

REGULATORY INSPECTION IN SPAIN

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Esta Comunicación trata de las misiones que la legislación española encomienda a la Junta de Energía Nuclear con relación a la evaluación de riesgos e inspección de las centrales nucleares y del transporte de combustible para las mismas. Con el fin de llevar a cabo tales misiones la Junta de Energía Nuclear tiene un departamento especializado dentro de su organización denominado Departamento de Seguridad Nuclear.

Por último se hacen comentarios sobre la experiencia adquirida.

The report deals with the missions that the Spanish Legislation commends to the Junta de Energía Nuclear with reference to evaluating the hazards and inspections of nuclear power plants and the transport of nuclear fuels for these installations. In order to carry out these missions, the Junta de Energía Nuclear has a special department within its organisation, known as the Nuclear Safety Department.

Finally comments are made referring the actual experience accumulated.

1. CREATION OF THE NUCLEAR ENERGY BOARD (JUNTA DE ENERGIA NUCLEAR, JEN)

When the future importance of nuclear energy, as a source of energy supply was foreseen in our Country - which is poor in energy sources required for development - the Spanish Government created the Nuclear Energy Board (JEN) by a Decree dated October 21st, 1951. This Organization, which depends on the Presidency of the Government, was in charge of all that referring to peaceful applications of nuclear energy, such as: basic and applied investigation, promotion of industrial development, safety and protection against ionizing radiation, training of specialized personnel and acting as an Advisory Board to the Government. In order to fulfill such missions, the National Nuclear Energy Center (where the Meeting is held) was built in Madrid together with other installations.

2. NUCLEAR ENERGY LEGISLATION

During the fifties, a set of legal provisions were established, constituting the legal framework which permitted investigation and exploitation of radioactive materials, possession and use of radioisotopes in medicine and industry, etc. This legislation together with the creation of JEN paved the way for completing this new technology's technical and legal infrastructure. Thus, the conclusion was reached that it was necessary to prepare a law which would encompass all the future legislation on nuclear energy, giving it the necessary flexibility and scope so that, while containing all the basic legal principles, it would permit future development of all the nuclear activities. The draft of this law was drawn up by JEN and after being discussed in Parliament, it was confirmed by the Chief of State on April 29th, 1964, under the title of Law 25/1964 on Nuclear Energy. We wish to point out that for drawing up this law, the laws referring to this subject existing in foreign countries were taken into consideration. Chart I shows the law's structure by chapters and the most important aspects of its contents.

Law 25/1964 on Nuclear Energy governs all the activities related to nuclear and radioactive installations, mining, transport of radioactive minerals and nuclear ships and airplanes. The law only contains a wide scope summary of the principles to be developed in the future in the form of applicable regulations which will be easier to up-date when experience and evolution in techniques so require. Up to the present time, two regulations have

been published which are called Regulation on Nuclear Risks Coverage (1967) and Regulation on Nuclear and Radioactive Installations (1972). Charts II and III outline the structures of these two regulations and comments on same. At the present time, a draft of the latest foreseen regulation is being drawn up and it refers to protection against ionizing radiation.

3. MISSIONS THAT THE LAW ON NUCLEAR ENERGY ENTRUSTS TO THE NUCLEAR ENERGY BOARD

The object of the Law is defined in its first article which states:

- a) To promote the development of peaceful applications of nuclear energy in Spain and regulate its being put into practice within the national territory.
- b) To protect lives, health and property against the dangers derived from nuclear energy and the harmful effects of ionizing radiation.
- c) To govern application in the national territory of the international engagements subscribed to and ratified by Spain regarding nuclear energy and ionizing radiation.

The Law commends the Ministry of Industry to execute its precepts, without this affecting specific tasks which other State or local Administrations may have. The Ministry of Industry, through the Energy Administration Board, (Dirección General de la Energía), is in charge of administrative processing of authorizations, imposition of technical and legal conditions to which the authorized activity must comply, and the imposition of administrative penalties for non-fulfillment.

The Nuclear Energy Board (JEN) reports to the Minister of Industry* in its capacity as an autonomous technical organization with its own legal personality and its mission is to promote, orient and direct studies, experience and work leading to the development of peaceful applications of nuclear energy with national objectives and promotion of a nuclear energy equipment and material industry.

* Actually denominated Ministry of Industry and Energy.

The following specific missions related to nuclear safety contemplated in the Law are as follows:

- Advisory Board to the Government, through the Minister of Industry, in matters related to the Law.
- Presentation of a preceptive report to the Ministry of Industry regarding the petitions referring to matters related to peaceful applications of nuclear energy.
- Analysis of the risks and intrinsic safety, as well as inspection of nuclear and radioactive installations in this regard.
- Counselling the Courts of Justice in matters of nuclear risk and damages.
- Surveillance in the distribution and use of radioactive isotopes.
- Surveillance of investigations, mining operations and concentration plants where radioactive minerals exist or where the minerals are accompanied in any proportion with other radioactive minerals.
- Proposal to the Minister of Industry of regulations regarding protection against radiation and general measures promoting the applications of nuclear energy.

Some of the missions mentioned are already being developed under the Regulation on Nuclear and Radioactive Installations (Chart III) which govern the rules for administrative authorizations in that which refers to siting, planning, construction, assembly, checking, starting-up and operating phases of the nuclear and radioactive installations; the granting of licenses to the plants' operating personnel; inspection and surveillance of construction and operation of the installations and during the transport of nuclear fuels and other radioactive materials. These missions are always focused towards reducing the risks inherent to nuclear energy, to the greatest possible extent, and in general to all ionizing radiations.

As already mentioned, in all cases, the executive resolutions correspond to the Minister of Industry and by Delegation to the Energy Administration Board, with JEN being in charge of issuing preceptive judgment and inspection statements. In order to better

fulfill these missions, JEN has a technical staff of experts available, which is called the Nuclear Safety Department and which reports directly to JEN's Executive Director. The Department presently consists of three Operative Units, a Standards Service and a Permanent Secretariat for granting Operating Licenses (Chart IV). Hereunder, we are describing the specific tasks of each one.

3.1.-Evaluation Operative Unit

- Evaluation of the files relative to applications for authorization of nuclear and radioactive installations, radioactive material transport, homologation of equipment for radioactive purposes, and drawing up proposals, in each case, to the reports and regulations to which the present legislation refers.
- Evaluation of the site, project, construction, verification and operation of nuclear and radioactive installations and of modifications introduced for analyzing inherent risks and those derived from operation as well as nuclear damage caused by foreseeable accidents.
- Evaluation of the characteristics of radioactive material transports and of the conditions in which they are carried out, in order to detect the inherent risks and those derived from transport, as well as nuclear damages caused by foreseeable accidents.

