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III. OTHER PROVISIONS

SPANISH NUCLEAR SAFETY COUNCIL

2136 *Instruction IS-11, revision 1, of 30th January 2019, of the Nuclear Safety Council on nuclear power plant operating personnel licenses.*

Article 2.a) of Law 15/1980, of 22nd April, creating the Nuclear Safety Council, attributes to this public body the faculty of "drawing up and approving instructions, circulars and technical guides relating to nuclear and radioactive installations and to activities relating to nuclear safety and radiation protection".

Likewise, Article 2.l) assigns to the NSC, among others, the function of "Granting and renewing the Operator and Supervisor Licenses for nuclear installations, through the undertaking of tests established by the Council itself".

Instruction IS-11, of 21st February 2007, of the Nuclear Safety Council, develops the regulatory framework established in the Regulation on Nuclear and Radioactive Installations (RINR, in its Spanish acronym), approved by Royal Decree 1836/1999, of 3rd December, regulating the types of license; listing the obligations and faculties of the licensed personnel; addressing the characteristics of programmes for the qualification of applicants for operating licenses and those required for the maintenance of the qualifications of licensed personnel; defining the necessary requirements to be an applicant for an operating license; establishing the rules governing the application, granting and renewal of operating licenses; as well as, including aspects that regulate the conditions under which the licenses remain active and are suspended due to inactivity.

The present revision of IS-11 maintains the same scope as the previous Instruction, but the experience accumulated since its publication in 2007 makes it advisable to revise it, providing greater consistency and precision in all aspects that apply to operating licenses. Among the most relevant aspects, mention should be made of the express requirement for the Systematic Design of Training in line with recognised international standards to guarantee the qualification of plant personnel, already required by the IS-12, of 28th February 2007, of the Nuclear Safety Council, to all personnel working for a nuclear power plant without a license; as well as the improvements introduced in the definition of the conditions of active permanence in the post and measures of recovery before its loss; and the definition of the concept of inactivity of an operating license, conditions of suspension of an operating license for inactivity and regulation of the lifting of such suspension. Other aspects of improvement include the requirements for maintaining the qualifications of licensed personnel, as well as the incorporation of specific definitions.

By virtue of the foregoing, and in accordance with the legal qualification foreseen in Article 2.a) of Law 15/1980, creating the Nuclear Safety Council, following consultation with the affected sectors and the appropriate technical reports, this Council, at its meeting held on 30th January 2019, has agreed on the following:

First. *Subject matter and scope of application.*

The objective of this Instruction is to establish the general criteria to be met in relation to nuclear power plant operating personnel licenses granted by the Nuclear Safety Council (hereinafter NSC).

The scope of application of this Instruction includes the licensees of the authorisations in force for nuclear power plants (hereinafter, the licensees), any person holding an operator's or supervisor's license for a nuclear power plant and any person aspiring to obtain one of these licenses, all in accordance with the terms used in the Regulation on Nuclear and Radioactive Installations (hereinafter, RINR)

and up to the granting of the nuclear power plant dismantling permit. Once the situation of definitive cessation of a nuclear power plant has been declared, the NSC shall determine the type of licenses required, as well as the method for obtaining and renewing them and the rest of the functions and requirements assigned to each of them, this Instruction serving as a supplementary regulatory framework.

Second. *Definitions.*

The definitions of terms and concepts used in this Instruction correspond to those contained in the following regulation: Law 25/1964, of 29th April, on Nuclear Energy, Law 15/1980, of 22nd April, Creating the Nuclear Safety Council, and Royal Decree 1836/1999, of 3rd December, approving the Regulation on Nuclear and Radioactive Installations.

In addition, for this Instruction, the following specific definitions are considered:

Analysis of post: A systematic process of analysis aimed at determining the skills required for the performance of each job, as well as the behaviour in and expected results from its competent performance, and whose scope could range from a skills analysis to a complete task analysis.

Task analysis: A systematic process whose objective is to determine the tasks assigned to a job, the knowledge, skills and abilities necessary for its attainment, as well as the behaviour in and expected results from their competent performance. Depending on the jobs it is aimed at, the task analysis may vary in complexity and scope, but the result must contain at least one list of tasks for each job defined, assigning to them the body of knowledge, skills and abilities needed, and the behaviour or result expected after their execution.

Candidate: The person who initiates the training process established in this Instruction in order to qualify as the holder of an operating license.

Certification: Documentary confirmation issued by a recognised company or organisation concerning an individual who has achieved one or more qualification requirements.

Skills: A combination of knowledge, skills and abilities required to perform a job satisfactorily.

Qualification: The combination of academic qualifications, experience and training necessary for the performance of a job. This includes the certificates required by Spanish regulations.

Systematic training design: A systematic process whose objective is to determine: the learning objectives according to the results obtained from an analysis of the previous job; the design of the training programme and its implementation based on said learning objectives; the tools and human resources necessary for its satisfactory achievement; the evaluation of the degree of personal compliance with the planned learning objectives; and finally, the evaluation and review of the training programme, based on the performance of the personnel in their job. Job analysis can comprise a range of methodologies starting from the lower complexity of a detailed skills analysis, and moving up to a complete task analysis.

Supervised study: Training carried out during working hours without their being any other concurrent activity, by means of the assistance or support of a tutor in charge of guiding the syllabus, answering questions and evaluating the assimilation of students; all this when it is foreseen in plant procedures.

Evaluation of personnel with operating licenses: An objective estimate which allows the holder of the current authorisation to provide guarantees regarding the certification of the competence of the personnel it has with an operating license. Likewise, this objective estimation will make it possible to gauge the degree of assimilation of said personnel in order to determine whether they have acquired the knowledge, skills and abilities contained in the training action, and the need for possible retakes when appropriate.

Experience: Activities developed within the framework of a contractual relationship in the industry, in the areas of design, construction, operation, testing, or maintenance. The mere participation in activities and training is not considered experience.

Prior training: A set of certified courses that are credited to a person prior to joining a job or a selection process as a candidate for an operating license.

Initial training: A set of courses programmed for workers who are going to occupy a job, as a condition to reach the necessary qualifications for the performance thereof.

Basic training: Part of the Initial Training dealing with general aspects to be taken on by any person carrying out any activity taking place at a nuclear power plant or assigned to its external technical services.

Specific training: Part of the Initial Training that deals with the specific aspects of the job, which must be known about by anyone who is going to gain access to it.

Continuous training: A set of scheduled courses for personnel providing services for a nuclear power plant, the purpose of which is to maintain and update their skills.

Inactivity of an operating license: This occurs when the person holding a license is not working operating shifts.

Integrity of the tests: It is the set of conditions that are established to preserve the characteristics and requirements that guarantee that the tests carried out evaluate the competences of the personnel that carry them out, including the condition of confidentiality.

Teaching: It is one of the characteristics of the training action that a person receives and which means that the action is taught, that is to say, imparted or directed in person by an instructor.

