

Excerpts from

**Licensing Systems and Inspection
of Nuclear Installations, 1991**

report by

Nuclear Energy Agency

of the

Organisation for Economic Co-operation and Development

CANADA

INTRODUCTION

The Atomic Energy Control Act of 1946 (as amended in 1954 and 1988), the 1974 Atomic Energy Control Regulations (as amended in 1988) and the 1983 Physical Security Regulations govern all nuclear activities in Canada.

This legislation lays down the licensing procedures for the construction and operation of "nuclear facilities" as defined in the Atomic Energy Control Regulations.

COMPETENT AUTHORITIES

Pursuant to the 1946 Act, the Atomic Energy Control Board (AECB) was set up and placed under the supervision of a designated Minister, currently the Minister for Energy, Mines and Resources. The Board is composed of five members supported by an AECB staff organisation. In early 1990 this organisation was restructured and now comprises several directorates concerned with the licensing of nuclear facilities and materials; one directorate responsible for nuclear safety research related to safety issues and health effects, and also safeguards and physical security matters; one directorate responsible for administrative matters; and the Secretariat which deals with corporate and Board matters.

The Directorate of Reactor Regulation is responsible for licensing power and research reactors and heavy water plants and for the certification of key reactor operators.

The Directorate of Fuel Cycle and Materials Regulation is responsible for licensing uranium mines, nuclear fuel processing and manufacturing facilities, waste management facilities, radioisotopes, particle accelerators, and for the regulation of transport packaging of radioactive materials.

The Directorate of Analysis and Assessment is responsible for technical activities in the areas of safety assessment, quality assurance and component integrity, and radiation protection.

The Directorate of Research and Safeguards is responsible for the AECB's research programme relating to nuclear safety and health effects. It is also responsible for safeguards and physical security activities.

The Directorate of Administration is responsible for financial control and reporting, human resources, material management, information management and electronic data processing services.

The Secretariat provides support services to the five-member Board and corporate services in support of the AECB's licensing and safeguards activities.

The AECB is assisted by two advisory committees, one on radiation protection and the other on nuclear safety. The Advisory Committee on Nuclear Safety (ACNS) is composed of fifteen members who are senior engineers and scientists competent in various fields of nuclear science together with technical representatives of relevant governmental agencies. The Advisory Committee on Radiological Protection (ACRP) consists of ten members affiliated with various research, academic and industrial organisations throughout the country. These committees review and advise upon all aspects of issues that are generic to nuclear safety and radiation protection.

LICENSING PROCEDURE

A three step procedure is used in the licensing of nuclear reactor projects in Canada. The first step is site approval, followed by two formal licences, the construction licence and the operating licence stating, respectively, the terms under which construction or operation is authorised.

In 1980, the AECB implemented a policy by which all information concerning the licensing procedure is made available for public examination with the exception of commercial or proprietary information and certain information involving international commitments and information relating to the physical security of facilities and material. The public is also notified of the existence of any hazards, of reports concerning any occurrences and of notices of intent to establish a nuclear installation. On the basis of a 1983 policy decision to encourage participation in its regulatory activities, the AECB makes available information on its schedule of future licensing actions and on final staff recommendations on licensing matters. Also, the AECB adopted in 1985 Rules respecting the proceedings of the Atomic Energy Control Board. These Rules apply to the persons who are heard or make representations pursuant to the Regulations of the Board. They lay down the procedure for such hearings or representations as well as for any interrogations by the Board. They also define the conditions under which information is disclosed by the Board or written briefs are requested by the persons participating.

It is prescribed that the Board's final decision must be clearly motivated and presented in writing. Parties to the hearings are entitled to legal representation, may call and examine witnesses and present argument on any matter in issue. Hearings are normally open to the public, unless security or protection of personal information dictate otherwise.

Finally, in 1990 the AECB adopted Regulations concerning the recovery fees for the cost of the licensing procedures and of the inspections carried out by the AECB.

a) Site approval

Although site approval is not a formal licensing step, it is current practice for an applicant to obtain AECB approval of a site before applying for a construction licence.

i) *Filing of application*

The initial application to the Board is for site approval. This application is accompanied by a Site Evaluation Report which contains sufficient information regarding the proposed installation to enable the Board to determine the nature of the site and the plant.

A summary description of the plant, outlining its size, the type of installation and the basic features of process and safety systems as well as data on land use, present and future population density, meteorological conditions, hydrology, hydrography, seismology and geology are included in the report.

ii) *Consultation of the public*

At this stage in the licensing procedure, the Board requires the applicant to publicly announce his intention to construct and operate a nuclear installation project further, to conduct a programme for the expression of public opinion regarding the proposal. An environmental assessment and its review by appropriate federal and provincial agencies, if required under their guidelines, are also held prior to the construction permit approval stage. Open meetings are normally scheduled so that representatives of the applicant can disseminate information to and discuss the project with the public. Members of the Board staff attend these meetings as observers.

Site approval is issued by the Board following a satisfactory recommendation by the Board staff as to the suitability of the site for the construction and operation of a reactor project as described in the Site Evaluation Report.

b) Construction licence

Following site approval, an application may be made for a construction licence; construction is considered to commence with the pouring of concrete for reactor building base-slab. A Safety Report is submitted to the Board with this application detailing the design of systems and equipment, site characteristics, quality assurance programmes, applicable design codes, standards and specifications, preliminary accident analyses and radiological considerations.

The Board staff reviews this documentation and discusses when necessary with the designers, the applicant and their consultants to obtain such additional information as may be required for a general assessment of the safety of the proposed project. If the staff is satisfied with the design, which may be still a conceptual one, a recommendation is made to the Board for the issuance of a construction licence.

While construction is in progress, the staff continues to review the design and safety analysis and meets the applicant frequently to resolve safety-related issues which arise as the design of the project proceeds and as plans develop for the commissioning and operating phases. During this period, the Board issues authorisations as may be required by the applicant to acquire, store and load heavy water and fuel. For power reactors, full-time on-site inspectors are placed at the station generally about two years prior to the date of first criticality.

c) Operating licence

When construction nears completion, the applicant submits a request for an operating licence. A final version of the Safety Report is tabled, documenting the final design and safety assessment, the results of commissioning, the qualifications of key operating staff and the policies and procedures to be used in operating the facility. The Board staff reviews the report and, subsequent to positive findings, recommends that an operating licence be granted. The initial term of the licence is generally a year for power reactors.

Applicants for licences other than those required to operate a radioactive waste management facility must additionally make adequate provision for the storage or disposal of waste. Conditions appropriate for this purpose are prescribed in each licence.

A comprehensive staff evaluation of facility performance and positive recommendation are necessary before the Board's approval to renew a licence is granted.

INSPECTION OF NUCLEAR INSTALLATIONS

The AECB staff continues its surveillance of the plant operation throughout its life, meeting the operators as required to discuss safety issues. Two or more staff members are stationed at the facility to provide on-site surveillance of all aspects of station operation. Periodic quality assurance audits are also carried out by AECB headquarters staff. Staff of provincial government agencies, responsible for enforcement of pertinent pressure vessel codes and standards sometimes participate in such audits.

Annual performance review of each reactor facility is conducted by the resident inspectors and senior headquarters staff member.

During the operational stage, the primary objective is to ensure that the plant is operated and maintained in accordance with the terms and conditions of the operating licence and the technical and administrative documents to which the licence refers.

AECB staff reports internally on a quarterly basis. The staff also reports directly to the Board all significant developments and enforcement actions taken pursuant to the licence.

The licensee submits an annual report to the AECB.

DECOMMISSIONING OF NUCLEAR INSTALLATIONS

This question is dealt with in Regulatory Document R-90 issued by the AECB as a Regulatory Policy Statement: "Policy on the decommissioning of nuclear facilities" which has been in force since 22nd August 1988. This Statement describes the policy of the AECB on the decommissioning of those facilities defined as nuclear facilities in the Atomic Energy Control Regulations. It is intended as a formal statement, primarily for the information of licensees, or potential licensees, of the regulatory process and requirements generally applicable to the decommissioning of nuclear facilities licensed and regulated by the AECB pursuant to the authority of the AEC Act and Regulations.

The Atomic Energy Control (AEC) Regulations prohibit the holder of a licence issued pursuant to the AEC Act and Regulations from abandoning prescribed substances except in accordance with conditions of a licence issued by the AECB, or in accordance with the written instructions of the AECB. Therefore, prior to the granting of an approval to abandon a nuclear facility licensed pursuant to the AEC Act and Regulations, the AECB requires that the licensee decommission the facility satisfactorily, according to plans it has approved. These must be developed during the early stages of design of the nuclear facility and refined during the operating life of the facility, and the associated decommissioning actions assured by adequate financial planning.

The AECB requires, before the issuance of a construction approval, a conceptual description of the decommissioning approach envisaged by the applicant. The detail and design of this conceptual plan must be such as to assure that the proposed approach is, in the light of existing knowledge, technically feasible and appropriate in the interests of health, safety, security and protection of the environment.

In the application and enforcement of its policy on the decommissioning of nuclear facilities, the AECB relies on its comprehensive licensing system currently in place. This system is administered with the co-operation of other federal and provincial government departments in such areas as health, environment, transport and labour (see "Licensing Procedure" above). The concerns and responsibilities of these agencies are taken into account before licences or approvals, including those for decommissioning and abandonment, are issued by the AECB.

A detailed decommissioning proposal must be submitted to the AECB at least one year before the scheduled end of operations, or within six months of the announcement of an unscheduled permanent shutdown of a nuclear facility. The required decommissioning proposal should be submitted in support of the application for a licence to decommission the nuclear facility.

In all instances where a licensee proposes a decommissioning plan which requires the establishment of long-term institutional controls subsequent to completion of decommissioning actions, the AECB requires that the licensee consider the feasibility of implementing alternative decommissioning

