by the Ministry of Industru it has to be considered that the ISPRA regulatory review of

the overall decommissioning plan in regard of nuclear safety and radiation protection is about to be completed, while the licensing procedure on environmental conformity has been already completed recently.

### A.1.3 Caorso NPP

The Caorso power station, a BWR unit (882 MWe), started its commercial operation in the year 1981 and was permanently shut down in 1986, just after the 4<sup>th</sup> refuelling.

Since 1998, the reactor core has been completely defuelled and all the irradiated fuel elements have been transferred to the spent fuel pools, waiting for reprocessing.

Caorso NPP is equipped with two spent fuel pools: one (internal) close to the vessel cavity, and another (outer), connected to the previous one on the other side of the vessel cavity.

The NPP is actually regulated through a preliminary decommissioning license granted on August 4, 2000.

An overall plan for a single step decommissioning of Caorso was submitted by SOGIN and is under regulatory review.

Some preliminary activities for decommissioning have been performed, in particular the following ones:

- decontamination of the circulation loops and of the clean up system has been completed on february 2004;
- dismantling activities of RHR towers were competed in 2009 while the dismantling in turbine building and off-gas system are actually in progress.

At present the radioactive waste (about 2490 m<sup>3</sup>, 2065 m<sup>3</sup> of which is still to be conditioned) is stored in the three storage facilities of the NPP site. 1250 m<sup>3</sup> of operational radioactive waste (resins and sludge) have been treated in the past with urea-formaldehyde but, due to the presence of significant amount of free (corrosive) liquids and due to a compressive strength significantly lower than the required limit of 5 MPa, a new conditioning campaign has to be performed, on request by the Regulatory Body.

On the bases of an international tender SOGIN has recentelly signed a contract with Sweden company (Studvick) for the supply of treatment and conditioning services for operational radioactive wastes.

In the year 2010 has been completed the following activities:

- The over reduction of volumes of about 600 drums of technological radioactive wastes with 1.2 GBq of total radioactivity;
- The dismantling of metallic stuck of the Off-Gas building;



- In June 2010 were completed the activities for removal and transport of all the spent fuel that were started in December 2007 for a total of 1032 spent fuel elements.

In may 2010, ISPRA has released the permission to put in operation the Phadec plant for the chemical decontamination of metallic materials, deriving from the dismantling inside the turbine and off-gas buildings.

#### A.1.4 Latina NPP

The 160 MWe GCR of Latina is located on the Tirrenian sea coast, around 70 Km south of Rome. It was operated by Enel since 1962 until 1986. The initial installed electrical power of 210 MWe was later scaled down to 160 MWe, after a reduction of 30°C of coolant temperature to avoid oxidation of reactor internals. The plant was definitely shut in November 1986, after the Chernobyl accident.

Since then, all spent fuel has been removed from the plant and the primary circuit has been filled with dry air. At present, the radioactive waste derived from plant operation (about 1220 m<sup>3</sup>, 900 m<sup>3</sup> of which is still to be conditioned) is stored in different facilities of the NPP site.



About decommissioning strategy, the initial safe storage strategy has recently switched to two phases decommissioning. The first phase foresees the putting in conservation of reactor building and the filling of the new temporary repository.

The second phase, to put in execution only after the localization and construction of the national repository, foresees the dismantling of all plant structures with the purpose to obtain the green field.

The plant is currently operated under a license issued in 1991 that establishes the procedures for the operability of safety relevant systems, radwaste management, public and workers radiological protection and environmental monitoring.

An overall plan for the decommissioning of Latina was submitted by SOGIN under a new application and is currently under review by ISPRA.

Some dismantling activities have already been licensed and performed, while other activities are currently being carried out as here in after summarized:

- structures and parts of the plant considered no longer safety related such as fuel charge/discharge machines, CO<sub>2</sub> production and storage system and auxiliary piping have been disassembled and removed;
- all fuel elements (22441 for a weight of 256 t) have been removed and sent to BNFL for reprocessing;
- the fuel pond is partially decontaminated through a scrubbing process (only the emergency and decay sections of the pond);
- about the charge section of the pond, SOGIN has submitted to ISPRA a new request for the decontamination of this section;
- CO<sub>2</sub> auxiliary piping has been removed;
- water and steam piping has been removed;
- all of 6 gas circulators have been removed (cases still on site as part of primary containment);
- the circulators halls were released from structures and components;
- thermal insulation has been removed from gas conduits and steam generators;
- the primary circuit has been dismantled;
- a project for the extraction and conditioning of sludges (licensed in 2003) actually is in realization phases; in particular for what concerns the construction of the buildings of extractions and conditioning;
- In 2008 was licensed the project for the construction of a new temporary repository and actually are in progress the activities for its realization.

Some activities are waiting for approval:

- the project for the extraction and conditioning of the Magnox residues (splitters);
- decontamination of all the fuel pond;
- removal of system components of reactor building;
- release of areas of the active effluents building.

