GC

International Atomic Energy Agency

General Conference

GC(XIII)/INF/113/Add.4
30 September 1969
GENERAL Distr.
Original: ENGLISH and FRENCH

Thirteenth regular session

PROGRESS IN PEACEFUL APPLICATIONS FOR NUCLEAR ENERGY DURING THE YEAR 1969/70

Statements by Member States received on 23 and 24 September

69-7769

CONGO, DEMOCRATIC REPUBLIC OF THE

Progress made in the peaceful uses of atomic energy during the year 1968-69

INTRODUCTION

1. During the period 1968-69 nuclear energy activities in the Democratic Republic of the Congo were directed mainly to the following ends:

(a) Conversion of the TRIGA Mark I reactor into a TRIGA Mark II reactor;

(b) Construction of new laboratories for the Regional Nuclear Centre;

(c) Organization of the Symposium on the Peaceful Uses of Atomic Energy in Africa held by the Organization for African Unity (OAU);

(d) Diversification of nuclear research in the TRICO Nuclear Centre.

CONVERSION OF THE TRIGA MARK I REACTOR INTO A TRIGA MARK II REACTOR

2. All the parts of the new reactor, which were ordered during the period 1966-67, are now on site and ready for installation. It is intended to shut down the old reactor at the beginning of 1970 and install the new one in about July 1970. The new reactor will be installed under the supervision of experts from General Atomic, San Diego. Construction of the hall in which the new reactor will be housed started in September this year.

CONSTRUCTION OF THE NEW LABORATORIES FOR THE REGIONAL NUCLEAR CENTRE

3. It will be recalled that at a meeting of the OAU Heads of State at Kinshasa in 1967 it was decided to convert the TRICO Nuclear Centre at Kinshasa into a regional centre which would be at the disposal of the OAU Member States. The change-over programme was started in June 1969 with the construction of laboratories for the various research departments of the Regional Centre. It is planned to complete this programme of construction towards the end of 1970.

ORGANIZATION OF THE OAU SYMPOSIUM ON THE PEACEFUL USES OF ATOMIC ENERGY IN AFRICA

4. With the support of the Agency the Commissariat des Sciences Nucléaires of the Democratic Republic of the Congo organized a Symposium on the Peaceful Uses of Atomic Energy in Africa. This Symposium was held in Kinshasa from 28 July to 1 August 1969 and was attended by more than 100 research workers and scientists from 23 African countries. The Symposium served a dual purpose:

(a) To make known what is being done in Africa in regard to the use of nuclear energy for peaceful purposes, and to enable participants and Member States of OAU to exchange views and report on their experience in this field; and

(b) To determine and delimit fields of activity (such as the training of professional and auxiliary staff, and the extraction of appropriate minerals) which could constitute future programmes for incorporation in the development plans of Member States, on an individual or collective basis.

DIVERSIFICATION OF NUCLEAR RESEARCH AT THE TRICO NUCLEAR CENTRE

5. Research at the TRICO Nuclear Centre was concentrated on the following fields:

(a) Radioagronomy

(i) Studies under way

Systematic determination of aluminium and silicon in Congolese soil;

Study of the influence of trace elements on the yield of orchards at the M'vuazi Agricultural Station;

Study of insecticide absorption by plants;

Determination of phosphorus and potassium in sugar-cane leaves at the Moerbeke plantation;

Study of the hydric state of the synthetic maize population at the Nsele plantation;

(ii) Studies planned

Uptake of sulphur by poultry;

Planting and selection of soya;

(b) Nuclear medicine and biology

(i) Studies under way or already completed

Intestinal absorption of iron;

Thyroid fixation of iodine;

Study of Rhizobium-Leguminosae relations with reference to DNA metabolism;

(c) Radiochemistry

(i) Studies under way or completed

Study of antimony and tin impurities in type lead;

Determination of silicon, aluminium, manganese, sulphur, copper and antimony in slag, pig iron and white metal produced in the Congolese metallurgical industry;

Determination of molybdenum and uranium in various Congolese ores;

(ii) Studies planned

Routine determination of vanadium in Congolese crude oil for the Moanda refinery;

Industrial-scale prcduction of radioisotopes;

(d) Training of personnel

The students of the Lovanium University have continued to use the facilities of the TRICO Nuclear Centre in their work for bachelor's and doctor's degrees.

