



ITALY

Convention on Nuclear Safety

Fourth Italian National Report

September 2007

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This National Report was drafted on behalf of the Ministry of Foreign Affairs by the National Agency for the Environment Protection and Technical Services (APAT).

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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 fourth National Report. It represents a revision to the third Report submitted by Italy on October 2004 for the third Review Meeting of April 2005.

This fourth 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 and third 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 third 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.

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.

This National Report was drafted on behalf of the Ministry of Foreign Affairs by the National Agency for the Environment Protection and Technical Services (APAT), 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 and 2004. To organise its content, the following aspects have been considered:

- the limited extent of changes intervened in national nuclear safety laws, regulations and practices since 2004, when the Third National Report was issued;
- the topics identified in the previous Report during the third 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, and therefore no new order for nuclear installations is, at the present, foreseen in Italy.

On the other hand, specific policies 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.

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. 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, none of the decommissioning plans has been authorized yet. 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 also for single phases leading up to planned and definite intermediate states. Such a possibility, however, is recognised 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 indicate some other priorities before starting the bulk of the dismantling activities. In particular there is 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 in more details in the following, a strategy to transfer the spent fuel abroad for reprocessing is under implementation 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 however the possibility to authorize specific activities related to decommissioning and dismantling before the approval of the overall decommissioning plan, providing benefits to safety and radiation protection are properly demonstrated. 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 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 third Report, difficulties have been until now encountered by the Government in finalising the national site for waste storage localisation and, in the absence of a defined perspective, some Local Administrations are opposing the construction of on-site temporary radioactive waste storage facilities. This is causing some delay in the timing of the decommissioning and dismantling activities and is making the authorization process of the decommissioning plans more complex.

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

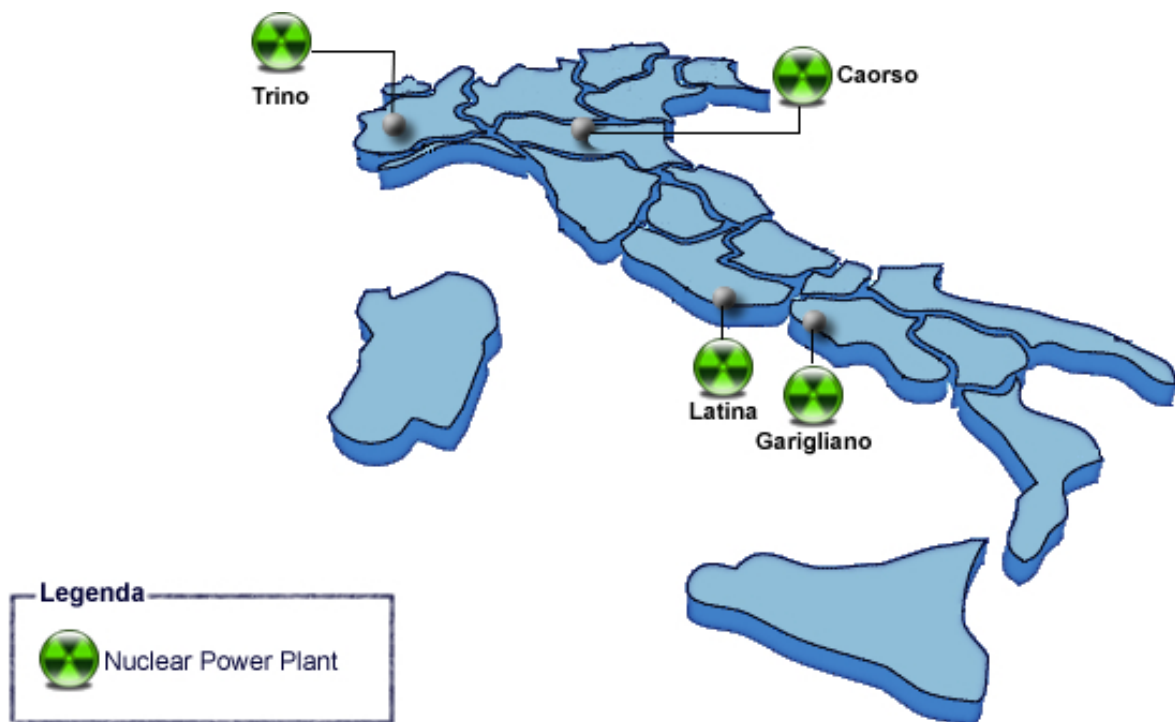


Figure 1: Location of Italian NPPs

Policy Developments

Since the Third Report, major policy events were the following:

Decommissioning policy

In 2004, 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, APAT took a 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. 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.