Critical task: A task is critical for safety when its inadequate or late execution, or its omission by operations personnel, could result in adverse consequences or a significant degradation in the prevention or mitigation capacity of the nuclear power plant.

Work in operations in shifts: Working in operations in shifts will be considered as such for licensed personnel who carry out the proper activities of the post of operator or supervisor according to a calendar of shifts distributed in a balanced way among its members, the fulfilment of their continuous formation and training programme, the time periods foreseen as far as the functions of retention are concerned, as well as the programmed breaks and vacations as part of labour rights. Cases of sick leave after 15 days, activities in support of the operation outside of calendar shifts, the performance of another job at the plant, and particular activities of any kind will not be considered shift work.

Operation or service shift: This is the group of workers that make up the operating team during the time interval corresponding to a shift and includes licensed personnel and auxiliary personnel, whose functions may be performed in the control room or outside it, in accordance with the provisions of the installation's Operating Regulations.

Third. *Licenses of operations personnel.*

3.1 Types of licenses. The personnel directing the operation and those operating the control and protection devices from the main control room, (or from the panels and controls located outside the main control room, assigned to such personnel in the plant procedures) shall be provided with a supervisor and operator license, respectively, granted by the Nuclear Safety Council.

It will be necessary to have one of these licenses for local supervision of the nuclear fuel core alteration and movement manoeuvres in the installation up to its exit from the plant buildings and its placement in the means of transfer or transport to the storage facilities, whether inside or outside the installation. This local monitoring function will be performed without any other activity being assigned to it.

Operation is understood to mean any manoeuvre affecting reactivity, the power level of the nuclear reactor, the cooling of the fuel or the integrity of the barriers against the release of radioactive material, as set out in the operating procedures.

The following operating licenses are established:

311 Supervisor License. The Supervisor license (LS, in its Spanish initials) enables the operation of the nuclear power plant to be managed in accordance with its operating procedures, including the activities of the operators subject to the license, within the limits and conditions defined by the official operating documents. It also enables the control and protection devices to be operated in circumstances that are specifically procedural or necessary for nuclear safety. The LS authorises the capability of occupying the posts of shift supervisor, room manager, shift manager or assistant shift manager, depending on the denomination established in the Operating Regulations of each nuclear power plant. The LS also authorises the supervision of core alterations and the movement of nuclear fuel.

312 Operator License. The operator license (LO, in its Spanish initials) enables, under the immediate direction of a supervisor, the operation from the main control room, or from the panels and controls located outside it where appropriate, of the control and protection devices of a nuclear power plant in accordance with its operating procedures; likewise, if so specified in the license application, it enables the supervision of core alterations and the movement of nuclear fuel. The LO qualifies the holder to occupy the positions of reactor operator, turbine operator and, if applicable, to supervise core alterations and the movement of nuclear fuel. Licenses for such actions are called reactor and turbine operator license (LORT, in all cases with their Spanish initials), reactor operator license (LOR), turbine operator license (LOT) and operator license with capacity for the supervision of the movement of nuclear fuel (LOSMCN).

32 Exceptions. Persons involved in practical training exercises in the Control Room in the presence and under the supervision of a licensed operator or supervisor as part of an operator or supervisor training programme shall be exempted from the obligation to hold such a license. In the particular case of an applicant for LO, the applicant must have previously completed and passed the initial phase of training on a full-scope simulator with a suitable Control Room (SSC) accepted by the NSC for the nuclear power plant for which the license is requested.

33 Functions. The detailed functions of each post requiring an operating license shall be defined in an administrative operating procedure.

34 Number of licenses. Without prejudice to the provisions of the RINR, the official operating documents of each plant shall establish the minimum number of supervisor and operator licenses that must be in service in each operating condition of the plant, in accordance with its technical and administrative characteristics, as well as with the functions assigned to the supervisory and operator posts.

The minimum total number of licenses available at a nuclear power plant should be analysed and defined in the document on Technical Capacity and Minimum Staffing, associated with the Plant Operating Regulations, and should be sufficient, among other considerations, to allow compliance with the on-going training programmes for licensed personnel.

35 Duties and powers of licensed personnel. With regard to the duties and powers relating to licensed personnel, the following should be considered:

3.5.1 The supervisor shall be obliged to direct operations in compliance with the Operating Technical Specifications, the Operating Regulation, the Internal Emergency Plan and any other official document of the installation as regards its operation. It must also faithfully follow the operating regulations contained in the operating procedures, a copy of which, updated, must

permanently be located in a pre-set place. When there is no procedure for the performance of a given operation, the supervisor shall undertake to write up such a procedure prior to performance and shall include it in the operations log. In the event of an urgent situation, he shall adopt whatever measures he considers to be appropriate and place them on record in the said log.

3.5.2 The operator is obliged to operate the control and protection devices under the direction of the supervisor and, in the event of holding the appropriate license, will supervise the alterations to the nuclear fuel core and movement, complying at all times with the operating standards, the Operating Technical Specifications, the Operating Regulation and any other official document of the installation in relation to these operations.

3.5.3 The supervisor of a nuclear power plant has the faculty and obligation to stop operation of the plant at any time, both in the situations contemplated in the Operating Technical Specifications and in situations of manifest danger not contemplated therein, if he considers that the due safety conditions of the installation have been reduced. This same faculty and obligation falls on the operator in the exceptional case of absence from the control room of a person with a supervisor's license.

3.5.4 Supervisors and operators are obliged to inform the licensee and, in turn, have the right to be informed by the licensee of any defects that they consider to exist in the official operating documents, operating procedures or components and equipment thereof.

3.5.5 The licensed personnel who are on duty during the operations shift, in accordance with their functions, should be aware of and authorise works carried out at the installation, whenever these directly affect its operation.

3.5.6 The service supervisor shall not be absent from the nuclear power plant. The service operator may not leave the control room without the supervisor's authorisation, and without being replaced by another operator or exceptionally by the supervisor himself on a temporary basis after having initiated the corresponding immediate action to maintain the composition of the shift team. These replacements and their duration shall be recorded in the operations log.

3.5.7 The holder of an LS or LO is obliged, without any other concurrent task, to make good use of the continuous training programme, as well as to carry out the performance tests and annual practices established therein in order to demonstrate their qualification for the position they occupy. The holder of the authorisation shall provide the means and resources for compliance with the continuous training and coaching programmes of the licensed personnel under their charge.

3.5.8 The shift supervisor (a post with a supervisor's license established in the Nuclear Power Plant Operating Regulations) will participate actively in leading the continuous formation and training of the members of their operation team.

3.5.9 The holder of an LS or LO must undergo an annual medical examination performed by an occupational risk prevention service to accredit their suitability for the performance of their job, including the requirements of physical health and psychological stability, as well as verification of their suitability as a worker exposed to the ionising radiations associated with their job.

3.5.10 The holder of an LS or LO will not be able to perform their functions under the effects of alcohol or any other type of drug or substance that may adversely affect their physical and mental fitness and, consequently, the competent and safe fulfilment of their licensing duties.

