Government of India
AtomicEnergy Commission

Bombay
July 20,

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A copy of the letter which Chairman has addres the following Editors of Newspapers is attached for :

1) Shri N.J. Nanporia
Editor, The Times of India
Dr Dadabhai Naoroji Road, Bombay 1

2) Shri A.B. Nair
Editor, Free Press Journal
21, Dalal St., Bombay 1

3) Mr A. K. Charlton
Editor, The Statesman,
New Delhi 1

4) Shri S.Mulgaokar
Editor, The Hindustan Times, New Delhi

5) Shri S. Basu
Editor, The Hindustan Standard
6, Sooterkin St., Calcutta 1

6) Shri S. Parthasarathy
Editor, The Hindu, Mount Road, Madras

(H. S. Sive)
20.7.'64

JS(B)/DS(B)
Dy.Director (Physics) TIFR
Publication Officer

NSStrr 20.7.64

10th Anniversary

SOME HISTORICAL LANDMARKS

As early as 1948, an Atomic Energy Act was enacted providing for the development and control of atomic energy. Under the terms of this legislation an Atomic Energy Commission was set up on August 10, 1948 with Dr H.J. Bhabha, F.R.S. as its Chairman. Among the tasks assigned to the Commission were to survey the country for atomic minerals, to work and develop such minerals on an industrial scale, to do research in the scientific and technical problems connected with the release of atomic energy for peaceful purposes, to train and develop the necessary scientific and technical personnel for this work and to foster fundamental research in nuclear sciences in its own laboratories and in the universities and research institutions in India.

The Commission functioned as an advisory and policy making body whose decisions were executed through the latey Ministry of Natural Resources and Scientific Research. It had virtually to start from a scratch as it did not have the benefit of a nucleus of scientists who had participated in the development of atomic energy during the war years, as did several other countries. Accordingly it devoted its immediate attention to the problem of building up nuclei of scientists in the different fields of sciences related to atomic energy. In this task it was greatly assisted by the Tata Institute of Fundamental Research which, since its foundation in 1945, had built up a group of scientists in nuclear physics and other related disciplines.

In fact some of the early projects of the Commission were carried out by joint teams belonging to the two organizations. The

Commission, in turn, gave substantial help to the Institute by providing funds for increasing its activities and for specialized equipment for nuclear research.

One of the first activities undertaken by the Institute for the Commission was the setting up of a small electronics group to design and build the electronic instruments without which atomic energy work is impossible. This group was the nucleus from which grew the present Electronics Group of the Trombay Establishment; producing most of the electronic instrumentation used not only at Trombay, but also by other institutions.

The Commission also set up a Rare Mineral Survey Unit for prospecting for atomic minerals. This Unit later grew to become the Atomic Minerals Division. In April 1951 construction was started at Alwaye (Kerala) on a plant for processing the monazite from the beach sands. The plant was commissioned in July 1952.

Work was also started in 1953 on another plant at Trombay to process the thorium cake, obtained at the Alwaye plant for obtaining thorium nitrate and uranium fluoride — the latter being a source of uranium metal for the reactors.

The activities of the Commission thus gradually expanded and it was felt that the country was in a position to embark upon a full-fledged atomic energy programme. At its 29th meeting held on January 3, 1954 the Commission decided that an Atomic Energy Establishment be set up at Trombay. In order to undertake this expanded programme effectively and efficiently it was decided to set up a separate ministry of the Government of India, called the Department of Atomic Energy, charged

necessary for them. About the same time the United Kingdom Atomic Energy Authority generously offered to make available enriched uranium in the form of fabricated fuel elements. At its meeting on March 15, 1955, the Atomic Energy Commission, therefore, decided to build up a reactor of the pool type using the enriched uranium fuel elements. However, though basically similar reactors were available on sale, the Commission considered that valuable experience would be gained if Indian scientists and engineers were made entirely responsible for the design, erection and the commissioning of India's first reactor. A basic design was frozen by July 1955 and work was begun in earnest to build a reactor operating at a maximum power level of 1,000 k.w.

