CHILE

SEVENTH NATIONAL REPORT RELATED TO THE

CONVENTION ON NUCLEAR SAFETY

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CONTENTS

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A. INTRODUCTION

Chile does not have nuclear power stations in operation neither foreseen in the near future and then this report will cover the Convention Articles of a Contracting Party without nuclear installations.

The existing nuclear facilities in the country are the following ones:

a) One nuclear research reactor of 5 MWth;

b) One nuclear fuel fabrication facility

c) One conversion plant of UF_6 to metallic uranium.

There is a second nuclear research reactor of 2 MWth that is in an extended shutdown condition with no nuclear fuel charged on it. The fuel elements of this reactor were delivered to the United States of America Department of Energy facility, as part of the United States worldwide high enriched uranium fuel recollecting program.

The owner and the operating organization of all the nuclear installations in the country is the Chilean Nuclear Energy Commission (CNEC).

In Chile the generation and distribution of electric energy is on private hands. The decision of constructing new power plants is made on the base of an economical comparison between different projects based on the country electricity need. This comparison is made periodically and defines a list of plants to be constructed and the dates of connection to the national grid, in a time span of 10 to 20 years.

B. SUMMARY

One of the main issues identified in previous reports was the proper and clear separation between the Competent Authority from organizations charged with responsibilities for the promotion or application of nuclear or radiation related technologies.

C. REPORTING ARTICLE BY ARTICLE

Article 7. Legislative and regulatory framework

The hierarchy status of the legal documents in Chile is as follows:

1° **National Constitution**: Enacted by the National Congress, by qualified quorum.

2° **Constitutional Laws**: Enacted by the National Congress. by qualified quorum.

3° **Laws**: Enacted by the National Congress by simple majority and have power over the other legal national instruments (except over National Constitution and Constitutional Laws).

4° **Decree Laws**: Enacted by the Executive. They are issued when the National Congress delegated on the Executive the faculty to regulate matters that have to be included in a law (and consequently enacted by the National Congress). The National Congress through a law gives this faculty; they have the same power of a law.

5° **Supreme Decrees**: Enacted by the Executive upon proposition of the Ministries. Usually, the National Congress, through a law, designated the Ministry that has the legal capability to propose this type of instruments. They have less power than a law or a decree law.

6° **Standards**: Issued by the Regulatory Authority.

The legislative and regulatory framework applicable to nuclear facilities in Chile is defined by the following Laws and Regulations:

a) LAW Nº 18.302 - LAW ON NUCLEAR SAFETY, published in the Official Gazette Nº 31.860 of May 2 1984. This law consists of six titles, that is:

   i. TITLE I - OF THE REGULATORY AUTHORITY, defines the different regulatory bodies and their respective scope.

   ii. TITLE II - DEFINITIONS

   iii. TITLE III - OF THE NUCLEAR SAFETY, settles down the general approach related to nuclear safety, including the authorizations and requirements to operate a nuclear facility.

   iv. TITLE IV - OF THE INFRACTIONS TO THE LEGAL AND REGULATION REQUIREMENTS ON PROTECTION AND NUCLEAR SAFETY, establishes the sanctions that can be apply in case of not compliance.

   v. TITLE V - OF THE CIVIL RESPONSIBILITY FOR NUCLEAR DAMAGE, establishes the amount and the modes of insurance to cover nuclear damage.

vi. TITLE VI - OF THE RADIOACTIVE FACILITIES, establishes the competent authority for the control of the radioactive facilities and the responsibility for the preparation of the associated regulations applicable to these facilities and the competence for proposing the new regulations on radiation protection and nuclear safety is vested on CNEC. The regulations related with radiation protection and authorizations, as Supreme decrees, shall be proposed by both, the Ministry of Health and the Ministry of Energy.