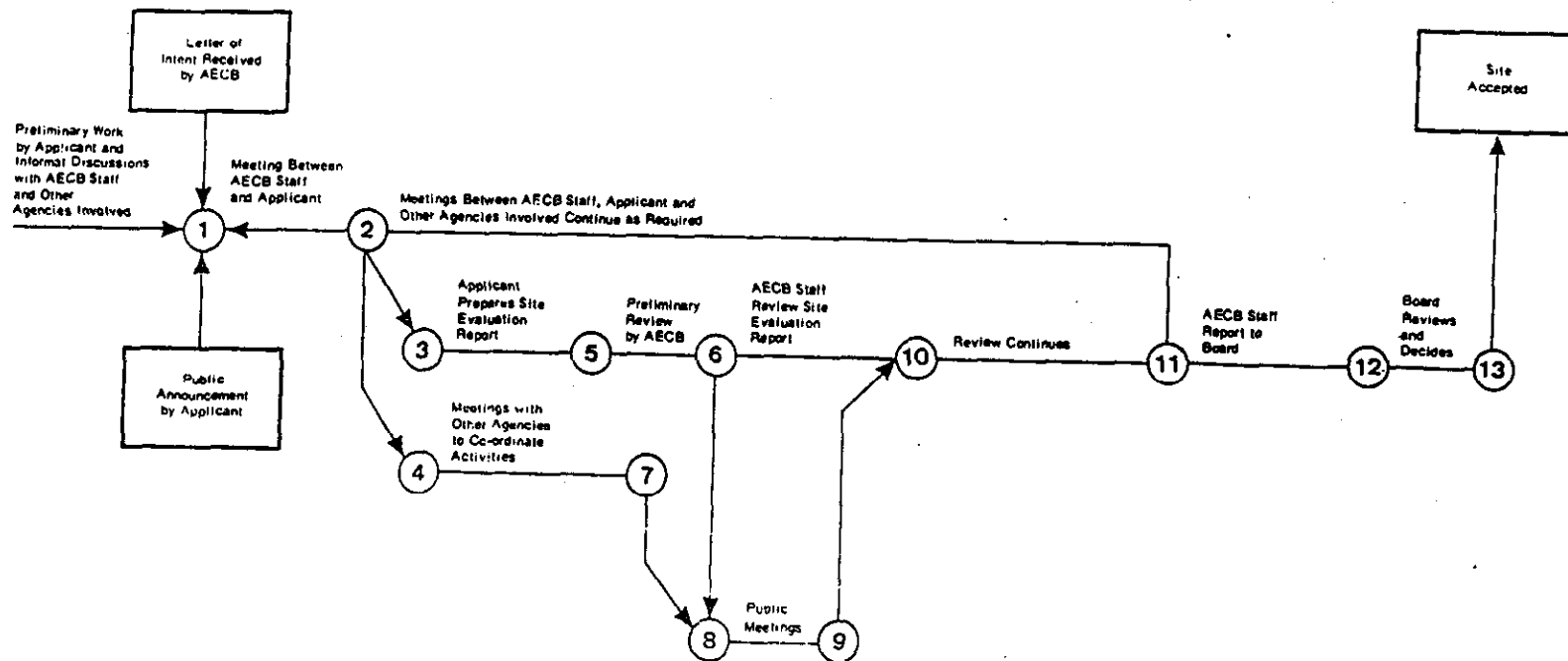
actions to avoid the need for continuing institutional controls. This evaluation should consider the nature and costs of the controls envisaged and the capability of the institutions concerned to implement and maintain the proposed controls.

When the decommissioning of a nuclear facility has been completed, and its effectiveness confirmed to the satisfaction of the AECB, the licensee will be permitted to abandon the site. The granting of AECB approval to abandon a decommissioned nuclear facility establishes that the licensee has fulfilled his obligations under the AEC Regulations, with respect to that facility, and is therefore absolved of further responsibility for the site under the AEC Regulations. The issuance of such approval pursuant to the AEC Regulations does not absolve the licensee of responsibility to comply with the requirements of other federal, provincial, or municipal agencies.

RADIOACTIVE WASTE FACILITIES

The Regulatory Policy Statement issued by the AECB on "Regulatory objectives, requirements and guidelines for the disposal of radioactive wastes - long term aspects" has been in force since 5th June 1987 [Regulatory Document R-104]. It specifies that the current operation of waste management facilities is strictly regulated by the AECB using a comprehensive system of licensing compliance and enforcement activities. A regulatory framework of radiological requirements is therefore applied, so that procedures of various types are reliably maintained for monitoring environmental discharges, conducting remedial actions as necessary and controlling exposure pathways.

Figure 1. Schematic of activities leading to site acceptance



FINLAND

INTRODUCTION

In March 1988, new nuclear energy legislation entered into force in Finland. Nuclear Energy Act No. 990/1987 and Decree No. 161/1988 define the licensing procedure and conditions for the use of nuclear energy as well as the responsibilities and authority of the regulatory body, namely the Finnish Centre for Radiation and Nuclear Safety (STUK). The general safety regulations are issued by the Council of State while detailed regulations and regulatory guides (YVL-guides) are issued by STUK. The Radiation Act of 27th March 1991, whose purpose is to prevent and limit harmful radiation effects to health, also applies to nuclear activities covered by the 1987 Nuclear Energy Act and therefore, its provisions are taken into account in the licensing procedure.

COMPETENT AUTHORITIES

The licensing of nuclear installations in Finland is the responsibility of the Council of State. However, licences for small nuclear facilities (e.g. research reactors the thermal power of which is below 50 MW) are granted by the Ministry of Trade and Industry which has overall responsibility for control of nuclear energy in Finland. Many other Ministries and authorities are involved in the licensing procedure for nuclear installations.

The Finnish Centre for Radiation and Nuclear Safety (STUK) is responsible for evaluating and controlling nuclear and radiation safety in nuclear installations in Finland. Control duties include inspection of the pressure vessels of nuclear installations, in accordance with the Decree on pressure vessels (No. 59 of 1973). The responsibilities of STUK also include regulatory control of radioactive waste and nuclear materials as well as physical security in nuclear facilities. STUK is also the expert body in radiation accidents and emergency conditions, while the Ministry of the Interior is the responsible authority for public emergency preparedness. Finally, STUK carries out research related to radiation and nuclear safety and is under the administrative control of the Ministry of Social Affairs and Health.

Several advisory committees assist the competent licensing authorities with their tasks. The Advisory Committee on Nuclear Safety co-operates with STUK in the area of nuclear safety while the Advisory Committee on Nuclear Energy and the Advisory Committee on Radiation Protection co-operate with the Ministry of Trade and Industry and the Ministry for Social Affairs and Health respectively. The members of these committees are appointed by the Council of State.

LICENSING PROCEDURE

a) General procedure

The licensing of nuclear power plants includes three stages: the decision in principle, the construction licence and the operating licence.

The safety aspects of the licence applications are assessed by STUK and the Advisory Committee on Nuclear Safety. Also, the other authorities and advisory committees mentioned above are involved in the review of the application (see diagram).

The following general conditions are prerequisites for all licences:

- utilisation of nuclear energy taking into account its various effects shall be considered generally beneficial for society;
- utilisation of nuclear energy shall be safe, and it shall not cause any detriment to human beings, the environment and property;
- physical security, emergency preparedness and other arrangements shall be sufficient to mitigate nuclear accidents and to safeguard the use of nuclear energy against illegal actions; and
- the import of nuclear explosives or the manufacture, possession or explosion of such explosives in Finland is prohibited.

The Council of State lays down general regulations concerning safety, security and emergency preparedness. It is the responsibility of STUK to prepare these regulations, except for regulations concerning public rescue services, which are established by the Ministry of the Interior. In particular STUK made the following proposals for general regulations:

- the Decision by the Council of State on general safety regulations for nuclear power plants;
- the Decision by the Council of State on general safety regulations for the final disposal facility for low and intermediate level radioactive wastes from nuclear power plants;
- the Decision by the Council of State on general regulations concerning the physical security of nuclear power plants; and
- the Decision by the Council of State on general regulations concerning emergency preparedness for nuclear power plants.

These regulations were adopted by the Council of State on 14th February 1991 and entered into force on 1st March 1991.

The regulatory guides (YVL-guides) issued by STUK now include about sixty guides in the following eight series:

- general guides;
- systems;
- pressure vessels;
- civil engineering;
- equipment and components;
- nuclear materials;
- radiation protection; and
- radioactive waste management.

b) Decision in principle

The application for the Council of State's Decision in Principle may concern one or more alternative nuclear installation projects. It must be accompanied, *inter alia*, by the following information and documents:

- particulars on the competence of the applicant;
- description of the site where the nuclear installation(s) will be constructed (administrative and technical matters);
- nature of the activity and its general significance, particularly as concerns Finland's energy supply;
- description of the applicant's financial resources and the economic viability of the project;
- description of the installation in question and its technical operating principles;
- description of the safety principles to be applied;
- description of environmental effects and of principles for preventing and mitigating these effects;
- general description of the plans for nuclear fuel and radioactive waste management.

Before the decision is made, an overall description of the installation, its environmental effects and safety plans are made generally available to the public. The population and local authorities in the vicinity of the planned installation are given the opportunity to present their opinions in writing.

If the general prerequisites mentioned above are met, and if the municipal council of the site in question is in favour of construction of the installation, the Council of State may make the decision in principle. This decision is then submitted to Parliament, which either confirms or rejects it.

c) Construction licence

The application for a construction licence must be accompanied by information similar to that required for the application for a decision in principle, but is more detailed. Also, the following information is directly submitted to STUK:

- preliminary safety analysis report with topical reports;
- safety classification document;
- preliminary security plan;
- quality assurance (QA) programme for construction;
- preliminary emergency preparedness plan;
- plans for the control of nuclear materials; and
- arrangements for ensuring provision of regulatory control by STUK in Finland and abroad.

In addition to the general conditions mentioned above, the following conditions must be met to obtain a construction licence:

- plans concerning the nuclear installation must entail sufficient safety, and the safety of workers and population must have been taken into account;
- the site is suitable from the safety viewpoint and appropriate environmental protection measures must have been taken;
- physical security has been adequately taken into account;
- administrative and legal arrangements concerning the construction of the installation at the site have been made;

- methods for ensuring radioactive waste management, including final disposal of the waste and decommissioning of the installation, are adequate;
- sufficient arrangements have been made for implementation of the regulatory control by STUK; and
- the applicant has the adequate competence and economic resources to carry out the activity safely and in accordance with the international agreements signed by Finland.

d) Operating licence

The application for an operating licence must be accompanied by information similar to that required for the application for a construction licence but must take into account the installation as constructed, and must cover the detailed plans for the operation of the facility. The following information is directly submitted to STUK:

- final safety analysis report with topical reports;
- probabilistic safety analysis report;
- quality assurance programme for operation;
- technical specifications;
- programme for in-service inspections;
- final physical security and emergency preparedness plans;
- programme for the control of nuclear materials;
- particulars on the responsibilities and authority for management of the operation of the installation; and
- programme for environmental radiation monitoring.

In addition to the general conditions mentioned above, the following conditions must be met to obtain an operating licence:

- operation has been arranged so that protection of workers, safety of the population and environmental protection have been adequately taken into account;
- methods for ensuring radioactive waste management, including final disposal of the waste and decommissioning of the installation, are adequate;
- the applicant has the adequate competence, and, in particular, the operating staff are competent and operating arrangements are appropriate;
- the applicant has the economic and other necessary resources to carry out the activity safely and in accordance with the international agreements signed by Finland.

ENFORCEMENT MEASURES DURING CONSTRUCTION AND OPERATION OF A NUCLEAR INSTALLATION

a) Regulatory control during construction

Before construction work begins, the plans and the relevant documents must be approved by STUK. During construction, the following are controlled by STUK:

- management of the project;

- nuclear waste management;
- physical security; and
- emergency preparedness.

The programme includes forty different inspections most of which are repeated at intervals of one year and some of which are more frequent.

The most important inspections the operating organisation must request are those related to repairs and modifications. For all repairs to failed safety-relevant components, as well as for all modifications of the safety systems, the operating organisation must present the plans in advance to STUK for approval. The plans must include technical documentation to verify the acceptability of the functional features, structure and materials of repaired or new equipment. Also, the method of repair, quality control, and tests after work must be presented. Once the work has been completed, the operating organisation must request an inspection of the results of the work.

Other inspections are related to topics such as personnel qualifications, reactor core refuelling, manufacturing of nuclear fuel, and conduct of in-service inspections.

With regard to personnel qualification, this is controlled mainly through oral examinations of the control room operators. Each operator passes an examination every three years. Other personnel which must be qualified includes welders and workers making non-destructive tests of mechanical components (ultrasonic, X-ray, etc.).

In-service inspections of the primary circuit and other pressure retaining components important to safety are carried out by licensed inspection companies. STUK reviews the inspection programme, controls the execution of the programme and evaluates the results of the inspections.