Waiting for the transfer abroad for reprocessing, the spent fuel is being maintained in the storage pools. With regard to the NPPs, spent fuel is still present at the Caorso and Trino sites. 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 generated by the operation of nuclear installations is stored in the sites of origin.

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 the Parliament (i.e. Law n. 368/2003, Law n. 239/2004) issued provisions for the location of national sites to build repositories for the disposal of low and intermediate level waste and of high level waste.

Waiting 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

A latest and relevant development on the matter regards the Government decision to send abroad for reprocessing spent fuel still present on the Italian territory.

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.

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.

Legislative and regulatory framework

Other two recent events of interest are hereinafter mentioned.

- The enacting of the Law no. 286/2006, which reorganises the APAT as a legal entity of public administration, endowed with new institutional Organs. Provisions of such a Law enhance the Agency autonomy.
- The ending on 31st December 2006 of the Emergency Status declared by the Government on February 2003 to respond, by the adoption of specific plant measures, to the international concern on potential terrorist actions against nuclear installations.

National Nuclear Programmes Pertaining to Nuclear Installations - Main Safety Issues

As referred in the previous third 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, National Nuclear Programmes regard essentially the decommissioning of these NPPs and of other nuclear facilities and the associated spent fuel and radioactive waste management.

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 (e.g. Law no. 368 of 2003 and Law no. 239 of 2004).
- 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 3rd category on 2018.
- Re-entry in Italy of waste packages to start on 2020 and to be completed on 2025.
- SOGIN

In relation to the safety of the NPPs, a programme has been recently established by SOGIN to respond to specific requests of APAT. This programme is 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 consists 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 regard 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.

In the framework of the authorisation process, the assessment of the decommissioning plans by APAT is now in progress and is running along with the licensing process of activities related to radioactive waste and spent fuel management. Times and modes for implementing decommissioning programme will actually depend on the implementation of the road map established in the referred Agreement.

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, APAT is a member of the Western European Nuclear Regulators Association (WENRA) and has actively participated in the work recently completed to compare safety requirements of the different member countries, against agreed reference levels, as basis for harmonisation.

Together with all the other WENRA Members, APAT 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.

APAT expects that the international participation will require increased resources during the next years as nuclear regulation, while still being a national responsibility, becomes more and more international. Important driving forces here are the enlargement of EU as well as more explicit policies within IAEA and other organisations for development of common safety standards and regulatory practices.

International support programmes

Italy has continued its technical participation in international programmes of assistance to the eastern European Countries (TACIS now INSC). In addition to the APAT 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).

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

Section C. Compliance with articles 4 to 19

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.

The Italian Legislative and Regulatory framework has been long in force (since the early 60^{ties}), as discussed in detail in the first three Reports and summarized in the present Report. Being this framework quite complete, no further step is deemed necessary because of the Convention.

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

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

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.

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, APAT required SOGIN to update the overall assessment of the safety status for all the nuclear installations and other nuclear facilities. SOGIN has 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.

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 as well as a list of proposed actions to continue to measure the safety culture level and to, eventually, take the proper countermeasures.

6.1.4 *Short term actions*

Among the Operator actions to be implemented in the short term, the following are mentioned:

- Definition of the Company policy;
- Establishing days for acquainting the personnel with behavioural issues;
- Organising events of internal communication on the safety issues and on the achieved results;
- Establishing days on the operating experience.

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 safety is the result of an evolution of rules and provisions that begun in the early 60^{ties} 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 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 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.

Legislative Decree no. 230/1995 as modified by Legislative Decrees no. 241/2000 and no. 257/2001, 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 now APAT, 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.

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) 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 draft for consultation is expected in a short time frame.

