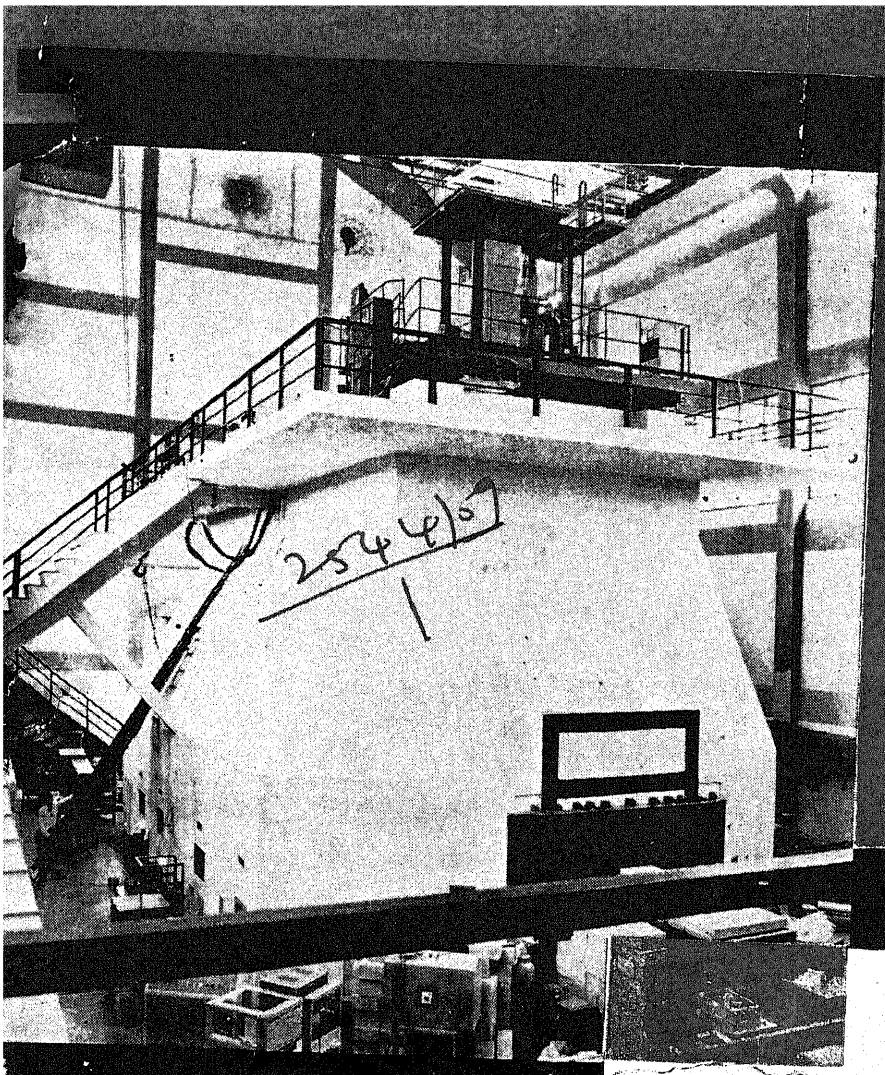

MADRAS information

July 1959

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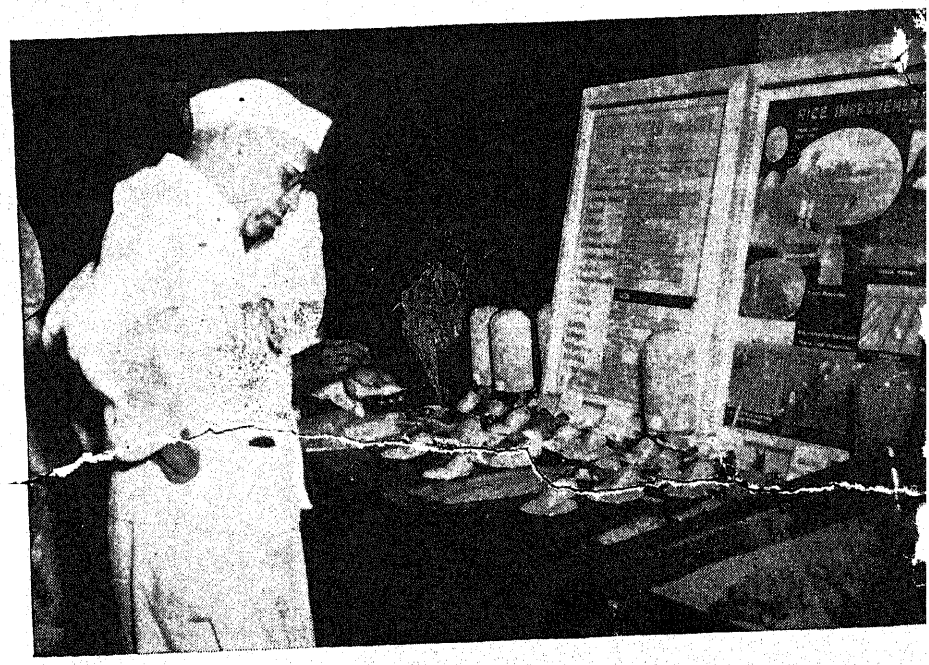
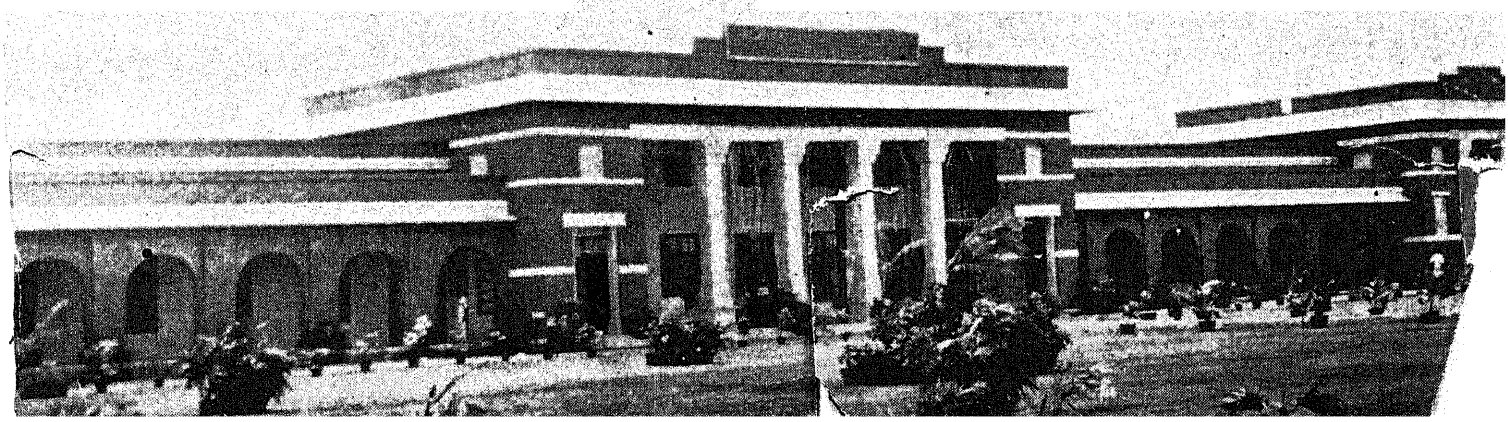
COIMBATORE AGRICULTURAL COLLEGE

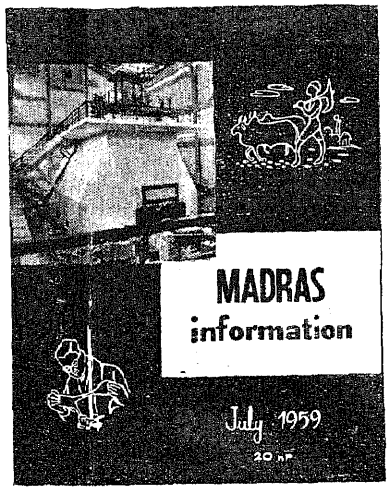


Sri Nehru declared open the Agricultural College Jubilee buildings at Coimbatore on May 29.

The photograph at the bottom shows a view of the new building. Above and right : *The Prime Minister inspecting some of the exhibits and charts*



This month's cover :



The Reactor, Apsara, at the Atomic Energy Establishment at Trombay is seen on this month's cover. This small sized reactor, which costs Rs. 35 lakhs is producing radio isotopes which are already being extensively used by Indian agriculture, medicine and industry. Apsara is the nation's principal facility for training personnel in reactor technology and for fundamental research in physics, engineering and biology which require the use of strong fluxes of ventrons.

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MADRAS information

IN THIS ISSUE

Vol. XIII, No. 7] [July 1959

Atomic Power Programme for Madras

The supply of limitless power has always been an inventor's dream. To-day, that dream may be approaching reality. Indian Scientists are well on the way to making this dream come true. Work on this is proceeding slowly but steadily and surely. At present, the work is in the research stage. A few years of research and experiment should necessarily precede before we could supply our homes and factories with cheap electric power from nuclear power stations.

In Britain.

In the quest for power from the atom, India is basing its research on the results of experiments conducted in Britain, the United States and Canada. Britain boasts of the first full-scale nuclear power station in the world. This power station at Calder Hall has two nuclear furnaces which produce the heat for an otherwise conventional power station. This has been operating for nearly two years and has given less trouble than is usually experienced with a conventional power station. Based on the experience gathered in building the power station at Calder Hall, four more powerful stations are being built in Britain. By 1960–61, they will be producing between them about 1,400 mega watts of electricity. Britain has got an ambitious programme to produce 25 per cent of its electricity from nuclear energy by 1966 and half of its requirements by 1975.

In U.S.A.

In the United States, the Shipping-port Atomic Power Plant was commissioned in May 1958. This is the world's first large-scale atomic reactor devoted exclusively to generating commercial electric power. This plant, at full power, generates 60,000 kilo watts of electricity enough to supply the residential needs of a community of 250,000 population. During a 24-hour period, the smokeless and virtually noiseless atomic power plant burns atomic energy equivalent to 3,000 tons of coal. Pressurized-water type of reactor is in use here and the heat is produced here by split atoms. Four more larger atomic-electric plants are being established in United States and they are scheduled for completion in 1960. Different types of reactors are being constructed in these power stations. This system of trying out different reactor types is to find the best and cheapest way of generating nuclear electricity. Altogether, a total of more than 700,000 kilo watts of atomic electric generating capacity will be installed in America by 1960.

Canada has two power reactor projects in progress. Here too, the process is still in experimental and research stage. The Canadian Government offered to help India to set up a high-flux reactor of the NRX type. The decision to proceed with this joint project was taken in August 1955 and work started in February 1956. The reactor is expected to go into production early next year.

The Atomic Energy Commission.

India's scientists started the research on Atomic Energy from 1954. In 1948, the Atomic Energy Commission was established as an advisory body and six years later a separate department of the Government of India with the full power of a Ministry came into being. In March 1958, the Indian Government decided to set up an organization with full authority to plan and implement the various measures relating to the development of atomic energy on sound and economic principles free from all non-essential restrictions or needlessly inelastic rules. Thus the advisory body set up in 1948 has been replaced by a Commission with full execution and financial powers.

Research in India.

The Atomic Energy establishment at Trombay was formally inaugurated by the Prime Minister on 20th January 1957. This is India's first nuclear reactor and the first in Asia, outside the Soviet Union. This is of the swimming pool type. Since the establishment of the department of Atomic Energy in August 1954, research into, and development of the peaceful uses of atomic energy, have made important advances. A greatly expanded programme is envisaged, under which India is to produce all the basic materials required for the utilization of atomic energy and to build a series of atomic power stations which will contribute increasingly to the supply of electric power.

In the Engineering Division of Trombay establishment, reactor feasibility studies were made on fuel cycles and a phased atomic power programme based on indigenous nuclear fuel to suit India's resources. To make use of the plentiful supply of thorium available, a three-stage programme has been considered. In the

Power from the Atom

In a conventional power station we burn coal or oil to boil water which produces steam ; the steam turns the blades of a turbine rather like the wind turns the sails of a wind-mill: the turbine drives large dynamos which in turn produce electricity. In an atomic power station exactly the same thing happens except that instead of boiling water by burning coal or oil we boil it by using some of the energy locked inside the atom. This is the only difference. Instead of the conventional furnace in which coal is burnt we have an atomic furnace, called a reactor, in which we generate heat by splitting atoms.

first stage, natural uranium power reactors produce plutonium. This plutonium is used with thorium in second stage power reactors to produce uranium 233, which is fissile. In the third stage, uranium 233 is used with thorium in power reactors which breed slightly more uranium 233 than they consume. Possible rates of growth of installed atomic power capacity were evaluated.