The safety level of the nuclear power plant is re-evaluated after any abnormal event, and the need for corrective measures is considered. To ensure a systematic analysis of the event and its causes, an investigation team is appointed by STUK. The team must complete a form covering systematic consideration of the root causes of equipment failures and human error, as well as weaknesses in the performance of the operating organisation as a whole. The team must present a final report including recommendations for corrective actions, intended to prevent a recurrence of similar events. The descriptions of the abnormal events as well as the completed evaluation form are recorded in a computer system.

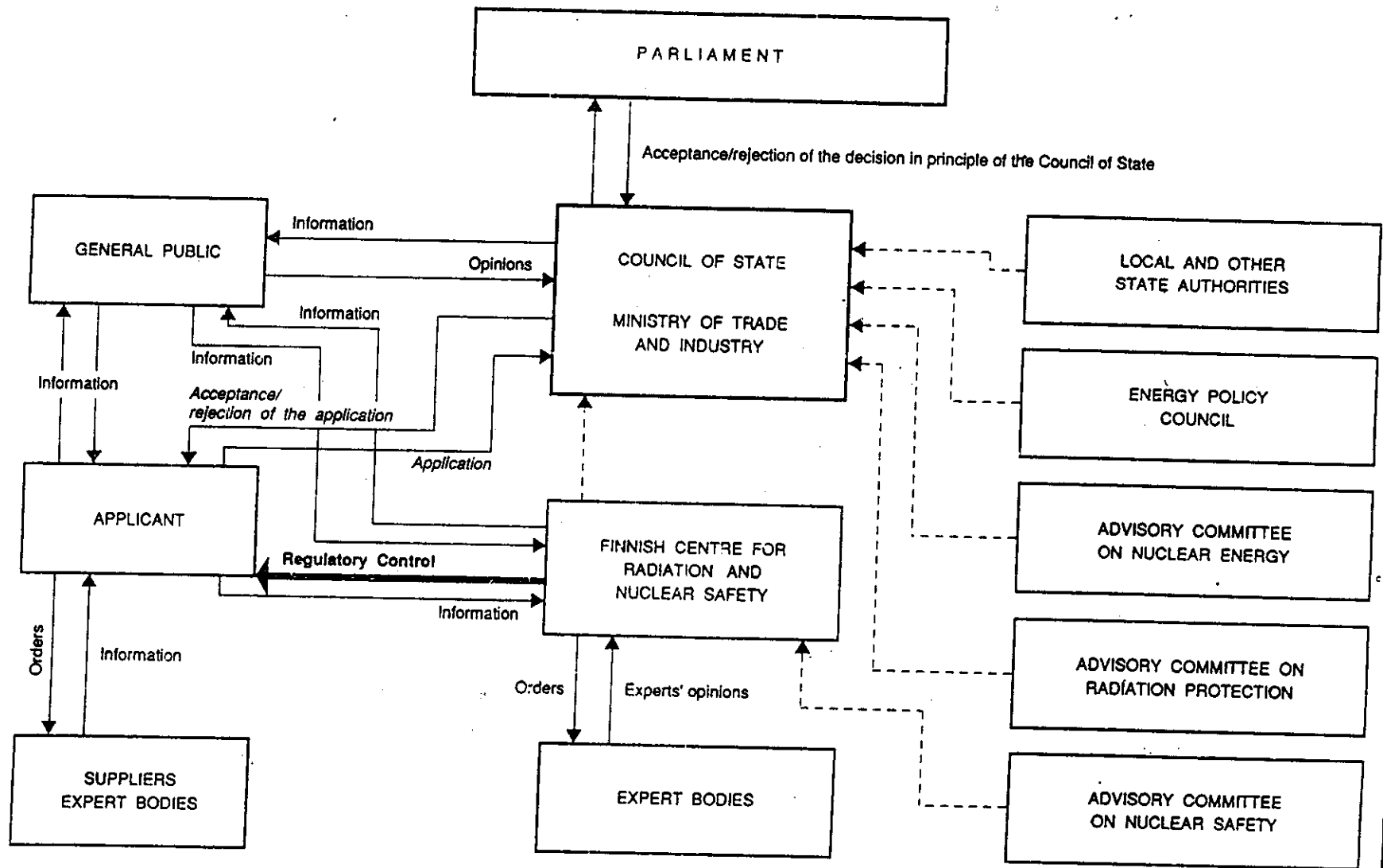
The situation at Finnish nuclear power plants is also evaluated if an event reported by another country is suspected to be of such a nature as to be relevant for the safety of the Finnish plants.

The adequacy of the plant safety level and its licensing are re-evaluated whenever modifications might be suggested, based on new results of safety research, general technical development, or new safety requirements.

A list of the topics requiring re-evaluation and the respective work plan are drawn up annually.

Operating licences are granted in Finland for a limited period (the practice has been from five to ten years). When renewing a licence, a summary evaluation of the safety of the plant in question is carried out by STUK based on the annual re-evaluation results and on the findings of the inspections.

Licensing of nuclear power plants in Finland



----- Statement on the Application

FRANCE

INTRODUCTION

Large nuclear installations, referred to in French regulations as *installations nucléaires de base*, are governed by the Decree of 11th December 1963, amended by a Decree of 27th March 1973 and a Decree of 19th January 1990.

These regulations have been supplemented as regards procedure by an Instruction of 27th March 1973 and a Decision of the same date (amended by a Decision of 17th December 1976), which are internal instruments issued by the Minister for Industry; they cover:

1. nuclear reactors, except for those comprised within a means of transport;
2. particle accelerators likely to provide such particles with energy exceeding 300 MeV;
3. plants for the preparation, fabrication or conversion of radioactive substances, namely plants for the manufacture of nuclear fuels, isotopic separation of nuclear fuels, reprocessing of irradiated nuclear fuels or processing of radioactive wastes;
4. facilities for the storage, deposit or use of radioactive substances, including wastes.

The installations referred to in (3) and (4) are classified as large nuclear installations only when the quantity or total activity of the radioactive substances exceed the threshold fixed according to the type of installation or radioisotope in question.

COMPETENT AUTHORITIES

The authorities primarily involved in the licensing procedure for the setting up of large nuclear installations are the Minister for Industry (at present the Minister Delegate for Industry and Foreign Trade) and the Minister for the Environment. The consent of the Minister for Health is requested.

Set up in 1973 within the Ministry of Industry, the Central Service for the Safety of Nuclear Installations – SCSIN is also available to the Ministry of the Environment. Now renamed the Directorate for the Safety of Nuclear Installations (*Direction de la sûreté des installations nucléaires – DSIN*).

It is responsible mainly for:

- studying problems raised by site selection;
- establishing the procedures for licensing large nuclear installations (licences for setting up, commissioning, disposal, etc.);
- organising and directing the control of these installations by the inspectors of large nuclear installations;
- drafting general technical regulations and following their implementation;
- establishing plans in the event of an incident in a large nuclear installation, enabling it to intervene in the framework of the Minister of Industry's responsibilities and in accordance with the Prime Minister's instructions;
- proposing and organising public information on nuclear safety.

At local level, the DSIN's actions are relayed through the nuclear divisions of the Regional Directorates for Industry, Research and the Environment (DRIRE).

These Directorates are mainly responsible for inspecting nuclear installations, monitoring reactor unit shut-downs and all pressurized components, and also provide technical support to the *préfet*, the Government representative, in particular in case of an accident.

The DSIN is assisted in its decisions mainly by the Institute for Protection and Nuclear Safety (*Institut de protection et de sûreté nucléaire - IPSN*), set up in 1976 within the Atomic Energy Commission (*Commissariat à l'Energie Atomique - CEA*). A recent reorganisation strengthened the independence of the IPSN's safety experts. The Institute may also undertake studies, research and work on protection and nuclear safety requested by all ministerial departments and agencies concerned.

The Central Service for Protection against Ionizing Radiation (*Service central de protection contre les rayonnements ionisants - SCPRI*), under the Ministry of Health, participates in defining and implementing the policy on protection against ionizing radiation. The SCPRI is also consulted in the licensing procedure for setting up a nuclear power plant and for radioactive liquid or gaseous releases, as well as on any modifications which could have an incidence on conditions for such releases.

The SCPRI is responsible for controlling the implementation of regulations on continuous radiological monitoring of sites and their environment.

LICENSING PROCEDURE

The licensing procedure proper is governed by Decree No. 63-1128 of 11th December 1963 and aims to authorise the setting up of installations. Under this procedure the Decree authorising the setting up of an installation lays down the technical requirements and the other formalities with which its operator must comply. For nuclear reactors, for instance, there are generally two stages: firstly fuel loading and commissioning tests, and secondly the entry into operation - both conditional on approval being given jointly by the Ministers for Industry and for the Environment.

Apart from the licensing system described below, it should be noted that nuclear installations also require separate licences regarding:

- pressurized components they contain (Decree of 2nd April 1926, and Decree of 26th February 1974 on the primary circuit of light water reactor steam supply systems);
- gaseous and liquid effluent releases (Decrees of 6th November and 31st December 1974 and their implementing Orders of 10th August 1976).

a) Filing of application

The application for a licence to set up a large nuclear installation is sent to the Minister for Industry. It contains the essential specifications of the installation. A preliminary safety report is also attached to the application. The application is also transmitted to the Minister for the Environment, together with a document describing, on the basis of the principles set out in the preliminary safety report, the measures to deal with risks originating from the installation and to limit any possible consequences. As regards large nuclear installations, this document constitutes a risk analysis within the meaning of the 1987 Act on the prevention of major risks. Scrutiny of the application includes referral of the application file to the various Ministries concerned (Interior, Health, Equipment, Regional

Development, Agriculture and Transport), as well as a local inquiry procedure and a technical study by the Directorate for the Safety of Nuclear Installations and its technical back-up services (namely the CEA's Institute for Protection and Nuclear Safety and the competent Standing Group of Experts).

b) Consultation of the parties concerned

i) Consultation and involvement of the public and local authorities

Procedures for consulting the public and its involvement in the licensing process are governed by the 1983 Act on democratisation of public inquiries and environmental protection and in its 1985 implementing Decrees which prescribe a special public inquiry procedure. The purpose of the Act is to inform the public on any work likely to affect the environment and to obtain comment and suggestions.

The public inquiry is opened by the *Préfet* of the *Département* in which the installation is to be sited. The file submitted to inquiry must contain in particular, information about the identity of the applicant, the purpose of the inquiry, the nature and essential specifications of the installation and a plan of the latter, a map of the area, etc. On the other hand, it gives no information which might jeopardise the security of the installation or the protection measures established against harmful acts. The inquiry is conducted by an Investigating Officer or by an inquiry Commission appointed by the President of the Ordinary Court of Law. The inquiry lasts at least one month and its costs are borne by the operator.

Comments from the public are put on the inquiry records. The local services of the Ministries concerned are consulted.

The report and reasoned conclusions of the Investigating Officer, as well as any proposals by the public and the replies of the operator are published following the inquiry. If the Officer expresses a negative opinion, a stay of execution may be issued by the judicial authority.

For nuclear reactors, this inquiry is often merged with the public inquiry required by the procedure declaring the building of the installation to be of public interest; the latter procedure is current practice and includes consultation of the population concerned; in most cases these inquiries are held even before the application for a licence to set up an installation is filed. The application for public interest status must, in particular, provide information on the architectural aspect of the planned installation, an environmental impact study and the main measures for nuclear safety and radiation protection (1976 Circular on the protection of nature).

ii) Consultation and involvement of technical bodies

In parallel with consultation of the public and the local authorities, the preliminary safety report attached to the application for a licence is considered from the technical viewpoint, under the supervision of the Directorate for the Safety of Nuclear Installations (DSIN).