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, 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 APAT is sought under law in order to determine technical specifications applicable to the installation. The technical advice of APAT 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, APAT 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 APAT that elaborates a safety and radiation protection assessment, taking in due consideration such observations, and identifies conditions and specifications. Taking APAT assessment into account, the other administrations send APAT their final observations. After seeking the advice of the National Technical Commission¹ set up under article 9 of the Decree no. 230, APAT sends its advice, together with technical specifications, to the Minister of Economic Development, who grants the authorisation prescribing compliance with technical specifications proposed by APAT.

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

After obtaining the advice of APAT 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

¹ Technical Commission for Nuclear Safety and Health Protection established at APAT headquarter with a role of giving APAT 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 APAT. When 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.

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 such as APAT play the role of State instruments to which care and supervision of certain highly technical matters are confided.

On the other hand, the licensing procedure involves the need for APAT 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 APAT 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.

It has to be mentioned that, in order to start the decommissioning activity, a further permission is needed from the Ministry of the Environment, Territory 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 APAT 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, APAT 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 ANPA 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.

APAT has general inspection powers for installation falling under the provisions of the Act and the Decrees. In the fulfilment of their duties, APAT inspectors are vested with police powers, that is, they even have power of seizure on sources or installations inspectors deem 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

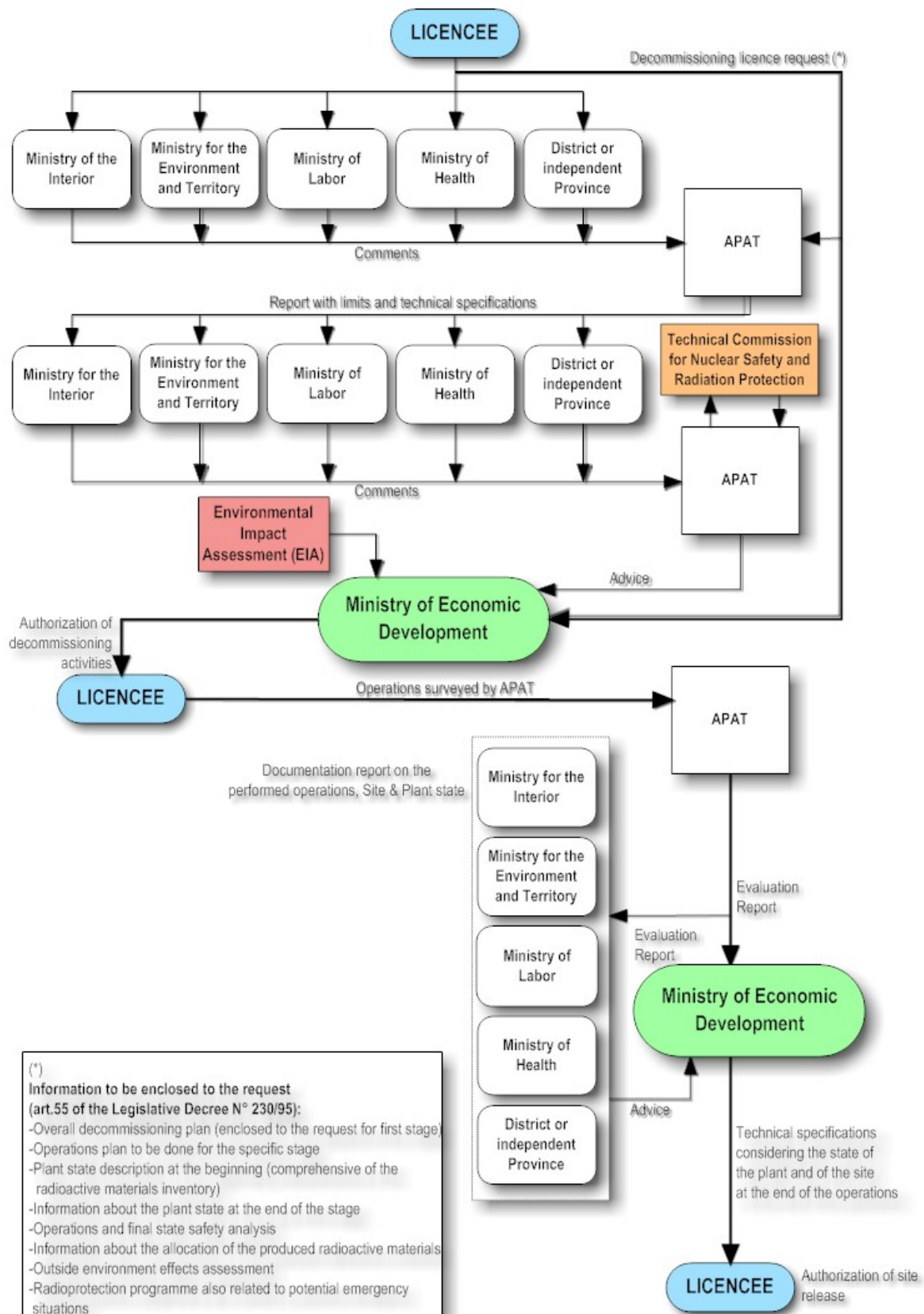
Article 58 of Legislative Decree n. 230/1995 establishes the procedure according to which, in case of non compliance with the conditions attached to the licence, the Ministry of Economic Development can suspend or revoke the licence or the authorization.