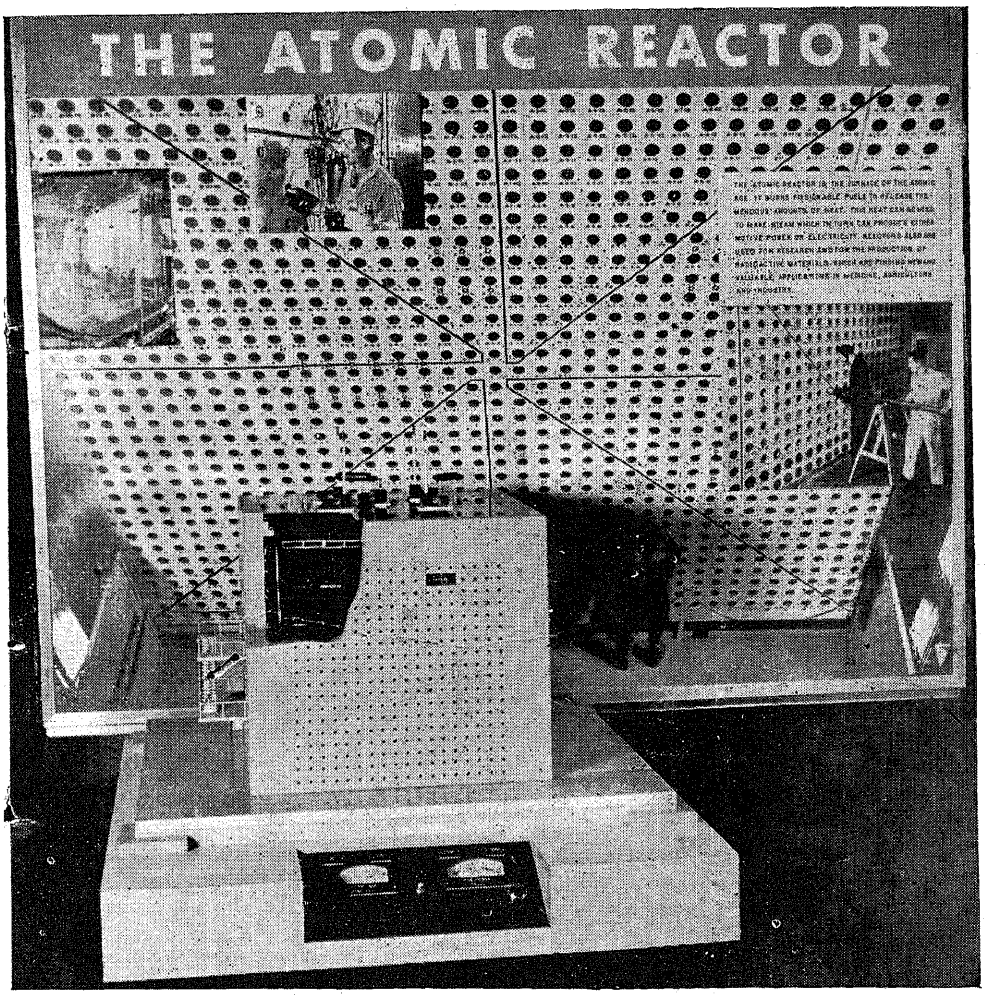
The feasibility of different reactor systems for power generation has also been looked into, and heavy water and beryllium oxide moderated gas cooled reactors have been studied quite extensively. Another reactor system which has been looked into in some detail is the organic moderated and cooled reactor. Organic moderators offer a number of advantages, such as a high boiling point and good heat transfer properties, and thus do not require the use of vessels capable of withstanding extremely high pressures ; they also do not present any serious corrosion problem. The engineering design and economics of organic moderated reactors suitable for use with natural instead of enriched uranium are being studied. For this purpose, the deuterization of the organic moderator is also being considered.

Nuclear materials.

In the first instance nuclear power is to be produced from natural uranium in India. But it is proposed to base the generation of nuclear power as soon as possible on thorium rather than on uranium. This country can well afford to do this while other nations are trying for alternative methods. For, India is blessed with an abundant and rich resources of thorium. There are large reserves of nuclear fuels, including 500,000 tons of thorium and 30,000 tons of uranium. The " black sands " of the Kerala Coast contain ilmenite, garnet, monazite, quartz, rutile and other minerals. The monazite content of these sands is 5 per cent. The monazite sands occurring on the Kerala Coast are estimated to contain over 2,000,000 tons of the element. This monazite has a thorium content of 8 to 9 per cent. The highest in the world, and also contains over 0·3 per cent of uranium, which in view of the size of the deposits, makes it an important source of uranium.

Mineral resources of Madras.

Apart from the sands of Kerala, monazite occurs in the sands of Kanyakumari district in Madras State. Deposits of heavy minerals consisting of monazite, rutile, ilmenite and zircon have been discovered in the sand dunes of Sathankulam, those of gulf of Mannar beach, and the Kudirmala Reserve Forest in the Tirunelveli district. According to preliminary examination, the heavy minerals of these three dune deposits appear



The Atomic Reactor is the furnace of the atomic age. It burns fissionable fuels to release tremendous amounts of heat. This heat can be used to make steam which in turn can produce either motive power or Electricity. Reactors also are used for research and for the production of Radioactive materials which are finding new and valuable application in Medicine, Agriculture or Industry.

to be similar with regard to their percentage distribution. The Sathankulam sands which have been examined in some detail contain about 9 per cent by weight of total heavies with ilmenite contributing 6.8 per cent, rutile 0·24 per cent, zircon 2·30 per cent and monazite 0·03 per cent. The Tio2 content of the ilmenite is between 53-54 per cent as at Manavalakurichi.

Among the recorded occurrences of uranium mineralization, mignatite in Coimbatore district and uraniferous allanite and fergusonite hearing pegmatites and the graphaitic host rock of Rangapalayam and Karupathevanpatti village in the Madurai district and the deposits at Kullampatti in Salem district are expected to contain significant quantities of ore.

The Case for Madras.

The Madras State Government have, in recent times, been urging the Centre for the establishment of an atomic power station in this State. The State Electricity Board is in correspondence with the Atomic Energy Commission in this regard. The Commission has been made to understand the need for an atomic power station in this State in order to augment the power already supplied from thermal and hydro stations. At the end of the First Five-Year Plan, the installed capacity of the State Grid was 256,000 k.w. The power demand of the Madras Grid has been steadily on the increase necessitating new schemes to be taken up in succession. During the Second Plan period, large-scale industrial development, both in private and public sectors requiring large blocks of power has been contemplated and many industrial schemes are being implemented. Apart from these, the growing needs of the small-scale industries have to be met. As the power demand is expected to be of the order of 415,000 k.w. in 1960-61 and 600,000 k.w. in 1965-66, new power sources have to be tapped. Power from the atom is the best solution. Even though the initial outlay on the cost of establishing a nuclear power station is high, there is every prospect of there being a reduction in capital cost with the advances made in designing.

Why Atomic Power?

The essential and determining consideration in favour of the atomic power programme is the fact that it will make available a sufficient quantity of plutonium, essential for the more advanced and economical type of reactors of the future. In these later stages of the programme, the capital cost of every additional kilowatt of nuclear power is estimated to be considerably less than the capital cost of obtaining the same power from coal, and even on the basis of present technology the additional capital investment required for nuclear power during the first seven years will be offset by the saving during the following ten years, by which time electricity from atomic power stations may be expected to cost about 2.6 nP. per unit, and thus be definitely cheaper than electricity from thermal power stations (about 4.0 nP. per unit). Indeed, at that stage, nuclear power stations may be competitive with thermal power stations even near coal-bearing areas.

Further, while coal is a wasting asset, the completion of the first stage of power programme would enable, the country to move to use of thorium and, at that stage, by the use of breeder power stations provide the means to double the installed electrical capacity every five years for virtually an indefinite length of time if considered necessary and money were available. At that stage, the installation of new electric power would need very much less effort and money than obtaining the same power from hydro or coal. Thus, it is seen that, in the long run, power from the atom is obtained cheaper than from the conventional methods.

Plans of Atomic Energy Commission.

The Atomic Energy Commission has planned to establish 3 nuclear power plants in India before the end of the Third Five-Year Plan. The first plant is expected to be set up near Ahmedabad in Bombay State at a cost of Rs. 45 crores and it is expected to go into operation by the end of 1960. This plant will produce 250,000 kilowatts. The Atomic Energy Commission has also recommended to the Planning Commission the setting up of power plants in Madras and Rajasthan in the Third Plan itself. Since Madras has enough resources

Continued on page 14.

Uranium Occurrences in Madras State

Among the recorded occurrences of uranium mineralisation, the following are expected to contain significant quantities of ore:—

Migmatite in Coimbatore district, and uraniferous allanite—and fergusonite bearing pegmatites and the graphaitic host rock of Rangapalayam and Karupathevanapatti village, Madurai district, Madras.

Kullampatti prospect in Salem district.—Detailed sampling of surface ore has been completed and the deposit is now ready to be explored by bore-holes.

Tirunelveli district.—Deposits of heavy minerals consisting of monazite, rutile, ilmenite and zircon have been discovered lately in the sand dunes of Sathankulam, and those of the Gulf of Mannar beach, and the Kudirmala Reserve Forest, in the Tirunelveli district, Madras.

According to preliminary examination, the heavy minerals of these three dune deposits appear to be similar with regard to their percentage distribution. The Sathankulam sands which have been examined in some detail, contain about 9 per cent by weight of total heavies, with ilmenite contributing 6·8 per cent, rutile 0·24 per cent, zircon 2·30 per cent and monazite 0·03 per cent. The Ti0 -content of the ilmenite is between 53·54 per cent as at Manavalakurichi.

Nuclear Power Programme for India

A paper entitled "A study of the contribution of atomic energy to a nuclear power programme in India" by H. J. Bhabha and N. B. Prasad, was communicated to the Second International Conference on the Peaceful Uses of Atomic Energy at Geneva. The paper envisages the installation of a million kilowatts of nuclear power based on natural uranium by the end of the Third Five-Year Plan, a use of the plutonium produced in a second generation of power reactors of an installed capacity of about 250,000 kilowatts, which would also convert thorium into uranium-233, and a use of this uranium-233 in thorium breeder reactors which would produce more uranium-233 than they consume.

The total capital cost of the programme, including the cost of mining equipment, the cost of plants to extract uranium from ore and to turn the uranium into fuel elements for reactors, the cost of the power stations, and the cost of treating the used fuel elements and extracting plutonium would come in round figures to Rs. 250 crores, spread over the seven years from now up to the end of the Third Five-Year Plan. While the cost of installing the same amount of power based on coal, including the investment in mining and transport, would be about 40 per cent less, the additional investment in nuclear power during the next seven years is a necessity, if use is to be made eventually of the country's vast thorium reserves.

The proposals of the Atomic Energy Commission were discussed with the Planning Commission last year, and it was decided that a minimum of 250,000 kilowatts of nuclear power should be included in the Third Five-Year Plan. Preliminary work to this end has to start immediately, so that the power station may start functioning by the end of 1964.

The expenditure for one unit of 250,000 kilowatts is expected to be of the order of Rs. 45 crores. This figure is only a broad indication of the order of outlay, as rapid technological improvements are already bringing down the cost considerably in foreign countries.

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of nuclear materials, we can legitimately expect the setting up of a nuclear power plant in our State. Further, the enormous demand for electricity in this State also warrants the establishment of an atomic power station.

Power from nuclear fusion.

Apart from production of nuclear power based on natural uranium, Britain's scientists are well on the way to extracting energy from water, with the source of supply as inexhaustible as the oceans themselves. With ZETA, Britain's latest thermonuclear apparatus, they have attained temperatures up to five million degrees centigrade, 800 times hotter than the surface of the sun. They have thus created the intensely high temperatures at which hydrogen atoms will join. This means they have made a major advance towards harnessing the power released by nuclear fusion—the process which provides the heat of the stars.

A rough estimate indicates the potential energy available. A bucket of water contains sufficient hydrogen fusion fuel to replace 1—2 tons of coal. A day's flow of a fair-sized river would provide a country of 50 million people with power for a year or more; the oceans would supply the world's needs for countless millions of years.

The world's reserves of other fuels are relatively limited. Its coal and oil resources may be exhausted within 200 years. Known supplies of uranium and thorium, nuclear fuels for 'conventional' systems, may be consumed in 2,000 years. Hydrogen power may by that time have become the world's sole source of large-scale energy. What is more, it will not result in accumulations of radioactive wastes like those from fission reactors.

With all these possibilities at our disposal, we can very well expect to have a nuclear power reactor in Madras State. That day is not very far. It is our earnest hope that before the end of a decade Madras will have its first Atomic Power Station.

Training Centre for Printing and Dyeing in Killiyoor Block

The Government have approved a scheme for starting a training centre for printing and dyeing at Palliadi village in Killiyoor block, Kanyakumari district, where there are a large number of weavers co-operative societies. The object of the scheme is to train 12 persons in the art of printing and dyeing for a period of one year and after that period the convert the training centre into an Industrial Co-operative Society. The trainees will be paid a stipend of Rs. 25 per mensem each during the period of training.

The Government have sanctioned a total amount of Rs. 8,600 towards recurring and non-recurring expenditure for the scheme, besides the staff required for the training centre.

Reactors in India

Apsara, India's first reactor, will complete 3 years of operation on August 4, 1959. During the past year *Apsara* has been in regular operation and has completed 291,000 kwh. of operation.

The reactor has provided an excellent facility for research in neutron physics, irradiation of specimens required for biological and chemical investigations and training of personnel.

There has been a considerable increase in the demand on reactor time during this year and the reactor was put on round-the-clock operation during the latter part of the year. In the first six months of the year the reactor was operated at an average power level of 18,000 kwh. per month, which in the subsequent six months increased to 31,000 kwh. During the month of November 1958 the reactor reached a new peak of 52,000 kwh.

In addition to shortlived isotopes, small quantities of radio-phosphorus and radio-iodine are being continuously produced and supplied to medical and other workers in various centres in India.

Many new and interesting results have been obtained in the study of low energy nuclear reactions and research in solid state physics. A number of papers based on experiments done at *Apsara* were presented to the Second International Conference on the Peaceful Uses of Atomic Energy organized by the United Nations at Geneva in September 1958.

Designs have been completed for an attached workshop and an emergency dump tank. These should be operating by the middle of 1959. Plans have also been drawn up for air-conditioning the reactor hall so as to improve the working of the electronic equipment.

Zero Energy Reactor for Lattice Investigation

Work on this reactor, which is intended for investigations leading to new designs of power reactors, progressed satisfactorily, and a large proportion of the components have been fabricated, most of them in the divisional workshop.

Work on the building to house this reactor has just started and is expected to be completed by the middle of 1959. All the components of the reactor will have been made by then and will have undergone preliminary testing before final assembly. The reactor is expected to start functioning some three months after the building is ready.

Canada India Reactor

The steel shell of the reactor hall, whose construction had caused considerable difficulties during the previous year, was completed in May 1958. This involved achieving circularity to a tolerance of 1 inch in a shell 130 feet in height and 120 feet in diameter, and a 100 per cent radiography of all welds. Construction of the pile block started in September and the thermal shields have been placed in position.

The delay loop, which permits decay of radioactivity of process water to tolerable levels before recirculation, has been completed, and the laying of underground pipes connecting it to the reactor has started.

Work on the jetty continued during the year except for the monsoon period. Half of the 3,200 feet jetty has been completed, and the remainder is scheduled for completion before the monsoon of 1959. The caisson, which fits on at the end of the jetty, has been cast in a dry dock and will be ready for floating to the end of the jetty by March 1959.

Contracts have been awarded for an 850,000 gallon pre-stressed concrete emergency water storage tank and a 400-foot high effluent stack, and work has started on both.

The laboratory attached to the Canada India Reactor was redesigned to effect economy, and a saving of nearly 300 tons of steel has been achieved. The design of the attached workshop has been finalised and tenders have been called as soon as working drawings are available.

The design for the rod cutting block, where the active fuel elements will be dismantled after removal from the pile, is in hand, and excavation work has started.

According to the present schedule the reactor is expected to go into operation by March 1960.