PHILIPPINES

Progress in the peaceful uses of atomic energy during 1968-69

GENERAL

1. There was continued progress and expansion in the work of the Philippine Atomic Energy Commission. Some of the activities which might be of interest to the Agency and the Member States are briefly summarized in this report.

RADIATION MUTATION

2. Several promising mutants have been developed by the irradiation of IR-8 rice seeds. The IR-8 is a high-yielding variety developed by the International Rice Research Institute. It suffers from two important defects: low resistance to the blast disease and poor table quality.

3. Mutants being tested by the Commission include types that are earlier maturing, shorter stemmed, higher yielding, blast resistant and give grains of superior quality.

4. Radiation mutation studies are also being undertaken on soy bean, corn, mongo bean and coconut, in addition to work being done to induce seedlessness in several important Philippine fruits.

FOOD PEST CONTROL

5. Studies on the life history of the melon-fruit fly (Dacus cucurbitae), on the techniques of mass rearing them in the laboratory and on their radiosensitivity have been started with a view to applying the sterile-male technique to control this insect pest. Several insects which cause damage to stored grain are also being dealt with. They include the saw-toothed grain beetle (Oryzaephilus surinamensis), the flour beetle (Tribolium castaneum), the rice weevil (Sitophilus oryzae) and the grain moth (Corcyra cephalonica).

6. A study has also been started to determine the effects of orally-administered tritiated thymidine in the production of dormant lethal genes in the field rat which is a major agricultural pest in the Philippines.

CONTROL OF SCHISTOSOMIASIS

7. Work involving the use of radioisotope techniques to find methods for the control of the schistosomiasis disease has been going on in the Commission for several years. Several studies have begun to yield encouraging results. The cercariae of the Schistosoma japonicum have been successfully tagged with carbon-14, which permitted the determination of their distribution and fate inside the body of the infected host.

8. Further studies deal with the development of a vaccine in which irradiated cercariae for immunization against schistosomiasis are used. The dispersion and movement of the intermediate host snail of liver fluke is being studied by cobalt-60 labelling.

SOME RADIOISOTOPE APPLICATIONS IN INDUSTRY AND MINING

9. Studies on the production of hard wood from inferior wood are in progress. At least eight varieties of soft and semi-hard wood have been experimented on, involving the use of monomers and monomer combinations and irradiation by a cobalt-60 source. A project has been started involving the grafting of several types of monomers to important Philippine textile fibres such as kenaf, ramie and abaca by irradiation to improve their properties.

10. Studies are also being carried out on the use of atomic absorption spectroscopy for testing for magnesium and chromium in minerals and on the use of neutron activation analysis in mapping the geochemical distribution of economically important mineral occurrences.

11. The Commission provided technical advice and services relating to the use of radiotracers in a study of sewerage pollution in Manila Bay carried out with the assistance of the World Health Organization.

NUCLEAR POWER DEVELOPMENT

12. The laying of the groundwork for the eventual introduction of nuclear power in the country is being continued. Following the passage in 1968 of an Atomic Energy Regulatory and Liability Act, the Commission is preparing appropriate rules and regulations for the licensing of atomic energy facilities and for the use of nuclear materials. A 16-week nuclear reactor technology course was conducted for engineers, mostly from the Manila Electric Company (MERALCO), the largest private electrical company in the country which has plans for the use of nuclear power.

LOCAL TRAINING IN NUCLEAR SCIENCE

13. As in past years, the Commission provided the main facilities, through its Nuclear Training Institute, for local training in atomic energy. In addition to the nuclear reactor technology course mentioned above, seven other courses were conducted for some 160 scientists, engineers, doctors and teachers. They included two sessions of the basic radioisotope technique course, a course on elementary statistics for scientific research, a first course on the agricultural uses of radioisotopes and radiation, a seminar in nuclear science for elementary and high-school teachers and a seminar in nuclear technology for university faculties.