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, APAT 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



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.

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 (APAT – National Agency for the Environment Protection and Technical Services), 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, Territory and Sea, when applicable.
- b) APAT, in this report defined as the Regulatory Body, is the Governmental Agency 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. APAT supervises the compliance with the requirements established in the law and in the Ministerial authorization decrees throughout its inspection activity. APAT 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, APAT inspectors reports to the Public Attorney of the jurisdiction the installation belongs to. APAT is also the competent body entitled to support the Governmental rule-making function in the field of nuclear safety and radiation protection. APAT 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 APAT. The Technical Commission is composed of experts designated by various Ministries (Interior, Health, Environment, Territory and Sea, Economic Development, Labour and Infrastructure), by APAT, by ENEA and by the Regions where the nuclear activities are exploited. The Regulatory Body functions in APAT are performed by a specific Nuclear Department to which the Agency assigns, with high priority, human and financial resources. Actions are foreseen to ensure the continuity and the effectiveness of regulatory functions in the future through the recruitment of new personnel.

8.2 Independence of the regulatory function

The national nuclear Operator 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 APAT. APAT performs its regulatory functions in a fully independent and autonomous manner. APAT is, in fact, a Governmental Agency reporting to the Ministry of Environment, Territory and Sea. In this respect, it is pointed out that the APAT autonomy has been further enhanced by the referred Act no. 286/2006 which constituted the Agency as a legal entity of public administration, with its own Board of Directors.

As already said, APAT 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.

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.

9.1 Responsibility of the license 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 APAT 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.

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.

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.

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 APAT itself, each give close, independent scrutiny to the documentation submitted by the applicant and to APAT 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 (APAT), 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.

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.

As indicated in the previous section, the Operator SOGIN has devoted financial resources in a strategic safety project.

11.2 Human Resources

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

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 recent safety strategic project by the Operator 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 Italy meets the requirements of this Article of the Convention.

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.

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 Organisation 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.

APAT 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 operator SOGIN for responding to the APAT 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.

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.

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 - *Quality 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 performance of 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.

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, APAT, 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.

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 APAT 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 APAT actions in the last years were also aimed to check that the conditions for a competent, well coordinated intervention of the subjects 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 APAT 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 outmost 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.

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.

15.1 Laws and Regulations

The main Law that regulates radiation protection matters is the Legislative Decree no. 230/1995 and its modifications (e.g.: Legislative Decrees no. 241/2000 and no. 257/2001), 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, 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 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.

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 attended also by 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 plan is in force since 1997. With particular reference to events taking place in nuclear installations located in the vicinity of the national territory, emergency preparedness provisions envisaged in such a plan have been determined on technical bases which assumes, as reference events, severe accidents potentially occurring at NPPs under operation. 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.

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 APAT (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 and representatives of regional laboratories. APAT will provide 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 Operating Manual which have been recently updated. The Centre also makes use of important technical support features, such as the Control Centres of two radiation monitoring networks and a computational system, named ARIES, 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 normal 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.

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 Assessment of compliance

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

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.

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.

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 3rd review meeting

Keep the necessary support systems in the plants operating

Surveillance activities on safety systems are conducted according to the same scheme as during operation. Moreover, as described in the main text under the Article 6, a specific activity aimed at assessing plant status, including the analysis of each plant and the identification of activities with safety priority, is underway.