3.2.-Inspection Operative Unit

- Inspection of nuclear installations in the planning and construction stages and surveillance of pre-nuclear verification, including the owner's organization with regard to quality assurance, as well as inspection of the manufacturing process and homologation tests of nuclear components in the factory.
- Inspection of nuclear installations in operation - whether in provisional or final operating license stages - including verification of the fulfillment of the authorization contents, operating specifications and other preceptive documents, plus evaluation of periodical and non-periodical operational reports.
- Inspection of radioactive installations and radioactive material transports, including inspection during construction and operation of the installations, as well as evaluation of its operational reports.

3.3.-Radiological Protection Operative Unit

- Estimate the radiological capacity of the nuclear and radioactive installations' areas of influence.
- Estimate the maximum admissible disposal limits for radioactive waste from the nuclear and radioactive installations, and analysis of the radiological consequences of accidents.
- Estimate the radiation dose received by professionally-exposed persons, by the population and environment as a consequence of the nuclear and radioactive installations' operations.

3.4.-Standards Service

- Preparations of proposals of standards to develop the nuclear regulations currently in effect, including the contents of the different perceptive safety documents, operational personnel qualifications and requisites as well as the contents of the periodical and non-periodical operational documents.
- Preparation of guidelines and procedures relative to siting, project, construction, verification and operation of nuclear and radioactive installations and radioactive material transport, in such a way that the nuclear safety of the installations and radiological protection of persons is guaranteed.

3.5.-Permanent Secretariat for Granting Licenses to Operating Personnel

- Processing of license applications for Supervisors and Operators and Chief of Protection Service against Radiation in nuclear and radioactive installations.
- Preparation of the subjects to be included in the exams as well as evaluation of both practice and theory tests and recommendations for granting licenses.

4. NUCLEAR SAFETY DEPARTMENT ACTIVITIES IN RELATION TO NUCLEAR INSTALLATIONS

In the Law on Nuclear Energy, nuclear installations are defined and in the Regulation on Nuclear and Radioactive Installations the procedure for obtaining administrative authorizations is established.

By means of the required authorizations and inspection, the nuclear safety control and radiological protection of authorized activities is carried out. The formalities and established procedures require the applicants to present, in each case, the necessary technical documentation to prove the suitability of the project presented, the adequacy of the site chosen, including all data, studies and tests necessary in this regard.

4.1. Sequence of Activities

The nuclear power plants must obtain the following authorizations from the Energy Administration Board, as shown in Chart V:

- a) Prior authorization - This is an official recognition of the proposed objectives and of the chosen site that allows the interested party to apply for the installation's construction permit.
- b) Construction permit - This allows the applicant to carry out construction of the installation in accordance with the project approved and to request execution of pre-nuclear verification (Tests prior to loading nuclear fuel into the core).
- c) Starting-up authorization - In order to start-up the nuclear installation, the following must be obtained:
 - A provisional operating permit, which entitles the owner to carry out nuclear tests, namely tests and verifications to be carried out in the installation after the nuclear fuel has been loaded, and including all the different phases of experimental operation that permits obtaining the basic data to evaluate the installation's nuclear safety.
 - A definite operating permit, once the installation has been satisfactorily checked out.

In processing each one of the above-mentioned authorizations, the Nuclear Energy Board is to issue a preceptive safety report which must be sent to the Energy Administration Board so that the latter may take a decision on the requested authorization. The technical documentation presented by the applicant to the Ministry of Industry to support his application is examined and evaluated before preparing this report. At the same time, contacts and work meetings are held with the applicant and any additional information

deemed necessary to carry out their mission is requested, as well as visits to the site and inspection during construction and operation stages. The Nuclear Energy Board can also request, if considered necessary, advice from specialized organizations both domestic and foreign.

The prior authorization request must be accompanied by the following documents, amongst others: Descriptive Report of the proposed installation; characteristics of the selected site; preliminary chart of the foreseen organization to supervise the project and guarantee the necessary quality during construction.

The location is analyzed from a nuclear safety and radiological protection point of view, taking into consideration its demographic, hydrologic, meteorologic, sismologic, geologic conditions, etc., and possible radiological consequences derived from the installation are evaluated both under normal working conditions and in case of accident. As a result of this study and in view of the statements received during the period of public information, which is established for 30 days by the Provincial Delegation of the Ministry of Industry where the installation will be located, a report on the application as well as on the analyzed site is issued proposing the limitations and conditions which are considered adequate and which should be incorporated in the authorization, which also establishes a maximum period of time for requesting the construction permit.

The application for a construction permit must be accompanied by the following documents, amongst others: general installation project; preliminary safety study (PSAR).

The preliminary safety study is analyzed and evaluated from a nuclear safety and radiological protection point of view. This study must contain precise data on the location's characteristics which completes and up-dates the information presented in the prior authorization request; description of the installation, including criteria of the systems design or components upon which the installation's safety depends; analysis of foreseeable accidents and their consequences; justification that the installation does not represent an undue risk for the population during normal operation; foreseen organization for supervising the project and quality assurance; foreseen organization for operation and personnel training. As in the previous case, the safety report on the application

is issued once all the documents are analyzed and additional information, if considered necessary, has been requested from the applicant with whose representatives working meetings are frequently held. If the report is favourable, the limitations and conditions which must be incorporated in the corresponding authorization are established and mentioned in same.

Before proceeding to loading the fuel in the installation, the owner of the construction permit is required to carry out a test program which will confirm the adequate performance of the components, equipment and systems which make up the installation and which have been manufactured, built and assembled in accordance with a pre-established quality assurance program.

This test program, called Pre-nuclear Verification of the Installation, must be specifically approved by the Energy Administration Board.

During construction, the JEN inspectors will periodically visit the site to check the fulfillment of all project specifications and conditions and to witness the execution of selected pre-nuclear tests. The inspectors also visit the factories where the different components related to the installation's safety are being manufactured. After each one of these visits, a report is issued.

The application for provisional operating authorization must be accompanied by the final safety study (FSAR); proposals must also be prepared in relation to the technical specifications to be followed during the installation's operation, planning of foreseeable emergencies, operating regulations and radiological protection standards. All these documents are analyzed and their contents discussed with the applicant. At the same time, results of the checks carried out in the installations are reviewed, especially those corresponding to incorporated technological safeguards, and one global inspection of the installation is finally carried out. The applicant must also present a detailed program of the foreseen nuclear verification, which is evaluated and discussed with him.

Once it has been verified that the installation is completed and that the pre-nuclear checks have been carried out, and that the adequate personnel is available and licensed, and that the contents of the documents are satisfactory, JEN issues a preceptive report to the Ministry of Industry proposing, if this is the case, that the provisional operating permit be granted, with certain limitations and conditions. During exploitation, the inspectors

often visit the site in order to verify whether the program containing the different tests and checks which have been approved are in effect being carried out and whether the specifications contained in the documents as well as the limitations and conditions established are being fulfilled.

