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PROGRESS IN PEACEFUL APPLICATIONS OF NUCLEAR ENERGY DURING THE YEAR 1967/1968

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ITALY

The Main Developments in the Italian Nuclear Energy Programmes during 1968

GENERAL

1. At its eleventh regular session the General Conference was informed of the main developments in the Italian nuclear energy programmes which are described in document GC(XI)/INF/97/Rev.1, and considerable progress has been made since then in carrying out these programmes. The most important developments are described below.

PCUT PROGRAMME

2. The Trisaia Nuclear Research Centre of the National Nuclear Energy Commission (CNEN) near Rotondella (Matera province) was officially opened on 2 May 1968. Under the Uranium-Thorium Cycle Programme (PCUT), the Centre is required to carry out research with a view to developing:

(a) Knowledge concerning the technical possibilities and economic advantages of applying the uranium-thorium cycle to power reactors as an alternative to the uranium-plutonium cycle; and

(b) The techniques and technologies of reprocessing irradiated fuel and refabricating nuclear fuels by remote handling.

3. This research will be mainly carried out by the installation for the reprocessing and refabrication of fuel elements (ITREC) at the Trisaia Centre, and subsequently other installations will also be used for this purpose. In addition to its main aims mentioned above, the research also serves a number of purposes of secondary importance relating to various branches of engineering, chemistry and physics and the economic evaluation of the experimental data obtained. It should be noted that the criteria used in the design and operation of ITREC, which were established for experimental work on thorium fuel, can also be applied in the case of uranium-plutonium fuel, for which the requirements with regard to refabrication by remote handling are the same. Thus, once ITREC has completed the necessary study of the fuel cycle in convertor reactors, it will be possible to use it for experimental work on fuel cycling in fast reactors.

EUREX PROGRAMME

4. The construction of the EUREX installation at Saluggia, which began in January 1966, was completed in March 1968 and it is intended to start using this installation in early autumn.

5. The design, construction and use of this installation is part of the EUREX Programme, which envisages research on the reprocessing by aqueous techniques of fuel elements in research and power reactors. The CNEN intends to use this installation to study the technological and chemical problems bound up with reprocessing installations so as to obtain the technical and economic data required to construct an installation carrying out reprocessing on an industrial scale which would meet future national requirements.

PLUTONIUM PROGRAMME

6. At the Casaccia Nuclear Study Centre a laboratory has been constructued covering an area of almost 1800 m^2, half of which is intended to be used for small laboratories specializing in research on ceramic-plutonium materials.

7. In Italy the growing interest in plutonium as a nuclear fuel is justified by the fact that about 300 kg of this precious metal is produced per year, i.e., slightly less than one-third of a ton, in the nuclear plants now in operation. Furthermore, current estimates indicate that there will be a considerable increase in production in future years. These circumstances have prompted the principal Italian organizations interested in national nuclear energy development to undertake long-term development and research programmes relating to plutonium-based fuels.

8. The Ente Nazionale per l'Energia Elettrica (ENEL), in co-operation with EURATOM, has embarked on a series of studies and tests with a view to the immediate use of plutonium in thermal reactors; the tests consist of the irradiation of a large number of plutonium-based elements in an Italian nuclear plant. In addition, the CNEN has undertaken large-scale activities relating, inter alia, to the development of plutonium-based fuel elements for fast reactors.

9. The main aim of the Plutonium Programme, which started in 1966, is to enable the CNEN as quickly as possible - by providing it with the necessary technicians and equipment - to develop ceramic-plutonium nuclear fuels. The construction of the Laboratory with an area of 1800 m^2, mentioned above, serves this purpose. The CNEN programme also includes irradiation tests with ceramic-plutonium fuel.

ROVI PROGRAMME

10. The Italian ROVI Consortium was set up in December 1967 under the auspices of the CNEN with a view to the commercial development and exploitation of ROVI reactors as desalting plants on both domestic and international markets. This Consortium includes the following seven major Italian industrial companies: Bombrini Parodi Delfino, Breda, FIAT, Montecatini Edison, Progettazioni Meccaniche Nucleari (IRI), SNAM Progetti (ENI), SoRIN. The Board and Secretariat of the Consortium are appointed by the CNEN.