Fourth. *Qualifications of Licensed Personnel.*

4.1 Training programmes. The licensee must have initial and on-going training programmes for licensed personnel, the general lines of which shall be included in the Operating Regulations. In the annual training reports (required in the conditions for the Operating Authorisations of nuclear plants), sufficient information

on the continuous training and coaching programmes shall be included, as well as on the variances incurred therefrom.

4.2 Systematic training design. In order to draw up and update initial and on-going training programmes, the licensee shall start from a systematic process of identifying their qualification needs, using job analysis methodologies for posts that need a license, with a level of detail corresponding to a complete task analysis. This process and these methodologies will be the basis on which the following elements of the Systematic Design of Training (hereinafter, DSF) will be built:

1. Determination of learning objectives, derived from an analysis that describes appropriate and expected behaviour after the delivery of training and coaching.
2. Design and implementation of the training programme based on the learning objectives.
3. Use of tools and human resources necessary for the training programme's satisfactory achievement.
4. Evaluation of the degree of personal compliance with the planned learning objectives.
5. Evaluation and review of the training programme, based on the performance of the personnel in their job.

4.3 Evaluation and review of training programmes. These programmes shall be evaluated annually and appropriately revised by the licensee to guarantee their effectiveness, reflect their experience in the nuclear industry and the modifications affecting the nuclear power plant, procedures, standards and quality assurance requirements. In the case of initial training programmes, they shall be reviewed each time new license applications are made. The holder shall keep records of these programmes in archives that guarantee their integrity and accessibility.

4.4 Qualifications required to obtain a supervisor or operator license. Applicants for an operating license must demonstrate the following qualifications:

441 Academic training. Applicants for an operating license must possess the qualification required in the RINR for the license applied for. Applicants for an LS or LO must hold a university degree in accordance with Organic Law 6/2001, of 21 December, on Universities and Royal Decree 1393/2007, of 29 October, which establishes the organisation of official university education, or equivalent degree.

442 Specific training. Specific initial training programmes should include the theoretical and practical knowledge appropriate to the license requested, on scientific and technological foundations applicable to nuclear power plants, reactor physics and operating principles applicable to nuclear power plants, nuclear power plant technology, nuclear power plant functioning and operation, including incidental and accidental situations, radiation protection, operating standards and documents, identified in accordance with the methodology of Systematic Training Design. The contents of these subjects developed in Appendices 1 and 2 of this Instruction will be taken into account.

The number of hours accounted for which are dedicated to specific training under supervised study, by personnel with adequate and accredited training and experience, will have a limit that must be reflected in the plant's training procedures. These time periods shall not exceed fifty percent for LS candidates or twenty-five percent for LO candidates with regard to the values recommended by the NSC in relation to time dedicated to specific training. For applicants for a license that enables them to supervise the movement of nuclear fuel, no hours of supervised study training will be counted.

Exceptionally, the Licensing Tribunal may accept applicants for examination whose training does not comply with this proportion of supervised study, in a responsible manner.

44.3 Training. The initial training programme shall include training in a full-scope Control Room Simulator (hereinafter, SSC) suitable and accepted by the NSC for the nuclear power plant for which the license is requested, as well as on-the-job training. Detailed SSC and on-the-job training programmes will be submitted to the Licensing Tribunal prior to commencement of implementation.

44.3.1 Training at the SSC. The hours devoted to training in the simulator for applicants for a license shall be sufficient to ensure that they acquire the capacity to operate, control or direct, depending on the license, the state and evolution of the plant from their post, under normal, transitory and accident conditions, following the corresponding training programme. Initial simulator training shall include, among others, the operating situations listed in Appendix 3, adequately combined with the accidental sequences that contribute most to risk, deduced from the probabilistic safety assessments of the installation for which the license is requested, as well as those considered relevant to the processes of the licensee for the tracking of the operating experience, and shall be complemented by the minimum competencies to be trained that are applied as set out in Appendix 4.

For SL candidates, for the purposes of accreditation, only the hours of training performed in the single shift supervisor position shall be counted, except in those circumstances where two supervisors are required for the simultaneous execution of emergency operating procedures. For candidates for LO accreditation, the hours of simulator training performed in a position that does not correspond to that to which they are aspiring may be taken into account, valued at fifty percent, up to a maximum of fifty percent of those recommended by the NSC. The composition of the training shift shall not exceed the number of licensed control room posts established in the official operating documents of the plant.

44.3.2 On-the-job training. On-the-job training for an LS candidate or LO candidate, contained within in a detailed programme, will include on-the-job training in the control room and on-the-job training in the plant, are far as operating practices are concerned, where candidates are performing at least the same functions as they would do once licensed. In the case of LS candidates, work experience in the main control room (or from the panels and controls located outside the main control room, assigned to licensed personnel in plant procedures) will always be carried out under the presence and direct supervision of a person in possession of a supervisor's license. In the case of LO candidates, work experience in the main control room (or from the panels and controls located outside the main control room, assigned to licensed personnel in plant procedures) will always be carried out under the direct supervision and tutelage of a person in possession of the license who authorises the performance of the functions that are the subject of such work experience. In both cases, to preserve the safety of the installation, on-the-job training shall be conducted under the non-delegable responsibility of the on-call supervisor. For all license applicants, account shall be taken of the minimum training competencies applicable to them, as set out in Appendix 4. In addition, it is necessary for all license applicants to accredit during their practical training period at least one refuelling session by carrying out tasks related to the post to which they are applying.

44.3.3 Training to supervise the movement of nuclear fuel. If the license requested (once gained by the candidate) qualifies (the latter) for the supervision of the movement of nuclear fuel, the training, contained within a detailed programme, will include the performance of work experience in all tasks relating to these functions, in normal as well as incidental and accidental situations, as well as attendance at least at one fuel re-loading, all under the direct supervision and tutelage of a person holding an equivalent license.

444 Experience for supervisor licenses. In the case of applicants for LS, a minimum of three years' experience in the position of licensed operator will be required in an effective manner, although exceptionally the Licensing Tribunal may accept a minimum of two years' experience. This experience cannot only come from one LOT and must be accredited prior to licensing. During this period, the candidate must have participated in the activities and manoeuvres typical to the post of licensed operator, such as: fuel reloads, starts, load variations, shutdowns and other related actions, as well as having adequately completed and taken advantage of their continuous formation and training programme.

If the applicant for a supervisor's license comes from an LOR, his or her qualification programme shall explicitly include the specific training required in the LOT position and training in all LOT tasks obtained through the DSF.

445 Experience for operator licenses. Applicants for LO will not need to prove previous experience.

Fifth. Application for and granting of licenses.

5.1 Application for licenses. The licensee shall inform the NSC by letter of the intention to submit candidates for licensing examination, as well as to submit each candidate's initial training programme, in both cases prior to the start of its implementation, for acceptance of the programme by the Licensing Tribunal, the latter is considered to be accepted if there is no resolution to the contrary.