Soil Conservation Schemes, Coimbatore district

The Government have sanctioned a Scheme for undertaking soil conservation work in an area of 1,000 acres in Ganapathipalayam and Vanasampatti villages of Udumalpet taluk of Coimbatore district during the year 1959-60. Under the scheme the following soil conservation measures will be adopted :—

(1) Contour bunding,
(2) Construction of waste weirs, and
(3) Gully plugging.

The scheme will be executed by obtaining agreements on stamped papers from the ryots concerned. The scheme will cost Rs. 46,700 and will involve an expenditure of Rs. 3,464 on recurring items per year.

Nuclear Materials

The Chairman of the Indian Atomic Energy Commission, Dr. H. J. Bhabha, has estimated that the total reserves of thorium in India amount to more than 500,000 tons in a readily extractable form in the monazite sands on the West Coast. India's long-term aid was therefore to base the generation of nuclear power as soon as possible on thorium rather than on uranium. Thorium would be used in reactors which breed more fissile material (U233 or plutonium) from source materials (thorium and natural uranium) than they consume.

A plant at Alwaye in South India, to treat the monazite sands on the west coast, has been in operation since 1952. It is owned and run by Indian Rare Earths (Private), Limited—a joint undertaking of the Central Government and the Government of Kerala. In addition to producing rare earths and trisodium phosphate, a cleaning material, this plan produces a cake containing thorium and uranium. This cake is brought to a thorium-uranium plant at Trombay for processing, to produce a very pure thorium salt, and also uranium salt. This plant was built entirely by Indian scientists and engineers and has been in operation since 1955. Its capacity was increased sixfold in 1956.

A small plant to turn uranium concentrates into reactor grade uranium metal has been designed and is under construction. Construction of a plant for the fabrication of fuel elements is expected to be completed by the end of 1958.

India is one of the world's few producers of beryl, from which the metal beryllium can be obtained. Beryllium has various possible uses in nuclear energy, e.g., canning material. At present annual production is several thousand tons of high-grade beryl. A large pilot plant for producing beryllium oxide pure enough for nuclear purposes, and sintering it into bricks, is being designed. Its capacity will be about 15 tons of beryllium oxide a year, but it will be capable of considerable expansion. Preliminary studies indicate that the cost of beryllium oxide produced in this plant will be lower than the cost at which it is being produced in other countries at present.

India also intends to produce heavy water in quantity. A plant at Nangal in the north is to produce 10 to 20 tons of heavy water annually, together with some 340,000 tons of nitrogenous fertiliser.

Investigations are being carried out to make graphite of a purity sufficient for nuclear purposes from petroleum, coke and coal tar pitch produced in a refinery in Assam.

Zirconium is another metal which has promise as a canning material, and a process for separating it from hafnium has been tested.

Mineral Sand Industry in Kanyakumari District

Travancore Minerals (Private), Limited, was registered in October 1956 with an authorised share capital of Rupees one crore. The subscribed and paid-up capital is Rs. 50 lakhs, which has been subscribed by the Government of India and the Government of Kerala in equal proportions. The Company started its operations from May 1957. The primary product of the Company is ilmenite, while rutile, zircon and monazite are also produced.

The Government mineral concern at Manavalakurichi, which had passed to the Government of Madras consequent on the reorganization of States, has been taken over by Travancore Minerals (Private), Limited. The Government of Madras has concurred in this change and further action to implement the decision is in progress. The Government of Madras will become a subscriber in the share capital of Travancore Minerals (Private), Limited, through a transfer to it of 5 per cent of the total share capital from the Government of Kerala. Thus the share capital in Travancore Minerals (Private), Limited, will be held by the Government of India, the Government of Kerala, and the Government of Madras in the proportion of 50 : 45 : 5. As a result of this change, the Board of Directors of the Company will now consist of three representatives of the Central Government, two and one of the Governments of Kerala and Madras respectively, and a Chairman nominated by the Government of India, who is at present Dr. John Mathai. Ilmenite, which is an important product of this Company, continues to be in good demand in foreign markets and measures to step up the exort of this mineral are under consideration.

Messrs. National Lead Company of New York, who are one of the biggest purchasers of Indian ilmenite, have offered free of cost the services of Messrs. Carpco Research Engineering Company, U.S.A., to survey the Indian mineral sand industry with a view to its rationalisation and modernisation, so as to increase efficiency and production. The representative of Messrs. Carpco recently spent a few weeks in India working in close collaboration with Indian scientists and representatives of the industry.

A systematic marine survey of heavy mineral sands off the Kerala coast is proposed to be carried out by the Atomic Energy Commission with a view to establishing the extent of under-sea deposits and determining quantitatively the various constituents of the heavy minerals. Trial explorations have already commenced for this purpose. If these explorations yield encouraging results, explorations on an extensive scale are envisaged.

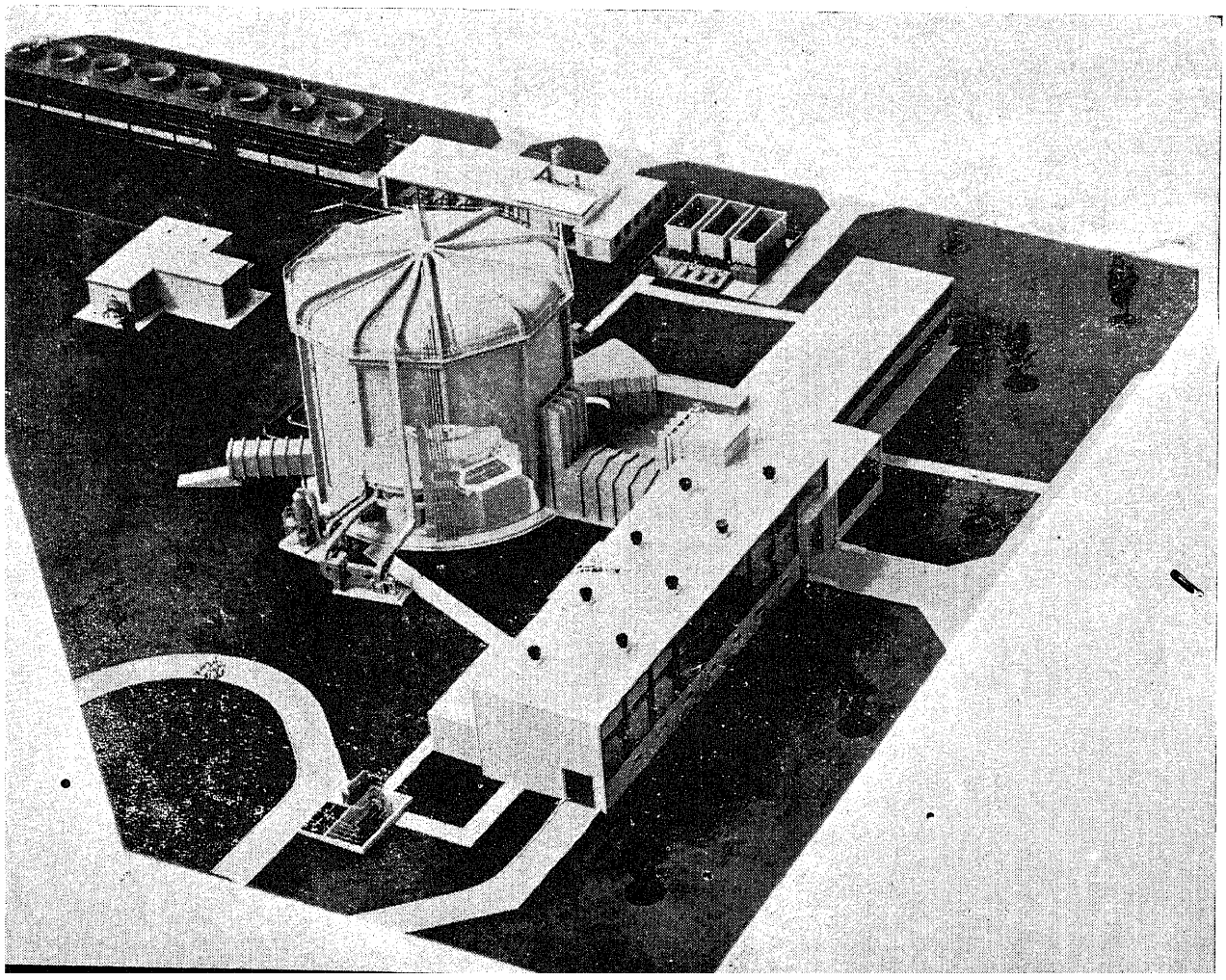
CALDER HALL

SIR JOHN COCKROFT.

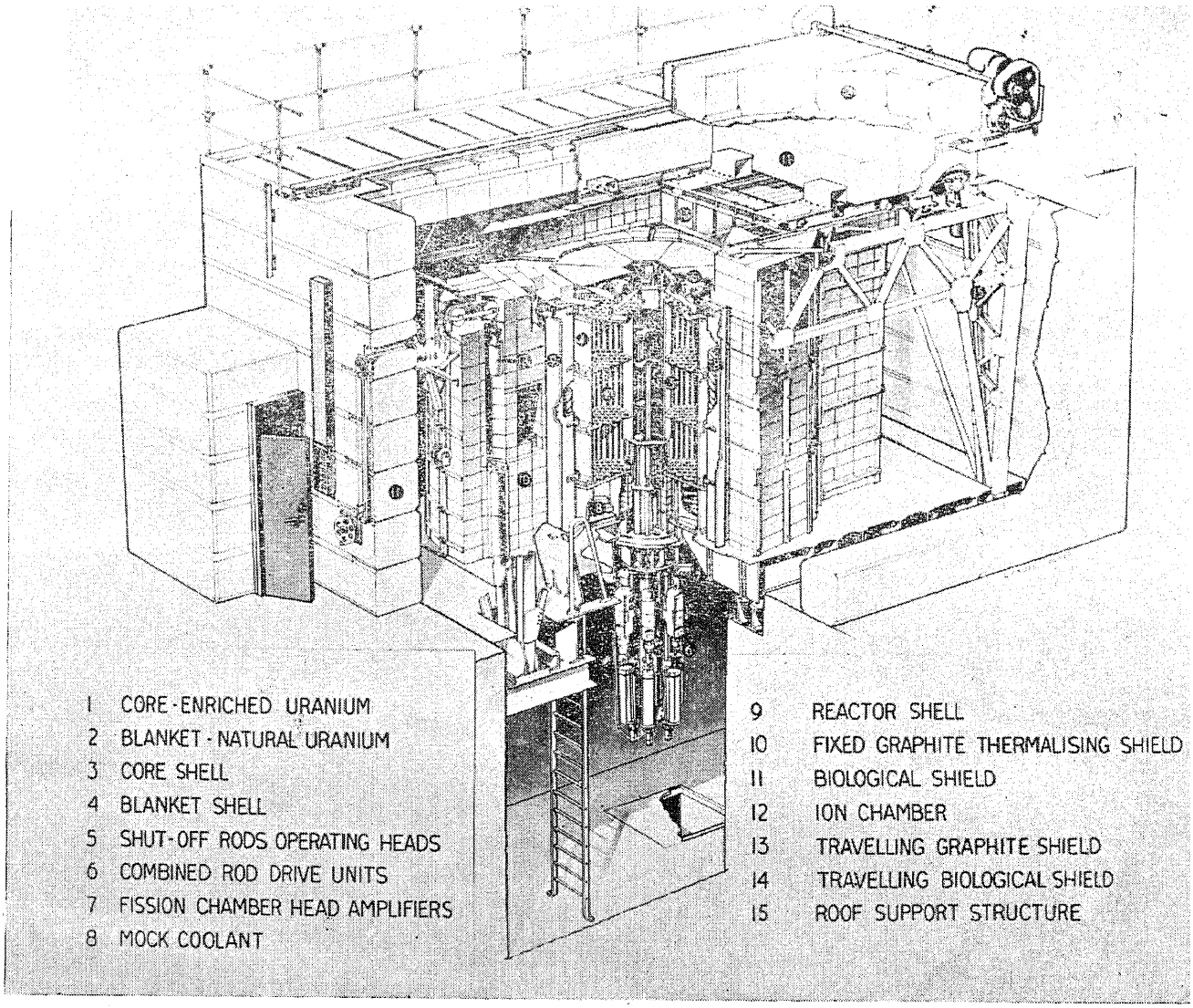
During 1950, we at Harwell turned our attention to designing the first power-producing atomic pile. We called this PIPPA. Two years of intensive engineering study and simultaneous development of technology showed that a nuclear power station could probably be built, which could produce electricity at almost economic prices—we said at less than 1d. a unit. Our Government therefore decided that our Industrial Group should build such a power station, but with the primary objective of producing plutonium—with electricity as a by-product. Three years later, the Calder Hall nuclear power station came into operation, and it now develops over 70,000 kilowatts of electricity.

The Calder Hall power station was, therefore, the world's first full-scale nuclear power station. It has two nuclear furnaces which produce the heat for an otherwise conventional power station. Each furnace consists of a huge steel drum, 37 feet in diameter, containing a graphite pile. The graphite pile consists of 1,200 tons of blocks of very pure graphite. In between the blocks are vertical channels in which are stacked bars of uranium metal sheathed in a magnesium alloy. The chain reaction is started by withdrawing neutron-absorbing control rods, and is controlled by adjusting the position of these rods. The temperature of the uranium is allowed to rise gradually over a period of half an hour and reaches 400 degrees centigrade. The heat which is produced is transferred to tubes of water in heat exchangers by circulating carbon dioxide gas past the hot uranium rods, and then past the water tubes and thence back to the atomic pile.

The water in the tubes is transformed to steam, and this passes to steam turbines which drive electrical generators. The power station has operated now for nearly two years, and has given remarkably little trouble—less trouble, in fact, than is usually experienced with as conventional power station. The second of the two furnaces has operated on full load for 90 per cent



A general view of a model of DIDO, a heavy water reactor under construction at the United Kingdom Atomic Energy Authority Research Establishment, Harwell.



A drawing ZEUS, an experimental fast reactor at the United Kingdom Atomic Energy Authority Establishment, Harwell, Berkshire, England. This reactor is a prototype of the power station reactor now being built at Dounreay, Scotland.

DIDO

The British Government plans to have at least sixteen nuclear power stations generating electricity for the national grid. In such stations oil or coal furnaces are replaced by reactors, in which atomic fission is made to take place. This fission produces energy which appears as heat, and from there on the process of producing electricity is conventional.