The DSIN has the safety reports on large nuclear installations scrutinised by its technical back-up services, the Institute for Protection and Nuclear Safety which reports to the responsible Standing Group (under the Head of the DSIN); there are three Standing Groups, the first for nuclear reactors, the second for facilities for the long-term storage of radioactive wastes and the third for other large nuclear installations. The Standing Group concerned gives the Directorate for the Safety of Nuclear Installations its opinion on the safety of the installation as envisaged by the operator and its recommendations on the instructions to be given. In the light of this opinion and the recommendations and having been informed of the results of the public inquiry and of any comments by the Ministers concerned, the

Minister for Industry, provided there is no outstanding obstacle, prepares a draft decree authorising the installation to be set up.

This draft is then sent to the Interministerial Committee for Large Nuclear Installations for its opinion. Representatives of the various ministries and bodies concerned sit on the Committee. The latter (or its permanent unit which decides on matters presenting no special difficulties) must communicate that opinion within two months.

The draft decree, amended if necessary in the light of the comments of the Interministerial Committee for Large Nuclear Installations, is then submitted to the Minister responsible for Health for consent. His decision has to be given within three months, whereafter the decree authorising the installation to be set up may be made by the Prime Minister.

The decree, signed by the Prime Minister and countersigned by the Minister for Industry and the Minister for the Environment, fixes the perimeter of the installation and the requirements that the operator must comply with. It also lays down the conditions to be met by the operator for his installation to be brought into normal operation. In addition to the conditions relating to the safety of the installation, the decree may include instructions on other aspects, e.g. heating of natural waters and climatic effects.

It should be noted that decrees authorising an installation to be set up relate to a specific installation on a specific site and that there is no prior licensing procedure regarding siting. Nevertheless, the Directorate for the Safety of Nuclear Installations is required to give its opinion on contemplated sites at an earlier stage, notably when the application for the project to be declared of public interest is being considered, and even at a stage prior to such application, which allows for the necessary consultation to take place between the administrative departments on this point.

c) Commissioning

In the case of nuclear reactors, as has already been said, the commissioning of an installation comprises two stages:

i) Commissioning and preliminary safety report

Six months prior to the loading of a reactor, the operator must send the Ministers for Industry and for the Environment a preliminary safety report together with proposals for provisional general operating instructions and an internal emergency plan specifying its organisation and the measures to be implemented in case of an accident. At the request of the Head of DSIN, the report and instructions are scrutinised by the Institute for Protection and Nuclear Safety and submitted to the responsible Standing Group. In the light of this technical inquiry, the Ministers may, as appropriate, give their approval for the loading of fuel and the commissioning tests to be carried out, subject, as necessary, to compliance with a number of technical requirements or to some modifications being made to the installation or to the proposed general operating instructions.

ii) Entry into operation within the meaning of the Decree of 11th December 1963 and final safety report

Before approval can be given for a reactor to be brought into operation within the meaning of the 1963 Decree (the decision on which must be taken within a time-limit laid down in the licensing decree), the operator must submit a final safety report to the Ministers concerned, accompanied by updated general operating instructions and the internal emergency plan. At the request of the Head of the

Directorate for the Safety of Nuclear Installations, the Institute for Protection and Nuclear Safety studies these documents which are then submitted to the responsible Standing Group. In the light of this inquiry, the Ministers concerned may – as appropriate – decide in favour of the installation being brought into normal operation, possibly subject to a number of technical requirements or to certain modifications being made to the installation or to the general operating instructions.

Throughout its lifetime, the installation must be operated in compliance with the conditions specified by the safety report and the approved general operating instructions and by the technical requirements defined in the approval given for normal operation. Any modification must be authorised in advance by the Directorate for the Safety of Nuclear Installations; generally it will have the application studied by the Institute for Protection and Nuclear Safety.

In certain important cases, the responsible Standing Group will be consulted. Moreover, if the alterations planned involve non-compliance with the provisions of the licensing decree, a new licensing decree is required.

INSPECTION OF NUCLEAR INSTALLATIONS

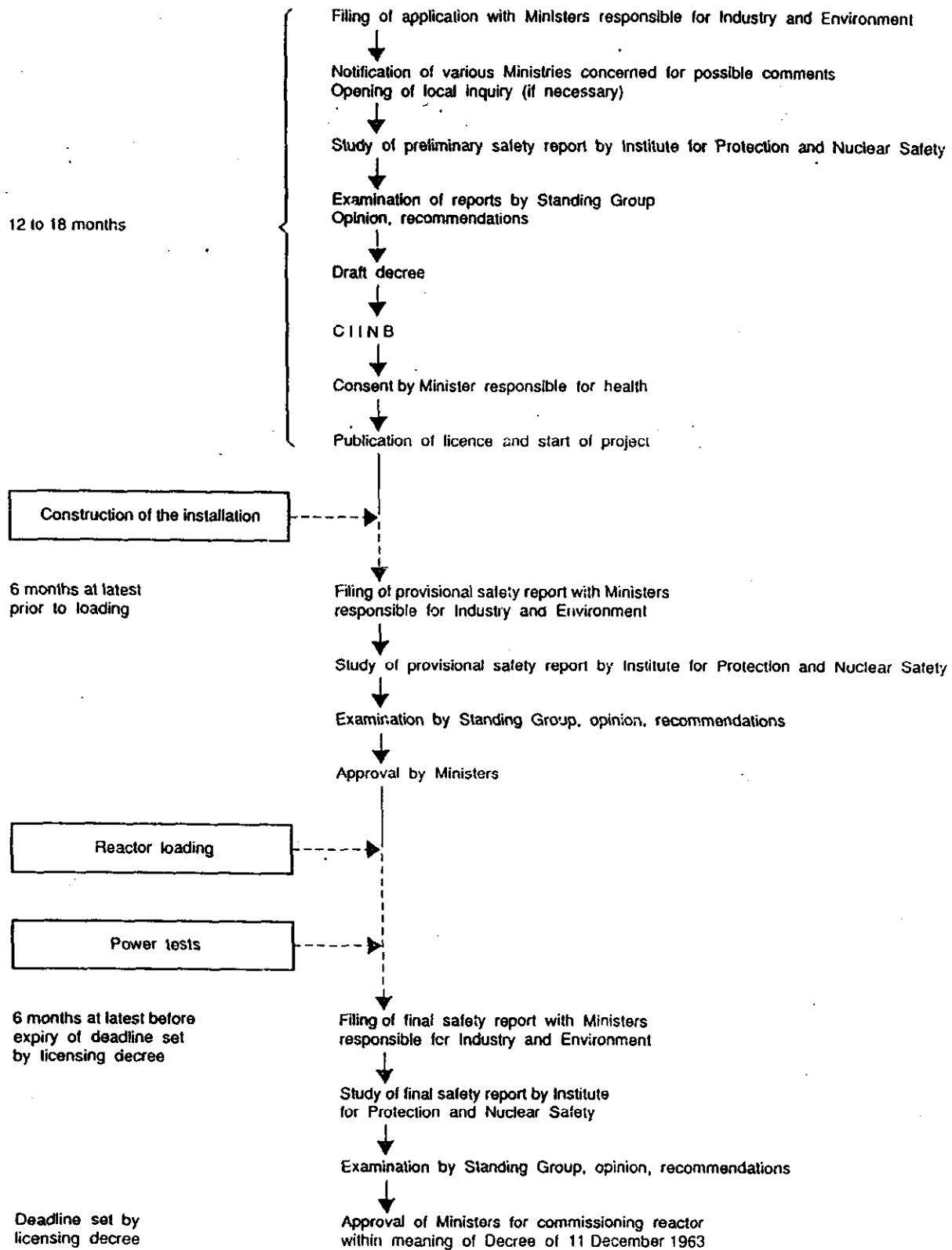
Large nuclear installations are subject to two types of supervision by the authorities:

- The first is exercised by the Directorate for the Safety of Nuclear Installations, under the authority of the Minister for Industry. This supervision covers the safety of such installations and regulation of pressurised components.
- The second type of supervision is carried out by officials from the Central Service for Protection against Ionizing Radiations which is responsible, in accordance with the Decree of 11th December 1963 as amended, for ensuring that the regulations with regard to liquid or gaseous radioactive releases are properly observed. The SCPRI also has duties with regard to the protection of workers in large nuclear installations (Decree of 28th April 1975).

The supervisory duties of the DSIN include:

- "Supervision visits" to operators and their sub-contractors in accordance with the Decree of 11th December 1963 as amended. These are undertaken by inspectors of nuclear installations, under the authority of the Head of the DSIN. The inspectors may be directly attached to the DSIN or may belong to one of the nine nuclear divisions of the Regional Directorates for Industry, Research and the Environment (DRIRE).
- "Technical control visits" by the same inspectors for purposes of monitoring reactor shut-downs for maintenance and controlling the regulation of pressurised components (Order of 26th June 1974 on primary circuits). This task belongs to the DRIRE which is competent locally.
- "Control visits" by the inspectors of the Control Bureau of the Nuclear Construction Department of the DRIRE, Burgundy, responsible for controlling the design and manufacture of the primary circuit components in accordance with the Order of 26th February 1974. The inspectors also act in support of other DRIREs during reactor shut-downs.

Table of procedures



UNITED KINGDOM

INTRODUCTION

The main legislation governing the safety, and enforcement of safety, of nuclear installations in the UK is the **Health and Safety at Work etc. Act 1974** (the 1974 Act), together with the associated relevant statutory provisions of the **Nuclear Installations Act 1965** as amended (the 1965 Act) and the **Ionizing Radiations Regulations 1985** (IRR 1985), as supplemented by the **Nuclear Installations Regulations 1971** as amended (the 1971 Regulations).

The 1965 Act requires that no nuclear reactor (other than one comprised in a means of transport) or nuclear installation as prescribed in the 1971 Regulations may be installed or operated on a site without that site having first been granted a nuclear site licence by the Health and Safety Executive.

The installations prescribed in the 1971 Regulations are:

- an installation manufacturing fuel elements for the production of atomic energy from either enriched uranium or plutonium;
- an installation used for producing alloys or chemical compounds from enriched uranium or plutonium;
- an installation manufacturing devices which incorporate enriched uranium or plutonium for subsequent irradiation in a reactor;
- an installation comprising a sub-critical nuclear assembly in which a chain reaction can be maintained with an additional source of neutrons;
- an installation for processing irradiated nuclear fuel;
- an installation for the storage of fuel elements, irradiated nuclear fuel or bulk quantities of other irradiated matter;
- an installation involved in the extraction of plutonium or uranium by the treatment of irradiated matter or the enrichment of uranium;
- an installation for the production of radioisotopes from nuclear matter.

Previously, nuclear installations operated by the United Kingdom Atomic Energy Authority (UKAEA) or Government Departments were not subject to the licensing regime of the 1965 Act. By Ministerial directive they were required to maintain equivalent standards to those imposed on the operators of licensed nuclear sites. However, Regulations to amend the 1965 Act, removing the UKAEA's exemption from licensing, came into force on 31st October 1990.