REGIONAL CO-OPERATION

14. A notable regional co-operative undertaking in the peaceful uses of atomic energy under the auspices of the International Atomic Energy Agency was phased out last August after five years of successful operation. This was the IPA project, so-called after its sponsors, India, Philippines and the Agency, which was established to provide facilities for training and research on neutron diffraction for scientists from Member States of the Agency in South Asia, South East Asia and the Pacific, and the Far East. India helped to initiate the project by the loan and subsequent donation of a neutron crystal spectrometer and the assignment of Indian experts. The Philippines provided the supporting facilities, including the 1-MW research reactor in the Philippine Atomic Research Center in Quezon City where the project was set up. The Agency, for its part, contributed financial assistance to defray the travel and living expenses of the Indian experts and provided fellowships for participants.

15. Eleven scientists and technicians from Indonesia, Korea, the Republic of China, Thailand and the Philippines received intensive training under the programme on the installation, operation and use of the neutron crystal spectrometer. Most of them now have their own neutron diffraction projects in their respective centres. In Indonesia and the Philippines at least, participation in the project has resulted in the building of their own spectrometers.

16. The high quality of the research work done under the programme is attested to by some 20 reports and papers that have been produced. Results of studies have been published in the following journals: Nuclear Instrumentation and Methods, Physical Review and Philippine Nuclear Journal. Two recent papers have been submitted for publication in Acta Crystallographica.

17. But over and above these specific achievements, it is believed that the greater importance of the IPA project lies in the fact that it successfully demonstrated a practical approach towards promoting regional co-operation in Asia. Encouraged by this success the Agency convened last March in Manila a meeting to assess the possibility of organizing a new project to replace the IPA project. Participants in the meeting recommended a co-operative project in nuclear science on a wider scale. The proposal has been transmitted to the countries concerned and it is gratifying to note that a number of them have already officially agreed with the recommendations.

AGENCY ASSISTANCE

18. As in past years, the Agency was the chief source of technical assistance for atomic energy work in the Philippines. It made available to the Commission the services of one expert in radioisotope production, one expert in neutron diffraction, one expert in activation analysis, and a fourth one in food preservation. Equipment provided included a multi-channel analyser, cryogenic equipment and a portable X-ray fluorescence analyser with a total value of more than $35 000. Ten new fellowships requested by the Philippine Government were approved.

19. In addition, the Agency awarded two new research contracts on gamma irradiation of foodstuffs and fish, worth $7500. Five research contracts were renewed. They related to studies on the sorptive and exchange capacity of tuff, studies on the nutrition of the coconut palm, studies on the effects of ionizing radiation on certain Philippine fruits, studies on the effects of neutron irradiation on seeds and studies on the use of induced mutation in rice breeding. The latter contracts involve an additional award of $19 200.

AGENCY MEETINGS

20. The Philippines was host to three Agency meetings held consecutively in Manila. They were the Panel on the Utilization of Reactor Centres in Training Staff for Nuclear Power Systems, held from 10 to 13 March, the Organizational Meeting for a Regional Co-operative Project to Succeed the IPA Project, held from 14 to 16 March, and the Study Group Meeting on Research Reactor Utilization, held from 17 to 20 March. Fourteen countries were represented at these meetings.

21. An FAO-IAEA Visiting Seminar on Food Irradiation was held in Manila from 30 to 31 January.

SWEDEN

Progress in the peaceful uses of nuclear energy in 1968-69

NUCLEAR POWER DEVELOPMENT

1. Last year the ordering of two large power stations, Ringhals 1 and Ringhals 2, was reported to the General Conference. This development, which reflects the rapid progress being made in carrying out the Swedish nuclear power programme, continued this year when two new power stations were ordered, this time by the private utilities, Oskarshamns Kraftgrupp AB and Sydkraft. The two reactors, Oskarshamn 2 and Barsebäck 1, are almost identical and are to be delivered by the Asea-Atom company and the turbines by Brown Boveri/Stal-Laval. The net electrical output from the stations are calculated at about 580 MW each.