Hopes, Frustrations And Success

The reactor, on which about 50 scientists and engineers of the Trombay Establishment worked, was completed within one year. The efforts to commission the reactor, however, did not lack a sense of drama as they were marked with hopes, frustrations and final success.

The loading of the fuel elements was started on the evening of July 30, and continued till 1 A.M. The first trial run was started the next day evening with the loading of more uranium fuel elements. The neutron flux gradually rose but by 7 A.M. on the next morning the reactor had not become critical. The scientists worked on August 2 to change the disposition of the fuel elements and the control rods, and the second run was started at 5 P.M. on August 3. The team worked throughout the night but by 10 A.M. on August 4 no chain reaction had been achieved. A further rearrangement of the fuel elements was carried out and finally at 3.45 P.M. on Saturday, August 4 the first reactor in Asia became

critical. The scientists and engineers, led by Dr Bhabha, had worked without a break for nearly 24 hours.

As soon as the reactor had reached criticality, Dr Bhabha telephoned the news to the Prime Minister, also the Minister for Atomic Energy. The Prime Minister asked Dr Bhabha to convey the congratulations to all concerned.

The reactor has throughout given trouble-free service.

CIR

About the same time that a decision was taken to build a reactor of the pool type, attention was also being given to the selection of a high flux reactor for engineering experiments, with facilities for materials testing and radioisotope production. Different reactor types were considered for this purpose, when in April 1955 Canada offered assistance under the Colombo Plan for the design and construction of a reactor similar to their NRX reactor in operation at Chalk River. Details of this offer were discussed by the members of the Commission with the Canadian authorities concerned at the time of the First United Nations International Conference on the Peaceful Uses of Atomic Energy held in Geneva in August 1955. As a result of these talks it was decided in principle to accept the Canadian offer, and a recommendation to this effect was cabled to the Prime Minister on August 29. The keen interest taken by the Prime Minister in this project is evidenced by the fact that the Government of India's approval was cabled on September 1. This was followed by the visit of a team of Indian scientists to Canada to work out the technical details of the Project.

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A formal inter-governmental agreement was signed with Canada on April 29, 1956 in New Delhi, under which the costs and responsibilities were shared between the two countries roughly in equal proportion.

Although Canada was responsbile for commissioning the reactor and taking it to full power, the group actually responsbile for the job consisted of both Canadian and Indian personnel. As a matter of fact the Indian scientists and engineers were associated with almost all the intricate jobs of building a reactor ; and the largest number of the Canadian staff at any time did not exceed 32 as against the total engineering and skilled staff of 1,200.

The Canada-India Reactor is fuelled with natural uranium. With a view to achieving self-sufficiency in the nuclear field, it was decided during 1956-57 to set up a plant for producing reactor grade uranium, as well as a Fuel Element Fabrication Facility. The design and layout for the Uranium Metal Plant were completed during 1957, and the plant was completed by the middle of December 1958. The first nuclear pure ingot of uranium metal was produced, from the uranium fluoride obtained at the Thorium Plant, on January 30, 1959.

Fabrication of fuel elements for reactors is a highly skilled and complex job. This is borne out by the fact that in the world today there are only about half a dozen countries making their own fuel elements. The primary objectives of the group entrusted with the responsibility for setting up the Fuel Element Fabrication Plant was to fabricate fuel for the first charge of the Canada-India Reactor. But the plant was to be so planned as to enable making other uranium fuel elements in such shapes and sizes as may be required for experimental purposes or for future research and power reactors. On the basis of development work carried

out at Trombay, the preliminary flow sheet for the plant was finalized in November 1957. The plant was completed in just about twenty months after this, engineered and built entirely by Indian metallurgists and engineers. The first prototype fuel element for the Canada-India Reactor was produced on June 15, 1959, and the first lot of ten fuel elements were ready on February 15, 1960 -- about five months before the Canada-India Reactor became critical.