When DIDO was completed in 1956 it had the highest neutron flux of any research reactor in Western Europe, and was used to help to determine the future pattern of Britain's reactors for the generation of power. It will also produce more intense sources of radio-active isotopes for use in medical research and treatment, in industry and in agricultural research.

Britain's first atomic power station at Calder Hall, Cumberland, was opened by Her Majesty the Queen in October 1956.

the possible time—a higher proportion than most conventional power stations. The reactors are shut down only at week-ends, when the load is light, and then only for maintenance operations on ordinary engineering components, such as pumps.

ZEUS

During the ten years between 1955 and 1965, the British Government proposes to spend more than £300,000,000 in the construction of twelve nuclear power stations, with a total generating capacity of about 2,000 megawatts. By 1965, these stations should be producing electricity equivalent to that produced by about 6,000,000 tons of coal annually. In a coal or oil-fired power station these fuels are burned to raise steam which drives an electric generator. In a nuclear power station the coal or oil furnace is replaced by a rector, in which atomic fission is made to take place. This fission produces energy, which appears as heat, and from there on the process of producing electric power is conventional. Certain fast reactors, called "breeder reactors", create more atomic fuel than they use. This type of reactor is being built for Britain's new atomic power station at Dounreay, in the north of Scotland.

Four commercial nuclear power stations, all much more powerful than Calder Hall, are now being rapidly built in Britain. By 1960 or 1961, they will be producing between them about 1,400 megawatts of electricity for our electricity authorities. And after that we are going to build at least eight more, so that by 1966 we will be producing a quarter of our electricity from

(*Continued on page* 21)

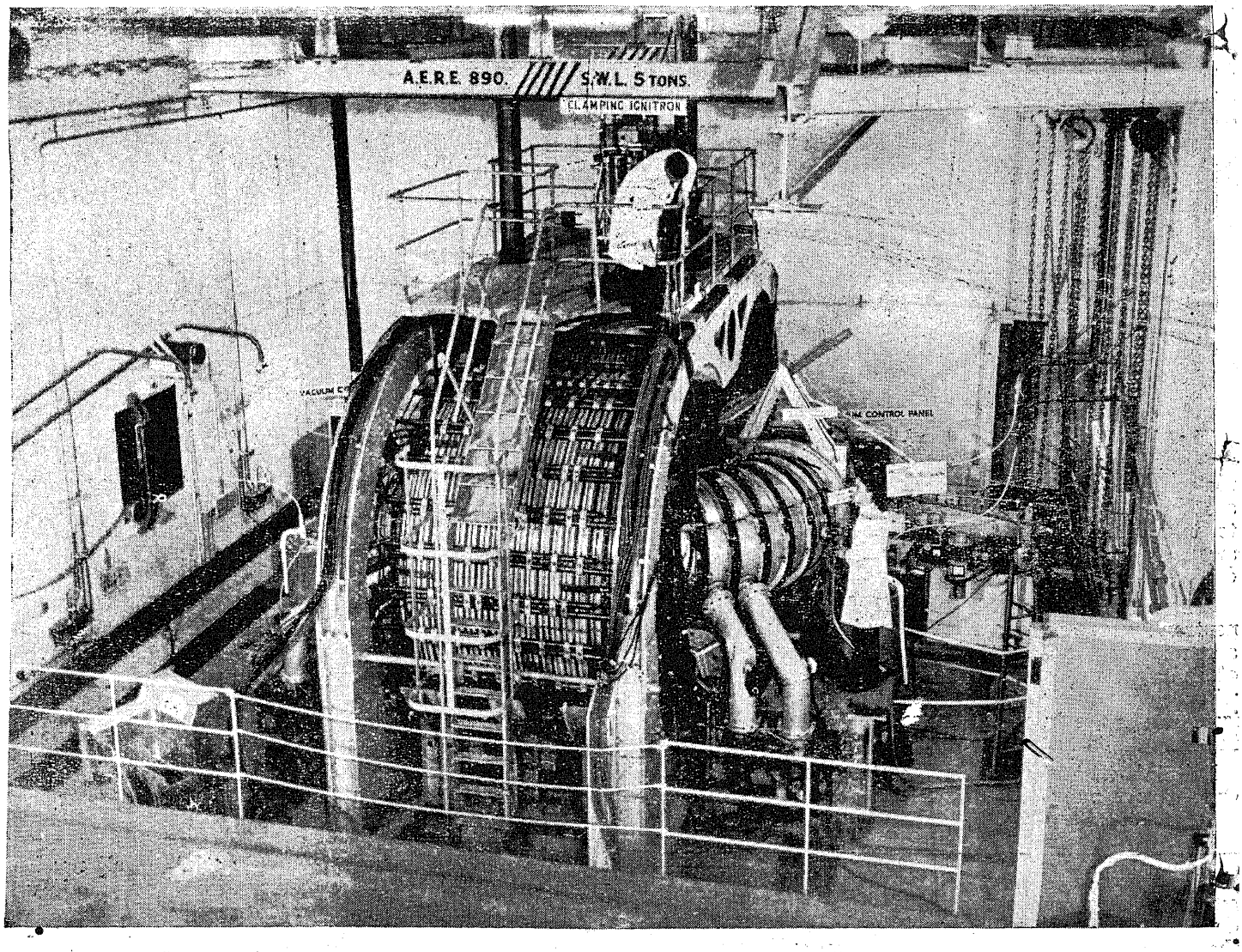
Zeta and its Prospects

Zero Energy Thermonuclear Assembly

Zeta which attained five million degrees in a stable discharge at Harwell during August 1957, is the fourth version of the original and much smaller torus fusion apparatus. Costing £300,000, it represents the combined work of scientists and engineers and took 21 months to build. It was expected, at the outset, to attain the relatively modest temperature of one million degrees but pleased its designers with much better results. Its ring-shaped discharge tube, about 10 feet in mean diameter, has a bore of 39 inches, big by previous standards anywhere. (Sceptre III, which attained four million degrees, was the third version of a fusion machine built at Aldermaston. It has a mean diameter of 45 inches and a bore of 12 inches.)

The peak current used to heat Zeta's gas was a pulse of 200,000 amperes, supplied by a bank of electrical condensers charged to 25,000 volts. This pulse was repeated every 10 seconds, and produced around one million neutrons each time. The scientists are 'ninety per cent' certain that these neutrons derived from true

(*Continned on page* 33)



A view of ZETA at the United Kingdom Atomic Energy Authority's Research Establishment at Harwell, Berkshire, England.

Oak Ridge National Laboratory

The Oak Ridge National Laboratory designed and constructed in 1952 a Swimming Pool Nuclear Reactor that proved so useful for nuclear research and so low in cost that it has become a prototype for low-cost research reactors being constructed by universities and industrial firms in the United States. A nuclear reactor of the Swimming Pool type is so relatively inexpensive to construct and so simple to operate that its installation is hardly a major project. It consists of an assembly of fuel elements, together with control rods, measuring devices, and reflector, submerged in a pool of water that acts as a shield and moderator.

The advantages of the Swimming Pool type of reactor are striking, as indicated by the following examples: In addition to cooling and moderating the reactor, the water supplies a foolproof shield for personnel. If the water accidentally becomes contaminated, it can be drained. With 16½ feet of water above the active lattice, gamma rays are attenuated sufficiently so that a person standing next to the pool will receive considerably less than 50 milliroentgens in 8 hours when the reactor is operating at 100 kilowatts. A depth of 3½ feet of water between the reactor and the pool floor and walls will attenuate the neutron flux sufficiently to keep the concrete from becoming seriously activated. The commercially pure aluminium used in the reactor structure has a half life of 2.4 minutes. Thus, if the fuel elements and control rods are removed and the pool is drained, personnel can work on the reactor structure after a waiting period of a few hours.

For research purposes, the pool, in effect, provides an infinite beam hole. Large pieces of equipment can be lowered into the water and positioned against the face of the reactor. The nominal power level of 100 kilowatts can be sustained with convection cooling; higher power levels would be feasible with added shielding and forced-circulation cooling.

The oldest and probably the most widely-known atomic energy centre in the world is a 60,000-acre establishment located at Oak Ridge, in the south-eastern State of Tennessee. Born at the dawn of the Atomic Age, this complex production and research centre has played a major role in virtually every phase of the fast-expanding nuclear programme in the United States. Its achievements in harnessing the atom, producing radioisotopes, developing atomic devices, conducting research and training scientists are recognized in all parts of the world.

Oak Ridge has the greatest variety of atomic research and production facilities ever assembled in one place. Here there are vast plants that separate uranium-235, the radioactive form of uranium vital to all atomic energy operations. These plants and the area's large research and development facilities, known as the Oak Ridge National Laboratory, are operated for the United States Atomic Energy Commission by Union Carbide and Carbon Corporation. Here also are the Oak Ridge Institute of Nuclear studies, operated by 30 universities in 14 southern states; and the American museum of Atomic Energy, operated by the Institute.

The Oak Ridge National Laboratory is famous mainly for its production of radioisotopes. These valuable products are made in the Laboratory's 2,000-kilowatt grapite pile, the world's first full-scale producting reactor, built in 1943. Originally this machine was utilized to design reactors for the big Hanford plutonium plant. Now the veteran reactor produces more than 100 different types of radioisotopes, which are sold at cost by the Laboratory within the last 10 years, more than 93,000 shipments of radioisotopes have gone to 1,200 institutions in the United States and 4,500 shipments have gone 250 institutions in 54 other nations. Utilization of these atomic products has been responsible for many of the beneficial atomic developments in medicine, agriculture and industry.

Since its establishment 13 years ago, Oak Ridge has been instrumental in the development of many types of atomic reactors in use to-day as well as others now being built or planned for future construction.

In 1951, the Oak Ridge National Laboratory completed the first "swimming pool" reactor, so named because the 10-kilowatt machine is suspended in a 20-foot-deep pool of water. A replica of this reactor was operated by the United States at the first International Conference on Peaceful Uses of Atomic Energy in Geneva, Switzerland, in 1955 and later was sold to that nation. Many swimming pool reactors now are in operation in the United States, and several are being built there for other nations. The safety and flexibility of this type of reactor makes it extremely valuable for research.

Between 1950 and 1952, Oak Ridge National Laboratory developed and built pilot models of reactors for other U.S. Atomic Energy Commission plants, some of which now are being copied for civilian use.

In 1952 the Reactor Experiment (HRE) was completed at Oak Ridge. During tests it became the second reactor in the world to produce power for production of electricity. In 1954, the HRE was dismantled to make way for construction of an improved model, known as HRE-2 which was completed in 1956

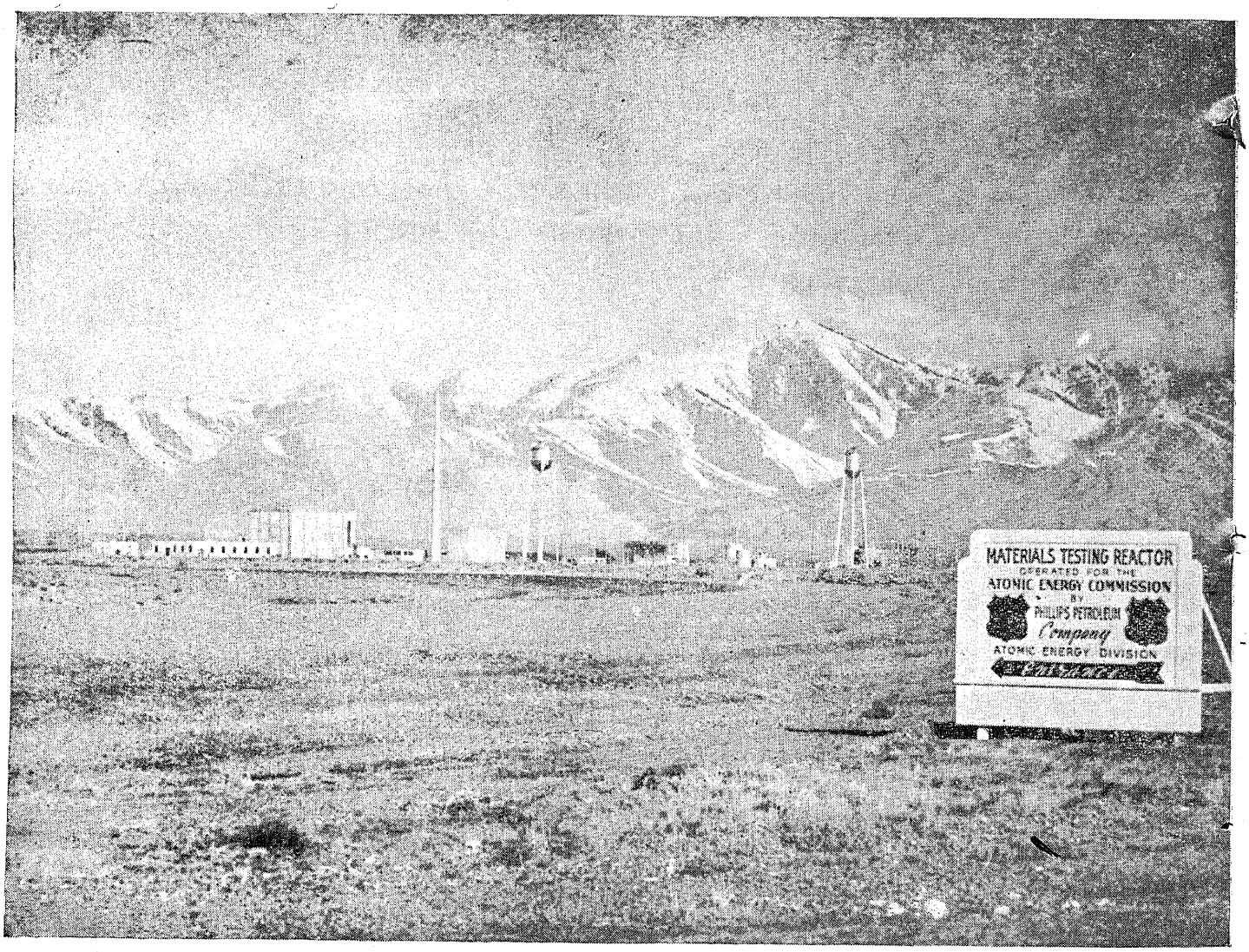
but its operation has been delayed by difficulties with corrosion which now are being corrected. This reactor, considered promising for the production of electricity, is extremely safe and so simple in design that it often is referred to as " a pot, a pipe and a pump ".

Among many types of reactors now in various stages of planning and development in the Laboratory is an aircraft reactor. The equipment consists of a test reactor and its shielding, which are suspended from four 324-foot steel towers that provide stimulated conditions of an airplane in flight. Another reactor under development is a model to be used for basic research and engineering studies.