11. The present programme of work covers the preparation of a commercial tender, specifying the cost and providing for a guarantee, for a small plant which could produce about 50 000 m^3 of desalted water per day. This tender should be ready by the end of 1968. Considerable interest has already been shown in this project by the authorities in the Italian regions in which water resources are scarce and by many countries, particularly developing countries.

12. The CNEN and the Italian firms in the Consortium believe that ROVI can make a vitally important contribution to the solution of the problem of water supplies in many areas of the world.

DEVELOPMENTS IN THE NATIONAL NUCLEAR ENERGY INDUSTRY

13. In March 1968 COREN, the nuclear reactor fuel company jointly established in July 1967 by Westinghouse, FIAT and EFIM-Breda, completed the construction of its installation at Saluggia and, at the end of April 1968, started the first operations connected with the assembly of the fifth core area of the pressurized-water reactor at Trino Vercellese.

14. The two other Italian companies which intend to manufacture nuclear fuel are FABBRICAZIONI NUCLEARI S.p.A. at Genoa, set up by Ansaldo Meccanico Nucleare and General Electric, and COMBUSTIBILI NUCLEARI S.p.A. set up by SNAM Progetti and the United Kingdom Atomic Energy Authority at Rotondella (Matera province).

PHILIPPINES

Progress in the Peaceful Applications of Nuclear Energy during the Year 1967/68

GENERAL

1. The Philippine Atomic Energy Commission (PAEC) marked the tenth anniversary of its establishment on 16 July 1968. In general, the year 1967-68 was marked by a continued expansion of nuclear energy activities. This brief report summarizes the progress made, especially as it relates to the activities of the Agency.

NUCLEAR POWER DEVELOPMENT

2. The Manila Electric Company (MERALCO), the largest private electric utility company in the country, which serves the Manila metropolitan area, has analysed and evaluated the international bids received for oil-fired and nuclear-fuelled power plants in the size range of 300 to 500 MW(e). Although the economic competitiveness of the nuclear plants as alternatives to oil-fired plants was established from the analysis of these bids, the high capital cost of the former seems to have deterred MERALCO from adopting nuclear power for its generating units which are scheduled for operation in 1971-73. MERALCO's tentative plans now indicate the operation of its first nuclear plant by 1975-77.

3. Although the National Power Corporation has not formulated any definite plan for nuclear power development, it has started studies of the possibility and implications of installing nuclear plants to complement its existing hydro plants in Luzon.

4. To pave the way for the eventual introduction of nuclear power in the country, the following have been undertaken through the initiative of PAEC:

(a) The Atomic Energy Regulatory and Liability Act, which provides the legal framework for the licensing and regulation of atomic energy facilities and the use of materials, and establishes the rules on civil liability for nuclear damage, was enacted by the Philippine Congress during its 1968 regular session;

(b) A new Agreement for Co-operation between the Philippines and the United States of America Concerning the Civil Uses of Atomic Energy was concluded, providing for the uranium materials needed during the next 30 years in the operation of two nuclear power plants having a capacity of 300 to 500 MW(e) each; and

(c) The local training programme in reactor operation, maintenance and instrumentation has been finalized to provide initial training for the engineering staff of MERALCO and the National Power Corporation.

THE AGENCY'S REGIONAL TRAINING COURSE ON PLANNING FOR THE HANDLING OF RADIATION ACCIDENTS

5. PAEC acted as host to this brief course which lasted from 2 to 13 October 1967. The course provided training for 19 nuclear scientists, all of whom are responsible for the handling of radiation accidents in the seven Asian countries that they represented. An international team of seven visiting professors was assisted by six Philippine lecturers in the conduct of the course. The head of the Health Physics Department, Philippine Atomic Research Center (PARC), served as course director.

INDIA-PHILIPPINES-AGENCY (IPA) NEUTRON CRYSTAL SPECTROMETRY PROGRAMME[1/]

6. This five-year research and training programme has entered its fourth year of operation. Two participants, one from the Republic of Korea and the other from Thailand, completed their training during the period under review. Two Indian experts recruited by the Agency also completed their tour of duty. Meanwhile, a new group of three IPA participants from China, Indonesia and the Republic of Korea started training at PARC towards the end of 1967.

7. Apart from the noteworthy research being carried out under the IPA programme, a far-reaching result of this co-operative venture is the upsurge of interest and activity in neutron solid-state physics in the region. The Republic of Korea and Thailand are now doing neutron scattering research under the leadership of the scientists who have been trained under the programme.

