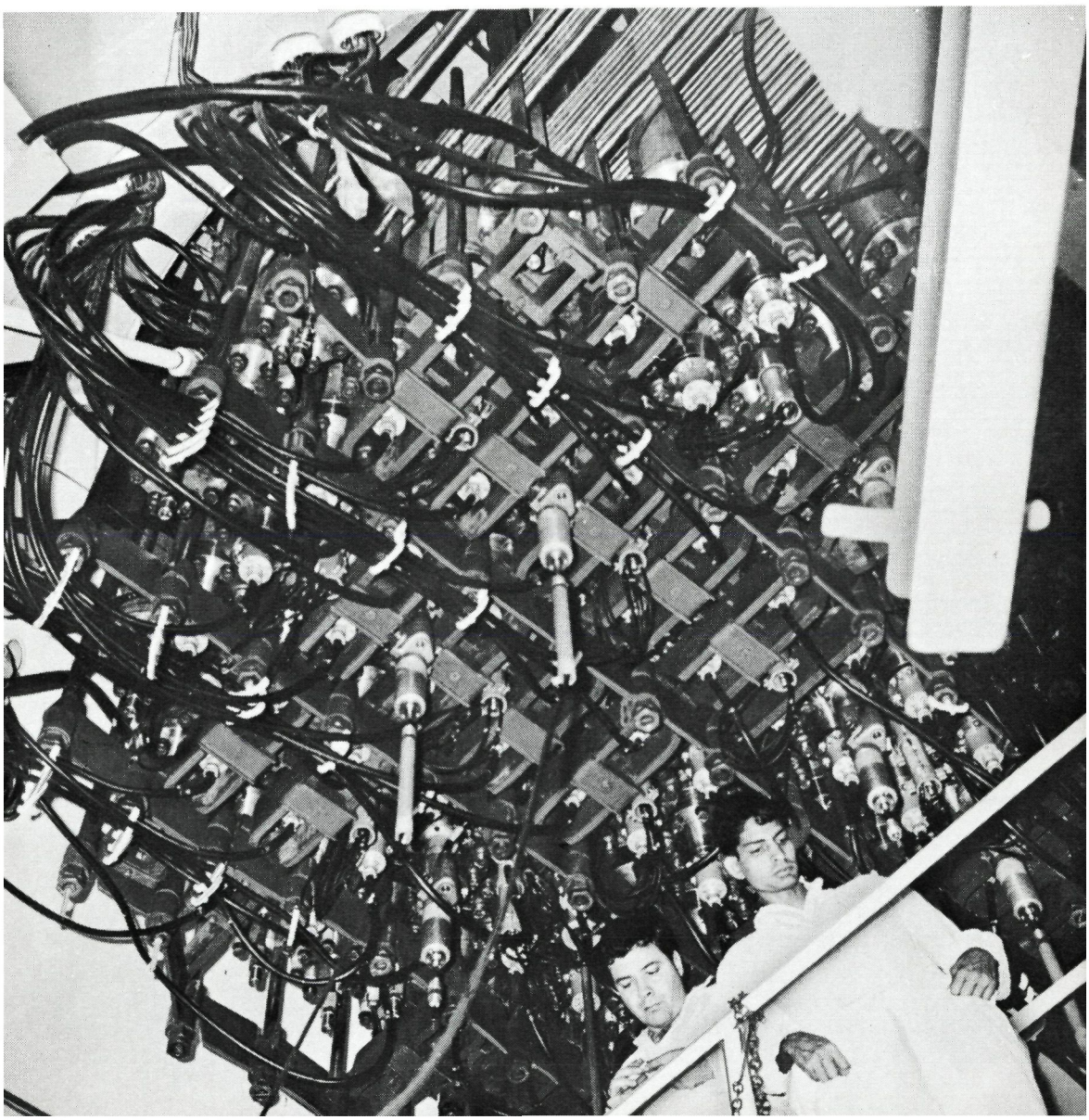
25 years of age

The Indian nuclear research effort
is now 25 years old,
having begun with the establishment of the Tata Institute of
Fundamental Research in Bombay in June 1945.
Many other countries have research programmes of the
same or greater age; but India may be
reckoned to have achieved some notable "firsts".