Improve capabilities for temporary storage of waste

The applications for the construction of additional facilities for waste storage have been submitted for Garigliano and Latina NPPs. In Caorso NPP the waste produced during the activities have been prescribed not to overcome the present waste storage capabilities. The storage capabilities at Trino NPP are considered to have sufficient margins.

Maintain environmental monitoring and national emergency preparedness also in relation to NPPs in neighbouring countries

The environmental monitoring system in case of an accident is based on some different systems of automatic monitoring stations and a network of laboratories to perform environmental sampling and measurements.

As far as automatic stations the following networks have to be mentioned:

- a national network of monitoring stations (7 REMRAD stations plus 50 gamma stations), operated by APAT since the year 2000, with the function to early warn and to characterize from the spatial point of view the resulting contamination in case of involvement of the national territory by the consequences of an accident affecting NPPs in the neighbouring countries. Data from the station are collected on a continuous basis in control centres located in the APAT Emergency Centre. This network is in the process of being extended with 15 additional gamma monitoring stations;
- some networks of gamma monitoring stations at regional levels, operated by the regional environmental protection agencies;
- an extended network of gamma stations operated by the Ministry of Interior - National Corp of Fire Brigades, developed for civil defence purposes. This network autonomously contribute to the monitoring activity to be performed after an accident;
- Local monitoring stations in the nuclear sites operated by the licensees.

As far as the environmental monitoring after an accident there is a network of regional and local laboratories which are called to perform measurements on samples on environmental and food matrices and to transmit the resulting data to the a dedicated Centre for elaboration and evaluation of data "CEVaD, hosted and coordinated by APAT.

A document with the technical bases for updating National Radiological Plans, firstly established in 1997 by APAT, have been submitted to Civil Protection Department. Such bases take the possible accidents in neighbouring countries into account and suggest the following measures:

- To maintain good predictive capabilities for atmospheric dispersion of contamination and for estimating plant accident evolution,
- To maintain and improve the capabilities to perform radiological monitoring of environmental and agricultural matrices in large areas in the national territory,
- To be prepared for the possible implementation of sheltering protecting measures addressed to groups of population potentially exposed to the effects of the cloud passage,
- To maintain adequate availability of Iodine tablets and to produce appropriate instructions for their possible use in favor of a limited group of public.

Maintain motivation and Safety Culture during Decommissioning

The initiatives taken on this subject are described in par. 6.1.

Pending decommissioning, the 4 sites are still nuclear installations

As explained in the introductory sections, ranking the four Italian power stations as nuclear installations according to the Convention is to be considered as a pure formal evaluation. In fact, because of the current state of the Italian NPPs, all the safety matter dealt with in this Report falls in the scope of the Joint Convention.

Italy responded anyhow to all the articles of the Convention and in particular to the article 14 regarding the assessment and verification of safety of nuclear installations under shut-down conditions.

Maintain competence in NPP Safety

In addition to what referred under the policy section, it is noted that the degree of maintaining the competence in nuclear safety by all the involved organisations is primarily related to the current situation of the national nuclear programme. Moreover APAT, as Industry and Universities, have several international activities related to nuclear safety for nuclear installations. The national electrical operator ENEL is maintaining and improving its knowledge in nuclear safety in relation to its international activities connected to NPPs operation. APAT is maintaining competences in nuclear safety also to provide technical support to national authorities in emergency situations originated by accidents in nuclear installations located in neighbouring countries.

Complete / renew bilateral agreements for Emergency Preparedness

A proposal for establishing a bilateral agreement with Regulatory Bodies of France, Switzerland and Slovenia is under preparation by APAT.

Participation of Italian Utilities in NPP operation in other Countries

The answer involves a subject non involved in the preparation of this report and the topic is outside the scope of the Convention.

Improve international involvement to share and harmonize Safety Practices

The present involvement described in the text is considered adequate to the present nuclear programme.

Section E. Planned activities to improve safety

Development of Final Repository for Waste and build new Temporary Storage Facilities as required at sites

As referred under the introductory sections, the road map included in the Agreement that the Italian Government signed with France establishes definite steps leading to the construction and operation of a national facility for waste storage and the associated realization of the needed temporary storage facilities at the NPPs sites.

Updating the National Emergency Plan

Actions undertaken on this topic are referred under the previous section relevant to the topics of interest from the 3rd review meeting.

