

25

9/11

BACKGROUND

MEXICAN NUCLEAR PROGRAM

Summary

Mexico's nuclear program began in the mid-1950's with work on sub-atomic particles in various universities around the country, and the construction of a pilot plant for the milling, refining, and conversion of uranium at the School of Chemistry. In 1955, the Comision Nacional de Energia Nuclear was formed to regulate, protect, and develop nuclear materials. It was reorganized in 1972 as the Instituto Nacional de Energia Nuclear; in 1979 it was again reorganized, renamed, and divided into three separate entities:

The Instituto Nacional de Investigaciones Nucleares (ININ, the National Institute of Nuclear Research), responsible for planning and implementing research and development in nuclear science and technology, and information dissemination;

The Comision Nacional de Seguridad Nuclear y Salvaguardias (CNSNS, the National Nuclear Commission for Safety and Safeguards), responsible for regulating the safety of nuclear installations, applying generally US regulatory requirements; and

The Uranio Mexicano (Uranium of Mexico), formed to carry out uranium ore exploration, exploitation, milling and mining functions. In 1985, it was placed under the joint command of the Comision de Fomento Minero (Commission of Mining Development) and the Consejo de Recursos Minerales (Council of Mineral Resources).

In 1985, the Comision de la Industria Nuclear (Commission of Nuclear Industry) was added to carry out the operational phases of the nuclear fuel cycle.

In 1965, the Centro Nuclear de Mexico (Nuclear Center of Mexico, also known as the Salazar Center) was opened, housing ININ, and equipped with three research reactors, a Triga Mark III 1 Mwe, a sub-critical facility (Chicago Modelo 9000) and a Tandem particle accelerator.

Res B

In 1970, the Mexican Government opened bidding for two 654 Mwe nuclear power reactors. In 1974, an agreement was reached with General Electric to build Laguna Verde I & II, to be located at Alto Lucero on the Gulf Coast of Mexico, 70 kilometers north of the city of Veracruz. Laguna Verde's steam supply systems are from GE, the turbogenerators are from Mitsubishi, and the architect/engineering services for both units is being provided by the Ebasco Corporation. Mexico adopted NRC's regulations and supporting guides as the basis for acceptance of the design, construction, and operation of Laguna Verde.

A-1/29
~~1/29~~

Organization and Competent Authorities

The operating utility for Laguna Verde is the state agency Comision Federal de Electricidad (CFE). The regulator is the Comision Nacional de Seguridad Nuclear y Salvaguardias (CNSNS). Both CFE and CNSNS report to the same cabinet level minister in the Ministry of Energy.

International Commitments

Treaty on the Non-Proliferation of Nuclear Weapons:

Mexico ratified the NPT in January 1969.

International Atomic Energy Agency:

Mexico is an active member of the IAEA, and all its nuclear facilities are under IAEA safeguards.

Treaty for the Prohibition of Nuclear Weapons in Latin America:

Ratified in November 1967, Mexico provided the impetus and raison d'etre for this treaty, and the negotiations from 1963 to 1967 took place in Tlatelolco, a northern suburb of Mexico City, which lent its name to the instrument's more common name, the Treaty of Tlatelolco. (Alfonso Garcia Robles, Mexico's head delegate at the negotiations, was awarded the Nobel Peace Prize in 1984 due to his tireless efforts in the nonproliferation area.) Mexico is the depository government for the Treaty, and also hosts the Treaty's instrumental organization, the Agency for the Prohibition of Nuclear Weapons in Latin America (OPANAL).

OPANAL is responsible for holding consultations among member states, supervising compliance with the established obligations, including a control system verifying peaceful uses among its parties, and promoting regional and relevant international accession to the treaty and its two protocols.

Convention on the Physical Protection of Nuclear Material:

This treaty came into force in February 1987. Mexico has signed and ratified it.

Convention on Nuclear Safety:

Mexico signed and ratified this treaty.