Finally, in addition to the nuclear site licensing requirements, the **Radioactive Substances Act 1960** requires that an authorisation be obtained before one can dispose of or accumulate radioactive waste. The authority given responsibility for granting such authorisations is the Secretary of State for the Environment in England and Wales and in Scotland, the Secretary of State for Scotland. Licensed nuclear sites are exempted from this requirement in so far as it concerns accumulation of waste (because this is controlled under licence conditions); however, they are not exempted from the requirements concerning disposal of waste, and additionally authorisation must be obtained from the Minister of Agriculture, Fisheries and Food for disposal from such sites. Radioactive waste is also subject to provisions of the **Control of Pollution (Radioactive Waste) Regulations 1976** and the **Control of**

Pollution (Special Waste) Regulations 1980. The safety of radioactive waste on licensed sites is controlled under the nuclear site licence conditions.

COMPETENT AUTHORITIES

The Health and Safety Executive (HSE) as the executive arm of the Health and Safety Commission (HSC) which reports to the Secretary of State for Employment, was set up under the 1974 Act and brought together HM Nuclear Installations Inspectorate and a number of other Inspectorates under the umbrella of a single authority. The 1974 Act incorporates as relevant statutory provisions those sections of the 1965 Act which relate to health and safety. This, together with the associated relevant legislation detailed above, provides the basis for the control of activities involving ionizing radiations to reduce to the minimum practicable level the risk of harm to workers and the public.

The HSE is the competent authority for regulating the safety of nuclear installations in the UK and for the enforcement of the health and safety provisions of the above legislation. HM Nuclear Installations Inspectorate (the Inspectorate) is that division of HSE which ensures that all statutory requirements regarding the safety of the workforce and of the general public, in relation to nuclear installations, are strictly adhered to. Its inspectors appointed by HSE, have the necessary powers to enforce the appropriate parts of the relevant legislation and it is their work which will be described in this chapter. HSE is empowered to recover the costs of the Inspectorate's work (in proportion to the expenses involved) from licensees and licence applicants.

Although the HSE and Inspectorate are outside the Departments directly concerned with energy policy they remain ultimately answerable through the Health and Safety Commission to the Secretary of State for Energy and the Secretary of State for Scotland for nuclear safety matters.

LICENSING PROCEDURE

A single, non-transferable, nuclear site licence may be granted only to a corporate body (not to an individual) and is in respect of a specific site. The licence enables the corporate body (licensee) to install and operate a specified nuclear installation on that site. The licence is not issued until a preliminary assessment of the installation has been carried out by the Inspectorate and it has been confirmed as conforming to the siting policy requirements. Conditions attached to the licence provide the necessary checks and controls that the Inspectorate require to be exercised during the design, construction, commissioning and operational stages of the installation's life.

The licensing is covered in three stages:

- filing of application;
- consulting of all parties concerned; and
- granting the licence.

a) Filing of application

In practice, an applicant for a nuclear site licence consults the Inspectorate on the information required in a submission for a licence and on the detailed procedures to be followed. These will vary with the type and size of the proposed installation. However, sufficient information must be provided to enable the Inspectorate to satisfy itself as to the safety of the proposed plant and the suitability of the site. For example, for power reactors applicants are initially required to submit details of the basic safety principles on which the design is based and to indicate how these principles will be incorporated in the plant. This is known as the Preliminary Safety Report (PSR). Information must also be provided on the main pressure containment system and cooling arrangements both in normal and accident conditions, the layout of the site, the expected radiation contours and arrangements for dealing with radioactive effluents, waste storage and the handling of irradiated fuel elements.

The applicant's submission also has to include an outline of the fault studies and other investigations and tests planned to support the design assumptions.

If the Inspectorate's assessment of the proposed site and installation proves to be favourable, the applicant can then make more detailed proposals to submit a formal application to the HSE.

In addition to the requirements of the Inspectorate, the applicant for a nuclear site licence for a nuclear power station will require the consent of the Secretary of State for Energy under section 36 of the Electricity Act 1989.

It is normal practice that before a consent for construction is issued the Inspectorate carries out a preliminary safety assessment of the safety case for the site and the reactor design, based on the PSR. For a power reactor the main documents required for this assessment besides the PSR are the Reference Design, the Contract Design Report and the Pre-Construction Safety Report (PCSR).

These documents are backed by extensive supporting documents providing further details of calculations for the safety case, supporting research and development programmes, component development programmes, Quality Assurance schemes and in-service inspection proposals.

b) Consultation of all parties concerned

i) Involvement of the public and local authorities

The HSE, on receiving a formal application for a nuclear site licence can, under the 1965 Act, at its discretion, direct an applicant for a licence to serve notice on local authorities, river boards, local fisheries committees, statutory water undertakings and other similar public bodies. It must then consider any representation they may make and may not grant a licence until three months after service of the last notice.

In addition, planning permission will be necessary from the local authority.

In the case of nuclear power plants, these matters are dealt with under the electricity legislation which makes similar provision for publication and notification to interested parties of any proposed power plant. When all interested parties have been given an opportunity to comment on or object to the proposed power plant, the Secretary of State for Energy (in Scotland, the Secretary of State for Scotland) decides whether or not the proposals affect their interests to an extent which makes it desirable to hold a public inquiry. If, however, the local Planning Authority objects, the Secretary of State is obliged to hold such an inquiry.

Consultation with the relevant local authorities is also required prior to the granting of an authorisation for disposal or accumulation of radioactive waste. Moreover, in the event of a revocation of or variance in a previously granted authorisation, the relevant Government Ministers must grant the concerned person, and may grant the appropriate local authorities, a hearing on the matter.

ii) Consultation and involvement of technical bodies

The Inspectorate regulates the safety aspect of design, construction and operation of nuclear installations in the interest of safety of site personnel and the general public. The Inspectorate staff includes safety assessors whose principal task is to examine those facets of nuclear installations which have significance for safety and to recommend, if necessary, where improvements should be made. The Inspectorate will also examine the safety reports submitted by the applicant once the licence has been issued. These safety reports are produced during the design, construction, commissioning and operation of the installation to fulfil the requirements of the conditions attached to the licence.

The Secretary of State is also advised on these matters affecting nuclear safety by HSE'S independent Advisory Committee on the Safety of Nuclear Installations (ACSNI). This Committee consists of an inner cadre of independent experts together with a number of expert assessors from the nuclear industry.

c) Granting the licence

In accordance with the 1965 Act the Inspectorate may attach to a nuclear site licence whatever conditions appear to be necessary or desirable in the interests of safety. Conditions may be varied, revoked or added at any time. In particular, they may include:

- securing the maintenance of an efficient system for detecting and recording the presence and intensity of any ionizing radiations emitted from anything on the site or from anything discharged on or from the site;
- regulating the design, siting, construction, installation, operation, modification and maintenance of any plant or other installation on the site;
- providing measures to be taken in the event of an accident or other emergency on the site;
- controlling the discharge of any substance on or from the site; and
- dealing with the handling, treatment and disposal of nuclear matter.

THE NUCLEAR SITE LICENCE

The format of the nuclear site licence has been standardised and authorises the applicant to install and operate particular nuclear installations, at a particular site and subject to the various conditions which are attached to that licence.

The conditions attached to each licence have also been standardised and are generally of a non-prescriptive nature, requiring that the licensees "make and implement adequate arrangements" to cover defined areas of safety concern. The conditions also lay down the requirement that during construction, commissioning and, where appropriate, modifications to the "adequate arrangements" may divide the activity into stages. The Inspectorate reserves the powers to approve (and thereby "freeze") the

arrangements and where the activity is divided into stages to specify the stages defined therein as hold points beyond which the licensee cannot proceed without its agreement.

The details of the licensee's arrangements to fulfil the requirements of the conditions attached to the nuclear site licence will vary as the site progresses through each of the steps of design, construction, commissioning and operation. It is the licensee's responsibility to ensure that the arrangements are "made", "implemented" and "adequate". The matters covered in the conditions attached to the nuclear site licence are listed in the Annex.

The Inspectorate is preparing internal guidance for its inspectors to judge on the adequacy of arrangements to meet the licence conditions.

INSPECTION OF NUCLEAR INSTALLATIONS

The purpose of inspections is to verify that the requirements of the licence are met throughout the construction and commissioning stages as well as the operating period for the nuclear installation. They also provide checks on the effectiveness of the safety measures taken.

The results of each inspection are presented in individual visit reports. Quarterly and half-yearly summaries are also drawn up by the site inspector.

In addition to inspections at sites, the Inspectorate carry out Quality Assurance assessments and audits on site or at contractors factories off-site to check the adequacy of the licensee's arrangements for safety.

The powers available to the Inspectorate in carrying out inspections are wide-ranging. They stem from the wider provisions governing the health and safety of employees in the workplace contained in the 1974 Act, and cover matters such as the right of entry to premises, the right to obtain any relevant information and the right to inspect any relevant area of the plant. The Inspectorate may also vary licence conditions at any time to change either their scope or the detail of their application, and it holds the ultimate sanction of being able to shut down any operations on the site or, if necessary, to revoke a site licence at any time. In this way, the Inspectorate has the means by inspection to monitor and control the effectiveness of the licensee's arrangements for safety matters established within the framework of licence conditions.

The Secretary of State for the Environment is also authorised to appoint inspectors to assist in the execution of the Radioactive Substances Act 1960.

Annex

Conditions attached to a Standard Nuclear Site Licence

1. Interpretation
2. Marking of the Site Boundary
3. Restrictions on Dealing with the Site
4. Restrictions on Nuclear Matter on the Site
5. Consignment of Nuclear Matter
6. Documents, Records, Authorities and Certificates
7. Incidents on the Site
8. Warning Notices
9. Instructions to Persons on the Site
10. Training
11. Emergency Arrangements
12. Duly Authorised and Other Suitably Qualified and Experienced Persons
13. Nuclear Safety Committee
14. Safety Documentation
15. Periodic Review
16. Site Plans, Designs and Specifications
17. Quality Assurance
18. Radiological Protection
19. Construction or Installation of New Plant
20. Modification to Design of Plant under Construction
21. Commissioning
22. Modification or Experiment on Existing Plant
23. Operating Rules
24. Operating Instructions
25. Operational Records
26. Control and Supervision of Operations
27. Safety Mechanisms, Devices and Circuits
28. Examination, Inspection, Maintenance and Testing
29. Duty to Carry Out Tests, Inspections and Examinations
30. Periodic Shutdown
31. Shutdown of Specified Operations
32. Accumulation of Radioactive Waste
33. Disposal of Radioactive Waste
34. Leakage and Escape of Radioactive Material and Radioactive Waste
35. Decommissioning.

UNITED STATES

INTRODUCTION

The regulations concerning nuclear installations in the United States are governed by the **Atomic Energy Act of 1954** as amended, and the **Energy Reorganization Act of 1974**, as amended (which abolished the Atomic Energy Commission and created the Energy Research and Development Administration, subsequently incorporated into the U.S. Department of Energy, and the Nuclear Regulatory Commission). The Nuclear Regulatory Commission (NRC) administers these statutes in the licensing of nuclear installations in the United States. In addition, several other statutes bear substantially on the practices and procedures of the Commission. These are:

- National Environmental Policy Act of 1969;
- Resource Conservation and Recovery Act (RCRA) of 1976;
- Toxic Substances Control Act;
- Clean Air Act of 1977;
- Clean Water Act (CWA) of 1977;
- Uranium Mill Tailings Radiation Control Act of 1978;
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980;
- West Valley Demonstration Project Act of 1980;
- Nuclear Waste Policy Act of 1982;
- Low Level Radioactive Waste Policy Amendments Act of 1985;
- Administrative Procedure Act;
- Coastal Zone Management Act;
- Endangered Species Act;
- Federal Advisory Committee Act;
- Federal Water Pollution Control Act;
- Freedom of Information Act;
- Government in the Sunshine Act;
- National Historic Preservation Act;
- Privacy Act;
- Wild and Scenic Rivers Act.