b) LAW Nº 18.730 - MODIFIES THE LAW ON NUCLEAR SAFETY, published in the Official Gazette Nº33.143 of August 10, 1988. This Law only modifies the Title VI of the previous Law, regarding the competent authority for the control of the radioactive facilities. The Chilean Nuclear Energy Commission is incorporated as competent authority for the control of the radioactive facilities of first category, as established in the Decree Law Nº 133, indicated later on.

c) LAW N° 19.825 – MODIFIES THE LAW ON NUCLEAR SAFETY, published in the Official Gazette of October 1, 2002. This law mainly modifies Title III of the previous Law, with regard to the competence of the Chilean Nuclear Energy Commission (CNEC) as competent authority for the control of transport of radioactive material in or through the exclusive economical zone, the international waters related and national air space.

d) LAW N° 20.402 – MODIFIES THE LAW ON NUCLEAR SAFETY, published in the Official Gazette of February 1, 2010. This law modifies the dependency of the CNEC from Ministry of Mining to Ministry of Energy.

e) LAW N° 19.300 – LAW ON ENVIRONMENTAL GENERAL BASIS, published in the Official Gazette of April 9, 1994. This law consists of six titles, that is

i. TITLE I – GENERAL ASPECTS.

ii. TITLE II – ENVIRONMENTAL MANAGEMENT TOOLS.: establishes the projects that require an environmental evaluation. The projects requiring an environmental evaluation include Nuclear Power Plants and nuclear and related facilities; and production, storage, transport, disposal or reuse of radioactive material.

iii. TITLE III – RESPONSIBILITY FOR ENVIRONMENTAL DAMAGE.

iv. TITLE IV - INSPECTION.

v. TITLE V – ENVIRONMENTAL PROTECTION FUND.

vi. TITLE VI – ENVIRONMENTAL NATIONAL COMMISSION.

f) LAW N° 20.417 – MODIFIES LAW ON ENVIRONMENTAL GENERAL BASIS, published in the Official Gazette of January 26, 2010. This law mainly creates the Ministry of Environment which replaces the Environmental National Commission.

g) DECREE LAW Nº 87/84 - REGULATION ON PHYSICAL PROTECTION OF MATERIALS AND NUCLEAR FACILITIES, published in the Official Gazette Nº 32.117 of March 9, 1984. It is based on IAEA document INFCIRC/225.

h) DECREE LAW Nº 133/84 – REGULATIONS ON AUTHORIZATIONS FOR RADIOACTIVE FACILITIES OR IONIZING RADIATION GENERATING EQUIPMENTS, OPERATING PERSONNEL OF SUCH EQUIPMENTS AND OTHER RELATED ACTIVITIES, published in the Official Gazette Nº 31.955 of August 23, 1984. This ordinance categorizes the different radioactive facilities, according to the associated risk of the practice, the required authorizations and the associate requirements, for facilities and workers; includes the import, export and transport of radioactive materials, as well as the way to apply sanctions.

i) DECREE LAW Nº 3/85 - REGULATION ON RADIOLOGICAL PROTECTION OF RADIOACTIVE FACILITIES, published in the Official Gazette Nº 32.153 of January 3, 1985. Basically establishes the limits of acceptable dose (based on the ICRP Nº 26) and requirements for Services of Personal Dosimetry provided in the country.

j) DECREE LAW Nº 12/85 - REGULATION FOR THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS, published in the Official Gazette Nº 32.192 of June 10, 1985. It is a transcription of the version 1985 of the Safety Guide Nº 6 of the IAEA – Regulations for the safe transport of radioactive material.

k) SUPREME DECREE N° 95/01 – REGULATION ON ENVIRONMENTAL IMPACT EVALUATION SYSTEM. Published in the Official Gazette of December 7, 2002. Establishes a categorization of project according to the potential environmental damage and the procedure to carry out environmental evaluation for each category.

Chilean regulations don't establish a procedure to grant licenses for the Nuclear Power, except for the mention in the Nuclear Safety Law that the nuclear facilities requires a sitting, construction, commissioning, operations and decommissioning authorization.