In addition to its work in designing reactors, Oak Ridge has performed basic research in the development of chemical separation processes; radiation protection, including disposal of radioactive wastes; reactor fuels; radioactive and stable isotopes, and extensive studies in the fields of biology, chemistry, physics, metallurgy and health physics. The Laboratory provides the most modern equipment available for this research, which is conducted by 3,000 employees and 100 research groups.

More than 5,000 acres in the Oak Ridge area are utilized for agricultural research conducted by the nearby University of Tennessee under contract for the United States Atomic Energy Commission. This programme has resulted in beneficial uses of radioisotopes in horticulture and has provided valuable biological information gained through studies of animals ranging in size from mice to full-grown cattle.

The unsurpassed facilities of the Oak Ridge National Laboratory, plus the knowledge and experience of its

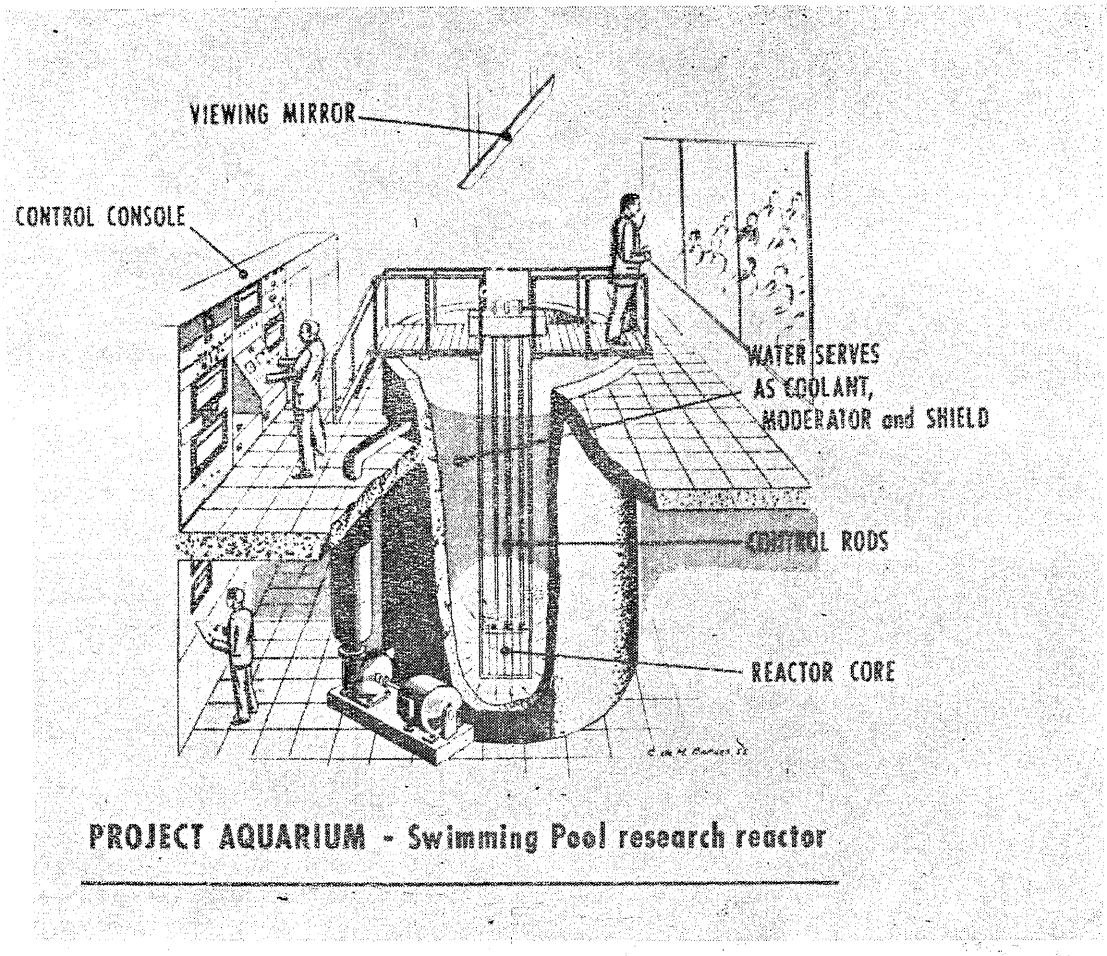


This group of buildings, the largest of which houses the Materials Testing Reactor, is typical of the clusters of structures spread over the 690 *square miles at the National Reactor Testing Station. At this station, located on a high plateau in western Idaho, research conducted by many industries and* 1,600 *employees has contributed significantly to the international " atoms for peace " programme.*

staff, are shared with scientists and students. Technicians from industry and graduates of colleges and universities come to Oak Ridge to attend the Laboratory's School of Reactor Technology and to do advanced work in radiological physics, industrial hygiene and other subjects of their choosing.

Much of the educational work at this large establishment is conducted by the Oak Ridge Institute of Nuclear Studies, a non-profit organization operated by 30 universities on contract for the United States Atomic Energy Commission. Thousands of scientists from many nations have attended the Institute's month-long course on the use of radioisotopes, which is offered six times a year. Through a travelling lecture programme and regional seminars, in which Oak Ridge scientists participate actively, the Institute takes atomic knowledge to interested groups in colleges and universities. The Medical Division of the Institute, which operates a 30-bed hospital, co-operates with 22 medical schools in a long-range programme of investigation into the value of radioisotopes and atomic radiations in the treatment of cancer.

The work of the Oak Ridge Institute of Nuclear Studies includes a concerted effort to educate the general public in atomic energy. At Oak Ridge, the Institute operates the American Museum of Atomic Energy, the only permanent museum of its kind in the world. Each year thousands of tourists from many nations visit the museum to view its 18,000-square-foot display of pictures, diagrams and working models that trace the development of atomic energy. To-day, many of the exhibits are taken in large "atoms for peace" truck trailers to all parts of the United States, where the atomic story is shown to more than 1,000,000 people each year.



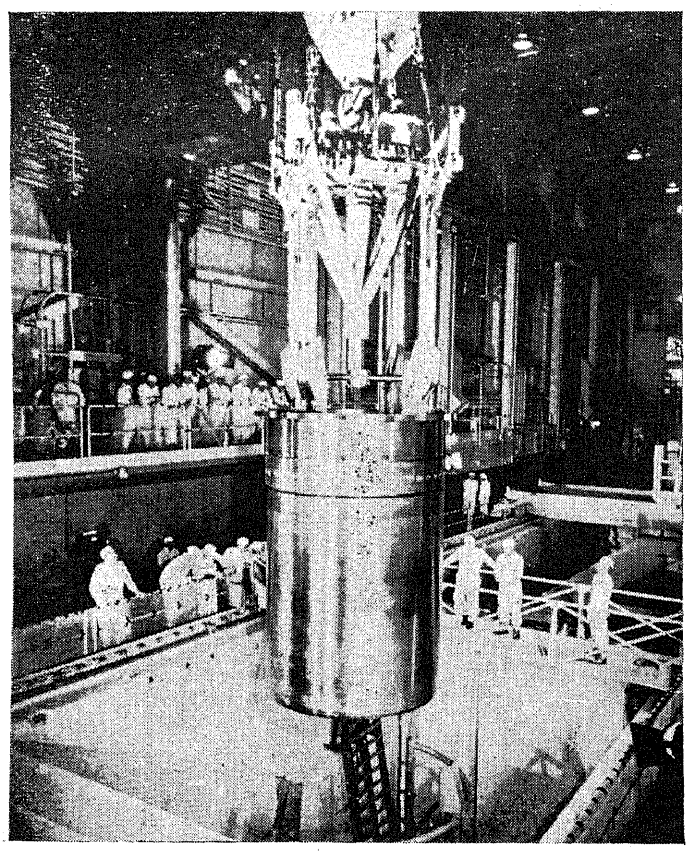
The schematic drawing shows how the "swimming pool" reactor, to be built by the United States at Geneva, Switzerland, for the United Nations International Conference will look when completed. This operating research reactor will be submerged in the tank with water serving as a coolant and shield. The tank is ten feet in diameter and twenty feet deep. The Oak Ridge National Laboratory, operated for the Atomic Energy Commission by Union Carbide and Carbon Corporation, will design and construct the reactor. The reactor will be housed in a temporary prefabricated metal building designed especially to enable the delegates and visitors at Geneva to see the reactor in operation. The swimming pool reactor which is estimated to cost about 350,000 will be part of the technical exhibit being planned by the United States at Geneva.

Shippingport Atomic Power Plant

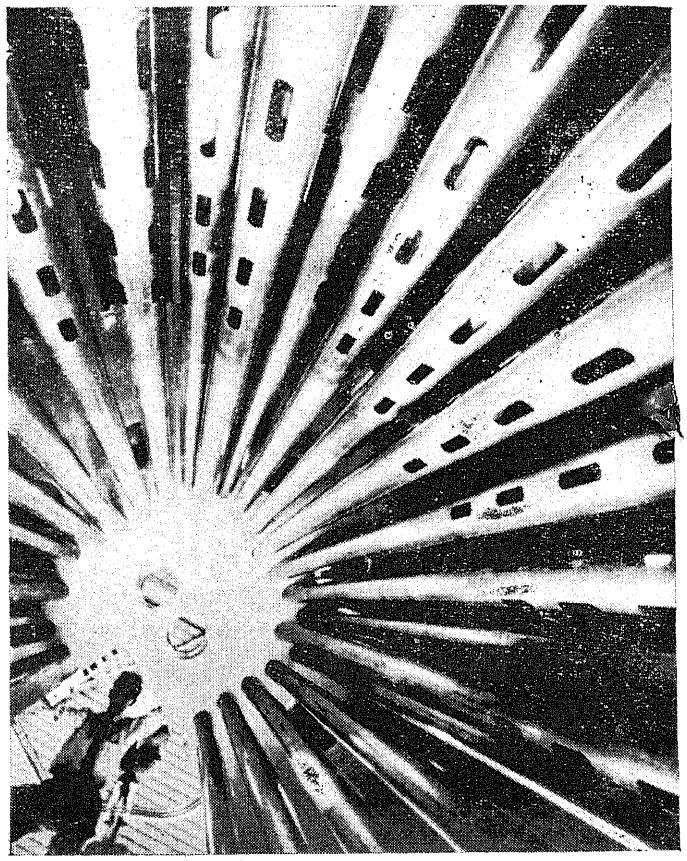
The atomic power plant at Shippingport, Pennsylvania, dedicated by President Eisenhower on May 26, 1958, is the world's first large-scale atomic reactor devoted exclusively to generating commercial electric power.

The atomic-electric generating plant has been in test operation since December. But with the dedication, the power will flow regularly to homes, stores and industrial plants throughout the Pittsburgh area in Western Pennsylvania.

In dedicating the Shippingport facility, President Eisenhower said: "This plant—using the power of the atom to supply electric power—represents what can be done, not only in America, but throughout the world, to put the atom to work for the good of mankind, not his destruction." He reaffirmed his belief that "atomic power will ease mankind's burdens and provide additional comforts for human living."



The 'heart' of the first full-scale atomic power station in the U.S. is lowered into place at Shippingport. It is the 58-ton, multi-million dollar atomic reactor core, loaded with fuel consisting of 14 tons of natural uranium and 165 pounds of highly enriched uranium.



The tubes, or shrouds, that house the control rods for regulating fission in the Shippingport reactor look like this. To the left on the man atop this mock-up of the reactor are two holes, called ports, used to insert remote handling equipment for removing or replacing fuel elements.

The huge 121 million Shippingport station at full power generates 60,000 kilowatts of electricity—enough to supply the residential needs of a community of 250,000 population.

During a 24-hour period, the smokeless and virtually noiseless atomic power plant burns atomic energy equivalent to 3,000 tons of coal.

Pressurised water circulates through the reactor's core—or furnace—which contains 14 tons of natural uranium more blanketed in 165 pounds of highly enriched Uranium-235.

This water—which removes great quantities of heat produced by the split atoms—is pumped through heat exchangers, where it converts a second supply of water, protected against radioactivity, into steam. The steam then turns a turbine generator to produce electricity.

The pressurised-water reactor is the same type of atomic power plant which operates in the *Nautilus*, the first atomic-powered submarine.

The Shippingport project is a joint effort of the U.S. Atomic Energy Commission (AEC), the Westinghouse Electric Corporation, the reactor's builder, and the Duquesne Light Company, which furnishes electricity to the Greater Pittsburgh area.

More than 1,300 scientists and thousands of other workmen participated in the project which began in 1954. One of its major purposes is to serve as a pilot plant to test and improve the design of future commercial nuclear power plants.

The installation has been in test operation since electric power plant to begin operating, it soon will be December 18. Officials say it is working " even better than we had hoped."

Although Shippingport was the first full-scale nuclear followed by four larger U.S. atomic-electric plants, all scheduled for completion in 1960.

There are eight other power reactors now in operation on an experimental basis in the U.S. These represent six different reactor types.

Of the forthcoming larger reactors, the plants at Rowe, Massachusetts, and in New York State will be of the same pressurised water type as Shippingfort; the Massachusetts reactor will generate 134,000 kilowatts, while the New York one will be capable of generating 275,000 kilowatts.

The " boiling water " type of plant is represented by the 180,000 kilowatt plant underway near Joliet, Illinois. The fourth plant under construction is the kilowatt " fast breeder " type being built at Monroe, Michigan.

Altogether, a total of more than 700,000 kilowatts of atomic electric generating capacity will be installed in America by 1960.

This approach of trying out different reactor types is to find the best and cheapest way of generating nuclear electricity.

Khadi

In the month of April 1959, 274,022 yards, worth Rs. 7,15,658.70 nP. were produced and Rs. 2,49,141.74 nP. worth of Khadi were sold.

3,060,210 yards of Khadi worth Rs. 75,75,898.91 were produced and 2,443,805 yards worth Rs. 67,90,358.72 were sold in this State between 1st April 1958 and 31st March 1959.

During the month of May 1959, 274,340 yards of Khadi worth Rs. 7,05,656.76 were produced and rupees 5,92,015.31 worth of Khadi was sold in this State.