About 20.000 m<sup>3</sup> of radioactive wastes are expected from decommissioning activities, among which around 2000 t of graphite: such wastes cannot be stored on the site, not even temporarily, so that the availability of a national facility for the radwaste storage is critical for the completion of the decommissioning activities.

## **Annex 2 – Background historical information on the past Italian nuclear programme**

Commercial utilisation of nuclear power in Italy started in 1964 and within 1981 four nuclear power plants, namely the NPPs of Garigliano (BWR), Latina (Gas Grafite), Trino (PWR) and Caorso (BWR), and a LEU fuel fabrication installation (Fabbricazioni Nucleari S.p.A.) had been commissioned.

During that period, an extensive R&D programme on the nuclear fuel cycle was developed by the Nuclear Energy Research Agency (CNEN) - now the National Agency for New Technology, Energy and the Environment (Enea) - with the operation of experimental fuel cycle installations (e.g. ITREC and EUREX).

The three NPPs of Latina, Trino and Caorso continued to be operated until 1987, when they were definitively shut down based on a governmental decision which in such a way interpreted the results of a national referendum called upon after the Chernobyl accident. The NPP of Garigliano had been already shut down in 1978, for technical reasons.

At the same time, the nuclear programme was closed, the Interministerial Committee for the Economical Planning (CIPE) required the National Electricity Company (Enel S.p.A.) to start the decommissioning of the NPPs and a “safe storage” (IAEA level 1/2) option was adopted.

In 1999, all Enel S.p.A. liabilities and assets connected to nuclear power were assigned to a newly established company, named SOGIN (Società Gestione Impianti Nucleari) S.p.A., whose shareholder is the Ministry of Economy and Finance, while the strategic and operational aims are given by the Ministry of Productive Activities, now of Economic Development. The primary mission of the SOGIN S.p.A. is to cover the decommissioning of all Italian nuclear installations and the safe management of the spent fuel and radioactive waste.

The spent fuel and the largest part of the radioactive waste to be managed in Italy derive from the operation of the above mentioned NPPs and fuel cycle facilities. As far as spent fuel is concerned, part of that has already been transferred abroad for reprocessing (namely the fuel of Latina and part of the fuel of Garigliano and Trino NPPs) and the remaining amount of fuel still in Italy is going to be sent abroad in the framework of the recent reprocessing agreement referred in the policy section of the Report. It is planned that treated and conditioned waste resulting from the reprocessing will be returned to Italy.

The technical guidance and standards that at the early 60ties were initially assumed as reference for the design, construction and operation of NPPs were essentially the ones developed in the Country where the specific technology was originated. The reasons for that are easily understandable if one thinks that NPPs had a US and UK origin.

A long process of assimilation into the main stream of the industrial and regulatory practices has been taking place since the inception of the Italian nuclear program. The results of that assimilation process developed into an indigenous conception of the safety and radiation

protection criteria. In this context it must be remarked that radiation protection concepts such as justification and optimisation were long in use even before the formal introduction into the legislative corpus of rules. Moreover, in the 80ties, some specific Italian requirements were introduced into a new homogeneous corpus establishing general criteria and requirements applicable to pressurised light water reactors. That process led to an approach that resulted in establishing integration between safety and radiation protection requirements. Full use of probabilistic assessments was required by applicants for demonstration of having met the radioprotection objectives in terms of doses to members of the public for the entire spectrum of operational scenarios (including transients and accidents).

A reflection of the adoption of nuclear US technologies has been the use of some parts of 10 CFR (U.S. Code of Federal Regulations), and of other US industrial standards.

### Annex 3 – List of acts, decrees, regulations, guides and standards

#### a) Statutes and Legislative acts

**Act no. 1860 of 31 December 1962:** published in the Italian Republic's Official Journal no. 27 of 30 January 1963, as amended by the President's Decree no. 1704 of 30 December 1965 (Italian Republic's Official Journal no. 112 of 9 May 1966) and by the President's Decree no. 519 of 10 May 1975 (Italian Republic's Official Journal no. 294 of 6 November 1975);

**Presidential Decree no. 185 of 1964:** "Safety of plants and protection of workers and general public against the risk of ionising radiation associated to the peaceful use of Nuclear Energy replaced in 1996 by the Legislative Decree no. 230/1995, described below;

**Act no. 393/1975:** which contains Administrative rules on the selection of the site for NPPs;

**Presidential Decree no. 1450/1971:** which contains Requirements and procedure for the acquisition of the operational personnel licences;

**Presidential Decree no. 519/1975:** "Civil responsibilities in the field of nuclear safety";

**Legislative Decree no. 230 of 17 March 1995:** published in the Supplement to Italian Republic's Official Journal no. 136 of 13 June 1995, which has been in force in Italy since January 1st 1996 - and replaces the Presidential Decree no. 185/1964, the previous radiation protection act -, implements six EURATOM Directives on radiation protection (EURATOM 80/836, 84/467, 84/466, 89/618, 90/641 and 92/3). Legislative Decree no. 230 needs a series of Government and Ministerial Decrees;