The technical requirements for nuclear research reactor operators are established in standards approved by CNEC. The regulatory policy in the case of technical matters not regulated in national standards, including the case of nuclear installations, is to adopt the IAEA recommendations or the regulations of the supplier’s country, when there is not specific guidance in the IAEA documents.

CNEC Safety Standards:

1. NCS-DR-01 "Radioactive Waste Management"
2. NCS-GG-02 "Procedure for Licensing Nuclear and Radioactive Facilities "
3. NCS-GG-04 "Specific Safety Procedures"
4. NCS-PM-01 "Calibration of Radiation Detection Devices"
5. NCS-PP-01 "Radioactive Facilities Operators Licensing"
6. NCS-PP-02 "Nuclear Research Reactors Operators Licensing”
7. NCS-PR-01 "Radiation Protection Standards"
8. NCS-SI-01 "Occupational Health"

9. NCS-SV-01 "System of Accounting for and Control of Nuclear Materials”
10. NCS-TR-01 "Nuclear and Radioactive Materials Transport Licensing "CNEC Regulatory Guides
11. NS-AI-01 “Licensing concentration Facility of uranium or thorium”
12. GR-C-01 “Design Criteria for Structures of Nuclear Research Facilities"
13. GR-E-01 "Design Criteria for Electric Systems of Nuclear Research Facilities”
14. GR-G-02 "Nuclear Safety and Radiation Protection Criteria”
15. GR-G-03 "Nuclear Research Reactors Safety Reports”
16. GR-G-08 "Nuclear Research facilities Emergency Planning”
17. GR-G-09 "Nuclear Research Facilities Commissioning”
18. GR-G-10 "Quality Assurance for Commissioning and Operation of Nuclear research Facilities”
19. GR-G-11 "Nuclear Research Reactor Operation"
20. GR-G-13 "Periodic Inspection of Nuclear Research Facilities”
21. GR-G-14 "Organization and Procedures of Nuclear Research Reactors”
22. GR-G-15 "Radiation Protection for Nuclear and Radioactive Facilities”
23. GR-M-01 "Design Criteria for Hydraulic Systems of Nuclear Research Reactors”
24. GR-N-01 "Design Criteria of Pool type Nuclear Research Reactor Core
25. GR-P-01 "Radiation Protection Design Considerations of Nuclear Research Facilities”

Article 8. Competent Authority

The Nuclear Safety Law Nº 18.302 in its Article 2º establishes that the regulation, the supervision, the control and the inspection of the activities related with the peaceful uses of the nuclear energy and to facilities and nuclear substances correspond to the Chilean Nuclear Energy Commission (CNEC) and the Ministry of Energy in their case.

Article 4º of the same Law indicated that an authorization of the Chilean Nuclear Energy Commission for the sitting, construction, commissioning, operation and decommissioning of the facilities, plants, centres, laboratories, establishments and nuclear equipment will be required. In this group of facilities are included all the nuclear facilities actually operating:

- Research reactors
- Nuclear Fuel Fabrication Facility

- A conversion plant of UF6 to metallic uranium.

On the other hand, nuclear power stations, enrichment plants, reprocessing plants and the permanent storage of radioactive waste will require and license issued by supreme ordinance, through the Ministry of Energy.

According to the above mentioned dispositions, of the two competent authorities for the nuclear facilities, the Ministry of Energy has the responsibility for licensing the facilities covered by the Convention on Nuclear Safety. This ministry depends directly to the Central Government and the Chilean Nuclear Energy Commission related with the Government through the Ministry of Energy.