1/ Under the agreement reproduced in document INFCIRC/56.

8. The Joint Committee for the IPA programme held its fifth meeting at PARC in Quezon City. With the IPA agreement due to expire by the end of 1969, the future of the programme was discussed. Experience gained under the programme has served to focus attention on the need for expanding regional co-operation to meet the increasing quantity and sophistication of research on neutron scattering in the region.

SAFEGUARDS TRANSFER AGREEMENT

9. On 13 June 1968, the Governments of the Republic of the Philippines and of the United States of America signed a new Agreement for Co-operation Concerning the Civil Uses of Atomic Energy, which supersedes the Agreement signed on 27 July 1955. The new Agreement covers a period of 30 years and provides, among other things, for the transfer of up to 17 600 kilograms of enriched uranium in anticipation of the plan to introduce nuclear power into the Luzon Grid by 1975-77. The stipulated amount represents the requirements for two power reactors in addition to the modest requirement for research.

10. The two Governments further agreed that the Agency should continue to administer the safeguards stipulated in the new Agreement for Co-operation, as was done under the Agreement that has been superseded. Accordingly, a new trilateral agreement on the transfer of safeguards between the Agency, the Philippines and the United States of America was signed on 15 July 1968[2/]. The Agency is presently preparing the text of the subsidiary arrangements to this new Safeguards Transfer Agreement in accordance with its Safeguards System.

IAEA RESEARCH CONTRACTS

11. The Philippines continued to avail itself of Agency research contracts as a means of stimulating local research activities in the nuclear field. Contracts totalling $20 700 were awarded for one new project (mutation studies of soybeans, with the Agency contributing $4 000) and five old ones (renewals). Of these contracts, four were awarded to PARC, one to the Philippine Women's University an the other one to the National Institute of Science and Technology. The research contracts renewed and the corresponding grants by the Agency were:

2/ Reproduced in document INFCIRC/120 (in print).

(a) Studies on the nutrition of coconut palm, $3300;

(b) Radioisotope studies in schistosomiasis, $1600;

(c) Effects of ionizing radiation on mango, banana and chico fruits, $4800;

(d) Co-ordinated programme on the use of induced mutations in rice breeding, $4000; and

(e) Co-ordinated programme on the study of protein metabolism in marginal protein deficiency, $3000.

TECHNICAL ASSISTANCE

12. For the past eight years, the Agency has been the Philippines' major source of technical assistance in atomic energy. In addition to the research contracts, assistance has been in the form of expert services, equipment grants and training fellowships. During the past year two experts, representing nine man-months of expert services, were provided by the Agency for the IPA programme and the radioisotope production project. Equipment worth $14 000 for radio-isotope production was also received. Ten new fellowships and one scientific visit were included in the 1968 programme of technical assistance.

13. As a result of the Agency's assistance, the production of 17 types of radioisotopes at PARC has been expanded, and superphosphate labelled with ^{32}P is now produced in quantities sufficient to meet local research requirements.

REPLACEMENT FUEL ELEMENTS FOR THE PHILIPPINE RESEARCH REACTOR PRR-1

14. All 20 new fuel elements have been received from the fabricator in the United States of America. The enriched uranium (93% ^{235}U) for these replacement fuel elements was supplied by the Agency under the offer made by the United States Government to donate $50 000 worth of special nuclear materials in 1966. With the reactor fuelled with the original 30 elements (containing uranium enriched to only 20%) at the end of its operational cycle, the first refuelling operation is now in progress. Earlier, the ^{235}U content of each fuel element was determined experimentally. Differences between the experimental values and the manufacturer's values ranged from 2.2% for high-load elements to 3.7% for low-load elements.

15. The fabrication of the third batch of ten replacement fuel elements is now under negotiation; the uranium is to be supplied through the Agency by the United States Government under a new Supply Agreement recently concluded between the Agency, the United States of America and the Philippines 3/.

NON-PROLIFERATION TREATY

16. The Philippines were among the first Member States to sign the Treaty on the Non-Proliferation of Nuclear Weapons. The Philippine Ambassador to the United States and Permanent Representative to the United Nations signed the Treaty in Washington when it was first opened for signature on 1 July 1968, and later in Moscow. This is a manifestation of the strong support that the Philippines has accorded to the Treaty.

3/ To be reproduced in document INFCIRC/88/Add.1.