**Legislative Decree no. 241 of 26th May 2000:** which has transposed EU (European Union) directive 96/29/Euratom laying down basic safety standards for the radiation protection of workers and the public; the standards laid down in the directive incorporate the 1990 Recommendations of the International Commission on Radiation Protection (ICRP) into EU radiation protection legislation. Decree no. 241 has modified and integrated Legislative Decree no. 230 of 1995, the latter constitutes the main piece of legislation laying down radiation protection requirements for workers and the public;

**Legislative Decree no. 257 of 9th May 2001:** which modified certain details in Legislative Decree no. 241 of 2000 concerning requirements for notification and authorisation of non nuclear installations where ionising radiation is used for industrial, research and medical purposes;

**Act no. 933/1960:** on the establishment of the National Committee for Nuclear Energy (CNEN);

**Act no. 84/1982:** on the establishment of the State Agency for new technologies, energy and environment (ENEA);

**Act no. 61/1994:** on the establishment of the National Agency for the Environment Protection (ANPA);

**Legislative Decree n° 300/1999 and President of the Republic Decree n°207/2002:** on the establishment of APAT, by merging ANPA with other national Technical Services;

**Act no. 286/2006:** on the reorganisation of APAT as a legal entity of public administration, endowed with new institutional Organs;

**Law n° 368 of 24<sup>th</sup> December 2003:** establishing the procedures for the site selection of a national repository for HLW;

**Law n° 239 of 23<sup>rd</sup> August 2004:** promulgated for the rearrangement of the energy sector extends the procedures established by the Law n°368 of 2003 also for the site selection of a national repository of LLW;

**Law n° 10 of 19<sup>th</sup> January 1998:** promulgated for the ratification of the Convention on Nuclear Safety;

**Law n° 282 of 16<sup>th</sup> December 2005:** promulgated for the ratification of Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

b) Technical guides - Selected APAT TG addressed to Nuclear Installations' licensing

**Doc. DISP (87) 10** "General Design Criteria for PWR NPPs";

**Doc. DISP (87) 11** "Design Requirements for the limitation of the worker exposure for the PWR NPPs";

**T.G. no.1** "Content of the Preliminary Safety Analysis Report for NPPs, pursuant to article no.36 of the Legislative Decree no. 230/1995";

**T.G. no.2** "Procedure for the Authorisation of Changes in NPPs";

**T.G. no.4** "Implementation of the article no.41 of the Legislative Decree no.230/1995 --Detailed Construction Designs";

**T.G. no.8** "Quality Assurance Criteria for NPPs";

**T.G. no.9** "Quality Assurance Description of the documentation required for design and construction phases prior to carry out nuclear tests";

**T.G. no.11** "Criteria for the compilation of information reports on the operation of NPPs to be sent to DISP";

**T.G. no.20** "Quality Assurance Description of the documentation required for operation phase of NPPs";

<b>T.G. no.21</b>	“Content of Operating Rules“;
<b>T.G. no.22</b>	“Quality Assurance. Guide for collection, storage, preservation, and safekeeping of quality assurance records for NPPs“;
<b>T.G. no.23</b>	“Quality Assurance. Guide for procurement of Items and Services for NPPs“;
<b>T.G. no.24</b>	“Quality Assurance. Guide for Auditing on QA Programmes for NPPs“;
<b>T. G. no.25</b>	“Quality Assurance. Guide for Applying on design activities for NPPs“;
<b>T. G. no.26</b>	“Radioactive Waste Management“;
<b>T.G. no.27</b>	“In-service Inspection”.

c) Technical Standards

UNI standards related to decommissioning

The Standards applicable to the decommissioning of Italian installations are set out in a single document issued by the national standards organisation (UNI): UNI 9498.

That standard contains eight sections covering different topics. The contents of the individual sections of the document are summarised below.

In general the present standard pertains explicitly to the following type of installations:

- nuclear reactors;
- nuclear subcritical units;
- nuclear power plants;
- nuclear research plants;
- nuclear plants for spent fuel reprocessing;
- plants for preparation and fabrication of special fissile materials and of nuclear fuel;
- storage of special fissile materials and of nuclear fuel;
- installations for reprocessing, conditioning or temporary storage of radioactive wastes.

The standard is not applicable to:

- uranium mines;
- storage of final disposal of radioactive wastes;
- plant where during the operation, no radioactivity has been produced;
- plants which have been converted to a new nuclear related use.

UNI 9498/1 - General criteria

This standard gives a general picture that includes principles and factors which have to be considered for the decommissioning of a nuclear plant. It includes the general requirement that all the procedures, either of a management, accounting and administrative type, or of a technical type, must be planned and done in a controlled and documented way.