Nuclear installations in the United States must be licensed by the NRC. (Some government facilities are exempt from licensing by the requirements of the Atomic Energy Act and the Energy Reorganisation Act.) Facilities which must be licensed include:

- nuclear reactors (power, test and research);
- uranium mills;
- solution recovery plants (milling);
- UO₂ fabrication plants;
- fuel reprocessing plants;
- isotopic separation (enrichment) plants;
- spent fuel storage (interim) plants;

- high level waste and spent fuel geologic repositories;
- low level waste burial grounds.

Rules and regulations governing the licensing of these facilities are set down in "Title 10, Code of Federal Regulations (CFR), Chapter 1 - Nuclear Regulatory Commission".

Although the licensing process is similar for reactors, separation facilities, reprocessing plants, and nuclear waste storage and disposal facilities, most activity over the last several years has been with nuclear power reactors. This discussion of licensing practices describes the licensing process for power reactors and enrichment plants. Facilities for permanent disposal of high-level waste and spent fuel and low level waste are addressed in a brief discussion at the end of this chapter.

COMPETENT AUTHORITIES - POWER AND ENRICHMENT

The authority to issue, amend, renew, transfer, suspend, revoke or deny reactor licences is delegated by the Commission to the Office of Nuclear Reactor Regulation (fuel facility and nuclear waste storage and disposal facility licences are handled by the Office of Nuclear Material Safety and Safeguards), except where public hearings are required or involved in specific cases. In those cases, the decision to license, and the conditioning of the licence, rests with an Atomic Safety and Licensing Board. In connection with the issuance of a construction permit, the Board must decide all issues; in operating licence proceedings, a Board would decide only matters in controversy. Such decisions are subject to review by an Appeal Board and the Commission itself (the Commissioners). The Commission appellate process is being revised at this time. In these cases, the NRC staff cannot communicate directly with the Board and the Commission on the merits of the proceedings until such time as there is a final Commission decision rendered. Thus, in describing licensing in the United States, it is necessary to distinguish between actions, positions and decisions of the NRC staff, the Boards, and those of the Commission itself for all matters involved in the hearing process on individual cases.

Applications for a licence to construct and operate an enrichment facility are handled by the Office of Nuclear Material Safety and Safeguards. Where public hearings are held on such applications, the decision will be subject to review by the Commission.

Within the NRC, support for the licensing activities of the Office of Nuclear Reactor Regulation and the Office of Nuclear Material Safety and Safeguards comes also from the Office of Nuclear Regulatory Research and Regional Offices.

LICENSING PROCEDURE

The licensing process in the United States for production and utilisation facilities is a two-step procedure. A construction permit is required before a utility or other person is authorised to build a plant and an operating licence is required prior to fuel loading and subsequent operation. The scope of the licence proceeding covers matters of radiological safety, environmental protection, and antitrust considerations. Public hearings are required at the construction permit stage, and may be held at the operating stage if requested by the NRC, the applicant, or by a member of the public if a petition for leave to intervene is granted by the Atomic Safety and Licensing Board.

For activities not defined as production or utilisation of special nuclear material (fissile material), NRC regulations provide a simple licensing one-step process focused on possession of radioactive materials, their nature and quantity. Licences issued under these regulations are termed materials licences. Activities covered under such regulations include uranium mills, solution recovery plants, UO₂ fabrication plants and spent fuel storage (interim) and isotopic separation plants. Activities associated with decommissioning and with disposal of high level and low level radioactive wastes are covered under another set of regulations and are discussed below.

a) Construction permit

As a major part of the application for a construction permit, the applicant files a Preliminary Safety Analysis Report (PSAR). This document presents the design criteria and preliminary design information for the proposed facility and comprehensive data on the proposed site. The report also discusses various hypothetical accident situations and the safety features which will be provided to prevent accidents or, if they should occur, to mitigate their effects on both the public and the facility's employees. In addition, the company must submit a comprehensive Environmental Report (ER) providing a basis for the evaluation of the environmental impact of the proposed plant. Further, information must be submitted for use by the Attorney General and the NRC staff in their reviews of the antitrust aspects of the proposed facility.

An applicant for a construction permit for a nuclear power plant may tender the information required by 10 CFR Part 50 in three parts. One part is accompanied by the Environmental Report and site suitability information and another part by the PSAR. Tendering of the first part may precede the tendering of the other by no longer than six months. Whichever of the above part is tendered first must also include the fee and other general and financial information. The third part, consisting of antitrust information, is tendered 9 to 36 months prior to the other information in order for the Attorney General to begin the antitrust review.

When an application is submitted, it is first subjected to an acceptance review to determine whether it contains sufficient information to satisfy the Commission requirements for a detailed review. If the application is not sufficiently complete, the staff makes specific requests for additional information. The application is formally docketed (accepted) only if it meets certain minimum acceptance criteria. In addition, when the PSAR is submitted, a substantive review and inspection of the applicant's quality assurance programme, covering design, construction and procurement is conducted. Guides for the preparation of the documents, detailing the kind of information needed, have been developed by the staff to aid companies in preparing acceptable applications.

As soon as an application for a construction permit is received, copies are placed in the NRC Public Document Room. As soon as the ER and PSAR or early site information is received, copies are also placed in Public Document Rooms in the locality of the proposed site. Copies of all future correspondence and filings relating to the application are placed in these locations and are available to every member of the public. Also, a press release announcing receipt of the application is issued by the NRC. Upon docketing (acceptance) of the applicant's application for a construction permit, copies are sent to Federal, State and local officials and a notice of its receipt and of hearing is published in the Federal Register.

i) Radiological Safety Review

The staff reviews a construction permit application to determine if the proposed facility can be constructed and operated without undue risk to the health and safety of the public. If any portion of the

plant as described in the application is considered to be inadequate, the applicant would have to modify the plant to make it acceptable. In any event, the staff's safety evaluation sets down the bases on which the facility design would be acceptable.

The application is reviewed to determine that the plant design is consistent with NRC rules and regulations, regulatory guides and other regulatory requirements. As a result of the March 1979 accident at Three Mile Island (TMI-2), many additional requirements have been imposed upon operating reactors and reactors under construction [these requirements are specified in documents entitled "Clarification of TMI Action Plan Requirements" NUREG-0737, Nov. 1980 and "Supplement 1 to NUREG-0737 - Requirements for Emergency Response Capability" (Generic Letter 82-33), Dec. 17, 1982]. The review areas, procedures and acceptance criteria are specified in "The Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" NUREG-0800, July 1981, portions of which are updated as the need arises.

Design methods and procedures for calculations are examined to establish their validity. Audit checks of actual calculations and other procedures of design and analysis are made by the staff to establish the validity of the applicant's design and to determine that the applicant has conducted its analyses and evaluation in sufficient depth and breadth to support required findings with respect to safety.

During the staff's review, the applicant for the facility construction permit is required to provide such additional information as is needed to complete the staff's evaluation. The principal features of the staff's review can be summarised as follows:

1. A review is made of the population density and use characteristics of the site environs, and the physical characteristics of the site, including seismology, meteorology, geology and hydrology, to determine that these characteristics have been evaluated adequately and have been given appropriate consideration in the plant design, and that the site characteristics are, in the case of reactors, in accordance with the siting criteria in 10 CFR Part 100, taking into consideration the design of the facility, including the engineered safety features provided.
2. A review is performed of the facility design, and of programmes for fabrication, construction and testing of the plant structures, systems and components important to safety to determine that they are in accord with the pertinent regulations, regulatory guides, and other requirements, and that any departures from these requirements have been identified and justified.
3. Evaluations are made of the response of the facility to various anticipated operating transients and to a broad spectrum of hypothetical accidents. The potential consequences of these hypothetical accidents are then evaluated conservatively to determine that the calculated potential offsite doses that might result, in the very unlikely event of their occurrence, would in the case of reactors not exceed the guidelines for site acceptability given in 10 CFR Part 100. Probabilistic risk assessment studies are made to assure that the facility response to postulated severe accidents is consistent with the Commission's severe accident policy.
4. A review is made of the applicant's plans for the conduct of plant operations including the organisational structure, the technical qualifications of operating and technical support personnel, the measures taken for industrial security, and the planning for emergency actions to be taken in the unlikely event of an accident that might affect the general public. An important aspect of this review includes an assessment of the applicant's programmes for quality assurance and quality control to assure compliance with the Commission's requirements. These reviews form the basis for determining whether the applicant is technically qualified to operate the plant and whether the applicant has established effective organisations and plans for continuing safe operation of the facility.

5. Evaluations are made of the design of the systems provided for control of the radiological effluents from the plant to determine that these systems can control the release of radioactive wastes from the station within the limits specified by the regulations and that the applicant will operate the facility in such a manner as to reduce radioactive releases to levels that are as low as is reasonably achievable.

This review is conducted by members of the NRC staff and its consultants over a period of about two to three years. To the extent feasible and appropriate, the staff makes use of previous evaluations of other reactors licensed for construction or operation, and previous evaluations of various aspects of reactor design described in topical reports, to expedite its review.

Traditionally, the licensing process for reactor facilities includes the consideration of programmes proposed by an applicant for a construction permit to verify plant design features and to confirm design margins. The licensing process includes consideration of basic research and development programmes necessary to assure the resolution of safety questions associated with safety features or components. The applicant is required to identify any research and development work to be conducted to confirm the adequacy or to resolve any safety questions associated with the design of a particular facility, along with a schedule for completion of that research and development work. All such safety questions would have to be resolved prior to operation of the facility. After completion of construction, nuclear power plants are subject to a separate review at the operating licence stage, discussed below. Data obtained from research and development programmes on particular facilities and from the Commission's safety research programme are factored into these licensing reviews, as appropriate.

When the review and evaluation of the application progresses to the point that the staff concludes that acceptable criteria, preliminary design information and financial information, where required, are documented adequately in the application, a Safety Evaluation Report is prepared. This report represents a summary of the review and evaluation of the application by the staff relative to the anticipated effect of the proposed facility on the public health and safety and the common defence and security.

ii) Environmental Protection Review

Either concurrently with or separately from the radiological safety review, an environmental review, in accordance with the requirements of the National Environmental Policy Act (NEPA), is performed by the staff and its consultants to evaluate the potential environmental impact of the proposed plant, as well as to provide comparisons between the benefits to be derived and the possible impact to the environment. After completion of this review, a Draft Environmental Statement (DES), containing conclusions on environmental matters, is issued. The DES is circulated for review and comments by the appropriate Federal, State and local agencies as well as by individuals and by organisations representing the public. After receipt of all comments and resolution of any outstanding issues, a Final Environmental Statement (FES) is issued. Both the DES and FES are made available to the public.

iii) Antitrust Review

The Atomic Energy Act requires that antitrust aspects of a facility licence application must be considered in the licensing process. The antitrust information submitted by the applicant is sent to the Attorney General for his advice on whether activities under the proposed licence would create or maintain a situation inconsistent with the antitrust laws. Upon receipt, the Attorney General's advice is promptly published and opportunity is provided for interested parties to raise antitrust issues. An

antitrust hearing may be held based on the recommendation of the Attorney General or on the petition of an interested party.