The official request of the applicant shall be made by means of a request addressed to the President of the NSC at least three months prior to the date foreseen for the first examination, which shall include their personal data and the license which they are applying for, and shall be accompanied by the following documentation:

- a) A copy of their national identity document (DNI) or passport.
- b) Information on the academic and professional qualifications of the applicant and on their experience.
- c) Certification of training and coaching received, or in progress, as a license applicant.
- d) Declaration by the licensee which states the functions to be assigned to the applicant and their favourable assessment on the suitability necessary for the performance thereof.
- e) Medical fitness certificate, issued by an occupational risk prevention service following analysis of the physical health and psychological stability requirements for the performance of the activities proper to their licensed post and those involving a risk of exposure to ionizing radiations associated with the workplace. This certificate may not be more than one year old.

The medical certificates of applicants for licenses shall specify that their physical or psychological conditions will not adversely affect the performance of their duties as licensed personnel; they shall also include a statement of their fitness to work with ionising radiation, in accordance with the provisions of the Ionising Radiation Health Protection Regulations. These medical certificates shall specify the conditions of their suitability.

At any time since a license is requested, the NSC may request the additional information required for the process of granting the license to such candidates.

5.2 Subsequent applications. Applicants who fail to pass the license examination may make a new application on the basis of official notification of the results of the examination. The new application must update the documentation presented in the previous application and include a statement from the licensee detailing the training programme and

additional training undertaken or in progress, and their favourable assessment of the applicant's suitability for the performance of the functions to be assigned to them.

5.2.1 Validations. In the event that a license applicant has passed two of the three parts of the license examination, one of which must necessarily be the written examination, they may request, on a single occasion, the validation of the passed parts together with the subsequent application, providing the appropriate points in favour and attaching the documentation shown in 5.2. The Licensing Tribunal may accept such an exemption, if it considers it to be sufficiently justified, and no more than one and a half years have elapsed since the date of completion of the last license examination test in which the parts requesting validation took place and the first test of the new examination. In any case, the Licensing Tribunal will make the corresponding reasoned resolution of its decision.

5.3 Granting of licenses. The NSC will grant the operator and supervisor licenses with the limiting conditions deemed appropriate in each case, provided that the following requirements have been met:

- a) That the applicant has been admitted by the corresponding Licensing Tribunal upon fulfilling all the requirements set forth in this Instruction.
- b) That the applicant has passed the licensing examination deemed appropriate by the relevant Licensing Tribunal to ensure that the latter has the competencies to ensure the safe operation of the plant for which the license is sought.
- c) That by the time the license is granted, the applicant complies with all requirements, both medical fitness and established experience, training and initial training. That, at the time the license is issued, the medical fitness certificate must not be more than six months old.
- d) That there must be a direct labour relationship with the holder, as a prerequisite to be able to exercise the functions for which the license qualifies the latter.

Compliance with requirements (c) and (d) shall be certified by the holder.

Licenses shall include the terms that apply, if any, and the limiting conditions that are deemed appropriate.

5.4 License exam. The license exam to obtain an LS or LO will consist of a set of theoretical and practical tests. The objective of the license examination is to check for an adequate level of knowledge, skills and abilities necessary for the performance of the functions proper to the license in question, which shall be determined taking into account the learning objectives deduced from the systematic analysis of tasks performed by the holder, including the applicable appendixes to this Instruction. As a general rule, this examination will consist of three independent parts: a written examination, a simulator examination and an on-site examination. Each of the parts must be passed. The description of each part is as follows:

5.4.1 Written exam. It will consist of a representative selection of questions that will take into consideration what is generally described in 5.4. and will take into account the training programme accepted by the Licensing Tribunal.

5.4.1.1 Written exam for supervisor's license. For LS applicants, the examination shall include at least a representative sample of the subjects listed in Appendix 1, Content of the written examination for Operator's license applicants, with the depth and scope appropriate to the supervisor's license, as well as at least a representative sample of the specific subjects for an LS listed in Appendix 2, Additional content of the written examination for applicants for a Supervisor's license, insofar as they are applicable to the nuclear power plant for which the license is requested.

5.4.1.2 Written exam for operator's license. For applicants for LO, the examination shall include at least a representative sample of the subjects specified in Appendix 1,

Contents of the written examination for candidates for Operator's license, insofar as they are applicable to the post and to the nuclear power plant for which the license is requested.

5413 In the case of LOSMCN the examination will be limited to aspects related to their functions.

542 Simulator test. The objective of the simulator examination is to test the ability of the LO or LS candidate to perform his or her functions in the control room, with appropriate levels of knowledge, skills and abilities, operating and supervising plant systems under dynamic conditions, or directing such activities, both individually and as part of the operation team, and applying his or her knowledge in a practical manner. This test, which is eminently practical in nature, will be performed in an SSC which is suitable and accepted by the NSC for the nuclear power plant to which the license refers. To this end, the applicant shall successively occupy the positions for which the license requested qualifies them, forming part of a team whose composition shall be proposed by the holder and accepted by the corresponding Licensing Tribunal.

543 Plant examination. The objective of the on-site examination is to check the applicant's adequate familiarity and knowledge of the nuclear power plant for which it is requested (especially in those areas that could not be verified elsewhere in the license examination), its documentation and procedures, and its operating practices. The examination will focus on aspects related to the functions of the license applied for.

544 Passing the license exam and possible retakes. Each part of the license exam will be eliminatory in nature. The Licensing Tribunal shall weigh the contents of the examinations according to their importance for safety. Exceptionally, the Licensing Tribunal may accept in a reasoned manner, only once per sitting, the exclusive retake of one of the three parts of the license examination.

545 Required information for the Licensing Tribunal. For the preparation of the corresponding examinations, the licensee shall provide the documentation used in the training of the applicants requested by the Licensing Tribunal, and in the terms required in each case, including also the limitations existing in the SSC, and identifying the systems and functions that may be affected by it.

546 Conditions of integrity of the tests. The function of the holder is to ensure the integrity of the license examinations. All staff and external personnel directly or indirectly involved in the process of making and applying for the license examinations are obliged to keep and guarantee the conditions of integrity by written commitment, which will be available to the Licensing Tribunal.

5.5 Period of direct effective tutelage after the granting of the license. Once the licensee is in possession of the LS granted by the NSC, for at least the first twenty-one days in which they act as service supervisor, direct effective tutelage of their performance in the control room shall be carried out by an experienced supervisor in possession of a license which is more than two years old.

Likewise, once the licensee is in possession of the LO granted by the NSC, for at least the first forty-two days in which they act as a service operator, direct effective tutelage of their performance in the control room must be carried out by an experienced operator in possession of a license which is more than two years old.

If the LS had not previously performed the LOSMCN, and for the extended LOSMCN, once this license extension has been granted and for at least the first twelve hours on full shifts in which they act as a fuel movement supervisor, there shall be direct effective tutelage of their performance by an experienced person in possession of a license who is a trainer for such supervision, and who has at least participated in one refuelling action.