The standard is addressed to the operator of nuclear plants to be decommissioned and to persons responsible for the planning and execution of decommissioning operations; it provides to indications and recommendations about the methods and the technical options which are convenient in order to maintain an adequate health protection for workers, public and environment, and finally to minimise the radiological risk associated to the plant.

The scope of the standard begins at the decision of the owner/operator to permanently shut down the plant, and terminates when a situation without radiological constraints is reached. The status of the plant taken as a reference in the present standard is the configuration existing at the moment the decision is made to permanently shut down. The radioactive substances considered are those associated with the normal operation of the plant itself. The standard does not deal with decommissioning activities following a severe accidents.

The aspects related to processing, conditioning, transportation and disposal of radioactive wastes are not included in the scope of the standard. The numerical definition of radioactivity limits for materials free from radiological constraints are also not included. Nor the management, accounting and administrative aspects. The standard does not exempt the user from observing the rules and authorising procedures in force.

UNI 9498/2 - Decontamination techniques

The section describes the principles and the methodologies which have to be considered for the planning and execution of decontamination activities at a nuclear plant being decommissioned, for the case of either immediate or deferred dismantling. It provides technical information and recommendations necessary to the owner/operator of the plant and to people responsible for the planning and execution of all the decontamination procedures which are useful in improving the conditions of radiological protection at the plant as well as in achieving the optimum management of wastes.

It is not applicable to plants which, following an accident, show a generalised contamination of components, structures and buildings and of the site itself. In this case specific decontamination techniques will be have to set up, and they are allowed to be different to those described in the present standard.



#### UNI 9498/3 - Storage and surveillance

This section identifies the fundamental activities which are necessary to be done on a nuclear plant at the end of operation, to leave it in a safe condition for an adequate period of time. It is concerned in particular with plants where the existing radioactivity, after the complete removal of all fissile materials, is due primarily to radioisotopes which have decay times which justify placing the plant in a conservation and maintenance (C&M) state for appropriate period, in order to allow the plant to be completely dismantled with a greatly reduced level of radioactivity.

#### UNI 9498/4 - Dismantling of structures and components

This section describes the principles and the factors which have to be taken into account for the dismantling and removal of structures and components which have become contaminated and/or activated during the operation of the plant.

#### UNI 9498/5 - Radioactive inventory

This section specifies the methodologies to be followed in the evaluation of the remaining radioactivity and of the associated radiation fields in order to carry out the radiological characterisation of the nuclear plants to be decommissioned. Such methodologies must be programmed and performed in a checked and documented way.

#### UNI 9498/6 - Radiological characterisation and classification of materials

This section deals with the factors which have to be taken into account to characterise and classify the materials produced during the decommissioning of nuclear plants. It provides the criteria against which the most appropriate methodology for characterisation and classification of materials as a function of their type is to be chosen, as well as provides guidance for the choice of measurement instrumentation appropriate to define the radiological state of the materials.

#### UNI 9498/7 - Criteria for partial release of a nuclear plant and/or site

This section deals with those nuclear plants to be decommissioned for which a decision has been made to delay final dismantling for a sufficiently long period of time, such that they will have to be placed in a C&M state.

The decision of putting a part of a nuclear plant in a C&M state depends on the requirement to release some zone where other activities of a non nuclear type can continue to be performed.

Usually the part of the plant that will be put in a C&M state will be that part where the radioactivity cannot be easily removed but can be confined for long periods of time in well defined and sealed zones. Usually these are areas where the major part of the radioactivity is coming from neutron activation.

UNI 9498/8 - Requirements for the temporary storage of radioactive wastes and materials

This section gives the criteria to be followed in the design of a temporary store for the radioactive wastes resulting from the operation and dismantling of the nuclear plants. It also provides the general technical requirements which have to be fulfilled either in the design and management of the new temporary store, or in the modification of already existing facilities.

Furthermore it provides the criteria for environment protection against pollution resulting from management of radioactive wastes, in order to minimise the individual and collective doses of population and workers, and to preserve the quality of the environment for the present and future uses of the site.

The radioactive wastes mentioned above include those arising from reprocessing and/or conditioning activities, that are solid and satisfy the radioactivity concentration limits according to present standards for temporary storage or for disposal at an appropriate site.