Nuclear India, published by the Indian Department of Atomic Energy, recalls that the quarter century marks the commencement of the era of nuclear power in that country. The 380 MWe Tarapur nuclear power station, the first such installation in India and the largest operating nuclear power plant in Asia, was dedicated to the nation by the Prime Minister of India, Mrs. Indira Ghandi, on 19 January this year at a ceremony attended by Dr. Sigvard Eklund, Director General, and Professor I. S. Zheludev, Deputy Director General for Technical Operations, of the IAEA. The Tarapur power station began trial generation of power on 1 April last year, and became fully operational on Gandhi Jayanti Day in October. *Nuclear India* records that up to the end of March this year Tarapur had already generated more than 1300 million units of power for the two States — Gujarat and Maharashtra — which share its output.

A vision becomes reality

India had an early commitment to nuclear power. In 1961, nine years ago, Jawaharlal Nehru commented at the opening of the research reactor centre at Trombay that "if you have the picture of the future of India ... you will come to the conclusion of the inevitability of our building up atomic energy for peaceful purposes." That "building up" has now begun in earnest.

Two other nuclear power stations are now under construction: a 400 MWe installation, being built with Canadian aid at Rana Pratap Sagar in Rajasthan; and a 200 MWe installation at Kalpakkam in Tamil Nadu, near Madras. A second 200 MWe installation at Kalpakkam is planned. The first 200 MWe unit at Rajasthan is expected to be completed in 1971, and the second in 1973-74. The Kalpakkam station, which is expected to go critical in 1973, will mark another milestone in India's nuclear development, as it is to be built wholly by India, with nearly 80 per cent indigenous content.

The hub of the present Indian research effort is the Bhabha Atomic Research Centre (BARC), Trombay. The wide range of activities undertaken at this centre and its satellites indicate the true vigour of the programme, and its value to work in other countries. One such activity is the preparation of radioisotopes and labelled compounds, which have now been exported to 24 countries including Austria, Denmark, France, Hungary and Sweden. Trombay has also exported Cobalt-60 irradiation units to Burma and Kenya for use in agricultural and industrial research. To assist in the maintenance of Air India aircraft, workers at Trombay have also developed a remote-controlled radiographic camera for jet engine inspection.

The spectrum of activity

The Biology Division at the Centre is doing important work on plant breeding, particularly in relation to groundnuts and rice (as part of the All India Coordinated Rice Improvement Project). Work is also going on on the development of radiation preservation procedures for perish-

able foods, on the disinfestation of wheat, on the extension of the storage life of onions, and so on. The Radiation Medicine Centre is doing development work on medical uses of radioisotopes; the Electronics Division is engaged in intensive work on nuclear and non-nuclear electronic instrumentation and equipment. The Chemical Engineering Division is producing uranium metal for the CIRUS research reactor at Trombay, which has been in operation since July 1960, and is also manufacturing ceramic grade uranium oxide required for the first half charge for the Rajasthan project. The Fuel Reprocessing Division is reported to be working on the design of the Power Fuel Reprocessing Plant being built at Tarapur; the Atomic Fuels Division is engaged in developing and fabricating fuel elements and components for research and power reactors. On the basis of technical reports prepared by this last Division, a ceramic fuel fabrication plant, an enriched uranium oxide fuel fabrication plant and a Zircaloy fabrication plant are being set up at Hyderabad as part of the Nuclear Fuel Complex there.

The selection of particular programmes for comment is difficult. Among the major units which are administratively responsible to the Indian Department of Atomic Energy are the Physical Research Laboratory at Ahmedabad, the Saha Institute of Nuclear Physics, Calcutta (which is collaborating with BARC in the setting up of a variable energy cyclotron for the Department in Calcutta), and the Tata Memorial Centre, Bombay. In addition to its other work the Department undertakes the overall control of the national programme of space research and its utilization for peaceful purposes, through the Indian Space Research Organization (ISRO). India, as one of the member States of the IAEA, is both a contributor to the Agency's Technical Assistance Programme and a recipient of aid; and Indian scientists and technicians take an active part in world-wide research programmes coordinated by the Agency.

For a country whose nuclear research effort is only 25 years old, India has come a long way.