Sixth. *Continuing training and training of licensed personnel.*

6.1 Training programmes. The holder of an LS or LO shall follow a programme of continuous training and coaching, programmed without any other concurrent task and drawn up by the holder with the aim of ensuring that they maintain the appropriate level of knowledge, skills and abilities for the satisfactory performance of their functions. The provisions of Articles 4.2 and 4.3 of this Instruction shall be considered for its design, evaluation and review. The licensee must also establish mechanisms for requesting, analysing and, where appropriate, taking into account comments provided by licensed personnel.

6.2 Programming. Continuing education and training shall be scheduled, without any other concurrent task, for one calendar year and shall consist of at least two main parts: lecture sessions and practical sessions at the SSC. The cyclical aspects of the programme, referring to the review of general and specific knowledge, as well as to that on normal operation, failure and emergency tasks that must be trained for in the SSC or, failing that, in the Control Room, obtained from the Systematic Design of the Training, will be included in a plant document, specifying the period of time in which its review and complete training is foreseen.

6.3 Teaching sessions. The continuing training and coaching programme shall include lecture sessions (theoretical and practical) to review the general and specific knowledge of the nuclear power plant, Appendixes 1 and 2, and, as appropriate, shall emphasise in scope and depth the aspects included in Appendix 5, Minimum contents for the continuous education and training programme for licensed personnel. In addition, these sessions will contain an update of their training, distributed regularly and continuously throughout the period, through the delivery of operational experience and plant modifications. It shall also ensure that the contents of all abnormal and emergency procedures are reviewed on a regular basis. As a result, the licensed personnel must show satisfactory knowledge of changes in the design, procedures and licensing conditions of the nuclear power plant, as well as in regard to the components, systems, physical principles, limits and procedures involved in the operating skills trained for at the SSC.

Supervised study may only be used when, for justified reasons, personnel with an operating license are unable to attend the scheduled sessions, and training in class is not possible.

6.4 Time requirements for teaching sessions. Licensed personnel will receive a minimum number of hours per year in class sessions, scheduled without any other concurrent task, to which must be added, if applicable, the part that comes from the necessary retakes that have been identified in the continuous training and coaching process, which is necessary to guarantee the systematic maintenance of their skills. This training in class sessions may be given during on-call days provided it is guaranteed that, in the event such on-call status is activated, the possibility exists of receiving the training during days programmed for it.

6.5 Training at the SSC. The on-going training programme will also cover annual training at the appropriate SSC and which is accepted by the NSC, forming part of an operations shift under the same conditions as are required for operation in the control room and of an adequate duration for compliance with the training objectives. The training hours will be effective in posts for which the license qualifies them. In the case of LORT, training will be carried out by alternating between the reactor operator and turbine operator stations and this alternation will guarantee training in all the tasks foreseen for each licensed operator post. During this SSC training, the operational situations listed in Appendix 3 (which may be validated through their training from the control room in real manoeuvres that have taken place) will be reviewed, among others, combined appropriately with the accidental sequences that contribute most to risk, deduced from their probabilistic safety analyses,

as well as the critical tasks identified and those considered relevant in the processes of the licensee for the tracking of operating experience, and the minimum skills to be trained on included in Appendix 4. Updating of procedures and design modifications will also be covered.

The supervisor license courses will also provide the necessary training to operate the control and protection devices in specifically procedural or nuclear safety circumstances identified in the DSF.

6.6 Time requirements for annual SSC training. In order to ensure the systematic maintenance of their skills, licensed personnel shall train a minimum of annual hours at their SSC post as part of an operating shift. No other actions at the SSC other than operating as part of an operating shift shall be counted. In the case of a LORT license, the minimum time of annual hours covering the reactor operator and turbine operator posts for which the license qualifies them will be sufficient to ensure their skills in the two licensed posts. In the case of supervisor licenses, the SSC training time periods required to maintain training in procedural or nuclear safety circumstances will be increased. These minimum time periods will be increased when retakes identified as necessary in the continuous training and coaching process have to be taken.

6.7 Continuing training and coaching for the supervision of the movement of nuclear fuel. The continuous training programme for the supervision of alterations to the core and movement of nuclear fuel will consist of lecture sessions and practical training in the aspects related to their activities, and must comply with an additional minimum that guarantees the systematic maintenance of their skills.

6.8 The incorporation of new licenses into the continuous formation and training programme. The person who obtains a new operating license, after having completed the effective mentoring period referred to in Article 5.5, shall immediately be incorporated into the planned continuous formation and training programme activities.

6.9 Evaluation of licensed personnel. The continuous formation and training programme shall include the assessment of the individual performance of licensed personnel and the maintenance of their skills, through written tests and practices that enable the holder to verify and certify their proficiency for the post.

The check made of its utilisation by means of tests will affect all the subjects directly applicable to the functions of licensed posts, their contents will be adapted to the formative action maintaining a level of difficulty coherent with the learning objectives and it will be based on an objective evaluation.

In addition, each year practical tests will be carried out in the SSC based on an objective and independent evaluation of the contents of the year's programme. In the latter, in addition to the individual evaluation, the overall evaluation of the operations shift will be covered.

In all tests, both the contents and the administration of the tests shall meet the conditions necessary to ensure the integrity of the tests. The holder will have rules on assessment, which will be specific to each training environment.

In the event that the satisfactory use of licensed personnel or the maintenance of their skills in continuous training programmes is not demonstrated, the licensee shall adopt the necessary measures to guarantee adequate training for the safe performance of their functions, not excluding consideration of their temporary withdrawal from the shift, in which case the licensee shall report within fifteen days to the NSC, which may require the provision of additional training before the licensee may return to perform the functions assigned to it by the NSC.

The whole process of evaluation of licensed personnel will be properly documented and its final result will be included in the annual training reports.

The NSC may carry out complementary tests and practices with a view to verifying the training of licensed personnel.

6.10 Evaluation of the continuous formation and training programme. The continuous formation and training programme of personnel with operating licenses, as well as the procedures and criteria used in its elaboration, shall include a systematic process of evaluation of their suitability, as defined in article 4.3. of this Instruction. This process should include the systematic observation and assessment of the performance and competence of licensed personnel, both in the control room and in the SSC, carried out by supervisors of their tasks or training personnel. This information, including the proposed programme, the criteria used in its preparation, the deviations from the programme of previous years and the results of the systematic process of assessment of the suitability of the programme, shall be communicated to the NSC in the corresponding annual training reports.

Seventh. *Renewal of Licenses.*

7.1 Period of validity of licenses. Operator and supervisor licenses shall be renewed for the period established in the RINR, except for such temporary limiting conditions as the Licensing Tribunal may deem appropriate.