Organization of American States:

Mexico is an active participant in the OAS' nuclear energy organization, OLADE.

Organization for Economic Cooperation and Development:

Mexico became a member of the OECD in 1994.

Other treaties:

Mexico ratified the Limited Test Ban Treaty in 1963, and ratified the Outer Space Treaty in 1968.

COMISION NACIONAL DE SEGURIDAD NUCLEAR Y SALVAGUARDIAS

The National Nuclear Safety and Safeguards Commission, located in Mexico City, reports to the Ministry of Energy. The official mission of CNSNS is to guarantee the safety of the general population and both the nuclear and radioactive facilities within the country, through the establishment of the regulations and the surveillance of the fulfillment of the legal requirements and international treaties regarding nuclear and radiological safety and physical security.

Currently about 200 persons are employed at CNSNS, which is organized into three divisions: Radiological Safety, Nuclear Safety, and Technology, Regulations and Services. Also, an Administrative unit provides support to the above divisions.

The CNSNS program comprises the followings:

- Evaluation of safety reports and granting of licenses for nuclear facilities and installations
- Activities related to the compliance of radiological safety regulations in handling usage of radioactive materials
- Activities related to the physical security of nuclear facilities as well as the application of safeguards in handling and utilizing nuclear materials.
- Activities related to the compliance of radiological safety regulations in mining and processing of transuranium.

ENERGY POLICIES AND CONTROVERSY ABOUT NUCLEAR ENERGY

The current policies of the Mexican Government and the Comision Federal de Electricidad (CFE) to satisfy the energy demand for the next 10 years are based on the following:

- Construction of combined cycle power plants and reconversion to gas of the current fossil plants.

- Independent generation, mainly for combined cycle plants, and cogeneration.
- Power increase of the current hydroelectric plants.

Although the construction of nuclear power plants is not forbidden, there are no plans to construct more.

In Mexico there is not much controversy about nuclear energy; but there are small opposition groups like:

- The "Madres Veracruzanas" (Veracruz Mothers) group. Each weekend, about 10 members of this group gather in Xalapa (Capital of Veracruz State) to protest against Laguna Verde.
- About once a year the group called "Greenpeace" demonstrates against the plant.
- Currently, a former radiation protection technician who was fired from Laguna Verde because of administrative misdemeanors has been supplying misleading information to the newspapers and magazines like "Proceso" national magazine and in local newspapers. These publications have made public things like lists of persons who have worked at Laguna Verde and currently are sick, allegedly because of radioactive contamination or radiation exposure.

COMISION FEDERAL DE ELECTRICIDAD

CFE is a federal and public services institution which handles the generation and distribution of electricity in Mexico. The organization is headed by the CFE General Director who reports to a Government Council of which the Executive President is the Secretary of Energy. It is the owner of Laguna Verde and is held responsible for its design, engineering, construction, operation and maintenance.

The General Director has overall responsibility through CNSNS to ensure that CFE's responsibilities are carried out in a manner that they propose no undue risk to general public health and safety. The General Director has delegated this responsibility to the Nuclear Director.

The Nuclear Director is held wholly responsible for establishing the policies and practices for the management and the maintenance of Laguna Verde, and for insuring that all activities are carried. He is responsible for establishing an effective relationship with the Plant Manager, who is responsible for adequate plant operations) and the support groups (engineering, construction, administration, licensing, quality assurance, emergency plan) whose joint efforts guarantee correct operation and maintenance of both units.