Antitrust hearings are held separately from hearings on environmental and safety matters. Depending upon the findings of a Board, antitrust conditions may be imposed on the applicant in the construction permit.

b) Consultation and involvement of technical bodies and public authorities

When the application for a construction permit for a production or utilisation facility is filed with the Commission, copies are made available to the public and are sent to interested State and local officials and the Advisory Committee on Reactor Safeguards (ACRS).

i) ACRS

The Advisory Committee on Reactor Safeguards, an independent statutory committee established to provide advice to the Commission on reactor safety, must review each application for a construction permit or an operating licence for a production or utilisation facility, i.e. a reactor, or a spent fuel reprocessing plant [Atomic Energy Act, Sec. 182(b)]. The ACRS is composed of a maximum of fifteen members who, though not NRC employees, are appointed by the Commission for terms of four years each. The members are experienced, technically trained individuals selected from various technical disciplines, having applicable experience in industry, research activities and in the academic area. The ACRS also makes use of consultants in specialised technical and scientific disciplines.

As soon as an application for a construction permit is docketed, copies of the PSAR are provided to the ACRS. Each application is assigned to a project subcommittee, usually made up of four to five ACRS members. During the course of the review by the staff, the ACRS is kept informed of the staff's requests for additional information from the applicant and of meetings held, so that the subcommittee chairman is aware of any developments that may warrant a change in the plant. In those cases where the plant is a "standard design" and the site appears generally acceptable, the subcommittee review does not begin until the staff has nearly completed its detailed review of all the safety-related features of the proposed facility. Where new or modified concepts or special site considerations are involved, the ACRS subcommittee begins its formal review earlier in the process, selecting appropriate stages in the staff review to begin a series of meetings with the applicant and staff.

Normally, before the full Committee considers a project, the staff provides its Safety Evaluation Report for the Committee's information. This staff report and the report of the ACRS subcommittee form the basis for Committee consideration of a project. Special attention is given to those items which are of particular safety significance for the reactor involved and any new or advanced features proposed by the applicant. The full Committee meets at least once with the staff and with the applicant to discuss the application. These meetings are open to the public. When the Committee has completed its review, its report is submitted to the Commission in the form of a letter to the Chairman, which is made public.

The staff prepares one or more supplements to the Safety Evaluation Report to address the safety issues raised by the ACRS in its report and to include any other information made available since issuance of the original Safety Evaluation Report.

ii) ACNW

The Advisory Committee on Nuclear Waste (ACNW) provides advice to the Commission on all aspects of nuclear waste management, as appropriate, within the purview of the NRC's regulatory

responsibilities. The primary emphasis of the ACNW is disposal but will also include other aspects of nuclear waste management such as handling, processing, transportation, storage, and safeguarding of nuclear wastes including spent fuel, nuclear wastes mixed with other hazardous substances, and uranium mill tailings. In performing its work, the Committee examines and reports on specific areas of concern referred to it by the Commission or designated representatives of the Commission, and undertakes studies and activities on its own initiative as appropriate to carry out its responsibilities. The Committee interacts with representatives of NRC, other Federal agencies, state and local governments, Indian Tribes, and private organisations, as appropriate, to fulfill its responsibilities.

ACNW reports (except those which may contain classified material) are made part of the public record.

iii) Public hearings

The Atomic Energy Act of 1954, as amended, requires that a public hearing be held before a construction permit may be issued for a facility. Soon after an application is docketed, the NRC issues a notice of hearing which will be held after completion of the safety and environmental reviews. In addition, the hearing is advertised in several newspapers in the vicinity of the proposed facility and a public announcement is issued by the NRC. Opportunity is afforded to "interested" members of the public to participate in the hearing. Someone has an interest, in a legal sense, when he or she has a legally cognizable stake in the outcome of the proceeding. "Interested persons", who are admitted as parties, may introduce direct testimony in the proceeding and conduct cross-examination. At an early stage in the review process, potential intervenors are invited to meet informally and discuss with the staff their concerns with respect to the proposed facility.

The public hearing is conducted by a three-member Atomic Safety and Licensing Board (Board) appointed from the NRC's Atomic Safety and Licensing Board Panel. The Board is composed of one lawyer, who acts as chairman for the proceeding, and two other technically qualified persons. The Safety Evaluation, its supplements and the Final Environmental Statement are offered as evidence by the staff at the public hearing. The hearing may be a combined safety and environmental hearing or separate hearings can take place even if the application is not split. The Board considers all the evidence which has been presented, together with findings of fact and conclusions of law filed by the parties, and issues an initial decision. If the initial decision regarding NEPA and safety matters is favourable, a construction permit is issued to the applicant by the Director of Nuclear Reactor Regulation. The Board's initial decision is, in the case of a reactor licence application, subject to review by an Atomic Safety and Licensing Appeal Board on its own motion, or if exceptions are filed by any party to the proceeding. Under certain circumstances, and in the case of an enrichment plant licence application filed under Sections 53 and 63 of the Atomic Energy Act, the initial decision may be reviewed by the Commissioners.

Commission regulations provide that the Director of Nuclear Reactor Regulation may authorise limited amounts of work to be carried out prior to the issuance of the construction permit. This authorisation is known as a Limited Work Authorisation (LWA). The regulations provide for the authorisation of two types of work. Under one type, the Director may authorise site preparation work, installation of temporary construction support facilities, excavation, construction of service facilities and certain other construction not subject to the quality assurance requirements. Under the second type of LWA, the Director may authorise the installation of structural foundations.

Any LWA may be granted only after the Board has made all of the NEPA findings required by the Commission's regulations in 10 CFR Part 51 for the issuance of a construction permit and has

determined that there is reasonable assurance from a radiological health and safety standpoint that the proposed site is a suitable location for a nuclear power reactor of the general size and type proposed. The second type of LWA may be granted if, in addition to the findings described above, the Board determines that there are no unresolved safety issues relating to the work to be authorised.

It should also be noted that the Commission's regulations also provide that Boards commence hearings on the LWA as soon as practicable after issuance of the FES but no later than thirty days after its issuance. The Board is also directed to issue an initial decision on NEPA findings and site suitability. The LWA may not be granted unless there is a favourable decision on these matters.

c) Operating licence

When the construction of the nuclear facility has progressed to the point where the final design information and plans for operation are ready, the applicant submits the Final Safety Analysis Report (FSAR) and the operating licence stage Environmental Report in support of an application for an operating licence. The FSAR sets forth the pertinent details on the final design of the facility. The FSAR also supplies plans for operation and procedures for coping with emergencies. Again the NRC staff makes a detailed review of the information. Amendments to the application and reports may be submitted from time to time.

The Federal Emergency Management Agency (FEMA), participates with the NRC, pursuant to a memorandum of understanding, in reviews of the offsite emergency preparedness plans for each facility and of the full-participation exercise of these plans. The Environmental Report contains an update of the construction permit environmental report, and addresses relevant changes since the construction permit and items not resolved in the earlier review. The staff again prepares a Safety Evaluation Report and Environmental Statement (on the operating licence) and, as during the construction permit stage, the ACRS again makes an independent evaluation and presents its advice to the Commission by letter. As in the construction permit stage the operating licence Safety Evaluation Report and its Supplements, the Environmental Statements, and the ACRS letter to the Commission are available to the public, and ACRS meetings may be attended by the public.

For operating licence applications, the NRC must make a finding as to whether any significant antitrust changes have occurred subsequent to the previous construction permit review. If the finding is that no changes have occurred, the finding is published and opportunity afforded for interested persons to request a re-evaluation. If a finding is made that significant antitrust changes have occurred, the procedures used for the construction permit antitrust review are repeated.

A public hearing is not mandatory prior to the issuance of an operating licence. However, soon after acceptance of the operating licence application, the Commission publishes notice that it is considering issuance of the licence. The notice provides that any person whose interest may be affected by the proceeding may petition the Commission to hold a hearing.

The requirements for a valid petition are the same as those described at the construction permit stage. If a public hearing is held, the same decision process described for the construction permit hearing is applicable.

Each licence for operation of a nuclear reactor contains Technical Specifications and an Environmental Protection Plan, which set forth the particular safety and environmental protection measures to be imposed upon the facility, and the conditions of its operation that are to be met in order to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public and of the surrounding environment.

Some eight to fifteen amendments to each licence are processed each year. These licence amendments are needed to reflect changes in facility design, regulatory requirements or operational events. Depending on the circumstances, these licence amendments can be processed within a day or may take a considerable period of time. Opportunities for public participation are offered in the licence amendment process. However, the fraction of licence amendments that involve a public hearing has been very small.

d) Additional licensing practices and regulations

The NRC has developed licensing policies and regulations to increase the efficiency and effectiveness of the process and enhance safety and reliability of nuclear power plants. These are embodied in NRC regulations for early site reviews, standard design certifications and combined construction permits and operating licences. NRC has promulgated a new 10 CFR Part 52 which in Subpart A – Early Site Permits – allows any prospective applicant for a construction permit or a combined construction permit and conditional operating licence to apply for an early site permit even if an application for a construction permit or a combined licence for a facility has not been filed. The application must describe the number, type, and thermal power level of the facilities for which the site may be used, and contain a plan for redress of the site for use in the event that the site preparation activities are performed under the permit and the permit expires without having been referenced in an application for a construction permit or a combined licence. The application must identify physical characteristics unique to the proposed site, such as egress limitations from the area surrounding the site, that could pose a significant impediment to the development of emergency plans.

An early site permit is an NRC licence, and is subject to the applicable procedural requirements of 10 CFR Part 2.

The issues presented in an early site permit proceeding are to a considerable extent environmental, but because they also involve significant safety issues, a report by the ACRS on the permit application is required.

Section 52.25 provides that issuance of an early site permit allows the holder of the permit to conduct site preparation activities without having to seek prior NRC approval. The holder possesses what is commonly referred to as an "LWA-1" for the site and may perform activities such as preparation of the site for construction, support facilities, excavation for structures, service facilities and construction of structures systems and components which do not prevent or mitigate the consequence of postulated accidents. The activities permitted are only those which will not result in any adverse environmental impact which cannot be redressed.

An early site permit is valid for an initial period of twenty years and may be extended for periods of up to twenty years each. Any person whose interests may be affected by renewal of the permit may request a hearing.

An early site permit for which a timely application for renewal has been filed remains in effect until the Commission has determined whether to renew the permit. If an early site permit is not renewed, it continues to be valid in any proceeding on an application for a construction permit or a combined licence which references the early site permit and was docketed prior to the expiration of the early site permit. An application for renewal must be filed not less than twelve nor more than thirty-six months prior to the expiration date.

An approved site may be used for purposes not related to the construction of a nuclear power facility, such as a fossil-fuelled station or a park, provided that the NRC is informed of all significant

non-nuclear uses prior to actual construction or site modification activities. A permit may be revoked if a non-nuclear use would interfere with a nuclear use, or would so alter the site that important assumptions underlying issuance of the permit were called into question.

The NRC, notwithstanding the "backfit" rule in 10 CFR 50.109, may not impose more stringent requirements during the initial or renewal period in which an early site permit is in effect unless it determines that either significant new information shows that more stringent requirements are necessary to bring the site or the permit into compliance with its regulations and orders in effect at the beginning of the initial or renewal period, or more stringent requirements are necessary for adequate protection of the public health and safety.