Grant of Land Revenue Remissions : Distinction Cancelled

The Government have decided not to distinguish between rich and poor landholders in the matter of grant of land revenue remissions on account of adverse seasonal conditions. Till now pattadars who own lands in a taluk paying in all an annual assessment of Rs. 101 and above and all land-owners who are assessed to income-tax were not given the benefit of remission during adverse seasons. The decision to abrogate this distinction, has been taken in the context of the adverse seasonal conditions prevailing in some parts of the State, during the current fasli 1368, and the Government have directed that the earlier orders excluding the wealthy pattadars from the benefit of revenue remission in drought affected areas, be cancelled with immediate effect

Employment situation in April 1959

The employment situation in Madras State as a whole did not show any significant favourable trends during April 1959. Except for a slight improvement reported by Madras, the situation remained fairly static in the districts of South Arcot, Ramanathapuram, Tiruchirappalli and Chingleput, and showed a downward trend in all other districts. The number of employment seekers on the Live Registers of the Employment Offices at the end of April 1959 was 120,267; the corresponding number for the previous month was 118,353. During the month, 15,855 registrations were effected as against 15,747 during the previous month. Two thousand one-hundred and eighty-seven vacancies were notified during the month, as against 2,565 in March 1959. There was a fall in placings from 2,230 in March to 1,591 in April 1959.

Surplus of candidates continued in clerical and unskilled categories. On the other hand, local shortages of suitable candidates were reported in respect of Boiler Attendants, Building and Town Planning Supervisors, Civil Engineering Draughtsmen, Electricians, Health Visitors, Pharmacists, Stenographers, Craft Instructors, Librarians, Instrument Mechanics and Surveyors. The employment enquiry for the quarter ended 31st March 1959 commenced during the month under report. The Youth Employment Service in the District Employment Office, Madras, gave vocational guidance to 613 youths; of these, nine were subsequently given individual guidance. The Youth Employment Officer established contacts with 25 schools and other institutions in connection with the programme of vocational guidance. The work on the compilation of revised editions of the Handbooks on Training Facilities relating to institutional and inplant training facilities available in Madras State is in progress.

Atoms for Peace

Nuclear scientists in all parts of the world worked steadily and successfully during 1958 to increase the peaceful uses of the atom in the fields of electrical power production, medicine, agriculture and industry.

An outstanding highlight of the year was the second United Nations International Conference on the Peaceful Uses of Atomic Energy held at Geneva, Switzerland, in September 1958. Some 5,000 scientists from 69 nations attended this important conference to report on progress made in peaceful atomic uses since the first conference at Geneva in 1955.

Leading scientists from the participating nations described the use of the atom for numerous peaceful purposes including the heating of entire communities, providing power for ships, creating more productive food plants, reducing manufacturing costs, improving industrial products, detecting fingerprints, studying the corrosion of steel, and desalting sea water. In addition, a vast assortment of uses in medicine and medical research were described.

A survey made at the time of the conference by the U.S. Atomic Energy Commission showed that 13 nuclear power plants designed to produce electricity were in successful operation, while 60 others were under construction or in various stages of planning.

Of the power plants now in operation, eight are in the United States, three in Great Britain, and one each in France and the Soviet Union.

One outstanding advantage of atomic power is the small amount of fuel required to produce large amounts of electrical energy.

Radioisotopes.

The use of radioisotopes as tracers has added a new dimension to research in the physical and life sciences, and has made possible important new methods of medical diagnosis and therapy. Radioisotopes are ordinary chemical elements that have been made radioactive in nuclear reactors. They can be traced as they travel through human beings, plants and animals by listening to the radiation they emit. This is done by using a geiger counter or some other radiation detection device.

More than 2,000 medical institutions and private physicians in the United States now use radioisotopes for the diagnosis and treatment of disease. More than 1,000,000 medical patients were diagnosed or treated with radioisotopes during 1958. Their use has now spread throughout the world, largely as a result of the world-wide distribution programme carried out by the United States Atomic Energy Commission.

Diseases now treated with radioisotopes include hyperthroidism, brain tumors, various forms of cancer, heart ailments, chronic leukemia, and a number of blood diseases.

Industrial uses of the atom.

Used in such industral and measurement control devices as thickness, density and liquid-level gauges, radioisotopes are reducing wastage and improving produce uniformity in numerous basic manufacturing industries. The United States Atomic Energy Commission's latest estimate of the annual savings realized in United States industry through the use of these radioisotope devices is $500,000,000. These savings should be ten times as great by 1965, the Commission estimates.

Industrial uses of radioisotopes devices are too numerous to mention in detail.

For instance, in the petroleum industry such devices are used in many operations, ranging from logging oil wells to tracing catalyst flow in refining, and to monitoring the flow of refinery products through pipelines. Manufacturers of air conditioning equipment use radioisotope devices to detect leaks, glass manufacturers use them for corrosion studies, and fertilizer manufacturers use them for process control.

Extensive research was conducted in 1958 to develop new uses for nuclear radiation in the chemical industry. In this field, the United States Atomic Energy Commission reported recently, nuclear radiation shows promise of becoming a fourth chemical process "variable", supplementing heat, pressure and chemical catalysis.

The atom and agriculture.

During 1958 scientists at the Brookhaven National Laboratory in the United States continued use of nuclear radiation to create better, more disease-resistant and higher-yielding food plants. The Brookhaven Laboratory is the largest centre for this type of research, and the basic aim of its scientists is to increase the world's food supply by helping farmers in all countries to increase their crop production.

Plant breeding by conventional methods is a slow, tedious and expensive process which frequently requires many years to produce a desirable new plant species. If plants are exposed to nuclear radiation, however, many mutations can be produced very quickly. Atomic energy has, therefore, given geneticists a very important new look for the development of hardier and higher-yielding plant species.

Brookhaven geneticists have been experimenting with radiation-induced plant mutations for several years, using radioactive cobalt, to expose growing plants to radiation in a special crop area. Scientists in many other countries and in all parts of the United States send seeds, cuttings and entire plants to Brookhaven for irradiation under this programme.

There have already been a number of encouraging results, which point to the development of improved vegetables and fruits.

At the same time, the use of radioisotopes as tracers has brought about a more effective use of fertilizers and improvements in plant insecticides.

Rural Electrification

SRI V. P. APPADURAI.
Chief Engineer for Electricity, Madras State Electricity Board.

Madras State has an area of 50,170 square miles and comprises 19,900 villages and 295 towns. Of a total population of 30 millions, 75 per cent, i.e., 22.5 millions live in villages. To Madras, just as for the rest of India, rural electrification has therefore a special significance as it offers the solution for increasing food production, bringing more employment to the rural population, providing various amenities for healthy and happy living and thus raising their standard of life.

Progress of Rural Electrification in the State.

The Government of Madras have been attaching considerable importance to rural electrification and Madras leads the rest of the State in the matter of number of villages electrified. At present about 7,163 villages in the State are electrified. Out of the 561,107 villages in the Indian Union 7,400 or 1·32 per cent of the number of villages have been electrified by the end of the First Plan period.

The growth of the rural electric development in the Madras State can be seen from the following figures:—

Year.	*Number of villages electrified (at the end of the year).*
(1)	(2)
1935-36	30
1940-41	740
1945-46	804
1950-51	1,613
1951-52	1,820
1952-53	1,981
1953-54	2,187
1954-55 ..	2,392
1955-56	3,321
1956-57	5,016 (exclusive of 241 towns).
1957-58	6,362 (exclusive of 247 towns).
1958-59	8,106

It is estimated that over 270 million units have been consumed in the villages during 1957-58 forming about 20 per cent of the consumption in the State. The rural connected load forms over 25 per cent of the total connected load on the Grid.

Electricity in agriculture.

Electricity is used in villages chiefly for pumping water for agriculture. Nearly 70 per cent of the power consumed in villages or 19 per cent of the total consumption in the State is used up by agricultural pumpsets. There are at present nearly 60,000 pumpsets in the State using power from the Grid.

The demand for power for agricultural pumpsets is phenomenal in this State, there being more than 40,000 applications on hand for this type of load. The State Electricity Board has a target of connecting up more than 10,000 pumpsets a year.

The following figures regarding the use of electricity in agriculture may be interesting. The average unit capacity of a pump in the Madras State is 6 H.P. This can irrigate 7 acres of land producing about 3½ tons of foodgrains in a year. The lift of the pump varies considerably depending on the water table level at the location, say, from 10 to 110 feet. The average consumption of power for irrigation of 1 acre of land is 800 units costing nearly Rs. 40 a year.

With a view to encouraging the use of electricity in agriculture, the Government offer electricity at very cheap rates, viz., 0.90 anna per unit for the first 500 units per installed H.P. per annum and 0.75 anna per unit for all in excess. There is an annual minimum guarantee of Rs. 6 per H.P. connected, but, this will be reduced proportionately to the number of days in which the well could not be used due to drought, provided the consumer sends due intimation of the fact as soon as the well becomes dry.

The security deposit towards energy charges is collected for two months in respect of agricultural consumers as compared to the collection of three months charges in respect of other consumers. No service connection charges are collected for agricultural consumers and the service line is erected at the cost of the Department. They are generally considered as essential consumers. New connections for agricultural pumps are treated on a priority basis. The cost of lifting water from wells for irrigation per acre per crop of paddy by different methods are as follows:—

	RS.
By bullocks	300
By diesel engine pump	83
By electric pump	50

Processing Industries.

Other uses to which electricity is put in the rural areas besides lighting are processing industries of the locally-grown agricultural products. Rice hulling, groundnut decorticating, oil pressing, sugarcane crushing, cotton ginning, tape weaving, etc., are some of the rural processing industries and at present about 5,600 such industries with a connected load of 30,000 K.W. are now run on power in this State.

It has often been found economical by consumers to use a single motor to drive a number of different machines by means of a shaft with fast and loose pulleys as each of the machine has to run only for a limited number of hours in a day.

Other uses to which electricity can be put in rural farms is for milking, chaff cutting, baling, corn rolling, grinding, clipping and incubating. These have not,

however, found much favour in the country in view of the heavy capital outlay required for the purchase of the necessary implements.

The approximate power requirements and output of some of these industries are given in the following table:—

TABLE.

Serial number and description.	*H.P. of motor.*	*Output in lb. per hour.*	*Consumption of electricity in K.W. per 100 lb.*
(1)	(2)	(3)	(4)
1 Rice Huller and Polisher (Big)	25	2,400	0·8 to 1·0
2 Cotton ginning (Double roller type)	4 to 5	78	2·75 to 3·0
3 Groundnut decorticator	25	7,500 lbs. of shelled groundnut.	·0025
4 Flour Mill (For rice, ragi, cholam and wheat)	5 to 7·5	180	1·2 to 1·5
5 Oil Processing (Pinto oil process for gingelly oil, coconut oil, castor or groundnut oil).	3	15	5·0
6 Sugarcane crushing	3	1,000	0·25

Power looms.

Next to agriculture, handloom industry in India is the most important. Despite the strenuous competition from the large textile mills producing cheap cloth, the handloom industry has held its own and in the overall interests of the rural population, it is essential that this industry receives adequate support. This industry gives a subsidiary occupation to the agriculturist during periods when there is little or no cultivation work.

The output and wages in the handloom industry are however, so very poor that this can be considered only as an alternative to unemployment. But by adopting small power looms, the output can be increased several times with corresponding increase in wages.

A 1|2 H.P. motor is adequate to drive one loom and often one operator can look after two looms. In one working day of 8 hours a power loom can weave two sarees each of 9 yards by 45 inches, while with the handloom it would take two to two and a half working days for making one such saree. The power required for one loom being very small the energy charges are a small fraction of the working costs, but since the worker is able to obtain larger output with the power-driven looms, he is able to earn a reasonably good remuneration.

With a capital cost of about Rs. 400 per loom and an annual recurring charges of about Rs. 850, it is possible to produce 125 sarees each of 9 yards by 45 inches per annum so that the cost of production of a handloom saree is about Rs. 6-8-0. In the case of power loom, however, with a capital outlay of Rs. 6,000 and recurring charges of about Rs. 1,600 per annum, 400 sarees each costing about Rs. 3-9-0 for production could be produced. It is interesting to note that in Peelamedu and Coimbatore, 50 out of 600 weavers in a society of powerlooms earned Rs. 150 a month while 550 other weavers earned only Rs. 50 a month. The use of a powerloom enables the workers therefore to earn a large wage and the consumers can obtain cloth at a cheaper price.

Despite the attractive economy of the power looms, there has not been much development of this type of load for the reason that the average handloom weaver is too poor to find the capital for the power loom.

Refrigeration.

Cold storage of foodstuffs assumes great importance at present for the reason that prevention of damage and deterioration by means of refrigeration is a positive means of increasing the food availability in this country. Perishable foods like meat, fish, eggs, milk and dairy products, fresh fruits, dried fruits, etc., can be preserved indefinitely by maintaining appropriate temperature and humidity conditions.

The Ministry of Agriculture, Government of India, have been taking considerable interest in cold storage installations and there are now about 100 installations with a total storage capacity of 50 tons in operation in different parts of India. While the majority of plants are designed for the storage of potatoes, several units are suitable for the storage of other products like fruits, vegetables, fish, etc.

In Bombay State, the Government have installed a cold storage plant for storing 85,000 lb. of bottled pasteurised milk.

A 500-ton capacity storage installation requires power supply to the tune of 60 to 75 K.W.

Cottage Industries.

The importance of the use of electricity in cottage industries in the matter of giving employment to the agricultural population during off-season periods is slowly being recognized. A variety of cottage industries have been adopted to work on electricity, viz., silk lace throwing, knitting machine, carding for woollen drugget industry, tape weaving, button making, fountain-pen making, etc.

The power requirements of these industries are given below:—

1 Silk throwing—1|2 H.P. to 3 H.P.
2 Single-unit power loom—1|2 H.P. to 3 H.P.
3 Knitting machine—1|3 H.P. to 3 H.P.
4 Carding for woollen drugget industry—3 H.P.
5 Tape weaving—3|4 H.P.
6 Button making—1|2 H.P.
7 Fountain-pen making—1|4 H.P.