In order to obtain the definite operating permit, the applicant must prove that he has carried out the nuclear verification in a satisfactory and complete way. He must also prove that the contents of the proposed documents are adequate or propose the alternate modifications. JEN analyzes these documents once again and issues their preceptive report to the Ministry of Industry.

During the construction stage of each installation, the Energy Administration Board designates a Committee, called Coordination Committee, formed by representatives of the Administration, of the City Hall where the installation is located, and of the Electric Company, owner of the installation. The main objective of this Committee is to advise the interested parties of those aspects of the project's execution which could affect the public interest and safety, and outside experts, proposed by the Committee members may be summoned to their meetings for this purpose.

4.2. Required Efforts

The Nuclear Safety Department has a considerable amount of experience in the fulfillment of their mission of evaluating risks and inspecting nuclear and radioactive installations and radioactive material transports.

With regard to the nuclear power plants, this experience consists of three plants in operation for quite a few years now, 7 units in advanced construction stages (two about to start pre-operational tests), 7 units whose construction is about to be started or has already been initiated, and several other units still in different planning stages. The total power authorized is about 15,000 MWe, of which 1,100 corresponds to the units in operation. Furthermore, prior authorization for a fuel element factory, for light water plants, has recently been studied.

In relation to the domestic manufacture of mechanical components, electric equipment, instrumentation and control units, their installation or assembly and construction of containment

buildings, considered as nuclear-types in power plants, more than 150 applications have been analyzed and on the other hand in our Country there are about 600 radioactive installations, most of them having several years operating experience. A considerable experience has also been accumulated in evaluating the risks and in inspection of radioactive material transport.

Chart VI shows the accumulated experience of the Nuclear Safety Department, classified by activities. Based on this experience, the data regarding the effort considered necessary for each activity has been obtained. Chart VII shows the efforts corresponding to a LWR nuclear plant of about 1000 MWe, which are equivalent to 1,350 weeks x man, professionals, for the whole process until normal commercial operation begins.

If an effective work activity of 45 weeks/year (deducting holidays, illness, training course assistance, etc.) is considered, the effort required for the authorization of a nuclear plant, of a proven type, is about 30 men x year, an effort which is distributed over a period of 8 to 9 years, although not in a uniform manner. On the other hand, the surveillance and control during the commercial operation is about 65 weeks/year/man, in other words 1.5 men.

5. EVOLUTION OF THE NUCLEAR SAFETY DEPARTMENT

The present Nuclear Safety Department was created under the name of Nuclear Safety Service in 1958 as a consequence of the starting-up of a 3 Mw thermal swimming pool-type reactor that was installed in the National Nuclear Energy Center. In the period from 1959-1961, the Nuclear Safety Service analyzed some aspects of the two Argonaut type training and investigation reactors built by JEN for two Universities. By that time, the Service was constituted by two specialists in nuclear safety. Between 1961-1965 the Service participated in evaluating the safety of a thermal reactor and a fast reactor, both experimental with zero power, that were built by JEN, and also in evaluating the remaining JEN installations.

When the construction of nuclear power plants began in 1965, the Service was reorganized to meet the objectives that the Law on Nuclear Energy had commended to JEN.

Since 1965, up to the present time, the so-called Nuclear Safety Service has evolved in administrative importance and at the present time it has the highest administrative rank within the JEN, namely that of Department. This development has been forced by the Spanish nuclear program which is shown on Chart VI. However, the increase in the number of specialized personnel has remained behind in relation to the effort which should be carried out, as shown in Figure 1, which includes not only the effort corresponding to activities considered in Chart VII but also to others of technical support, such as the development of nuclear safety standards and guidelines on nuclear activities, program initiation and calculation models, participation in commissions and international work teams, etc.

Therefore, the situation is critical and there are hopes that in the near future the Government will authorize the hiring of necessary personnel (in principle it seems we shall get authorization to increase the staff by 13 people). This unbalance between the needs and available personnel will become more serious in the immediate future because, even in the supposition that we could now hire all the necessary personnel, the training period required is at least two years and on the other hand, the persons required to train the new personnel would have to leave part of the tasks they are doing at the present time. We have been able to partially overcome this situation by counting on the assistance of personnel from other departments in JEN in order not to paralyze the authorizations program.

6. NUCLEAR POWER PLANT INSPECTIONS

The Law on Nuclear Energy and the Regulation on Nuclear and Radioactive installations provides that legal and technical construction, checking and operation of a nuclear power plant is the responsibility of the plant's owner. The Administration insures the feasibility of the project and the competence and capacity of its personnel so that the plant does not represent an undue risk to human beings, by evaluating the documents which were presented throughout the authorization process, which was mentioned above. However, in addition to the evaluation and to duly protect the public, the legislation establishes the need for an inspection team whose main mission is to check that the technical conditions established in the different authorizations granted by the Ministry of Industry are being strictly fulfilled.

In Section 3, we stated that the inspection mission, in that which refers to nuclear safety and radiological protection, is entrusted to JEN by a legal mandate. Inspection of the plant's conventional systems is commended to the Provincial Delegation of the Ministry of Industry, where the plant is installed.

JEN's inspection activities are basically as follows:

- Check that the installation is being built in accordance with the approved project, following the guidelines, standards, codes and specified conditions.
- Check that all the equipment, components, and systems have been manufactured with the necessary quality.
- Check that the tests results satisfy the project requisites.
- Check that the installation's operation fulfills and does not surpass the limits and conditions imposed by the authorization.
- Check that there is an adequate organization of personnel capable of operating the installation efficiently and safely.
- Check that the operating personnel possess the required operating licenses (Supervisor and Operator) and that all persons who intervene in the operation fulfill their tasks with responsibility and efficiency.
- Check that the quality of the equipment, components and systems, as well as their operating characteristics, does not deteriorate throughout the life of the installation.

The inspection activities were established in JEN, with their own identity towards 1967, with the then-called Nuclear Safety Service. At that time, the construction of the "José Cabrera" nuclear power plant was very advanced and therefore these activities started with the pre-operational (pre-nuclear) tests, continuing with surveillance and control of the starting-up and commercial operation phases. A similar action was carried out in the second nuclear power plant, "Santa Maria de Garoña". In these two plants, the surveillance and control activities during construction were carried out, to a certain extent, by a Work Group belonging to the Plants' Coordination Committees.

In the third and last plant, the Vandellos Nuclear Power Plant, which was built as a "turn-key" plant, as were the other two already mentioned, inspection activities began from the beginning of the construction stage and followed through the different phases with increasing dedication and specialization, as by this time we had inspectors who were experts in civil construction, mechanical components and nuclear steam supply systems.

The inspection service has gone through subsequent reorganizations until reaching the present organization as the Inspection Operative Unit, integrated by the three groups which appear in Figure 4, and whose missions are indicated in Section 3.1.