2. The State Power Board and the private power companies have made a new study of the estimated growth of nuclear power in Sweden as well as the size and locations of the nuclear power stations. According to this study Sweden will in the year 1980 have about 7500 MW installed. The actual stations are given in the following table:

Swedish nuclear power stations ordered and planned

Name	Owner	Electric Power MW(e)	Type of Reactor	Start of Operation
Ordered				
Agesta	Stockholms Elverk/ Swedish State Power Board	10	Pressurized heavy water	1964
Marviken	Swedish State Power Board	140	Boiling heavy water	1970
Oskarshamn 1	Oskarshamnsverkets Kraftgrupp AB	440	Boiling water	1970
Ringhals 1	Swedish State Power Board	760	Boiling water	1973
Ringhals 2	Swedish State Power Board	830	Pressurized water	1974
Oskarshamn 2	Oskarshamnsverkets Kraftgrupp AB	580	Boiling water	1974
Barsebäck 1	Sydkraft AB	580	Boiling water	1975

Name	Owner	Electric Power MW(e)	Type of Reactor	Start of Operation
Planned				
Swedish East Coast	Swedish State Power Board	750		1976-77
Värtan, Stockholm	Stockholms Elverk	500		1976-77
Barsebäck 2	Sydkraft AB	750		1977-78
Swedish East Coast	Swedish State Power Board	750		1978-79
	"	750		1978-79
	"	750		1979-80

The siting of large nuclear power stations for combined district heating and electricity production close to population centres is of great interest to Sweden and is at present being studied.

AB ATOMENERGI

3. The formation of Asea-Atom has resulted in a reorganization of AB Atom-energi. From the middle of this year the company is wholly State owned. As mentioned last year, it will concentrate its activities in its research station at Studsvik. The direct participation in industrial reactor projects will gradually decrease and the company will devote its resources to the support of the nuclear manufacturing industry and the power utilities as well as to long-range research and development work.

4. The Marviken reactor is now in its final stage of construction and will become critical around the end of this year or the beginning of next year.

5. The company's uranium mill at Ranstad, using shale with only 300 grams of uranium per metric ton, has been a technical success and the plant has a capacity of around 140 metric tons of uranium per year. In comparison with the needs of the total Swedish nuclear programme during the late 1970's this production is much too low. It has been decided to carry out a three year study with a view to achieving further development of the process and a reduction in the cost of production and a project study of a plant producing about 1000 tons per year.

ASEA-ATOM

6. The Asea-Atom company now has the following reactors ordered or under construction: Oskarshamn 1, Ringhals 1, Oskarshamn 2 and Barsebäck 1. Fuel for these reactors as well as to fulfil some export orders will be manufactured at the company's fuel element plants. The above-mentioned four reactors are all of the boiling light-water type and represent a total power of 2350 MW(e).

UDDCOMB SWEDEN

7. In order to increase the manufacturing resources in Sweden for steel pressure vessels for water reactors a new company, Uddcomb Sweden Aktiebolag, was formed in the beginning of July as a joint enterprise between the Swedish State, Uddeholms AB and the American company, Combustion Engineering Inc. The Swedish State owns half of the shares of the company and the two other participants one quarter each. The company will manufacture and sell heavy components for nuclear power stations and the chemical industry.

CO-OPERATION BETWEEN THE NORDIC COUNTRIES

8. For a number of years the Nordic countries have been co-operating in the nuclear energy field. The co-operation takes place within the framework of a co-ordination committee which was set up by the Nordic Contact Committee for Atomic Energy Questions. The work is performed within several fields of mutual interest such as heat transfer and dynamic flow tests of full-scale fuel elements, reactor dynamics, concrete pressure vessels, heavy water reactors and nuclear safety.

The possibility of increased collaboration is being studied in the present negotiations between the Nordic countries regarding a common economic market.