UNI standards related to radioactive waste management

In the framework of the National Standardization Organisation (UNI) activities, the following standards aiming to the standardisation of the procedures for radioactive waste management have been developed:

- |                          |   |
|--------------------------|---|
| <b>UNI 10621 (2004)</b>  | “Radioactive waste packages characterization”;  |
| <b>UNI 10704 (2004)</b>  | “Radioactive waste classification”;   |
| <b>UNI 10755 (2004)</b>  | “Recording and labelling of RW packages”;   |
| <b>UNICEN 189 (2001)</b> | “Solid materials from nuclear plants - Radiological methods and procedures for the clearance”;  |
| <b>UNI11193 (2006)</b>   | “Qualification of conditioning processes for cat. 2 packages”, that sets out the general requirements for the conditioning process qualification and the specific test to which the waste form and/or packages should be verified (mechanical and physical/chemical properties for homogeneous and heterogeneous waste form and for High Integrity Containers); |

- UNI 11194 (2006)** “Radiological characterization of Cat.2 packages”, that establishes methods and requirements for radiological characterization of radioactive waste packages before their disposal (i.e. measurement system performances, typical radionuclides relevant for disposal to be measured, sampling preparation, correlation factors);
- UNI 11195 (2006)** “Information management system for the disposal of Cat. 2 packages”, that sets out the requirements and the methodologies for the management of the Surface Disposal Information Management System (i.e. data acquisition, waste reception plan, inspection and monitoring data base, long term management of the information system);
- UNI 11196 (2006)** “Containers for the final repository of Cat. 2 packages” That defines the requirements (dimension, mechanical characteristics) of the identified containers for LLW packages and qualification process;
- UNI 11197(2006)** “Identification procedure and traceability of information for Cat.2 Packages”, that defines the requirements for building a suitable Data Base and for organising the information needed to appropriately manage radioactive waste packages at a near surface disposal facility;
- UNICEN 214-1 (2003)** “Category 2 Radioactive Waste Engineered Repository”, that is structured as follows:
- Part 1: Basic Design Criteria;
  - Part 2: Basic Qualification Criteria for Engineered Barriers;
  - Part 3: Surveillance and Monitoring basic criteria.

#### **Annex 4 – Additional information on safety and radiation protection rules**

As referred in Article 15, the radiation protection in Italy is regulated by the Legislative Decree 230/1995 and its modifications.

One of the most relevant provisions in Legislative Decree no. 230/1995 is the distinction between practices and intervention, as defined in EU directive 96/29/Euratom in accordance with the Recommendations of ICRP Publication 60: the basic principles of justification and optimization (the latter being also called ALARA, i.e. requiring doses to be kept as low as reasonably achievable) apply both to practices and to intervention although the wording is somewhat different. As far as the third principle of dose limitation is concerned, in cases of intervention on the contrary such principle does not apply, intervention levels being used in its stead.

The Legislative Decree 230/1995 clearly state that the operator of a nuclear installation or non nuclear installations or facilities making use of radioactive materials, must implement all the safety and protection measures suitable to keep the exposures of workers and population as low as reasonably achievable, social and economic considerations being kept into account. The implementation of the optimization principle by the operator must be demonstrated firstly at the design stage and subsequently along the plant operation and decommissioning.

As far as situations concerning unplanned or uncontrolled releases of radioactive material into the environment are concerned, it has been a practice in the authorisation procedure - in force in Italy since 1964 – to request to the applicant an analysis of possible scenarios and the assessment of the consequences (in terms of radiological impact on critical groups of the public), together with appropriate measures implemented with a view of preventing and controlling accident conditions, and mitigating their consequences, with the aim of establishing ad hoc emergency plans. Following the transposition of the Directive 96/29/Euratom in the Legislative Decree 230/1995, an analogous provision was introduced also for non nuclear installations.

##### *A.4.1 Practices*

In accordance with the provisions of Legislative Decree no. 230/1995, a practice is subject to radiation protection requirements if certain thresholds of activity and concentration are exceeded:

- 1 Bq/g in activity concentration for all radionuclides, and
- relevant activity values for each radionuclide from Euratom directives 84/467 and 96/29, whichever the lesser.

However, for certain practices, such as medical use of radiation, deliberately adding radioactivity to consumer goods, importing and exporting such goods, discharges, reuse or

recycle of radioactive materials from installations, the Italian legislation's requirements apply for any radioactivity contents, without thresholds.

The concept of triviality in individual and in collective doses as well as provisions for unrestricted release of radioactive materials from installations have also been formally introduced into Italian legislation according to the following basic 'below regulatory concern' criterion, both conditions of which must be met:

- a) effective dose  $\leq 10 \mu\text{Sv}/\text{year}$ , and
- b) either collective effective dose committed in one year of performance of the practice not greater than about 1 man·Sv or the relevant analysis demonstrates that exemption is the optimum option.

From an administrative viewpoint, practices can be subject to the mutually exclusive requirements either of notification or of authorisation. In accordance with the new provisions of Legislative Decree no. 230/1995, a practice is subject to notification requirements starting from defined thresholds in activity and activity concentration as far as radioactive materials are concerned; the relevant thresholds are those laid down in Annex I of EU directive 96/29/Euratom. A holder of sources is required to notify local authorities of his intention to carry out the practice at least 30 days before the start of the practice. Besides, detailed requirements for notification apply which closely mirror those provided for in case of authorisation.