The competent authorities on radiation protection are the following:

- CNEC on its own facilities and those relevant radioactive installations, defined in the decree law N° 133/84, “Regulations on authorizations for radioactive facilities or ionizing radiation generating equipments, operating personnel of such equipments and other related activities”. As follows (1° Category):
  - Particle Accelerators
  - Irradiation Plants
  - Laboratories of high radio-toxicity
  - Radiotherapy and deep Roentgen-therapy
  - Industrial radiography (X-rays and gamma rays)
- The Health Ministry through its regional offices defined in the decree law N° 133/84. As follows (2° and 3° Category):
  - Laboratories of low radio toxicity
  - X-rays dental and diagnostic
  - Radiotherapy and superficial Roentgen-therapy
  - Industrial gauges
  - Calibration sources

Article 9. Responsibility of the licensee

The main responsibilities of the licensee are the following:

a) To carry out only the acts or operations determined in the licenses

b) To assume the responsibility for the nuclear damages that could occur in the facilities under his control.

c) To have, as required by the regulatory body, the number of authorized personnel to work in each facility, plant, centre, laboratory or nuclear equipment.

d) To provide the necessary means for the treatment and temporary storage of the radioactive waste. It is forbidden to authorize the storage

of nuclear or radioactive wastes in national territory, unless they are originate in the country.

e) To prepare and to maintain emergency plans revised and approved by the regulatory body, for nuclear accidents that could happen in its facilities.

f) To prevent the damages that could derive from theft, robbery or loss of unclear substances.

g) To provide, to satisfaction of the regulatory body, enough guarantees for the decommissioning and fulfil any requirement established in the regulation, when he wants to give up the licenses or authorizations in advance.

Article 10. Priority to safety

The Chilean Government, through the existent legal and normative structure in the country, has demonstrated his concern and interest in the matter, with the subscription and ratification of the following conventions and treaties;

a) Convention on Nuclear Safety: Decree Law Nº 272/97, enacted on June 3, 1997.

b) Convention on Early Notification of A Nuclear Accident. Supreme Decree N° 381/05, enacted on April 25, 2006.

c) Convention on Mutual Assistance in the Case of a Nuclear Accident or Radiological Emergency. Supreme Decree N° 8/04, enacted on April 12, 2005.

d) Vienna Convention on Civil Liability for Nuclear Damage. Supreme Decree N° 18/90, enacted on February 2, 1990.

e) Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention. Supreme Decree N°1.212/94, enacted on January 3, 1994.

f) Treaty for the Prohibition of Nuclear Weapons in Latin America (Tlatelolco Treaty). Supreme Decree N° 709/84, enacted on December 14, 1974.

g) Amendments to the Treaty for the Prohibition of Nuclear Weapons in Latin America (Tlatelolco Treaty). Supreme Decree N° 132/94, enacted on April 26, 1994.

h) Convention on the Physical Protection of Nuclear Material. Supreme Decree N° 1121/94, enacted on October 17, 1994.

i) Treaty on Non-Proliferation of Nuclear Weapons. Supreme Decree N° 797/95, enacted on September 25, 1995.

j) Additional Protocol to the Safeguards Agreement. Supreme Decree N°17/04, enacted on March 20, 2004.

k) Amendment to the Convention on the Physical Protection of Nuclear Material. Accepted on March 12, 2009.

l) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, entry in force on December 25, 2011.

Article 11. Financial and human resources

The national legislation doesn't demand the licensee to demonstrate that he has the financial resources to give support to the nuclear installation along its useful life. It only considered requirements for the human resources.

The national legislation doesn't consider requirements on financial resources for the decommissioning program and the administration of radioactive waste.

There are not regulations on the qualification, training and personnel's retraining. The law establishes the requirement to qualify the personnel and of defining requirements of personal qualification to the workers.

In attention that nuclear facilities are property of the state, the financial costs for operation, decommissioning and for radioactive waste management are covered through it.

Nuclear facilities in Chile are State owned. The State covers the financial costs for operation, decommissioning and for radioactive waste management.

Article 12. Human factors

Chilean regulations don't include a method to prevent, detect and to correct human errors.

As part of the licensing of CNEC nuclear facilities, Risk Analysis tools have been used. It includes the consideration of human errors, establishing measures to detect and to correct these errors. In addition, the CNEC, as the competent authority and as licensee of the research nuclear facilities, has established programs for operators' re-qualification.

