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ADVANCES IN THE APPLICATION OF NUCLEAR ENERGY  
FOR PEACEFUL PURPOSESInformation received from Pakistan

On 1 September 1977, the Director General received from the Pakistan Atomic Energy Commission, for the information of the General Conference, material on the advances made in its country during the year 1976-77 in applying nuclear energy for peaceful purposes. The material in question is reproduced below.

1. The activities of the Pakistan Atomic Energy Commission during the period June 1976 to July 1977 are briefly summarized below.

## 1. NUCLEAR POWER GENERATION

2. Pakistan is one of the poorest countries both in terms of per capita energy consumption and the availability of fossil fuel reserves. The per capita consumption of energy in Pakistan is about 150 kWh per year and its entire fossil fuel reserves of a mere 13 tons per capita barely correspond to one per cent of the world average.

3. Pakistan will need more than 30 000 MW of electricity by the end of this century. Out of this less than one half can be provided through resources of hydro power, oil, coal and gas. The remainder amounting to 16 000 MW or more has to come from nuclear energy. Accordingly, Pakistan has embarked upon a programme of setting up a chain of nuclear power stations to meet growing electricity demands of the country.

(i) Karachi Nuclear Power Plant

4. The country's first nuclear power plant at Karachi (KANUPP) continued to function satisfactorily and met about 24 per cent of Karachi's electricity

needs. The average availability factor of the plant during the last 12-month period was about 70% during which 486 million kWh of electric power was produced.

(ii) Chashma Nuclear Plant

5. Another plant called Chashma Nuclear Power Plant (CHASHNUPP) of 600 MW capacity is being planned near Chashma Barrage in Mianwali district. Geotechnical investigations and subsoil tests of the plant site have been completed. Site preparation and construction of various facilities are in progress.

2. AGRICULTURE

6. Agriculture is the mainstay of Pakistan's economy. It contributes about 60 per cent of the total GNP, and 80 per cent of the people directly or indirectly depend for their livelihood on this occupation. Pakistan, therefore, is very keen to apply nuclear radiation techniques to overcome the twin problem of low yield and damage to food grains by insects and pests.

7. At the Commission's two agriculture centres, namely the Nuclear Institute for Agriculture and Biology (NIAB), Lyallpur, and the Atomic Energy Agriculture Research Centre, Tandojam, research programmes continued to evolve new high yielding and disease resistant varieties of wheat, cotton, rice and pulses. Work was also carried out on the economic storage of food grains by disinfestation by nuclear irradiation.

8. A third agriculture centre called the Nuclear Institute for Food and Agriculture (NIFA) is under construction at Tarnab near Peshawar in the Frontier province. The Centre will be completed during 1978. The Institute will lay emphasis on preservation of food and fruit, which are grown abundantly in the area.

9. A new variety of rice has been evolved by radiation-induced mutation and released for cultivation in Azad Kashmir. It matures three weeks earlier than its parent Basmati-370. NIAB Lyallpur has also evolved a new promising variety of wheat. Preliminary trials have been completed and the variety is expected to be released for cultivation in rainfed areas. Some promising mutants of cottons have also been evolved which are under trial.

3. MEDICINE

10. Construction work of the country's sixth nuclear medical centre at Larkana in upper Sind has been completed. The Centre is expected to become operational early next year. It will be followed by two more nuclear medical centres which will be located at Lahore and Islamabad.

11. The five existing nuclear medical centres at Peshawar, Lahore, Multan, Jamshoro and Karachi are also being expanded and modernized. Besides treating a large number of patients, these centres also carried out research on the incidence of the various types of cancer.

4. NUCLEAR MINERALS

12. The Commission has stepped up its efforts to search for uranium in Dera Ghazi Khan and other parts of the country. In Dera Ghazi Khan investigations are made with the assistance of the United Nations Development Programme (UNDP). Useful information about mineral potential and mode of occurrence has been tabulated. The feasibility of economic exploitation of mineral sand along the Karachi coast is being examined.

5. TRAINING

13. The Commission organized local training programmes and offered six fellowships to the IAEA during the period under review. These fellowships will be utilized by Member countries at the Commission's Agriculture and Medical Centres. The Commission also awarded a number of fellowships for post-graduate research at the universities.

6. INTERNATIONAL SUMMER COLLEGE ON "PHYSICS AND CONTEMPORARY NEEDS"

14. The Commission sponsored the second International Summer College on "Physics and Contemporary Needs" from June 20 to July 8, 1977 at Nathiagali, about 50 miles from Islamabad. Twenty-seven countries were represented at the Summer College which was attended by a large number of eminent scientists from Pakistan and abroad including one Nobel laureate. The first College was held in 1976 and the Commission plans to make it a regular feature for the future.