6.1. Inspection Activities during nuclear power plant construction

The activities are carried out in accordance with the written procedures and take place in the following phases:

6.1.1 Prior Authorization

The Prior Authorization application is analyzed in relation to the preliminary organizational scheme foreseen for supervising the project and guaranteeing quality during construction. Meetings are held with the applicant's representatives in order to find out more about the aspects of their organization and finally detailed checks of the applicant's statements are carried out. As a consequence of the above activities, JEN proposes to the Energy Administration Board, if necessary, incorporation in the prior authorization of conditions related to quality assurance, to the applicant's organization, to contracting the main supplier, to design engineering, to the civil construction contractors, to manufacturing and assembly of the components.

6.1.2 Construction Permit

The Preliminary Safety Study (PSAR) is analyzed in relation to the quality assurance program, classification by nuclear types of the components and structures, applicable rules in each case and change of design with regard to the plant used for reference purposes. The technical specifications of the various contracts established in relation to quality assurance during construction are also analyzed.

An inspection is carried out to check the applicant's foreseen organization for supervision of the project and quality assurance during construction as well as his technical files. A visit is also made to the construction site.

JEN proposes to the Energy Administration Board the incorporation in the construction permit of any conditions related to the documentation to be submitted during the plant's construction stage.

6.1.3 Construction itself

During this phase, the inspectors check that the conditions contained in the Construction Permit are being fulfilled, by visits to the owner's offices, to the plant's site and to the factories authorized by the Energy Administration Board to supply components.

The frequency of the inspections are three to four a year per plant and usually an average of three persons participate including the inspectors and experts in different fields (civil construction, mechanical and electrical components, assembly, tests, etc.). During the inspection visits, the following aspects are revised and checked, amongst others: project organization and quality assurance; advances or delays in the established schedule and the causes for same; changes in design; availability of standards, codes and guidelines; quality assurance document file; construction status; equipment reception area; list of materials received and shipped, and various aspects, depending on the construction status.

The object of the visits to the factories where the nuclear components, destined to the plant, are manufactured, is to check that the conditions in the corresponding manufacturing authorizations are being fulfilled.

6.1.4 Pre-nuclear Tests

The inspectors check the pre-nuclear test program submitted by the owner and approved by the Administration to see that it is being followed step by step. In this regard, the tests, their objectives, procedures to be followed, data to be registered during their execution as well as discrepancies between the foreseen results and those obtained, are analyzed. In addition to being present during specific tests which are established in the program, the results that are being obtained during same are reviewed and the inspectors are also

present in other tests they deem convenient. During the final phase of the program, the inspectors are almost permanently in the plant.

Once the construction is completed and the pre-nuclear tests carried out, an inspection prior to granting the provisional operating permit is a legal requisite.

6.2. Inspection during nuclear power plant operation.

Follow-up of a nuclear power plant's operation starts from the time the provisional operating permit is granted, and includes the plant's nuclear test program. The inspections are carried out to check fulfillment of the program, the permit's special conditions and the content of the following preceptive documents; the plant's regulations; radiological protection manual; emergency plans; technical specifications and applicable administration and general rules contained in nuclear legislation.

Control and surveillance is carried out by means of inspection visits to the power plant and analysis of the periodical and non-periodical reports sent by same; monthly operating reports, reports on tests, reloading and in-service inspection; reports on simulated emergency situations that the plant must carry out at least once a year; and the reports established in case of failures and accidents.

The inspection activities are carried out during the following main phases:

- Nuclear tests.
- Provisional and definite commercial operation.

6.2.1 Nuclear Tests

These tests include fuel loading into the reactor, critical stage approach, as well as the calibrations related to the safety systems.

The nuclear tests can be grouped in the following phases:

- Open vessel tests (power practically zero)
- Initial heating
- Power increase tests
- Guarantee tests (full power demonstration)

During the nuclear tests, along general lines, inspection is as follows:

- Identification of the system's components, checking documents and visually inspecting their condition to see if they are in agreement with the project.
- Confirm that the tests carried out have been executed in accordance with the approved procedure and check the test results.

As the nuclear tests take place over a period between three to six months, a minimum of one inspection per week is carried out and with greater frequency, and even permanence at the site, during some of the indicated phases.

6.2.2 Commercial Operation

During the plant's commercial operation period, a control and surveillance is carried out by means of:

- Normal control inspections.
- Special control inspections.

The normal control inspections refer to checking that the plant is working within the approved limits and conditions and in this regard the operations diary, amongst other documents, is checked. All significant facts related to the plant's operation should be noted in this diary.

Special inspections are those related to insuring that the plant is making the necessary checks throughout its life-time regarding the condition of the plant's main components (in-service inspection). Also, those inspections which refer to fuel reloading are also considered as special inspections. The number of inspections per plant/ per year is about six.

6.2.3 Checks carried out with reference to the operating personnel

Prior to loading the fuel in the plant, a sufficient number of persons holding supervisor and operator licenses must be available. The supervisor is directly responsible for

the plant's operation and for the activities carried out by the operators during each work shift, and the operator is responsible for handling the control devices.

It is the inspector's mission to check that during each shift a licensed supervisor and operator are present and these shifts are established on a non-interruption basis, from the moment the fuel is loaded, independent of the plant's condition. The fact that these persons meticulously fulfill their responsibilities is also checked.

6.3. Inspection Reports

The results of the inspections carried out are included in a report which - in accordance with the present legislation - is made out in triplicate by the inspector. One copy is sent to the Ministry of Industry's Delegation in the province where the inspection was carried out, and another to the installation owner or his representative, who is invited to be present during the inspection, to make any statements on the content of the reports which he considers relevant and to sign the report.

The inspectors, as mentioned above, are authorized to have experts, who they deem necessary, accompany them during the visits. This circumstance will be mentioned in the report. Also, they may take samples of substances for testing and analysis which they consider relevant, in which case they must leave a control sample, duly sealed and marked, if so requested.

The inspectors do not have the authority to take decisions which are reserved for the Ministry of Industry. Independent of the actions which could result in administrative infractions on an Energy Administration Board, Ministry of Industry or Cabinet level, the Provincial Delegation may take - in cases of definite risk - the steps it considers necessary to correct the deficiencies observed in the installation, in the shortest possible time. In the same manner, and for safety reasons, the Nuclear Energy Board can also adopt urgent steps considered necessary in order to maintain the installation's safety level and both Organizations will inform the Energy Administration Board.

For a clearer understanding, Chart VIII shows the administrative inspection set-up and processing of the respective reports.