The requirements for nuclear research reactor operators are established in standards approved by CNEC. The case of power stations will be based in the IAEA recommendations.

Article 13. Quality assurance

Chilean regulations don't establish approaches of quality assurance. It has been considered the application of the Guides of the IAEA in case that is required.

For the upgrading of one of CNEC nuclear research reactors (1985-1990), a formal program of quality assurance was applied, based on the American Norm ANSI.

Article 14. Evaluation and verification of safety

Chilean regulations don't establish a procedure to grant licenses and issue reports on safety in the different stages related with a nuclear installation project as defined in the Convention.

For the emission of reports on safety of the research reactors, internal regulations of the Chilean Nuclear Energy Commission are applied, which are in revision process.

Article 15. Radiological protection

The main legal body that contains requirements on radiological protection is the Supreme Ordinance Nº 3 from 1985, which defines the dose limits and establishes general conditions of radiological protection, as well as the requirements for personal dosimetry services.

The competence for proposing the new regulations on radiological protection is vested on CNEC and the Ministry of Health and have to be proposed by both Ministries (Energy and Health), and promulgated by the Executive.

For the operation of the existent nuclear research facilities, CNEC has established programs of radiological protection to assure protection of employees and the public from unnecessary exposure to ionizing radiation.

CNEC has a system of environmental radiological surveillance that covers the research nuclear centres, with the purpose of watching over the emissions of its own facilities.

Article 16. Emergency preparedness

The Nuclear Safety Law demands that each licensee should have an emergency plan that covers the whole spectrum of possible events in a given facility.

To this respect, CNEC has prepared emergency plans for its two nuclear research centres that consider emergencies that involve areas outside of the site. Exercises or drills had been developed inside the nuclear centres. CNEC has coordinated with fire fighters and taken measures to inform the public about the preparation for emergencies in the vicinities of the nuclear facility.

CNEC in conjunction with the National Emergency Office have been working in a National Plan for Radiological Emergencies, including the two existent nuclear research centres. In this plan it is propose to perform emergency drills and exercises coordinated with other national organizations involved with the management of emergencies.

Through Decree 647 of May 2015 of the Ministry of the Interior and Public Security, the creation of the Security Commission on Radiological Emergency (CONSER) was enacted.

This Commission will have an inter-ministerial and inter-sectoral composition, whose mission is to advise and support the President of the Republic in strengthening the capacity for prevention and reaction of the competent

institutions to nuclear or radiological events that may affect public safety, integrity people or the environment.

Article 17. Siting

Chilean regulations do not establish a procedure to grant siting licenses, except for the mention in the Nuclear Safety Law that the nuclear facilities require a sitting license.

In the case of sitting studies for nuclear research facilities, CNEC internal standards will be applied.

Article 18. Design and Construction

As mentioned earlier, Chilean regulations don't establish a procedure to grant design or construction licenses, except for the mention in the Law of Nuclear Safety that the nuclear facilities require a construction license.

In the case of design and construction of nuclear research facilities, CNEC internal standards will be applied.

Article 19. Operation

An established procedure doesn't exist to grant operation licenses, except for the mention in the Nuclear Safety Law that the nuclear facilities require an operation license.

In the case of operation of nuclear research facilities, CNEC internal standards will be applied.

D. ACTIVITIES TO IMPROVE SAFETY

Despite that the main concern of the country in this area is to update the regulation related to the control of the existent nuclear and radioactive facilities during the period:

- CNEC as operating organization of RECH-1, start a project with the purpose of update the seismic risk analysis of structures, systems, and components important to the safety of the reactor, and to help in the characterization of the behaviour of the San Ramon geological fault of Santiago-Chile.
- CNEC as it has been mentioned act as Competent Authority (CA) as well as an operator therefor effort has been done with the purpose to transfer the CA functions to the Electricity and Fuels Superintendent.

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