The Legislative Decree's provisions state that a practice is subject to notification insofar as requirements for authorisation do not apply. In particular, nuclear installations do not require notification since they continue being subject to the ad hoc authorisation requirements laid down in Legislative Decree no. 230/1995, which have not been modified by the transposition of EU directive 96/29/Euratom.

For non nuclear installations using ionising radiation for medical, industrial and research purposes the Italian authorisation system is based, as in the past, on a two tiered structure: authorisation of the more important installations is the competence of the Ministry of Economic Development which issues authorisations in accordance with other relevant Ministries; the advice of APAT is sought under law in order to determine technical specifications applicable to the installation.

For smaller industrial and research installations the Prefect of the province has administrative competence to issue authorisations after seeking the advice of regional technical bodies and of the Fire Corps; the authorisation required for small medical installations is issued by the Regions, which are responsible for health in the Italian system.

A Technical Annexe to Legislative Decree no. 230/1995 lays down thresholds in order to determine which installations are authorised by the Ministry of Economic Development and which ones by local authorities; thresholds are set in terms of values of activity, activity concentration and neutron yield for radioactive sources, and of energy and neutron yield for

accelerators. The same Annexe also lays down the technical features of the radiation sources and of the installation which must be specified in the application.

A general criterion is in force in Italy for unrestricted release from any installation subject to either notification or authorisation requirements. Radioactive materials from such practices can be unconditionally released from regulatory control if the radionuclides concerned comply with conditions regarding both activity concentration and radioactive half life:

- activity concentration  $\leq 1$  Bq/g, and
- half-life  $< 75$  days.

If conditions above are not complied with, an authorisation is required for release, reuse and recycle of radioactive materials from the installation concerned and specifications to that effect are established in the licence. The authorisation is given on the basis of a case-by-case analysis which has to demonstrate compliance with the basic 'below regulatory concern' criterion stated above. In the case where the practice is not subject per se to authorisation requirements, as for instance in the case where notification applies, a special authorisation for release is provided for. The clearance levels to be specified in the prescriptions, must comply with the basic below regulatory concern criterion for practices – also established in the European Directive 96/29/Euratom – and, to this aim, must take into account directives, recommendations and technical positions provided by the European Union. The contravention to prescriptions included in the authorisation acts is opposed by ad hoc sanctions.

#### *A.4.2 Intervention*

As regards intervention in cases of emergency, it must be stated beforehand that requirements for detailed emergency plans providing for intervention in case of accidents in nuclear installations had been in force in Italy since Presidential Decree no. 185 of 1964 was promulgated. Further requirements to that effect have been introduced in Legislative Decree no. 230/1995 by transposing EU directive 96/29/Euratom providing for intervention in cases of radiological emergencies in non nuclear installations and for exposure resulting from the after effects of a radiological emergency or of a past or old practice or work activity, which were not regulated in previous radiation protection legislation.

As previously said, since the promulgation in 1964 of the first Radiation Protection Decree it had been a practice in the authorisation procedures to request of the applicant an analysis of possible accident scenarios and of their radiological consequences, together with appropriate measures to be implemented with a view to preventing and controlling accident conditions, and mitigating their consequences.

Given that nuclear installations proper continue to be subject to a special separate regime as in the past, ad hoc provisions introduced into Legislative Decree no. 230 of 1995 by Legislative Decree no. 241 of 2000 require for each non nuclear installation subject to authorisation by the

Ministry of Economic Development that evaluations of potential exposures should be made by the applicant seeking an authorisation and submitted to licensing authorities so that an intervention plan can be prepared by emergency preparedness and management Authorities.

For those non nuclear installations which require authorisation by the Prefect or by the Regions, licensing authorities will review evaluations of potential exposures made by the applicant and will decide whether such potential exposures are likely to exceed 1 mSv of effective dose; in this case an intervention plan can be prepared by emergency preparedness and management Authorities as well. No new installation can start operations before approval of an intervention plan if the former is required under the new rules.

A Technical Annex in Legislative Decree no. 230/1995, also introduced by Legislative Decree no. 241 of 2000, lays down indicative intervention levels in terms of effective, equivalent and absorbed doses for purposes of planning and intervention in case of emergency; broadly, the levels established are in accordance with the European Commission's guidelines (Radiation Protection 87 "Radiological protection principles for urgent countermeasures to protect the public in the event of accidental releases of radioactive material") and with criteria in IAEA Safety Series no. 109 ("Intervention criteria in a Nuclear or Radiological Emergency").

#### *A.4.3 Dose limits*

The transposing of the EU directive 96/29/Euratom in Legislative Decree no. 230 of 1995 has also led to establishing a new dose limit for exposed workers of 20 mSv in a calendar year. Instead of Annual Limits on Intake (ALI), age dependent coefficients relating a unit of intake of a radionuclide to committed effective dose for workers and members of the public are now in use in accordance with the EU directive mentioned above.