NATIONAL INSTITUTE FOR NUCLEAR RESEARCH (ININ)

The National Institute for Nuclear Research is located in Salazar near the Mexican city of Toluca approximately 50 kilometers west of Mexico City. The official mission of ININ is to promote and develop peaceful uses of nuclear energy in Mexico. Approximately 1200 persons (including 350 with technical degrees) are employed at ININ, which is organized into four departments: Administration, Technical Services, Research and Development, and Training and Information. Physical protection responsibilities are located in the General Services Section of the Administration Department. Other Sections in the Administration Department include: Finance, Personnel, Purchasing, Maintenance, and Commercialization. The Technical Services Department includes five sections: Nuclear Technical Services (primarily radioisotope production), Radiation Safety, Reactor, Engineering, and Prototypes and Models. The Research and Development Department includes four sections: Basic Research, Applied Research, Fuel (experimental fuel fabrication for the Laguna Verde Nuclear Power Station), and Nuclear Systems. The Training and Information Department organizes and implements all training programs and maintains ININ's technical information library.

The principal facilities at ININ are the Triga III Research Reactor which began operation in 1968, a pilot fuel fabrication laboratory, a large, pool-type gamma irradiation facility, a space particle accelerator, and radio-chemistry laboratories. All fuel (low and high enriched) for the reactor has been exported to Mexico pursuant to the U.S./IAEA/MEXICO trilateral supply agreement.

INSTITUTO DE INVESTIGACIONES ELECTRICAS

The operator training simulator for the Laguna Verde Nuclear Power Plant was designed, constructed and commissioned by the Institute for Electrical Research (IIE) and was delivered to the Federal Electricity Commission in 1991. At present, it simulates Laguna Verde Unit One, after its first fuel recharge. The IIE completed its first major updating in 1994 and is now working to convert the current simulator computer platform to high workstations using sophisticated, but more realistic and reliable software simulation models. The IIE is proposing, in parallel with the simulator upgrading, to develop a classroom analysis simulator able to provide full current hard-wired simulator capabilities as well as a complete set of visualization and analytical tools for in-depth studies of severe transient and accident sequences.

By letter of January 22, 1997, Miguel Medina, Director General of CNSNS, sent a letter to NRC's Acting Executive Director for Operations requesting several computer codes to be used to develop and test the aforementioned classroom simulator. As of this writing, it appears that the codes will be made available.

LAGUNA VERDE

Laguna Verde Units 1 and 2 are located on the Gulf of Mexico in the municipality of Alto Lucero in the state of Veracruz, 69 km NNW of the city of Veracruz. Both units have a boiling water reactor nuclear steam supply system as designed and supplied by GE and designated as BWR 5. The reactors are similar to, but smaller than, Susquehanna I and II, and Shoreham.

The containment design employs the drywell pressure-suppression features of the BWR/Mark II containment concept. The containment provides dual barriers consisting of the primary containment and the secondary containment. The primary containment is a steel lined reinforced concrete structure of the over-and-under configuration. The secondary containment is the reactor building which encloses the reactor pressure vessel and its primary containment.

Each reactor has a rated power level of 1931 MWT and a design power level of 2015 MWT. The units are designed to operate at a gross electrical output power of approximately 675 MWE and a net electrical output power of approximately 650 MWE.

Principal events in Laguna Verde's history are:

UNIT 1

- 1976 Construction of Unit 1 is started.
- 1976/84 Erection of main structures is carried out--reactor vessel, piping and electro-mechanical equipment are installed.
- 1984/87 Generic tests and "cold" preoperational tests are performed.
- 1988 On October 21, after fulfilling all the regulatory requirements, the CNSNS authorizes the initial fuel load and startup tests are initiated.
- 1990 The Startup Test program was completed. After receiving CNSNS certification, the Secretary of Energy granted CFE a license for commercial operation (July 29).

During the startup tests phase, which lasted about 21.5 months, a significant number of modifications and maintenance activities were performed, which later contributed to a good unit operation. Also, during this phase there were 5 planned scrams and 25 unplanned scrams.

UNIT 2

- 1977 Construction of Unit 2 is started.
- 1977/82 Little advances in construction mainly due to budgetary problems.

- 1982/84 Construction work is suspended.
- 1985 Construction is reinitiated.
- 1987 Electro-mechanical installation work is reinitiated.
- 1994 August 25, after having fulfilled all regulatory requirements, CNSNS authorizes the initial fuel load and startup tests are initiated.
- 1995 The startup test program was completed. Commercial operation license was granted on April 10.