7. COMMENTS AND CONCLUSIONS

1. By the end of last decade, the official inspection of nuclear power plants was structured (in what regards evaluation and control), in accordance with the missions commended to JEN by the law on nuclear energy.
2. Great effort has been made on the training of evaluation and inspecting staff during the first phase and therefore their work began with the start-up of the first two nuclear power plants. In what refers to the third one, Vandellos, proceedings and construction started at the same time.
3. At the beginning of the actual decade and before the construction of the so-called second generation of nuclear power plants was initiated, it was decided that no authorization for construction would be granted until the electric company involved would present the adequate technical staff duly trained to execute the project.
4. Special attention has been given to the technical staff related to quality assurance, since the owner is the direct responsible on the quality of the project before the Administration. Under this criteria, the official inspection team watches and controls the project, making sure it is in accordance with the authorization terms and the regulations with no direct interference in the carrying out of the project.
5. When the points mentioned before have been achieved, the efforts of inspectors were centered on the spanish manufacturers and civil work companies who were dealing for the first time with the nuclear field. Through a labour to national scale, the companies involved were convinced of the need on the improvement of their tools as well as the reorganization of their staff structure, thus introducing in their companies the quality assurance philosophy.
6. Actually, the official inspection team is paying a better and more intensive attention to the engineering companies participating in the projects. Especially to the main engineering suppliers, bearing in mind the future nuclear power plants of the so-called third generation.
7. We must admit that, in general, the utilities, the manufacturers and the civil workers as well as some engineering companies have developed a considerable effort applying for a quality which could be compared to the best international standards on this kind of services.

8. The official inspection team is well assisted by its basic structure and by its considerable experienced staff on the evaluation, surveillance and control fields. However, the actual staff is far in number from the minimum staff considered as necessary to evaluate, survey and control the ambitious Spanish nuclear program.

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CHART I - BASIC SPANISH NUCLEAR LEGISLATION (PART I)

LAW 25/1964 ON NUCLEAR ENERGY (it consists of 97 Articles, classified in 15 chapters).

CHAPTER	DEALS WITH	MOST IMPORTANT ASPECTS OF ITS CONTENTS
I.	OBJECT OF THE LAW (DEFINITIONS)	To regulate peaceful applications of nuclear energy, protect against its dangers and damaging effects of radiation.
II.	AUTHORITIES AND ORGANIZATIONS WITH SPECIFIC NUCLEAR COMPETENCE	Ministry of Industry and JEN (autonomous technical organiz.)
III.	COORDINATING NUCLEAR INVESTIGATION AND TEACHING	Institute of Nuclear Studies.
IV.	EXPLOITATION OF RADIOACTIVE MINERALS AND THEIR CONCENTRATES	Declared free and techno-administrative rules are established.
V.	ADMINISTRATION AUTHORIZATIONS FOR NUCLEAR AND RADIOACTIVE INSTALLATIONS	<u>Regulation on nuclear and radioactive installations</u> is being drawn-up. (1972)
VI.	SAFETY MEASURES AND PROTECTION AGAINST IONIZING RADIATIONS	<u>Regulation on protection against ionizing radiations</u> (being prepared).
VII.	CIVIL RESPONSIBILITY FOR NUCLEAR DAMAGE	Objective responsibility, limited in its quantity.
VIII.	NUCLEAR RISK COVERAGE	<u>Regulation on nuclear risk coverage</u> (1967) being developed.
IX.	CLAIMS FOR NUCLEAR DAMAGES	Taken before Common Courts.
X.	REPAIR OF NUCLEAR DAMAGES, BY THE STATE	When they exceed the coverage limit, the State subrogates.
XI.	NUCLEAR SHIPS AND PLANES	The competent authorities are defined.
XII.	NUCLEAR ENERGY INVENTIONS (PATENTS AND BRANDS)	The industrial property of same is recognized.
XIII.	CRIMES AND PUNISHMENT	Specifies nuclear crimes and their punishment.
XIV.	ADMINISTRATIVE SANCTIONS ON NUCLEAR MATTERS	Establishes maximum quantities and competent authorities.
XV.	FINAL PROVISIONS	

CHART II - BASIC SPANISH NUCLEAR LEGISLATION (PART II)

REGULATION ON NUCLEAR RISK COVERAGE (Approved by Decree 2177/1967, it consists of 77 articles, classified in three Titles)

FIRST TITLE: Civil responsibility for nuclear damage.

- CHAPTER I - General provisions
- CHAPTER II - Nuclear damages
- CHAPTER III - Responsible party
- CHAPTER IV - Injured party

SECOND TITLE: Responsibility guarantees and insurance

- CHAPTER I - General provisions
- CHAPTER II - Civil responsibility insurance for nuclear damage
- CHAPTER III - Other financial guarantees
- CHAPTER IV - Guarantee renewals

THIRD TITLE: State intervention in repairing nuclear damages

- CHAPTER I - General provisions
- CHAPTER II - Participation systems
- CHAPTER III - Government Insurance Department
- CHAPTER IV - Insurance compensation consortium

FINAL PROVISIONS

CHART III - BASIC SPANISH NUCLEAR LEGISLATION (PART III)

REGULATION ON NUCLEAR AND RADIOACTIVE INSTALLATIONS (Approved by Decree
2869/1972 -it consists of 87
articles, classified in 7 titles)

TITLE I: GENERAL PROVISIONS

TITLE II: OF NUCLEAR INSTALLATIONS

- Chapter I- Classification and authorizations
- Chapter II- Prior authorization
- Chapter III- Construction permit
- Chapter IV- Pre-nuclear verification of the installation
- Chapter V- Starting-up authorization

TITLE III: OF RADIOACTIVE INSTALLATIONS

- Chapter I- Definition, classification and authorizations
- Chapter II- Prior authorization of first-category radioactive installations.
- Chapter III- Construction permit for first and second category radioactive installations.
- Chapter IV- Starting-up authorization

TITLE IV: INSPECTION OF NUCLEAR AND RADIOACTIVE INSTALLATIONS

Sole Chapter.

TITLE V: PERSONNEL IN NUCLEAR AND RADIOACTIVE INSTALLATIONS

- Chapter I- Operator and Supervisor licenses
- Chapter II- Obligations of the operating personnel

TITLE VI: OPERATIONS DIARY, FILE AND REPORTS

Chapter -sole.

TITLE VII: MANUFACTURE OF EQUIPMENT FOR RADIOACTIVE PURPOSES.

Sole chapter.

FINAL PROVISION

TEMPORARY PROVISIONS

APPENDIX: Quantity of radionuclides which determine installation's category.