(*Continued on page 32*)

Slum Clearance in the City

The Slum Clearance Scheme was formulated by the Government of India in May 1956. It is based on two principles, namely, that there should be minimum dislocation of slum dwellers, and that emphasis should be laid on the provision of minimum standards of environmental hygiene and essential services. Financial assistance by the Government of India is made available to the State Government in the shape of loans and subsidies as given below:—

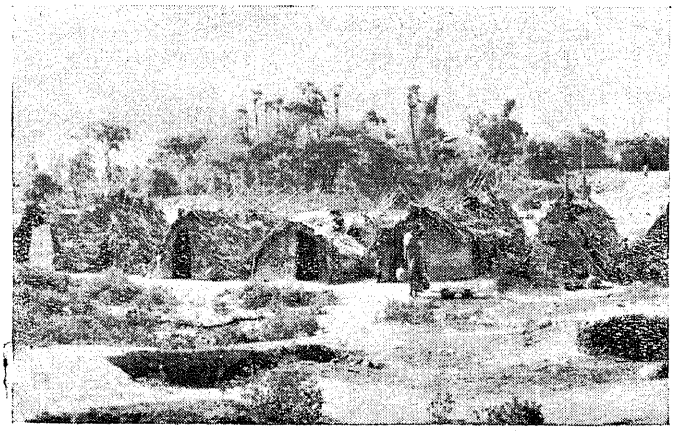
(i) 50 per cent of the approved cost as loan.
(ii) 25 per cent of the cost as subsidy.
(iii) 25 per cent of the cost as subsidy by the State Government.

The question of increasing their share of subsidy from 25 per cent to 37½ per cent by the Centre is under consideration of the Government of India.

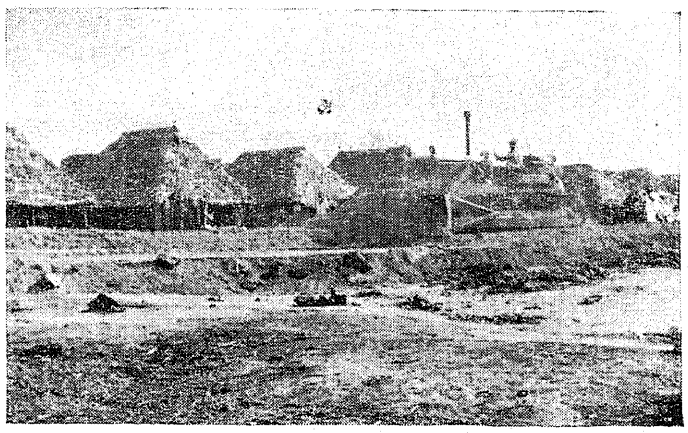
The general scheme contemplates provision of open developed plots as well as construction of pucca tenements. The developed plots or tenements will be leased to allottees on rental basis.

The total allocation for the Second Plan period is Rs. 168 lakhs. The Government have so far approved 17 schemes to the extent of Rs. 107·57 lakhs.

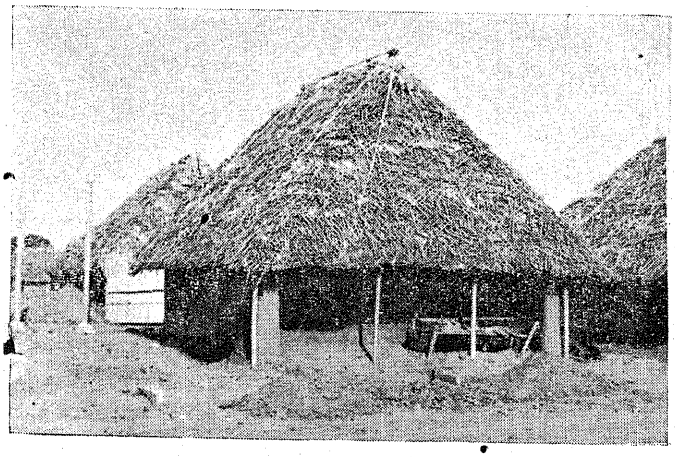
Of the 17 projects under the scheme approved, the Namasivayapuram Slum Improvement Scheme, which was the first and the *pilot* project contemplates the provision of 532 open developed plots at a total cost of Rs. 6,65,000, to re-house 357 families of slum dwellers in the existing slum area adjoining the Nungambakkam Railway Station and also to re-house 175 more families in the alternative site at Trustpuram, Kodambakkam, nearby.



The slum as it was.

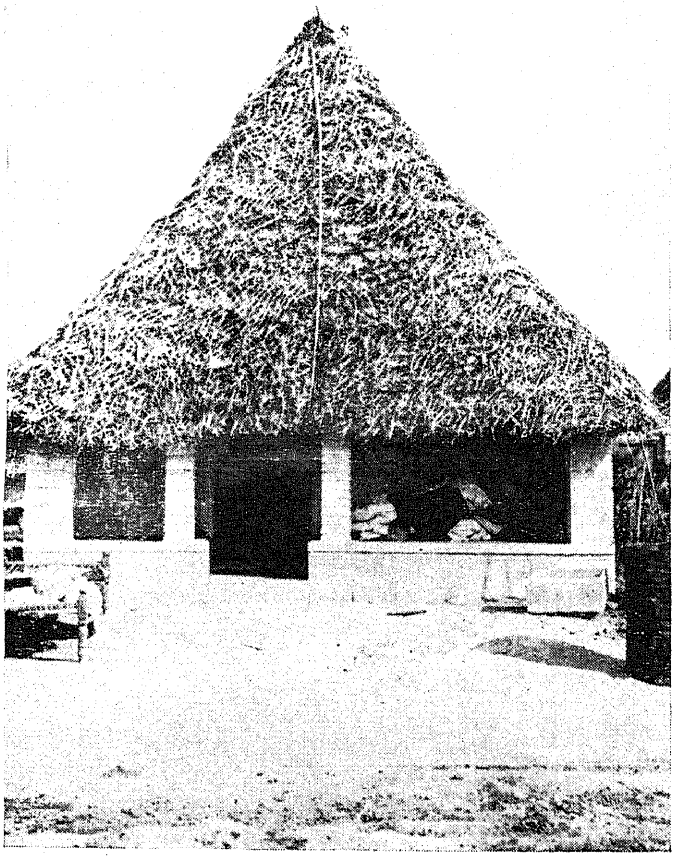


The Bulldozer at work.



Dwellings under construction.

A general view of the new Colony.



A completed dwelling.

Each family will be allotted a plot ranging from 875 square feet to 880 square feet provided with a high earthen platform (plinth) measuring 300 square feet by 1 foot a pucca f.o.l. 4 feet by 3 feet size, ond a pucca open bath 4 feet by 4 feet. Building materials worth about Rs. 125 plus Rs. 25 in cash will be given to each family for constructing a hut. Trees will be planted at 30 feet intervals and staggered in order not to be facing each other.

The scheme is now under execution by the City Improvement Trust.

Full-Fee Concession for Harijan Pupils

The Government have directed that the existing practice of granting full-fee concessions to the Harijan pupils including Harijan converts to Christianity reading in secondary schools be extended for a further period of one year, i.e., 1959-60.

Agricultural Extension Wing for Coimbatore Agricultural College

The Government have sanctioned the establishment of an Extension Section to the Agricultural College, Coimbatore, in order to provide scientific and supervised field training in agricultural extension methods and techniques, for under-graduate and post-graduate students. The actual training in extension work for under-graduates is to be in a Community Development Block set apart for the purpose, for a period of eight weeks during the intensive farm training given to the students of the B.Sc. (Agri.) course. This agricultural extension section is meant to bring the problems of the ryots to the laboratory of the research worker and to take out the results obtained in the research laboratory to the ryots in the field. Thus Education, Research and Extension will be fused in this course.

The total cost of the scheme for a period of two years, i.e., 1959–60 and 1960–61, works out to Rs. 4·15 lakhs. The Government of India have agreed to give a grant of Rs. 68,800 and a loan of Rs. 1,03,200 towards the entire expenditure on non-recurring items. The recurring expenditure for two years representing Rs. 2·43 lakhs is to be borne on a 50: 50 basis between the State and Central Governments. From the third year onwards the State Government will bear all the running expenditure. The Government have requested the Director of Agriculture to implement the scheme immediately. The main work of the agricultural extension section will be—

(1) Extension training for under-graduate students ;

(2) Extension work of the specialist (co-ordinated research and extension) ; and

(3) Evaluation of extension programmes.

Veterinary Artificial Insemination Work : Five more Sub-Centres for City

The Government have sanctioned the opening of five more Artificial Insemination Sub-Centres in Madras City, i.e., at Perambur, Ayyanavaram, Aminjikarai, Adyar and Triplicane. The opening of these five centres will involve a recurring expenditure of Rs. 3,050 and Rs. 5,500 on non-recurring items.

For artificial insemination work in Madras City, a main centre has been established at the Madras Veterinary College. The following sub-centres are also functioning :—

Corporation Cattle Depot, Basin Bridge.
Corporation Cattle Depot, Mylapore.
Veterinary Hospital, Saidapet.
Corporation Cattle Depot, Kodambakkam.
Government Veterinary Hospital, Rayapuram.

The scheme has become popular in the City and hence the Government have decided to open five more sub-centres.

Enlarging Recreational Facilities for Madras Children

VARKEY CHERIAN

Keeping children busy and out of mischief in summer holidays is a challenge to most parents. In busy urban neighbourhoods, this assumes the size of a social problem.

Hence, it was pleasurable to come across recently a bunch of ten-year-olds making merry in a sheltered lot just a few feet off busy Mount Road.

They had a choice of diversions, and as the spirit moved, they romped from slide to seesaw, on to the roundabout. If they tire of these, they need only to step into a small building for a peep into the fairly world of picture books, magazines and young people's classics. They can explore, if they feel like it, through picture encyclopædias, plant and animal kingdoms, history of peoples and location of lands.

These have been made possible by a recent extension of the Guild of Service Children's Library through a gift of Rs. 5,500 from the Asia Foundation of San Francisco, which interests itself in welfare projects in the Orient.

The Guild of Service, Madras, which runs the library, is a premier voluntary social service agency in India, which has a major stake in welfare activities for children.

It has branches in all the districts of Madras State, besides several units in Andhra, Mysore and Kerala States, and affiliates in Assam, Bihar and Madhya Pradesh.

Started some 36 years ago in Madras City by Mrs. Waller, wife of Bishop Waller, to bring together women of leisure for social work, the Guild of Service has become a synonym for voluntary service.

And an indefatigable promoter of its service ideal for the past couple of decades in this city has been Mrs. Mary Clubwala Jadhav, one of India's pioneer social workers.

Such fine institutions in Madras as the Seva Samajam Boys and Girls Homes for destitute children, the Mohite playground for delinquent children, the Bala Vihar for mentally-retarded children, Ashok Vihar (health and recreation centre), Juvenile Guidance Bureau, Vocational Centre at Saligram and the Madras School of Social Work, all under the aegis of the Guild, owe not a little to the vision and zeal of Mrs. Jadhav.

The Guild of Service of Information Bureau, of which the Children's Library is an adjunct, exemplifies the voluntary effort that makes the Guild institutions tick.

The entire work of this information centre is shared by a small band of young office workers under the leadership of S. Susainathan of the Southern Railways, who devotes to it up to five hours each evening. For the last ten years, the centre has been manned by such volunteers who donate their leisure hours. They answer correspondence, organize meetings and conferences, address some 3,000 wrappers for the Guild bulletin each month, distribute and maintain records of food gifts received from UNICEF CARE, Meals for Millions Foundation and Catholic Relief Service.

Withal, funds for operating expenses is a recurring headache for the Guild institutions. A major source of revenue for running the welfare homes is through foster parents, who undertake upkeep of specific individuals. Foster parents may be living next door to the institution or, as often happens, in another continent altogether.

For instance, Canadian foster parents are quite a number in the list of sponsored children in these Madras homes. The visible link between such parents and children is an international Santa Claus, Dr. Lotta Hitschmanova, founder-director of the Unitarian Service Committee of Canada, which works on the same voluntary pattern as the Guild.

Dr. Hitschmanova has been visiting the Madras homes every year since 1953 on behalf of the foster parents in Canada. A fairy godmother to many a boy and girl, she was recently in Madras, and aptly enough, it was she who inaugurated the extended Children's Library in Mount Road.

(Continued from page 9)

nuclear energy. We expect also that by that time electricity from nuclear power stations will be somewhat cheaper than electricity from coal or oil-fired stations. They should also be saving about £100 million tons a year of conventional fuel, much of which would have to be imported, and this is very important for our economy. Ten years later, by 1975, they should be saving about £200 million a year of imports and generating at least half of our electricity.

[From a Broadcast talk over the B.B.C.]

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Recommendations of the Committee on Agricultural Production

The Committee on Agricultural Production which was constituted by the Government in August last has submitted its report. The composition of the Committee on the date of its report was as follows:—

Chairman.

Sri M. Bhaktavatsalam, B.A., B.L., *Minister for Agriculture.*

Members.

Sri R. A. Gopalaswamy, I.C.S., *Commissioner of Food Production.*

Sri P. P. I. Vaidyanathan, Bar.-at-Law, I.C.S., *Secretary to Government, Food and Agriculture Department.*

Sri A. Venkatesan, I.A.S., *Director of Agriculture.*

Sri A. R. Venkatachari, I.S.E. (Retd.), *Retired Chief Engineer, Public Works Department.*

Sri V. K. Palaniswamy Gounder, M.L.C.

Sri M. G. Sanker, M.L.A.

Sri V. S. Thyagaraja Mudaliar, M.A.

Secretary.

Sri V. Vasudevan, M.A., *Deputy Secretary to Government.*

The Committee was appointed by the Government to undertake a thorough scrutiny of the food production plans with a view to assess the results achieved so far and to consider the further steps to be taken to accelerate the programme so as to ensure the full achievement of the targets of additional production. As desired by the Government the Committee extended its enquiry to the production of commercial crops also so as to cover the entire field of agricultural production in this State. The Committee's report is under print. It is a priced publication and copies of it can be had from the Superintendent, Government Press, Madras. A gist of the more important recommendations of the Committee is given below.

Improved Seed Programme.

The Committee is of the view that the work of seed multiplication and distribution at the primary stage in the State Seed Farms should be undertaken by the Government themselves even though they may have to incur some loss on this account as it is of paramount importance to ensure the quality of the primary seeds released for further multiplication in the secondary stage. The Committee considers that it will not be necessary to open as many as 360 State Seed Farms as provided for in the Second Five-Year Plan and that it will suffice if there are 70 State Seed Farms of 25 acres each for paddy and millets and 140 State Seed Farms of 25 acres each for cotton, groundnut and millets or 210 State Seed Farms of 25 acres each in all. These 210 State Seed Farms will between themselves provide a State Seed Farm acreage of 3,000 acres for paddy, 1,500 acres for millets, 2,000 acres for cotton and 2,000 acres for groundnut. In order to reduce the number of State Seed Farms and thereby ensure a more effective and closer supervision of the Farms and with a view to effect savings in the overhead charges the Committee has recommended that all the existing State Seed Farms should be expanded into 75 to 100 acre farms each of which should be managed by the same scale of staff as has now been sanctioned for a 50-acre farm. The State Seed Farms that may have to be started in future should also be only 75 to 100-acre farms. As every step should be taken to keep down the total outlay on the State Seed Farms to the minimum the Committee has commended the suggestion that assessed waste lands and porombokes which are satisfactory and suitable from the point of view of assured irrigation, fertility of the soil, etc., may be used for locating the State Seed Farms wherever such lands are available.