A person who has already filed an application for a permit to construct a commercial production or utilisation facility may request an early site review pursuant to NRC regulations in 10 CFR Part 2.

Subpart B of Part 52, Certified Standard Designs, sets forth the procedures and requirements for NRC approval of standard designs by rulemaking. These criteria will define minimum safety requirements for advanced reactors and will provide for assessment and documentation of the enhanced safety the Commission expects these reactors designs to embody. Part 52 deals only with procedural aspects of the certification of reactor designs; criteria for minimum safety requirements for advanced reactor designs are being developed. Ideally, designs for which certification is sought will be for an essentially complete plant. Applications for certification of a design must contain a level of detail comparable to that required for a final design approval under Part 50.

Subpart C of Part 52, Combined Construction Permits and Conditional Operating Licences, sets out the procedures for issuance of a combined construction permit and operating licence.

As noted above, the Atomic Energy Act has since its enactment permitted the NRC to issue a single licence for construction and operation of a nuclear facility. However, no application has ever been made for such a licence for a nuclear power plant.

The application for a combined licence may, but need not, reference a standard design which has been certified under Subpart B, or a site for which an early site permit has been issued under Subpart A. If the facility is to be of a design which has been certified, the scope of the proceeding on the application for a facility licence is narrowed, the major safety questions having been resolved in the earlier rulemaking on the design. Similarly, if the facility is to be located on a site for which an early site permit has been issued, the scope of the facility licence proceeding is further narrowed. If an early site permit is not referenced, the early site review procedures of Part 2 are available to expedite the environmental review.

The efficiency and effectiveness of the combined licensing process is maximized if both a certified standard design and a pre-approved site are referenced. It is anticipated that this will be the preferred approach, particularly with regard to standard designs. The NRC will give priority among applications to those which reference certified standard designs and preapproved sites.

The applicant must make good faith efforts to obtain the necessary certifications from State and local governmental agencies that the proposed emergency plans are practicable and that the responsible agencies are committed to execution of their responsibilities under the plans. If the certification cannot be obtained, the applicant must nonetheless demonstrate that the proposed plans provide reasonable assurance that adequate protective measures will be taken in the event of a radiological emergency at the plant. The antitrust review will be conducted as in the past for construction permit applications. Because an antitrust review can proceed in parallel with the technical review, the antitrust review should not affect the efficiency of the combined licence proceeding.

Subpart C incorporates, where appropriate, the technical standards and requirements of Part 50 as they would be applied to power plant licence applicants and licensees under the existing system.

The combined licence hearing will be governed by the appropriate sections of 10 CFR Part 2, and ACRS review of the application is mandatory. If the application does not reference a pre-approved site, the usual Part 51 procedures must be followed for the environmental part of the application.

Part 52 applies only to licensing of nuclear power plants. However, an early site review and issuance of a single licence are required in the case of an enrichment plant.

The NRC's current regulations at 10 CFR 50.51 provide that licences may be renewed by the Commission upon expiration of the term of the licence. To deal with the anticipated application for renewed licences, the NRC issued on 17th July 1990, a proposed regulation (10 CFR 54) which will establish the procedural requirements for processing the applications.

The proposed 10 CFR 54 prescribes the conditions under which renewed licences can be issued for a maximum term of twenty additional years beyond the term of the original licence.

INSPECTION OF NUCLEAR INSTALLATIONS

Through its inspection and enforcement programmes, the NRC maintains surveillance over the construction and operation of a plant throughout its lifetime.

The purpose of the construction inspection programme is to ascertain whether construction of reactor facilities is consistent with NRC requirements and commitments in the applicant's Safety Analysis Report (SAR). This inspection programme covers all safety-related construction activities at the facility site. For each construction area (structural concrete, piping and electrical, for example), the aspects of the inspection programme include: (1) examination of work performance and quality assurance procedures; (2) observation of work performance, testing, examination and inspection; and (3) review of records relative to quality. Results obtained from the above inspection activities are utilised to determine whether applicable requirements are met.

The pre-operational testing and operational preparedness phase verifies that the licensee has developed pre-operational tests for systems, structures and components related to safety and whether the results of such tests demonstrate that the plant is ready for operation as specified in NRC requirements and commitments in the SAR. It also verifies that the licensee has developed and implemented an operating organisation and procedures consistent with NRC requirements and commitments in the SAR.

The startup testing phase verifies that the licensee has developed tests for systems and components important to safety, and whether the tests conducted under both transient and operating conditions demonstrate satisfaction of NRC design requirements as delineated in the SAR. It also verifies that licensee management controls for the test programme are consistent with NRC requirements and commitments.

The purpose of the operations phase of inspections is to verify, through direct observation, personnel interviews, and review of facility records and procedures that the licensee's management control system is effective and the facility is being operated safely and in conformance with the regulatory requirements.

The NRC, as part of its inspection programme, provides for the assignment of resident inspectors at power reactors under construction or already operating. The licensee is required to provide rent-free office space for the exclusive use of NRC inspectors. The office must have full access to the facility and provide the inspector with both visual and acoustic privacy. The licensee must afford any resident inspector immediate, unfettered access to the facility.

In addition to regular inspections, staff members from several NRC offices investigate any significant incident and determine what hazards exist, if any. They also make sure that the licensee has taken or is taking timely and proper action to protect public health and safety.

The NRC maintains an allegation management system which is designed to assure that appropriate and timely consideration is given to all information it receives regarding design problems, unsafe operating practices or violations of NRC requirements. The information is received either from correspondence or telephone calls and can originate from licensee employees, contractor employees, corporate entities or from members of the public.

Inspection reports serve as the basis for action required to achieve compliance with the Commission's requirement. Action might include the amendment of licences so as to require design changes or changes in the technical specifications, notice of alleged violation, conference with the management, or if necessary, the shutdown of the installation until some important safety consideration is satisfied.

Finally, the NRC has a programme for the Systematic Assessment of Licensee Performance (SALP). It is an integrated agency effort to periodically collect and evaluate all available agency insights, data and other information on a plant/site basis, and in a structured manner in order to assess and better understand the reasons for a licensee's performance. Details on the SALP programme are described in chapter 0516 of the NRC manual.

DECOMMISSIONING

The NRC has amended its regulations to provide specific requirements for decommissioning. These amendments apply to the decommissioning of power and non-power reactors, fuel reprocessing plants, fuel fabrication plants, isotopic separation plants, uranium hexafluoride production plants, and independent spent fuel storage installations. They also apply to the decommissioning of non-fuel cycle nuclear activities, such as the manufacture of radiopharmaceuticals. Specifically, the regulations establish criteria in the following areas: acceptable decommissioning alternatives, assurance of the availability of funds for decommissioning, and environmental review requirements related to decommissioning. Among other things, the regulations require that before a licence can be terminated, the NRC must first determine that the licensee's decommissioning activities have been carried out in accordance with the approved decommissioning plan (if required for non-reactor licensees) and the NRC order authorising decommissioning and that a terminal radiation survey has been performed which demonstrates that the premises are suitable for release for unrestricted use.

As defined in NRC regulations, the term "Decommission means to remove (as a facility) safely from service and reduce residual radioactivity to a level that permits release of the property for unrestricted use and termination of licence".

Decommissioning activities do not include the removal and disposal of spent fuel which is considered to be an operational activity or the removal and disposal of non-radioactive structures and

materials beyond that necessary to terminate the NRC licence. If nuclear facilities are to be re-used for nuclear purposes, applications for licence renewal or amendment or for a new licence are submitted according to the appropriate existing regulation.

The decommissioning regulations provide a regulatory framework for more efficient and consistent licensing action related to decommissioning. The regulations make clear that the facility licensee is responsible for the funding and completion of decommissioning in a manner which protects public health and safety and the environment.

The NRC is preparing a Standard Review Plan for the review of decommissioning plans for commercial power reactors.

GEOLOGIC REPOSITORY FOR DISPOSAL OF HIGH-LEVEL WASTE AND SPENT FUEL

NRC's licensing authority over federal (DOE) facilities for disposal of commercial high-level waste and spent fuel initially was established by the Energy Reorganization Act of 1974. The Nuclear Waste Policy Act of 1982 (NWPA) revised and expanded NRC's responsibilities. It added significant requirements for consultation between NRC and its prospective licensee, DOE, well in advance of DOE's submission of an application for NRC authorisation to construct a geologic repository. The NWPA establishes a special framework for completing actions, including a period for NRC's acting on DOE's construction application (submission of which currently is scheduled in 2001). The pre-licensing consultation provides opportunity to identify and, where possible, resolve potential licensing issues as part of efforts to meet the NWPA-mandated timetable. (NWPA included a detailed site selection procedure, but in 1987 it was amended to focus exclusively on the Yucca Mountain site in the state of Nevada.)

By regulation, NRC requires that DOE's application to construct a repository be subject to NRC's formal adjudicatory hearing process. In large measure this process will be like that applicable to construction permits for power reactors. By virtue of stipulations in the NWPA, as well as NRC regulatory requirements governing the special case of a repository, there will be differences in regard to information required from DOE as applicant as well as in regard to the hearing process. For example, by regulation only the Commission itself may authorise construction of a DOE repository; and the NWPA makes stipulations about NRC's acceptance of DOE's Environmental Impact Statement. Further, regulatory provisions concerning "early site review" for power reactors do not automatically apply to the case of a DOE repository. Pursuant to NWPA and regulatory requirements, however, DOE's site characterisation and selection activities are subject to extensive review. Additionally, the NWPA has special provision for judicial review of certain actions, including Commission action on DOE's repository application.

NRC's regulations may be revised over time to clarify or refine requirements as the NWPA programme evolves. In particular, the regulations will be amended so as to implement more general standards that the Environmental Protection Agency plans to promulgate in 1992.

The NRC has provided in its regulations for special procedures for the high-level waste proceeding, including procedures for use of a "Licensing Support System" (LSS). The LSS is intended to provide for the entry of, and access to, potentially relevant licensing information as early as practicable before DOE submits the licence application for the repository to the Commission. The LSS would contain the documentary material generated by DOE, NRC and other parties to the licensing proceed-

ing, which are relevant to licensing of the repository. All parties would then have access to this system well before the proceeding begins. Access to these documents will be provided through electronic full text search capability. This provides the flexibility of searching on any word or word combinations within a document and thus facilitates the rapid identification of relevant documents and issues. Because the relevant information would be readily available through access to the LSS, the initial time-consuming discovery process, including the physical production and on-site review of documents by parties to the HLW licensing proceeding, will be substantially reduced.

LOW LEVEL WASTE (LLW) DISPOSAL SITES

The Low-Level Radioactive Waste Policy Amendments Act of 1985 (LLRWPA) authorises the formation of regional compacts, where each compact is to designate one active site for disposal of LLW, and establishes a system of milestones, incentives and penalties to ensure that states and compacts will be responsible for LLW generated within their boundaries. The NRC has developed regulations in 10 CFR Part 61 and guidance that will assist the states and compacts in developing the LLW disposal facilities as required by LLRWPA. Under the provisions of the LLRWPA, the Federal Government is responsible for disposing of commercial LLW above Class C concentration limits. The NRC requires disposal of "Greater than Class C" wastes in the deep geological repository for high-level waste, unless proposals for disposal of such waste in a disposal site are approved by the Commission.

In addition, the NRC is establishing procedures for licensing disposal technologies other than shallow land burial and is working on programmes to ensure licensing of new disposal sites in a timely manner.