It may be interesting to recall here the scepticism expressed by the Canadian engineers about using the fuel rods fabricated at Trombay for the initial fuel loading of CIR. They felt that CIR should be started up with a substantial load, if not complete load, of Canadian fabricated fuel elements if they were to be responsible for the start up. It was then decided to send two fuel rods from Trombay's first batch to Chalk River for use in their NRX reactor. The authorities there were not only satisfied with their performance but also told us that our fuel rods were among the very best. The reactor reached first criticality on July 10, 1960, with half of its 190 fuel rods having been fabricated at Trombay.

Complete responsibility for operating and maintaining the reactor was taken over from Canada in November 1960. It had a series of teething troubles which were successfully resolved by Trombay scientists and engineers. Among other things, the entire fuel charge had to be replaced by that of Indian origin. The reactor was taken to its designed full power operation of 40 megawatts in October 1963. The successful completion of this task once again proved that the Indian scientists and engineers are second to none in their skill and capabilities.

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India's third reactor, Zerlina, was designed, engineered and built entirely by Indian personnel. Though its construction was started in February 1958, its actual erection did not begin until May 1960 due to delays in the completion of the building in which it is housed. It reached criticality for the first time on January 14, 1961. Zerlina is a zero energy reactor, and has proved to be a very valuable experimental reactor. The fuel for this reactor is also fabricated at Trombay.

Trombay scientists and engineers have also successfully designed, built and commissioned a Plutonium Plant for processing irradiated uranium rods in order to extract plutonium and other fissionable materials. Plutonium is an extremely valuable fissile material and atomic fuel for future reactors. It is of great importance to the long-term power programme of the country as it will be used to breed uranium 233, also a fissile material, from thorium. As is known, India has the largest reserves of thorium in the world and her long-term atomic power is based on its use in future reactors.

Atomic Power

As mentioned earlier, at the conference convened by the Department of Atomic Energy in 1954, it was decided to embark upon an atomic power programme in the country. In August 1958, the Planning Commission approved the inclusion of an atomic power station in the power development programme under the Third Five Year Plan. It was decided to instal this plant in the Western ~~region~~ coast of India and supply the power generated to the industrial regions of Maharashtra and Gujarat States. The reasons for chosing the Western region of India for locating India's first atomic power station were the rapidly rising power demand,

inadequacy of conventional power to meet this demand and the very long distances involved for the transport of coal. After a comprehensive survey a site was selected at Tarapur, 60 miles north of Bombay, for ~~locating~~ this purpose.

Global tenders were invited for setting up a complete atomic power station. Out of the seven tenders that were received, the proposal submitted by the International General Electric Company of the United States of America was found to be the most suitable. The provision in the Third Plan envisaged a 300 MW station costing Rs 51 crores. However, under the IGE tender, we are now going to have a 380 MW station for only Rs 48.5 crores — thus having more power for less money. The cost of power from this station will be approximately 3.06 paise per kwh as against the cost of power from a conventional station of 3.69 paise per kwh in this area.

Work on this station is now in progress and it is expected to be completed by October 1968.

The favourable development in the technology and economics of nuclear power made the Government of India decide in 1962 to go ahead with a second nuclear power station, with an electrical generating capacity of 200 megawatts in one reactor, at Rana Pratap Sagar in the State of Rajasthan. To make the economic study precise, a joint Indo-Canadian team was set up with the cooperation of Atomic Energy of Canada Limited to study in detail the cost and feasibility of building a nuclear power station of the Candu type at this location. The detailed study indicated that although the capital cost per kilowatt installed for this station will be somewhat higher than that of the Tarapur Power Station, the cost of electricity from it will be less, being as low as

2.8 paise per kwh. It is now proposed to double the capacity of this station.

It has also been decided to locate a third nuclear power station with an electrical generating capacity of 400 MW in the State of Madras which suffers chronically from acute power shortage at certain times of the year and where the growth of industry is being thwarted by a lack of adequate power supply.

Act of 1962

With the rapid development of atomic energy in India, it was felt that the Atomic Energy Act of 1948 was no longer adequate. Accordingly, the Parliament passed a revised legislation in 1962. One of the salient features of the Atomic Energy Act of 1962 is that it specifically pledges that India's atomic energy programme is to be devoted solely for peaceful purposes.

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