#### A) WORKERS

The following limits shall not be exceeded for exposed workers:

- an effective dose of 20 mSv in any single (calendar) year;
- a dose equivalent of 150 mSv per year to the lenses of the eyes;
- a dose equivalent of 500 mSv per year to skin, forearms, hands, feet and ankles.

However, in exceptional circumstances, recourse can be made to specially authorised exposures for medically fit category A workers (as hereinbelow defined) if exceeding dose limits cannot be avoided; such exposures can be incurred only by voluntary workers and must not exceed twice the yearly limits laid down for exposed workers. In particular, no women of reproductive capacity can undergo such exposures; the same rule applies to male workers having exceeded dose limits in the twelve months before.

Special provisions ensure that workers having exceeded the effective dose limit of 20 mSv for any reason whatever must not be exposed in excess of 10 mSv per calendar year as long as their yearly averaged exposures are no more than 20 mSv.

#### WORKER CLASSIFICATION CRITERIA

An individual, in relation to his work activity, can be classified:

- a) non-exposed worker, if he is not likely to receive, because of his work, doses exceeding the following limits in a (calendar) year:
  - an effective dose of 1 mSv, or
  - an equivalent dose of 15 mSv to the lenses of the eye, or
  - an equivalent dose of 50 mSv to skin, forearms, hands, feet and ankles;(the above limits are numerically equal to those laid down for members of the public).
- b) exposed worker, if in relation to his work activity he has a likelihood to receive doses exceeding the limits indicated in a).

Exposed workers can be classified in two categories for monitoring and surveillance purposes: Category A and Category B workers.

**Category A workers:** Exposed workers are classified in such category when they have a likelihood to receive in a calendar year doses exceeding:

- an effective dose of 6 mSv, or
- an equivalent dose to the lenses of the eye of 45 mSv, or
- an equivalent dose to skin, forearms, hands, feet and ankles of 150 mSv.

Category A workers must be individually monitored, both for external and internal exposures while for category B workers area monitoring is used, as a rule, in order to assess doses and to verify compliance with ALARA constraints and, of course, with dose limits.

**Category B workers:** occupational exposure of any worker shall be so controlled through area monitoring that the previous dose levels for purposes of classification are not exceeded.

Other special provisions are laid down in Legislative Decree no. 230 of 1995 with a view to protecting: apprentices and students of age  $\geq 18$  years (who are training for employment involving exposure to radiation), the worker classification criteria shall be applied; apprentices and students of age between 16 and 18 years (who are training for employment involving exposure to radiation); apprentices and students of age 16 years or less; pregnant and nursing women.



Moreover, delineation of work areas (i.e. supervised and controlled areas) based upon by reference to an assessment of the expected annual doses and the probability and magnitude of potential exposures, thus distinguishing work areas at risk in controlled and surveyed areas.

According to EURATOM directive no. 90/641, special provisions were established in the Legislative Decree no. 230/1995 for outside workers and in particular the use of a radiation “passport”, logging doses incurred during their working activities.

## B) MEMBERS OF THE PUBLIC

The following limits shall not be exceeded for members of the public:

- an effective dose of 1 mSv per year;
- a equivalent dose to the lenses of the eye of 15 mSv per year;
- a equivalent dose to skin of 50 mSv per year.

### A.4.4 Radiological safety objectives and Authorised Limits

The Italian Regulatory Practice has always made intensive use of radiological safety objectives and authorised limits for ensuring that, during normal operating conditions, doses to workers and reference groups of the population are well below primary dose limits.

As regards transient and accident conditions, radiological criteria applicable to each kind of installation are identified, seeking to differentiate between various types of transient and accidental conditions in terms of maximum dose levels not to be exceeded to the relevant reference groups of the populations.

### A.4.5 Surveillance

For the implementation of provisions regarding radiation protection of workers and public, the Italian regulatory system identifies a particular person, the qualified experts, whose technical qualification is recognised through State examinations. Those professionals have been playing an advisory role and bearing technical responsibility, as far as radiation protection is concerned; their role consists in carrying out both preventive and periodical radiation protection evaluations and measurements, in particular regarding dose assessments both for workers and members of the public. Moreover qualified experts bear technical responsibility in that they must give operators all technical advice relevant to ensuring effective radiation protection of workers and public at the design stage, at the operational level and at the decommissioning stage.

An important instrument for the radiation protection of exposed workers is medical surveillance carried out by specialised physicians whose capacity to act as approved medical practitioners is recognised by means of State examinations. Every member of the work force must be recognised as fit prior to being exposed to radiation as a category A or B worker and is also subject to periodic reviews of health.

All considerations, evaluations, measurements and technical advice by qualified experts must be recorded, in particular as regards dose assessment records for which a strict regime of filing is provided for; the same requirement for filing holds for records concerning medical surveillance of exposed workers.