Implementation of recommendations from the international emergency exercises

With the aim to test and develop national arrangements for responding to a nuclear or radiological emergency, Italy participates in the international emergency exercises sponsored by International Organisations. Namely the CONVEX exercises coordinated and conducted by the IAEA, under the International Convention on Early Notification of a Nuclear Accident (1986), the ECURIE exercises organized by the European Union, based on the requirements of the EU Council Decision n° 87/600/Euratom and the INEX exercises promoted by the OED/NEA.

The overall performance of the emergency response plans, procedures and arrangements pointed up from the exercises evaluation has showed the effectiveness of the national emergency preparedness and its consistency to the international standards. Italy is available to commit in implementing possible new recommendations coming from international emergency exercises or as a result of the efforts of International Organisations in strengthening the international preparedness and response system.

Section E. Planned activities to improve safety

Section F. List of acronyms

AFR	Away From Reactor
ALARA	As Low As Reasonably Achievable
ANPA	National Environmental Protection Agency
APAT	National Agency for the Environment Protection and Technical Services
BWR	Boiling Water Reactor
CEI	Comitato Elettrotecnico Italiano
CEVaD	Centre for Data Elaboration and Evaluation
CIPE	Inter-Ministerial Committee for Economic Planning
DISP	Nuclear Safety and Health Protection Directorate
ENEA	Agency for New Technologies, Energy and Environment
ENEL	National Electricity Company
GCR	Gas Cooled Reactor
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
ISPESL	National Prevention and Workers Safety Institute
LWR	Light Water Reactor
NEA	Nuclear Energy Agency of OECD
OECD	Organisation for Economic Co-operation and Development
PUN	Italian Nuclear Unified Project
PWR	Pressurised Water Reactor
QA	Quality Assurance
SOGIN	Nuclear Installations Management Company
TC	Technical Commission for Nuclear Safety and Health Protection
TMI	Three Mile Island NPP
TS	Technical Specification
UNI	Ente Nazionale Italiano di Unificazione
WENRA	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. El.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) ²	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

Garigliano NPP

Plant description and events

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.

² The power was reduced with respect to the design value

In 1985-1987, the nuclear fuel (about 300.000 TBq) was carried out from the plant, to the Avogadro pool at Saluggia centre (VE), for long term wet storage. Furthermore extensive radwaste management activities were accomplished related to low level solid technological contaminated radwaste through treatment 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, sealed rooms with passive filtered ventilation were established to maintain the confinement of the residual radioactivity and to avoid diffusion from the containment.

In 1999, 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 new structures 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).

Plant status

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 nuclear Regulatory Body (ENEA/DISP, now APAT). 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 meet 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 APAT, has already issued its conditioned agreement, but other public institutions involved in the licensing procedure have not yet issued the required agreement.

Activities recently performed

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 surveillance activities;
- 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 decommissioning activities performed since the third Report are hereinafter given:

- Implementation in progress of the following improved projects: improvement of controlled access, removal of asbestos from turbine building and from containment, adaptation of the so called ex-diesel pre-existing building in a structure for temporary storage of radwaste;
- Activities for the removal of asbestos from containment;

The following projects already approved by the Regulatory Body have not yet implemented because of the lack of permission by local authorities:

- Construction of new liquid radwaste storage tanks;
- Construction of a 4-modules structure for temporary storage of radwaste (already mentioned above).

The following projects are still under regulatory assessment:

- demolition of the stack;
- improvement of the turbine ventilation;
- construction of 1-module structure for temporary radwaste storage based on the 4-modules project already approved;

Other relevant activities made in regard of plant decommissioning or maintaining the plant safety: 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).



Latina NPP

The 153 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 1987. 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 m³, 900 m³ of which is still to be conditioned) is stored in different facilities of the NPP site.



According to the referred change of decommissioning strategy, the initial safe storage strategy has recently switched to a single step decommissioning. 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 a single step of decommissioning of Latina was submitted by SOGIN under a new application and is currently under review by APAT.