The startup test phase lasted 7.5 months, representing an international achievement for plants of this type. There were three planned scrams and four unplanned scrams, which represents good performance during this phase.

U.S.-MEXICAN NUCLEAR RELATIONS

Peaceful Cooperation Agreement:

Mexico has elected not to conclude a bilateral agreement for peaceful nuclear cooperation with the U.S. as a matter of policy. It cites (a) the potential for special influence from the superpower in a bilateral relationship; (b) the imposition of the U.S.'s 1978 Nuclear Non-Proliferation Act (NNPA) which originated safeguards and controls (that go beyond Mexico's IAEA obligations); and (c) the need to develop indigenously in the broader nuclear field without constraints. X

From 1963-1974, Mexico, the U.S., and the IAEA negotiated trilateral supply agreements to cover the TRIGA research reactor at the Salazar Center, its fuel and components, the building of the power reactor at the Salazar Center, its fuel and components, and the building of the power reactors at Laguna Verde, and its fuel (to be enriched by the U.S. Department of Energy). There is no quantitative enriched uranium ceiling in the Laguna Verde fuel supply agreements, but there is a rated core power output and generating output for the power reactor involved, and the material can only be used to fuel that reactor.

Under the original supply agreements for the TRIGA research reactor at the Salazar Center (signed in 1963 and 1972), only 18 of 72 ordered fuel elements (70% enriched uranium) from General Atomic were delivered. A dispute also developed over the costs for storage in the U.S. of the fuel elements (the Salazar Center not having adequate storage for that many elements), and the expiration of the export license for the remaining paid-for fuel. These problems were resolved when the supply agreements were renegotiated in 1979, via an amendment to the exchange of notes between the countries to meet the additional NNPA conditions. The latter primarily related to no retransfer of U.S. materials and technology, and U.S. reprocessing veto rights.

NRC-MEXICAN NUCLEAR ARRANGEMENTS

NRC and the Mexican CNSNS are parties to an "Arrangement for the Exchange of Technical Information and Cooperation in Nuclear Safety Matters" effective April 8, 1981. The actual arrangement consists of:

- (1) an exchange of letters (the agreement in principle, signed in 1980); and,
- (2) a set of implementing procedures (the substantive agreement) signed by the designated coordinators in 1981.

This agreement was last renewed in October 1989. The renewal added "waste management" to the specified areas of cooperation and expanded, at CNSNS' request, the provisions covering emergency cooperation. The current arrangement administrators are Jim Shea, Director, Division of Bilateral Cooperation and Assistance, OIP for the NRC, and Dr. Sergio Waller Mejia, Head of Technology, Regulation, and Services for the CNSNS. The arrangement establishes:

- (a) formal communication and cooperation channels for the timely exchange of nuclear safety information (including prompt notification of, and updatings on, operating reactor incidents in both countries);
- (b) the provision of nuclear safety assistance (specifically, documents, joint meetings, on-the-job training and detailed technical advice); and
- (c) cooperation in the joint preparation of plans for dealing with emergencies having transboundary effects.

The current renewal differs from the previous one in that we have included some Department of State mandated IPR language and expanded areas of research.

The areas of research were expanded to accommodate CNSNS's requests (since 1992) to enter into a separate agreement for research. NRC has provided CNSNS with separate draft research agreements in the past; however, CNSNS has never reacted to the drafts.

Also since 1992, CNSNS has requested the opportunity to in engage (at no cost) in NRC's Cooperative Severe Accident Research Program (CSARP) on a limited basis, since Mexico has only one operating facility. This was pursued with the Office of Research and it was decided to invite the CNSNS to send to representatives (at no cost) to the upcoming three semiannual CSARP meetings to get better acquainted with the program and to determine which areas of the program would be of interest to CNSNS. CNSNS staff attended two of those meetings. To date we have not been able to agree on CNSNS participation in

the CSARP or the Code Assessment and Maintenance Program (CAMP) despite that fact that RESEARCH has agreed to consider their participation in these programs despite a reduced assessment of about 33% of normal cost (\$50,000 and \$15,000, respectively each year for a minimum of three years). The CNSNS claims (probably accurately) that it does not have the money to participate. It has requested to participate on an "in-kind" basis.