#### *A.4.6 Radiation Protection Inspections and enforcement*

Verification of compliance with radiation protection requirements laid down in law and in licensing prescriptions is the responsibility of various independent bodies. ISPRA inspectors are vested with authority over the whole domain of radiation protection requirements as both workers and public are concerned, Labour Inspectorates are concerned with requirements pertaining to workers' protection while Inspectors with regional bodies are mainly concerned with radiation protection requirements for the public. It must be remembered that Inspectors are vested with police powers in the Italian system.

The Italian compliance and inspection system is based upon the fact that legislation provides for penal sanctions in cases of non compliance; penalties are meted out by the Courts at the instigation of the Office of Public Prosecution to which inspectors are required under law to communicate every case of non compliance. Particular measures are laid down in legislation in order to prompt and/or force swift compliance, especially for non compliance concerning provisions for radiation protection of workers; in these cases inspectors are bound to evaluate if the user could avoid undergoing a trial by complying with *ad hoc* specifications established by inspectors and paying a fine.

#### *A.4.7 The ALARA Principle*

The principle that doses incurred in relevant exposures are to be kept as low as reasonably achievable, social and economic considerations being kept into account, is laid down in article 2 of Legislative Decree no. 230 of 1995, together with the principles of justification and of dose limitation. It must be remembered that the optimisation principle, together with the justification principle, had been implemented in Italian regulatory philosophy and practices long before it was legislated into the Legislative Decree no. 230/1995.

The implementation of the ALARA principle in the Italian system of regulatory control is ensured by means of two regulatory tools:

- provisions in the Legislative Decree no. 230/1995;
- administrative prescriptions.

The Legislative Decree has distinct provisions for doses to workers and public to be kept ALARA by operators: the provisions state, essentially, that rules of good practice are to be obeyed at every stage. Rules of good practice are not an exclusive means to ensure

optimisation as ALARA is also called: other means may be used to that end provided that results are the same.

The second regulatory tool, largely employed in the Italian system for the purpose of implementing ALARA, is the use of administrative prescriptions at every stage of the licensing process. It must be pointed out that such prescriptions are enforceable by means of criminal penalties.

From an operational viewpoint the whole of the regulatory instruments available, that is:

- the careful planning at the design stage, through the laying down of the radiological safety objectives;
- the consequent safety assessment and all ensuing reviews;
- the safety and radiation protection culture fostered among all Italian organisations involved,
- the good independent prevention role played by qualified experts;
- the support role by the NPP Council of Delegates;
- the system for verification of compliance.

all have conspired so that a more than satisfactory radiation protection level from the ALARA viewpoint was ensured for all stages of the installation life.

#### *A.4.8 Incident reporting*

The most important provisions are contained in Legislative Decree no. 230/1995, namely Articles 92 and 100.

In case of accidents, or incidents that could result in an exposure to workers above dose limits, according to article 92 of the Legislative Decree no. 230/1995, the operator is requested for notification as soon as possible, but not later than 3 days after, to the following Institutions:

- The Regulatory Body (ISPRA);
- Local Labour Inspectorate (Province);
- Local Offices of the National Health Services.

In case of unexpected radioactive contamination inside the plant boundaries or an accidental occurrence implying a significant increase of the risk of exposure to the workers, the Operator has to implement all suitable measures aiming at avoiding any risk increase (article 100 of the Legislative Decree no. 230/1995). Moreover, when significant contamination of air, water or land outside the plant boundary, or exposure to the public, at the occurrence of accidental events, the operator is required to immediately notify to:

- Local Government Representative (Prefect);
- Local Fire Brigade;
- Local Offices of the National Health Services;

- The Regulatory Body (ISPRA).

Furthermore, the operator has to take all the measures suitable to reduce the radioactive contamination in the areas outside the boundary of the plant, so to limit the risk to the public.

## **Annex 5 – Structure of the global decommissioning programme**

According to the reference legislative provisions, the overall decommissioning programme that SOGIN has submitted for each NPP, covers the operations lasting from the preliminary activities until the site release and is structured in three main stages as hereinafter summarized.

### **First stage:**

- a) interventions, partly already in progress, aimed at improving safety conditions, such as:
  - enhancing physical protection;
  - removing spent fuel from nuclear island;
  - treating and conditioning of radioactive waste coming from past operation;
  - removing structures and material implying conventional risks (e.g. asbestos, unsafe structures).
- b) design and implementation of activities which are deemed as opportune in order to facilitate subsequent decommissioning operations, such as:
  - dismantling parts of the plants not contaminated or at low contamination;
  - construction of temporary storage repositories;
  - installation of new ventilation systems;
  - refurbishment of safety systems revealing ageing problems.

**Second stage:** dismantlement of the nuclear island, decontamination of buildings, completion of waste treatment;

**Third stage:** completion of buildings' demolition, performing a final radiological survey and site release.

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