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

- structures and parts of the plant considered no longer safety related such as fuel charge/discharge machines, CO₂ 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 (emergency and decay ponds, still water filled the charge pond) decontaminated through a scrubbing process;
- CO₂ auxiliary piping has been removed;

- water and steam piping has been removed;
- 3 out of 6 gas circulators have been removed (case still on site as part of primary containment);
- thermal insulation has been removed from gas conduits and steam generators);
- the primary circuit is being dismantled, as well as the remaining 3 primary coolant blowers;
- a project for the extraction and conditioning of the resins and sludges was licensed in 2003 but it has still to be realized waiting for the construction permit by local Authorities on conventional aspects.

Some activities are waiting for approval by APAT:

- extraction and conditioning of the Magnox residues (splitters);
- dismantling of steam generators;
- construction of a new temporary repository.

About 20000 m³ 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.

Caorso NPP

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

In the **Caorso** NPP preliminary activities for decommissioning have been performed. Decontamination of the circulation loops and of the clean up system has been completed on february 2004. Dismantling activities in turbine building, RHR tower and off-gas system are in progress.



At present the radioactive waste (about 2490 m³, 2065 m³ of which is still to be conditioned) is stored in the three storage facilities of the NPP site. 1250 m³ 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. An international tender for the supply of treatment and conditioning services for operational radioactive waste is to be completed.

Spent fuel storage capacity is as follows:

- Internal pool: 820 fuel assemblies (plus 26 defective assemblies and control rods),
- Outer pool: 1360 fuel assemblies.

with an overall capacity of 2180 normal positions.

The total number of fuel assemblies currently stored in the outer pool is of 1032 spent fuel assemblies.

On November 2006, an agreement has been signed between Italian and French government to reprocess the Caorso spent fuel in French territory. The first shipment is planned by the end of 2007.

The NPP is 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.

Trino NPP

The Trino NPP, a 270 MWe PWR plant, was operated by Enel from 1965 to 1987. A limited amount of spent fuel is still present in the spent fuel pool of the TRINO NPP.

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 UO₂).

In the **Trino NPP** no major nuclear decommissioning activities have been performed yet, waiting for the approval of the overall decommissioning plan.



Following the change of the decommissioning strategy (December 1999), the preparation of a comprehensive plan for a single step decommissioning of Trino is in progress by SOGIN, as requested for the submittal of a new application.

At present the radioactive waste (about 1050 m³, 330 m³ 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. While the Regulatory review of the overall decommissioning plan is proceeding, an application for the execution of preliminary dismantling activities regarding non safety related systems has been submitted.

Annex 2 – Background historical information on Italian nuclear programme

Overview of the Italian nuclear power 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 lead 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 24th December 2003: establishing the procedures for the site selection of a national repository for HLW;

Law n° 239 of 23rd 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 19th January 1998: promulgated for the ratification of the Convention on Nuclear Safety;

Law n° 282 of 16th 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. 2301995";

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";

T.G. no.21 "Content of Operating Rules";

T.G. no.22 "Quality Assurance. Guide for collection, storage, preservation, and safekeeping of quality assurance records for NPPs";

T.G. no.23	“Quality Assurance. Guide for procurement of Items and Services for NPPs“;
T.G. no.24	“Quality Assurance. Guide for Auditing on QA Programmes for NPPs“;
T. G. no.25	“Quality Assurance. Guide for Applying on design activities for NPPs“;
T. G. no.26	“Radioactive Waste Management“;
T.G. no.27	“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:

UNI 10621 (2004)	“Radioactive waste packages characterization”;
UNI 10704 (2004)	“Radioactive waste classification”;
UNI 10755 (2004)	“Recording and labelling of RW packages”;
UNICEN 189 (2001)	“Solid materials from nuclear plants - Radiological methods and procedures for the clearance”;
UNI11193 (2006)	“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 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. In cases of intervention on the contrary the third principle of dose limitation does not apply, intervention levels being used in its stead.

The Legislative Decree 230/95 clearly states 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 230/95, an analogous provision was introduced also for non nuclear installations.

4.1.1 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 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 of 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 $\leq 1 \text{ Bq}/\text{g}$, 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.

4.1.2 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 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, 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").

4.1.3 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 ≥ 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 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.

4.1.4 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.

4.1.5 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.

4.1.6 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. APAT 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.

4.1.7 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 new Legislative Decree no. 230.

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;
- administrative prescriptions.

The 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.

4.1.8 Incident reporting

The most important provisions are contained in Legislative Decree no. 230, 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 (APAT);
- 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 (APAT).

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;