7.2 Application and renewal requirements. Official requests for the renewal of operating licenses shall be made at the request of the licensees addressed to the Chairman of the NSC at least three months prior to the expiry date of the license they hold, attaching a certificate from the licensee accrediting the following points:

a) That they have been using the specific functions of their license with the due competences, detailing all periods of inactivity that have taken place and certifying that the continuance conditions regarding the post established in the *Eighth* section of this Instruction have been fulfilled.

b) They have continued to make the most of their continuous formation and training programme, having passed all written tests and established practices that allow them to certify their training.

c) That their qualified status is on-going for the licensed job and for the work with ionizing radiations required by said job in any operating condition on the plant, (or any that is suitable under certain conditions and, in this case, indicating such conditions) as far as an occupational risk prevention service is concerned. The latter, after having analysed physical health and psychological stability requirements, specifying that their conditions will not adversely affect the performance of their duties as a licensed member of personnel.

7.3 Concession of renewals. The NSC will extend the renewals of the operator and supervisor licenses to all those complying with the requirements set out in the previous point. The Licensing Tribunal will assess all available information on the applicant's actions for the granting of a renewal.

Eighth. *Active continuance conditions, and suspension and loss of license due to inactivity.*

8.1 Active continuance conditions. The holders of an operating license shall maintain continuance conditions in their post as one of the requirements necessary to guarantee the maintenance of their skills. Active continuance conditions are not maintained when there is a period of continuous inactivity of more than three months or when there is a cumulative inactivity of six months in a period of nine. In the specific case of the fuel movement monitoring functions, the conditions of

active continuance will be lost when they have exceeded forty-eight months without having exercised their functions in a fuel movement operation.

82 Recovery of the conditions of active continuance. In order to regain active status, before returning to the shift, the person on leave must:

a) Recover any continuing education they may have missed, and
b) maintain the fitness for a licensed job qualification and for working with ionizing radiations (or fitness under certain conditions and, in this case, indicating such conditions) as far as an occupational risk prevention service is concerned, specifying that their physical or psychological conditions will not adversely affect the performance of their duties as licensed member of personnel.

c) The additional training periods specified in the following sections depending on the time during which the condition has been lost must also be fulfilled. In the particular case where the period of inactivity is due to the participation of the person in a training period in order to have access to another operating license on the plant itself, these time periods may be reduced justifiably by a maximum of 50%.

c1) Inactivity of less than six months. Where the condition of active continuance has been lost due to a period of continuous inactivity of more than three months but less than six months, or due to an accumulated inactivity of six months in a period of nine, the person on leave shall perform a period of control room operation of at least fifty-six hours, under the direct supervision of a person holding an equivalent license, without acting as an on-duty shift.

c2) Inactivity of more than six months. Where the condition of active continuance has been lost due to a continuous period of inactivity of six months or longer, the licensed person shall:

I. Carry out complementary training based on sessions in the SSC of twenty net simulator hours.

II. Comply with a period of operation in a control room of at least sixty-four hours, under the direct supervision of a person holding an equivalent license, without acting as an on-duty shift.

c3) Inactivity of more than twelve months. Where the condition of active continuance has been lost due to a continuous period of inactivity of twelve months or longer, the licensed person shall:

I. Complementary training based on sessions in the SSC of sixty net simulator hours.

II. Comply with a period of operation in a control room of at least one hundred and twenty-eight hours, under the direct supervision of a person holding an equivalent license, without acting as an on-duty shift.

c4) Inactivity of active continuance for the supervision of fuel movement.

In their first action, they exercise their supervisory functions under the direct supervision of a person holding an equivalent license, without acting as an on-duty shift, for a minimum time of eight hours.

83 Conditions of license suspension due to inactivity - The condition under which the automatic suspension of a license due to inactivity will take place occurs after a continuous period of eighteen months of inactivity in a licensed post. In the event that the license qualifies the operator for the supervision of the movement of nuclear fuel, this continuous period of inactivity will be sixty months.

In the particular case where the period of inactivity is due to the participation of the person in a training period in order to have access to another operating license on the plant itself, there will be no automatic suspension of the license due to inactivity while it remains within the scope of the call for the requested license examination.

84 Lifting of license suspension due to inactivity. Once a license has been suspended due to inactivity, the licensee may request the NSC to lift the suspension, accompanied by the justifying documentation which is deemed adequate and including the relevant competence recovery programme. The Licensing Tribunal will decide on the suitability of the petition and, prior to lifting the suspension, will assess the characteristics of the programme and the tests to be performed for verification.

85 Loss of license due to inactivity. The license shall cease to be valid when thirty-six months of accumulated inactivity in the last seventy-two months have been exceeded. The license enabling the supervision of the movement of nuclear fuel shall cease to be valid when a continuous period of inactivity of seventy-two months has been exceeded.

86 Additional condition for LORT. As an additional requirement to those established in this chapter, in order to maintain the conditions of active continuance and to avoid suspension or loss of license in one of the posts to which the operator is qualified by the LORT, a reasonably balanced distribution in the performance of both posts must be maintained.

87 Additional information. At any time, from the moment the license is granted until it expires, the NSC may request any additional information it considers necessary for the revocation, suspension or modification of the license.

Ninth. *Necessary communications.*

91 Communication of safety deficiencies. In addition to the provisions of the RINR, personnel holding an operating license are obliged to notify the licensee of any deficiencies or malfunctions that, in the opinion of the reporter, might seriously affect nuclear safety or radiation protection. To this end, the licensee of the installation shall have procedures and tools that allow for the classification, tracking and resolution of these incidents and information for the caller.

92 Suspension and loss of license. The licensee shall inform the NSC that a suspension or loss of license for the post has occurred as a result of compliance with any of the conditions established in Articles 8.1, 8.3, 8.5 or 8.6 of this Instruction. This communication shall be made within a maximum period of fifteen days from the date of suspension or loss of such license.

93 Departures and re-incorporations to shifts. The holder shall indicate in the Annual Training Report the departures and re-incorporations to shifts and their duration, for each of the persons on their installation in possession of a valid license.

The licensee shall inform the NSC of the departures of persons holding an operating license for more than one month and their reincorporation.

94 Recovering the conditions of active continuance. The licensee shall notify the NSC of the licenses whose holders are required to recover conditions of active continuance. This communication shall be made prior to their incorporation to the post which is being recovered.

Tenth. *Exemptions and equivalent measures.*

Exemptions: The NSC can temporarily exempt the holder from compliance with some of the requirements of this Instruction, as long as the holder justifies both the difficulty of satisfying said requirements in the established manner and that these prohibit said compliance, and the compensatory measures proposed for its exemption.

Equivalent measures: At the proposal of the owner, the NSC can favourably evaluate equivalent measures of compliance of the requirements stipulated in this Instruction, as long as the owner adequately accredits said compliance through the corresponding justification of the equivalent measures proposed.

Eleventh. *Infringements and penalties.*

This Instruction of the Nuclear Security Council is bound by that established in Article 2.a) of Law 15/1980, of the 22nd April, of the Creation of the Nuclear Safety Council, so that its breach will be penalised according to that decreed in Chapter XIV (Articles 85 to 93) of Law 25/1964, of the 29th April, on Nuclear Energy.