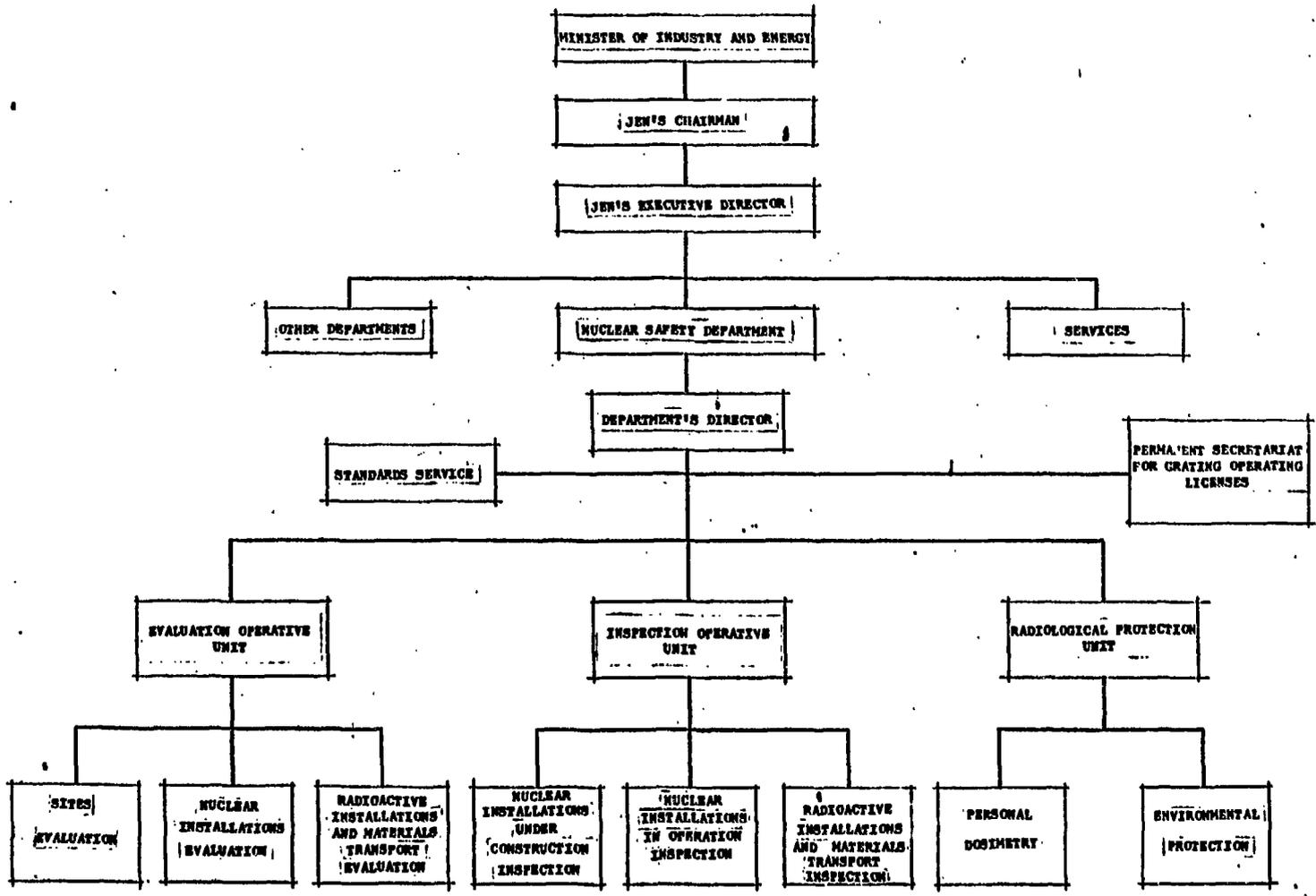


CHART IV.- JEN'S NUCLEAR SAFETY DEPARTMENT

CHART V

NUCLEAR INSTALLATIONS AND AUTHORIZATIONS REQUIRED

CLASSIFICATION OF THE NUCLEAR INSTALLATIONS	REQUIRED AUTHORIZATIONS
<ul style="list-style-type: none">- NUCLEAR POWER PLANTS; or any stationary installation for producing energy by means of a nuclear reactor.- NUCLEAR REACTORS; or any structure containing nuclear fuels placed in such a way that a self-maintained nuclear fission process can take place, without requiring an additional neutron source.- FACTORIES using nuclear fuel for producing nuclear substances and factories in which nuclear substances are treated, including irradiated nuclear fuel regeneration installations.- NUCLEAR REACTORS AND CRITICAL UNITS dedicated to investigation (2).- NUCLEAR FUEL STORAGE INSTALLATIONS except those places where these substances are temporarily stored during transport (2).	<ul style="list-style-type: none">a) PRIOR AUTHORIZATION (1)b) CONSTRUCTION PERMITc) PRE-NUCLEAR VERIFICATIONd) PERMIT FOR TEMPORARY FUEL STORAGEe) PROVISIONAL OPERATING PERMITf) DEFINITE OPERATING PERMIT

NOTES: (1) Submitted to public information process.

(2) No prior authorization is required, but the construction permit is subject to the public information process.

CHART V

NUCLEAR SAFETY DEPARTMENT ACTIVITIES RELATED TO THE NUCLEAR INSTALLATIONS
AND FUEL TRANSPORT

1. NUCLEAR POWER STATIONS

1.1. IN OPERATION

NAME	SITE (PROVINCE)	REACTOR TYPE & NSSS VENDOR	POWER Mw	CONSTRUCTION STARTED	OPERATION STARTED	ENERGY PRODUCED TILL 31-12-76 Gwh
JOSE CABRERA	GUADALAJARA	PWR (W)	160	1965	1968	7946
SANTA MARIA DE GAROÑA	BURGOS	BWR (GE)	460	1966	1971	14967
VANDELLOS I	TARRAGONA	GCR (French)	500	1967	1972	15032

TOTAL 1120

1.2. UNDER CONSTRUCTION

ALMARAZ I	CACERES	PWR (W)	930	1972	1975
ALMARAZ II	CACERES	PWR (W)	930	1973	1979
LEMONIZ I	VIZCAYA	PWR (W)	930	1972	1978
LEMONIZ II	VIZCAYA	PWR (W)	930	1973	1979
ASCO I	TARRAGONA	PWR (W)	930	1974	1979
ASCO II	TARRAGONA	PWR (W)	930	1974	1980
COFRENTES	VALENCIA	BWR (GE)	975	1975	1980

TOTAL.. 6555

1.3. UNDER PROJECT MANAGEMENT (PRELIMINAR PERMIT GRANTED)

REGODOLA	LUGO	NOT DECIDED	-	BEFORE 1950	
SAYAGO (*)	ZAMORA	PWR (W)	1000	THOSE MARKED (*)	
TRILLO (*)	GUADALAJARA	PWR (KWU)	1032	HAVE SOLICITED	BETWEEN
TRILLO II	GUADALAJARA	NOT DECIDED	-	CONSTRUCTION	
VALDECABA- LLEROS I (*)	BADAJOS	BWR (GE)	1000	PERMIT	1981-1985
VALDECABA- LLEROS II (*)	BADAJOS	BWR (GE)	1000		
VANDELLOS II (*)	TARRAGONA	PWR (W)	1000		
VANDELLOS III	TARRAGONA	NOT DECIDED	-		

TOTAL 5100

1.4. UNDER PROJECT (PRELIMINAR PERMIT SOLICITED)

ARAGON (2 UNITS)	ZARAGOZA				
ASPERILLO (2 UNITS)	HUELVA				
BAJO CINCA (1 UNIT)	HUESCA				
CABO COPE (1 UNIT)	MURCIA				
PARAMO (1 UNIT)	LEON	NOT DEFINED	NOT DEFINED	NOT DEFINED	BETWEEN 1980-1990
ESCATRON (2 UNITS)	ZARAGOZA				
L'AMEILLA MAR (2 UNITS)	TARRAGONA				
OGUELLA (2 UNITS)	VIZCAYA				
PUNTA ENDATA (2 UNITS)	GUPUZCOA				
SANTILLAN (1 UNIT)	SANTANDER				
TARIFA (2 UNITS)	CADIZ				
VERGARA (1 UNIT)	NAVARRA				

TOTAL ESTIMATED ... 22500

CHART VII (cont.)