NRC BILATERAL INFORMATION EXCHANGE ARRANGEMENTS IN LATIN AMERICA

In addition to Mexico, in Latin America, NRC has agreements with Peru, Brazil and Argentina. The agreement with Peru is a letter arrangement limited to the exchange of information on materials. The one with Brazil is up for renewal pending certain considerations. Chairman Jackson signed the renewal of agreement with Argentina in Vienna September 1996.

MEXICAN/CUBAN EXCHANGE

The CNSNS has a "peaceful uses" agreement with the Cuban Center for Radiation Protection and Hygiene which was renewed in 1996. The language in this agreement tracks closely language generally found in NRC arrangements with cooperation partners. Under the agreement, the CNSNS and the Cubans will cooperate in the following areas:

1. Safety of nuclear installations
2. Licensing of nuclear installations and radioactive materials.
3. Radiation protection of nuclear and installation and radioactive materials.
4. Regulations regarding radioactive waste.
5. Prompt notification and mutual assistance in case of a nuclear accident or radiological emergency.

status R.

This cooperation is to be in the form of 1) technical experts, 2) specialist training, 3) research and joint projects, 4) exchange of information and documents, 5) fellowships and technical training, 6) supply of equipment, examples and materials and 7) participation in national courses and seminars.

NRC/CNSNS EXCHANGES:

Since 1980, over 30 NRC headquarters and regional staff members have made technical mission visits to Mexico, either bilaterally or under the sponsorship of the IAEA, to assist the CNSNS in various aspects of regulatory safety, including the teaching of three separate training courses on BWR Technology Fundamentals. NRC has also provided information to Mexico in the form of copies of NUREGs and computer evaluation and analysis codes. During this same period, the CNSNS sent a number of its staff members to the NRC to receive short-term training at NRC headquarters or regional offices, or on-the-job inspection training at the Limerick and Perry nuclear power plant sites.

what kind?

In the area of emergency notification cooperation, procedures have been developed to ensure that the International Liaison representative at the NRC Operations Center will inform the CNSNS via telephone in the event of an

incident at a U.S. facility which prompts the activation of the Operations Center. At present, the NRC representative utilizes the office and home telephone numbers for Dr. Sergio Waller and Mr. Jose Delgado for all emergency notifications. The CNSNS telefax number is also available during normal working hours as a channel for these notifications. NRC understands that the CNSNS has a 24-hour emergency number for non-reactor radiological events, and that its use may be expanded in the future to include reporting of reactor events.

NRC SENIOR-LEVEL VISITS TO MEXICO

In April 1990, Harold Denton, Director, GPA, Bob Martin, Administrator for Region IV, Vic Benaroya and met with Mr. Medina and the Heads of the CNSNS Offices of Nuclear Safety, Radiological Protection and Technology, Regulation and Services in El Paso, Texas.

In February 1991, Commissioner Rogers, accompanied by his technical assistant, Jack Scarborough, Vic Benaroya, AEOD and William Upshaw, OIP, visited the CNSNS, SEMIP, ININ and the Laguna Verde facility.

In June 1992, Commissioner de Planque, accompanied by Harold Denton and her Technical Assistant, Eileen McKenna visited a number of facilities in Mexico. She also spoke at a radiation safety meeting in Zacatecas, Mexico in November 1993.

In January 1993, Commissioner Curtiss toured the Laguna Verde facility and met with high-level CNSNS officials.

In March 1994, then-Chairman Selin and Commissioner Remick visited with CNSNS officials and toured the Laguna Verde reactor.