First additional Provision.

The licensees of the authorisations in force have a period of six months from publication in the "Official State Gazette" to adapt their practices and procedures to those contemplated in this Instruction.

Second additional Provision.

This Instruction could be applicable to the operating licenses of other nuclear installations, with the adaptations established by the NSC taking into account the characteristics of the installation, serving, where appropriate, as supplementary legislation.

Derogatory provision.

Nuclear Safety Council Instruction IS-11 of 21 February 2007 and any provisions of equal or lower rank that oppose the provisions of this Instruction are hereby repealed.

Final provision.

This Instruction shall enter into force on the day following its publication in the «Official State Gazette».

Madrid, 30th January 2019-Chairman of the Nuclear Security Council, Fernando Marti Scharfhausen.

APPENDIX 1

Contents of the written examination for applicants for an Operator License

The sections shown below define the generic content for the post of Operator without limitation. Depending on the Nuclear installation to which the license applies and on the functions covered by it, this content will be modulated in depth and scope.

1. Basic scientific and technological fundamentals applicable to nuclear power plants: Fundamentals of physics. Principles of fluid mechanics and thermodynamics of heat transfer; basic thermohydraulics. Fundamentals of chemistry. Fundamentals of material resistance. Fundamentals of electricity and electromagnetism. Introduction to the regulation of processes and control elements. Mechanical, electrical, instrumentation and control components. Interpretation of flow, process, logic and wiring diagrams.

2. Reactor physics and operating principles applicable to the plant: Atomic and nuclear physics; fission process; neutron physics: diffusion and moderation; multiplication factor; neutron kinetics; sub-critical multiplication; neutron sources;

reactivity, inherent reactivity and power defect coefficients; neutron poisons; bar control effects; reactor operational physics (reactivity calculations, criticality indications, energy balances, shut-down margin, and other control room calculations). Reactor thermohydraulics and core thermal limits. Operating principles of nuclear instrumentation. Principles of strength of applicable materials including fracture mechanics and thermal shock under pressure. Chemistry applied to nuclear power plants. Principles of nuclear safety (defence in depth and other concepts) and radiation protection. General design criteria for nuclear safety and radiation protection.

3. Technology of the plant to which the license refers: Description, functions, general characteristics and design bases, components, operating modes (manual and automatic), signals, adjustments, set-points, permissive and interlocks, instrumentation, alarms and failure modes of the following systems: core, vessel, reactivity control mechanisms, nuclear instrumentation, reactor coolant, turbine cycle, control and limitation, protection, technological safeguards, electrical systems, support systems and auxiliary systems associated with the installation. Technical performance specifications applicable to these systems. Post-accident instrumentation and remote stop panel. Shielding, isolation and containment design features, including access limitations. Gas and fire detection and extinction systems. Area and process monitors. Systems associated with refuelling and fuel pools.

4. Functioning and operation of the plant:

4.1 Automatic response of the plant under normal, transient and accidental conditions. Fundamentals of plant response: thermohydraulics, reactivity, temperature, pressure, power production, fuel load changes, coolant chemistry and core damage mitigation. Fundamentals of operating limitations. Effects of the loss or malfunction of the systems on the automatic response of the plant. Most important accidental sequences and study of their evolution. Safety Procedures at Shutdown.

4.2 Operation of the plant under normal, transient and accidental conditions. General operating procedures. System procedures. System malfunction and failure procedures. Response procedures to fires, floods and earthquakes. Emergency Operating Procedures. Surveillance test procedures. Administrative procedures applicable to the operation. Behaviour of the plant with the intervention of the operation personnel. In-house and external operational experience. Accidents and most relevant incidents: TMI-2, Chernobyl, Davis-Besse, Fukushima. General knowledge of the Operating Specifications and segregated documents. Basic principles of equipment maintenance. General knowledge of severe accidents and severe accident management guides.

4.3 Results of the plant Probabilistic Safety Assessment (PSA). Basic concepts of PSA. Most significant PSA results relating to initiating events, accidental sequences and combinations of component failures and human errors (most significant minimum failure sets). Modes of simple failure and common cause, unavailability for testing and maintenance and human errors, which contribute most to risk. Recovery actions.

4.4 Human factors. Aspects relating to human factors to effectively perform the functions assigned to the operation shifts, reducing human error and promoting teamwork, communication and better monitoring of plant operation.

5. Radiation protection:

5.1 Basic principles. Ionizing radiations. Interaction of radiation with matter. Magnitudes and units of radio-protection. Detection of radiation and

pollution. Biological effects of ionizing radiations. Limitation, justification and optimisation of doses. ALARA. Protective measures (distance, time, shielding, confinement).

52 Radiation protection applied to the plant. Radiological risks at the plant. Radiation Protection Manual (RPM) and procedures applicable to the post. Classification of zones, signalling and surveillance (radiation and pollution levels). Radiation (process and area), object and operation monitoring systems, including alarms, automatic actions and surveillance equipment. Post-accident surveillance system. Classification of personnel, radiological surveillance and dosimetry control. Control and protection of work with ionising radiations and radioactive contamination. Procedures and equipment for the handling and storage of radioactive material and surveillance equipment. Basic knowledge of the ODCM (Outdoor Dose Calculation Manual).

6. Plant operating regulations and documents:

6.1 Standard.

Knowledge applicable to the power station on: Law on Nuclear Energy, Law Creating the Nuclear Safety Council, modified by Law 14/99, Regulation on nuclear and radioactive installations, Regulation on health protection against ionising radiations, NSC Safety Instructions and Guides and other technical standards applicable to the post.

6.2 Plant operating documents.

Operating permit. Safety assessment. Operating Specifications (Organisation and Administrative Section). Operating regulation. Site emergency plan (SEP). Procedures that develop the SEP applicable to your post. Quality assurance manual.

7. Alterations to the core and movement of nuclear fuel. Procedures and limitations (only applicable if the license permits the holder to supervise the movement of nuclear fuel): Core alterations, control rods, other core devices, and determination of internal and external effects on core reactivity. Devices and procedures for handling fuel: Implications deriving from the safety analysis relating to alterations to the nuclear fuel core and movement, associated technical limitations and specifications; reception and inspection of fuel, storage and handling of new and spent fuel, design of the handling area, fuel handling equipment, physical and administrative interlocks, projected impacts, activity control procedures and processes; radiation protection procedures applicable to fuel handling; emergency procedures associated with fuel handling activities; pools; boron concentration and associated systems; storage casks. Area and process monitoring instrumentation; communications from control room to fuel storage and handling areas; operation of systems from control room to support the fuel loading or unloading process. Preparation of transport for inspection and testing of irradiated nuclear fuel.