2. NUCLEAR FUEL PLANT (FOR LIGHT WATER REACTORS)

NAME	SITE	STATE
ENUSA (EMPRESA NACIONAL DEL URANIO)	SALAMANCA	UNDER PROJECT MANAGEMENT. HAS PRELIMINAR PERMIT GRANTED.

3. RADIOACTIVE INSTALLATIONS

	INDUSTRY		MEDICAL		RESEARCH & OTHERS	TOTAL
	RADIOLOGY	OTHER APPLICATIONS	COBALTHERAPY	NOT LOCKED SOURCES		
IN OPERATION	40	80	70	97	30	317
UNDER CONSTRUC.	30	70	20	80	25	225
TOTAL						542

4. NUCLEAR POWER PLANT COMPONENTS FABRICATION AND ASSEMBLING. (NUCLEAR CLASS)

	MECHANICAL		ELECTRICAL	CIVIL WORK	TOTAL	
	MANUFACTURERS	ASSEMBLERS	MANUFACTURERS & ASSEMBLERS			
IN FORCE AUTHORIZATIONS	64	6	15	9	94	
SOLICITED AUTHORIZATIONS	28	2	10	8	48	
TOTAL						142

5. NUCLEAR AND RADIOACTIVE INSTALLATIONS OPERATION PERSONAL LICENSES GRANTED

	NUCLEAR INSTALLATIONS		RADIOACTIVE INSTALLATIONS		TOTAL	
	SUPERVISOR	OPERATOR	SUPERVISOR	OPERADOR		
LICENSES GRANTED	49	36	417	310	812	
LICENSES SOLICITED	-	-	408	527	935	
TOTAL						1747

6. RADIOACTIVE MATERIALS TRANSPORTS. (SHIPMENTS)

NUCLEAR FUEL		OTHER MATERIALS
NOT IRRADIATED	IRRADIATED	
71	50	NOT ACCOUNTED

CHART VII

NUCLEAR SAFETY DEPARTMENT REQUIRED EFFORT FOR EVALUATE THE RISKS AND CONTROL AND SURVEILLANCE THE CONSTRUCTION AND OPERATION OF A TYPICAL PLANT (1000 Mwe - LIGHT WATER)

PHASE	ACTIVITY AND TECHNICAL WORK (MEN x WEEKS)	TOTAL
PRIOR AUTHORIZATION	1. <u>SITE</u> - Meteorologic, hidrologic, geologic and sismotectonic report analysis. 34 - Demography, ecology and human activities 10	80
	2. RADIOLOGICAL IMPACT 23	
	3. APPLICANT ORGANIZATIONAL SCHEME 2	
	4. QUESTIONNAIRES, REPORTS AND VARIOUS 11	
CONSTRUCTION PERMIT	1. SITE CHARACTERISTICS 22	295
	2. PROJECT AND INSTALLATION CHARACTERISTICS 182	
	3. ENVIRONMENTAL RADIOLOGICAL IMPACT 24	
	4. APPLICANT ORGANIZATIONAL SCHEME AND PROJECT QUALITY ASSURANCE 40	
	5. QUESTIONNAIRES, REPORTS AND VARIOUS 27	
CONSTRUCTION ITSELF	1. INSPECTIONS TO SITES, COMPONENTS FACTORIES AND ENGINEE RING OFFICES 125	440
	2. CONSTRUCTION FOLLOW - UP THROUGH REPORTS 290	
	3. VARIOUS 25	
PRENUCLEAR TESTS	1. PROCEDURES AND TESTS RESULTS ANALYSIS 49	74
	2. INSPECTION VISITS DURING TESTS 25	
PROVISIONAL OPERATING PERMIT	1. SITE CHARACTERISTICS 23	205
	2. PROJECT AND INSTALLATION CHARACTERISTICS 126	
	3. ENVIRONMENTAL RADIOLOGICAL IMPACT 6	
	4. PROJECT QUALITY ASSURANCE 5	
	5. TECHNICAL ESPECIFICATIONS, EMERGENCY PLANS AND PLANT REGULATIONS 18	
	6. NUCLEAR TESTS PROGRAM 7	
	7. QUESTIONNAIRES, REPORTS AND VARIOUS 20	
START-UP AND POWER INCREASE	1. PROCEDURES AND TESTS RESULTS ANALYSIS 35	60
	2. INSPECTION VISITS DURING TESTS 25	
DEFINITIVE OPE- RATING PERMIT	1. START-UP TEST RESULTS EVALUATION 32	36
	2. QUESTIONNAIRES, REPORTS AND VARIOUS 4	
VARIOUS	PERSONAL OPERATING LICENSES AND MISCELLANEOUS 160	<u>1.350</u>
COMMERCIAL OPERATION	1. OPERATION FOLLOW-UP THROUGH ANALYSIS OF THE PERIODICAL AND NONPERIODICAL REPORTS 45	65 men.week/year.
	2. INSPECTION VISITS TO THE PLANT 20	

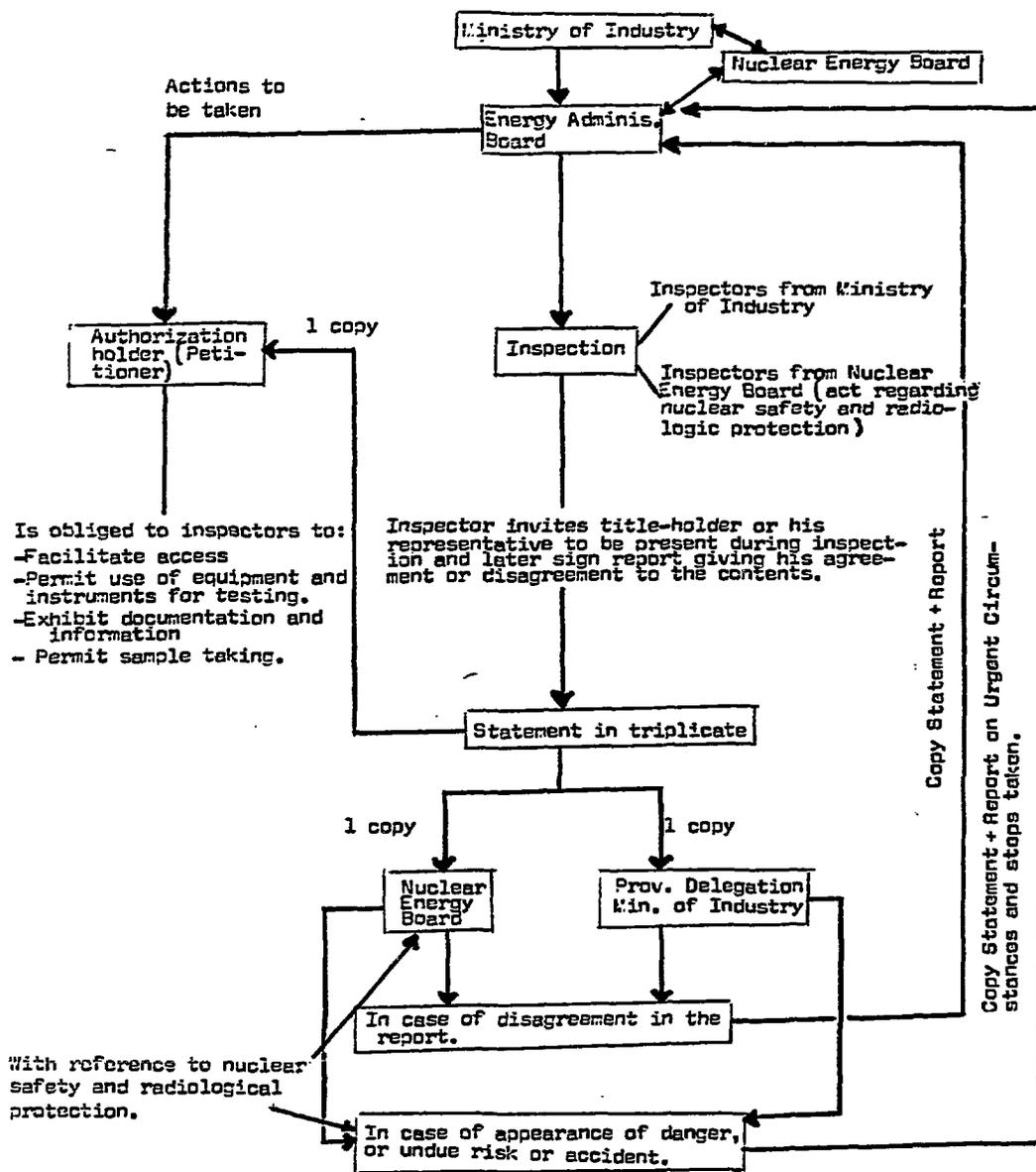


CHART VIII. - INSPECTION OF NUCLEAR AND RADIOACTIVE INSTALLATIONS, OF RADIOACTIVE MATERIAL TRANSPORTS AND OF MANUFACTURERS OF RADIOACTIVE AND NUCLEAR EQUIPMENT.

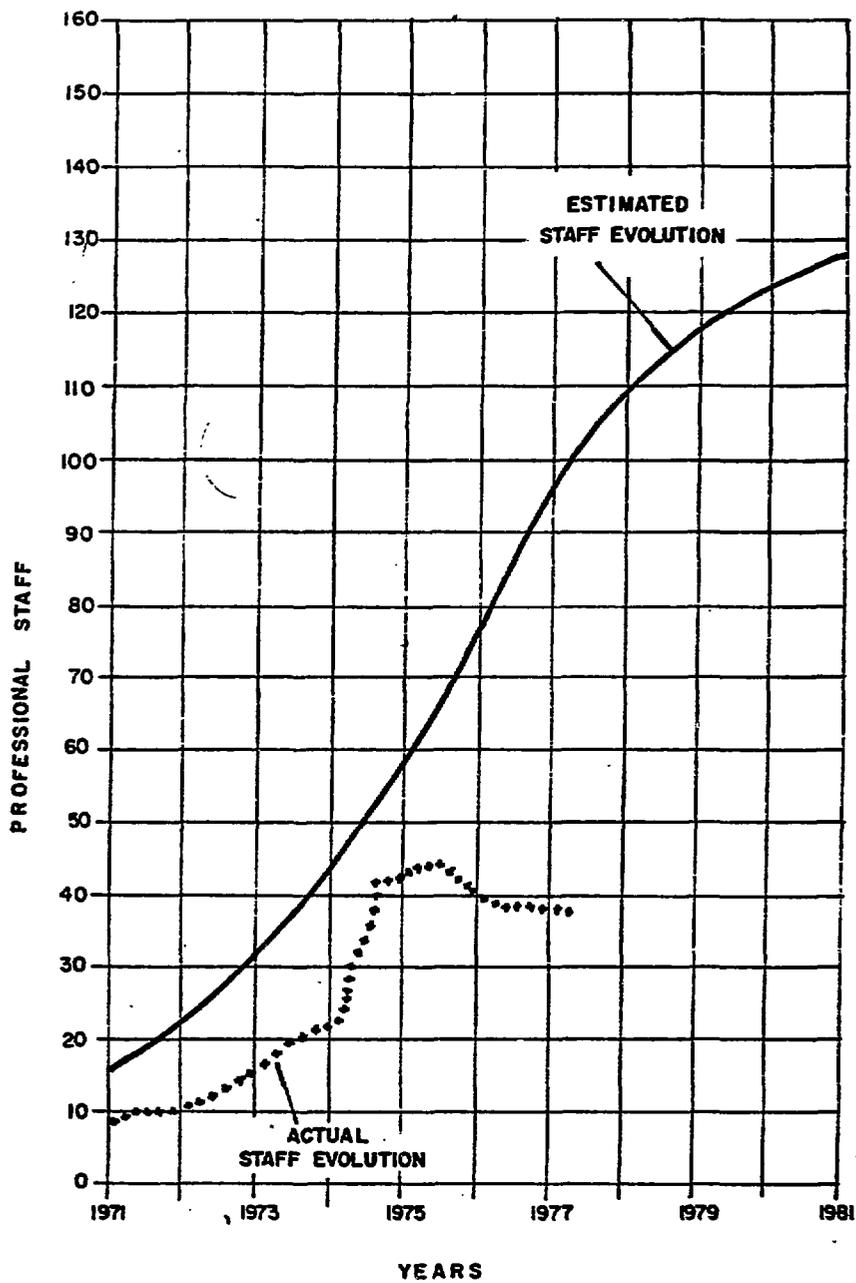


FIG. 1.—NUCLEAR SAFETY DEPARTMENT PROFESSIONAL STAFF EVOLUTION.