APPENDIX 2

Additional contents of the written examination for applicants for a Supervisor License

1. Basic scientific and technological bases applicable to nuclear power plants: no additional content.
2. Reactor physics and operating principles applicable to the plant: no additional content.
3. Technology of the plant to which the license refers: Design basis for system settings, set points, permissive and interlocking. Waste generated and systems for the processing and release of radioactive effluents. Technical performance specifications applicable to systems and their bases.
4. Functioning and operation of the plant:
 - 4.1 Analysis of plant response: thermohydraulics, reactivity, temperature, pressure, power production, fuel load changes, coolant chemistry and core damage mitigation. Emergency Operating Procedures and their design basis. Assessment of installation conditions and selection of appropriate procedures during normal, abnormal, emergency and severe accident operating conditions. Application of the Operating Technical Specifications and their bases. Risk monitor. Analysis and results of operational tests. Equipment maintenance. General criteria for the declaration of a degraded condition or non-conformity.
 - 4.2 General knowledge about the evolution and phenomenological aspects of severe accidents. Core heating and melting. Phenomena in and out of the vessel. Containment behaviour. Transport of fission products. Severe Accident Management Guidelines (GGAS, in its Spanish acronym). Extensive Damage Mitigation Guidelines (GEMDE, in its Spanish acronym). Emergency Shutdown Action Guides (GAP, in its Spanish acronym).
 - 4.3 Results and application of the SDA of the plant. Initiating events, accidental sequences and combinations of component failures and human errors. Applications regarding the operation of the installation. Results of risk quantification under power and at shutdown. Results of SDA level 2: Main accidental sequences after nucleus fusion and significant human actions. Dominant modes of containment failure. SDA results from external events (floods and fires).
5. Radiation protection: Sources of radiation risk during normal and abnormal operation, including maintenance activities and contamination conditions. Liquid and gaseous effluents and solid waste. Movement and transport of radioactive material. Monitoring of the public.
6. Plant operating regulations and documents: Installation license limits and conditions. Plant operating documents. Outdoor Dose Calculation Manual (ODCM). Procedures that develop the SEP and MPR applicable to the post. Procedures required for the authorisation of design or operational changes at the installation.
7. Alterations to the core and movement of nuclear fuel. Procedures and limitations: Core alterations, control rods, other core devices, and determination of internal and external effects on core reactivity. Devices and procedures for handling fuel: Implications deriving from the safety analysis relating to alterations to the nuclear fuel core and movement, associated technical limitations and specifications; reception and inspection of fuel, storage and handling of new and spent fuel, design of the handling area, fuel handling equipment, physical and administrative interlocks, projected impacts, activity control procedures and processes; radiation protection procedures applicable to fuel handling; emergency procedures associated with fuel handling activities; pools; boron concentration and associated systems;

storage casks. Area and process monitoring instrumentation; communications from control room to fuel storage and handling areas; operation of systems from control room to support the fuel loading or unloading process. Preparation of transport for inspection and testing of irradiated nuclear fuel.

APPENDIX 3

Minimal operational situations to be trained for in the full scope control room simulator for the initial and continuing training programme for licensed personnel

1. Start-up of the plant from a cold shutdown to full power.
2. Shutdown of the plant from full power to cold shutdown.
3. Manual control of steam generators and water feeds during start-ups and shutdowns.
4. Borations and dilutions of the reactor coolant.
5. Significant power changes, greater than 10%, with manual bar control or recirculation flow.
6. Power changes greater than 10% with turbine control.
7. Refrigerant losses, including significant steam generator (PWR) leaks, inside and outside of primary containment leaks, large and small leaks with leak rate determination, and situations with saturated primary response (PWR).
8. Losses of instrument air systems.
9. Losses or degradations of the electrical supply, partial and total.
10. Loss of forced and/or natural circulation of reactor coolant flow.
11. Losses and malfunctions of normal and/or emergency supply water systems.
12. Losses of essential service water systems.
13. Cooling losses at shutdown.
14. Losses of component cooling systems or the cooling of individual components.
15. Condenser vacuum losses.
16. Loss of protection channels.
17. Misalignments or falling control rods.
18. Malfunctions in the control rods.
19. Situations requiring the entry of emergency buoyancy systems or liquid reserve control systems.
20. Fuel sheath failures or high activity conditions in the coolant.
21. Turbine and main alternator trips.
22. Malfunctions of automatic control systems that affect reactivity.
23. Malfunctions of the pressure control system and/or volume control of the primary refrigerant.
24. Reactor fire.
25. Breakage of steam and feed water lines, inside and outside containment.
26. Losses and malfunctions of nuclear instrumentation.
27. Malfunctions of the waste heat evacuation system.
28. Malfunctions of the turbine pressure control system.
29. Control of the plant from outside the main control room.
30. Operation of the waste heat evacuation system.
31. Operation of the nuclear instrumentation system.
32. Control room calculations, including refrigerant inventory balance and reactivity balance.

APPENDIX 4

Minimum competencies to be trained in the full scope control room simulator or on the job for the initial and continuing training programme for licensed personnel

1. Follow-up of start-up procedures, including the operation of associated controls that may affect reactivity.
2. Actuation of control and protection devices as required to operate the plant safely from shutdown and at different power levels.
3. Identification of warnings or indicators (signs indicating plant operating conditions) in order to carry out the planned corrective actions.
4. Identification of instrumentation systems and the importance of their readings.
5. Observation and safe control of the behaviour of the operating characteristics.
6. To carry out the required actions during normal operation, failure and emergency, in order to obtain the expected results.
7. To carry out the safe operation of systems that provide the extraction of waste heat from the core, such as the primary cooling system, emergency cooling systems and waste heat extraction systems, as well as their supporting systems. Also, identification of the correct operation of these systems in relation to the rest of the plant's systems.
8. To carry out the safe operation of all other emergency and auxiliary systems, including associated controls that may affect the reactivity or release of radioactive material into the environment.
9. Demonstration or description of the use and functions of radiation surveillance systems, including area and process radiation monitors, alarms, portable monitors and personal surveillance equipment.
10. Demonstration of knowledge of the effects of radiation, permitted dose levels and ability to implement procedures that reduce excessive dose levels and protect personnel from radiation exposure.
11. Demonstration of knowledge of the internal emergency plan, including the responsibilities of licensed personnel to decide whether the plan should be activated, its levels, as well as the obligations assigned to each position in the emergency organisation.
12. Demonstration of knowledge and ability to assume the responsibilities associated with the safe operation of the installation in stressful situations.
13. Demonstration of the applicant's ability to work in a group within a control room at the post to which they are an applicant, following the established procedures of their plant and without exceeding the permits and licensing conditions of the installation.

APPENDIX 5

Minimum contents for the formation and continuous training programme of licensed personnel

1. Theory and principles of operation.
2. General and specific characteristics of the plant.
3. Instrumentation and plant control.
4. Plant protection systems.
5. Plant emergency systems.
6. Normal, abnormal and emergency operating procedures.
7. Control and protection against radiation.
8. Technical specifications.
9. Standard.
10. Human factors and error prevention techniques.
11. Stress management training (in normal and emergency operation).