In order to improve the efficiency of the State Seed Farms and with a view to induce capable hands to stick on to the jobs of Farm Managers and take an active interest in their work the Committee considers that it is absolutely necessary to give a bonus to each Farm Manager which should have a relation to the profit earned by the Farm during the period of his stewardship. The Committee has recommended the grant of a similar bonus to the other staff of the State Seed Farms also. In the Committee's opinion there would be better results if co-operatives are started to undertake the seed multiplication and distribution work in each Development Block in an integrated manner. It has therefore suggested that the Agricultural Banks may be persuaded to take up this work wherever they exist and that in other places co-operatives may be started for the purpose. Both the Agricultural Banks and the other Co-operatives should obtain their primary seed requirements from the State Seed Farms and take over the work that is now being done by the Village Seed Farms. While the Committee considers that the subsidy of 25 nP per bag of 160 lb. for meeting incidental charges and 12 nP. per bag of 160 lb. towards ceiling charges now being given to the villages seed farm ryots should be continued, it is of the opinion that there is no case for enhancing these rates of subsidy at present.

Soil Testing Service.

The Committee has stressed the need for a rational fertiliser use as recommended by a soil testing service particularly in view of the present acute shortage o

chemical fertilizers. It has recommended that a systematic survey of the soil in all the regions of this State should be conducted starting from the predominantly rice areas with a view to draw up a detailed soil map of this State, that linked with this survey there should also be an agronomical survey of the entire State, that three more soil testing laboratories should be established at Madras, Aduthurai and Madurai and that in addition a soil testing laboratory should be established in each sugar factory area meeting the expenditure from the sugarcane cess fund.

Chemical fertilisers.

The Committee has drawn attention to the present anamolous position in which the Government are on the one hand propagating the use of chemical fertilisers for stepping up agricultural production while on the other hand they are unable to meet the increasing demand for chemical fertilisers created by their own propaganda on account of shortage of stocks and has recommended that more fertiliser factories should be established throughout the country in such a manner that no difficulty will arise in the matter of transporting the stocks by road or rail from the factories to the consuming areas. The Committee is of the view that the distribution of chemical fertilisers through co-operatives should be the ideal to be aimed at and that co-operatives which are already having the monopoly of distribution of nitrogenous fertilisers in the Development Blocks should be persuaded to take over the distribution of super-phosphate, potash and manure mixtures also in the Development Blocks so that they may be given the monopoly for the distribution of these commodities also in the Development Blocks. As regards the Non-Blocks areas the Committee considers that in these areas also the co-operatives should be given the monopoly for the distribution of chemical fertilizers as soon as enough co-operatives to handle the entire requirements of nitrogenous fertilisers, super-phosphate, potash and other manure mixture in these areas are formed and begin to function. The Committee has recommended that more co-operative manure mixing societies should be started as quickly as possible and that they should be given adequate quotas of straight fertilisers. Among the recommendations made by the Committee for ensuring that chemical fertilisers are made available to agriculturists in proper time are the placing of indents by the distributors on the Collectors sufficiently in advance of the time at which supplies are required for distribution to ryots and the receipt and disposal of all applications for loans under the Intensive Manuring Loan Scheme six months ahead of the cultivation scheme.

Organic manure.

As the chief reason for the slow progress in the development of green manure is the inadequate supplies of green manure seeds, the Committee has recommended that the Forest Department should raise sesbania and Gyricidia crops at least over 2,000 acres of forest lands, collect the seeds obtained from these crops and supply them to the Agriculture Department. The recommendations made by the Committee for augmenting green manure resources are:—liberalization of the existing concessions in the matter of removal of green manure leaves from the Government reserved forests; giving sufficient prominence for growing green manure plants, etc., in the village forests which the Forest Department is now developing; the growing of green manure plants, etc., by the Forest Department on the fringes of reserved forests adjoining villages which should make available the green manure leaves to the ryots of those villages; grant of permission to ryots under permits to plant green manure plant, etc., on the canal, channel, river, tank and road porombokes in charge of the Revenue, Public Works, and Highways Department; supply of water (wherever it can be so supplied) specially from Government irrigation sources for raising and irrigating green manure crops without undue restrictions; giving of a suitable cash incentive to the lascars of the Public Works Department, road gang workers of the Highways Department and village officers in order to induce them to grow green manure plants, etc., on the banks of river canals and channels, on road margins or in porombokes in their charge as the case may be; the remission of kist for the cultivation of green manure as a pure crop by ryots on lands which are classified as "current fallows", "other fallows" and "cultivable wastes"; the institution of prizes at district, taluk and village levels for the producer of the best yield of green manure per acre at each of these levels in each district and the holding of inter-village competitions in each district in green manure production and the award of a prize of the value of Rs. 10,000 in the shape of developmental works of communal benefit to that village in each district which raises green manure over the largest area.

The Committee has drawn attention to the fact that as the legal of compost and farmyard manure production is only about 25 per cent of the requirements on a safe estimate the target for compost production which has now been fixed is far too low. It has recommended that a revised target should be fixed aiming at a production which should be calculated at the rate of 10 tons of compost per acre per annum for irrigated crops and 2 tons of compost per acre per annum for rain-fed areas growing dry crops. An intensive drive should be launched to achieve this revised target. The compost development work should be stepped up both in the Development Blocks and in the Non-block areas additional staff being employed where necessary. Village-wise targets should be fixed for compost development and scrupulously adhered to and the progress of the achievement watched periodically. The Forest Department should provide space in the fringes of reserved forests to ryots of the neighbouring villages for constructing their own compost pits and collect a nominal fee from the ryots per pit of specified dimensions. The Committee has also recommended that the feasibility of bringing within the easy reach of the average ryot the cattle dung gas plant which not only permits the use of cattle dung as fuel after its conversion into methane gas but also at the same time enables the use of the cattle dung sludge ejected by the gas plant as manure without any reduction in its manurial properties should be investigated and the Government should offer to give financial assistance for the setting up of 1,000 of these plants in the shape of 50 per cent of the cost as a subsidy and the remaining 50 per cent as a loan.

The Committee's recommendations in respect of other manures are: the export of oil cakes outside the country should be carefully regulated so as to ensure that enough supplies are made available for use within the country both as cattle food and as manure; the use of fish-meal as manure after processing should be popularised with a view to its utilisation to the fullest extent especially in the coastal areas of the State; as bone meal and hoof meal are two of the best sources of phosphate their export to other countries should be banned; and flaying centres equipped with bone meal digestors should be opened on a co-coperative basis in large numbers at the rate of at least one for every group of two or three Development Blocks with a view to provide sufficient quantity of bone meal for application to crops.

Major irrigation works.

As regards major and medium irrigation the Committee's main recommendations are: the surplus waters that are now being allowed to go to waste down the rivers in the neighbouring States of Kerala and Andhra Pradesh should be diverted to this State as quickly as possible with the willing co-operation of the Governments of those States; a systematic survey of all the jungle streams in this State should be conducted with a view to harness their flood waters; experiments should be conducted to obtain definite results regarding economy in the use of water and the circumstances under which the maximum yield from one acre of land and the maximum return from one cubic foot of water can be obtained; and the formulation of suitable schemes for utilising fully the drainage waters in several of the irrigated areas with a view to effect improvement to the duty of water and for relieving submersion of large areas under rice which now get water-logged.

Minor irrigation works.

The Committee has recommended that in implementing the Special Minor Irrigation Programme the highest priority should be given to the repair and restoration of tanks in the ex-estate areas, particularly those in the Ramanathapuram district, which are in need of immediate attention. It has also recommended that in order to actually restore the original ayacut of each tank the work of repair and restoration of tanks should also cover the repair and restoration of the supply channels, field bothies and sluices of the tanks in the case of Government sources of irrigation including those in the ex-estate areas. As regards the maintenance and silt clearance of supply channels the Committee is of the view that this may be left to be attended to as far as possible by the Panchayats or Panchayat Union Councils trusting that they will take advantage of the enabling provisions in Section 85 of the Madras Panchayats Act, 1958. The Committee considers that a beginning may be made in the matter of entrusting to the Block Agency the execution and maintenance of minor irrigation works in the Development Blocks. The Committee is of the opinion that the present arrangement under which the Chief Engineer for Irrigation is in charge of major irrigation sources and the Revenue Department is in charge of small irrigation sources while the Food Production Engineering branch headed by the Superintending Engineer (Food Production), who is under the control of the Board of Revenue (Food Production), is in charge of renovation of tanks which have been neglected for a long time is working satisfactorily and may be allowed to continue. As the scheme for desilting-*cum*-reclamation of irrigation tanks is still in its trial stage the Committee considers that it should be continued only at the present pace. It has further recommended that the results of the works already executed and now being executed under it should be carefully watched and that if it is found that these results are encouraging enough the pace of implementation of the scheme should be accelerated.

The Committee attaches great importance to the improvement of lift irrigation facilities. It considers that the scope of the revived well subsidy scheme is very limited and it has therefore recommended that the subsidy for sinking wells should not be confined only to those wells dug under this scheme but that subsidy at the same rate and subject to the same conditions should also be given for new wells dug with the help of other Government loans such as takkavi loans. As the scheme as it stands now may not prove of much assistance to ryots in many areas in this State like the Coimbatore district and the Sattur and Srivilliputtur taluks of the Ramanathapuram district the Committee has recommended that the loan ceiling should be raised to Rs. 2,000 per well of which Rs. 500 may be a subsidy in specified areas. The other recommendations of the Committee on this subject are: The Filter-point scheme should be continued and intensified; just as a subsidy of 25 per cent is now allowed in the Development Blocks for sinking filter point tube wells a similar subsidy subject to a maximum of Rs. 250 per well should be given for sinking filter-point and bore wells in the non-Block areas also; an examination of the potentialities for groundwater development by sinking tube wells and filter-points should be made immediately in respect of the entire State on the basis of the past boring records and the performance of the existing tube well pumps and filter-point pumps; the scope for further expansion of the artesian well sinking programme in the South Arcot and Tiruchirappalli districts should be explored; the boring equipment now with the Agricultural Department should be improved and augmented; the river pumping scheme should be continued, the units being run as far as possible as community river pumping units by the existing co-operatives or by co-operative specially formed for the purpose; and the hiring scheme for pumpsets should be wound up while the Hire Purchase Scheme for pumpsets should not only be continued but also intensified utilising the co-operative agency for its implementation. The Committee has also recommended that the centage now charged by the Agricultural Department for servicing the pumpsets distributed under the Hire Purchase Scheme may be waived and that complete discretion should be given to ryots in the matter of choosing the pumpsets.

Land reclamation.

As regards tractors the Committee has recommended that all the wheel-type tractors owned by the Agricultural Department should be disposed of, that such of

them as could not be disposed of may be utilised for running the Tractor Hiring Scheme until they become unserviceable, that all the track or chain-type of tractors equipped with bull-dozers should be retained and their number increased to the extent necessary and that the Tractor Hiring Scheme should be continued utilising such tractors alone. The Committee has also recommended that the Hire Purchase Scheme for tractors should not only be continued but also expanded, that the Government of India should be moved to permit the import of an adequate number of tractors each year to meet the demand from the ryots in full together with a suitable complement of spare parts, that the Government of India may be requested to take steps for the manufacture within the country of a sufficient number of track type tractors with a view to make the country self-sufficient in regard to its requirements of this type of tractors in the near future and that immediate arrangments should be made to import adequate quantities of fast-moving spare parts required by Government-owned tractors and private-owned tractors in this State. The Committee has further recommended the starting of three mobile tractor workshops and the exemption from taxation under the Madras Motor Vehicles Taxation Act of all private tractors and trailers used solely for the owners' personal agricultural purposes and all tractors and trailers owned by the Agricultural Department.

In view of the poor progress so far in the implementation of the Madras Land Utilisation Order the object of which is to bring under the cultivation of food crops any occupied waste or arable land which has been left uncultivated the Committee has recommended the appointment of a Special Officer of the status of a Collector to attend solely to this work. It has also recommended the appointment of two two-man teams each consisting of an officer drawn from the Agricultural Department and another officer from the Public Works (Irrigation) Department to make a survey of the waste lands belonging to Hindu Religious and Charitable institutions in this State and draw up schemes within a specified time limit for putting them to the best possible use.

Plant protection.

The Committee considers that the present arrangement under which pesticides and fungicides are sold at 50 per cent of the cost price only in those areas which are declared as pest-affected by the District Agricultural Officer concerned is not satisfactory and has therefore recommended that pesticides and fungicides should be sold at a concessional rate in all areas throughout the year. It has also recommended that there should be four mobile pest control units at the rate of one under each Deputy Director of Agriculture.

Agricultural implements.

In order to improve the supply position of improved agricultural implements the Committee has recommended that some of the Government workshops of the various Government departments particularly those belonging to the Agriculture, Industries and Public Works Departments which have a surplus capacity should take up the fabrication of agricultural implements specified by the Agricultural Department. It has also recommended that some of the irrigation workshops of the Public Works Department which have become surplus to the requirements of that Department may be taken over by the Agricultural Department for the fabrication of agricultural implements. The opinion of the Committee is that a system of quality control of the agricultural implements produced in this State should be introduced.

Supply of electricity.

The Government should give, in the view of the Committee, a subsidy to the State Electricity Board in order to enable it to supply electricity for agricultural purposes to new areas in the under-developed and backward areas of the State expecting only the normal 10 per cent return from the beneficiaries without demanding the special guarantee. Even in the well developed areas in this State it is understood that if the upper limit of the special guarantee which is at present Rs. 50 per H.P. is reduced to a larger number of ryots will come forward to take up electric supply. To the extent that this maximum limit is reduced the Government will have to give a subsidy to the State Electricity Board to reimburse to it the loss that will be incurred thereby. The Committee has recommended that the Government should consider by how much it would be feasible and desirable to reduce the upper limit of the special guarantee in the well-developed areas.

Co-operative credit.

The Committee has recommended that the pace of development of co-operative credit should be further accelerated and that there should be only one agency for the disbursement of all kinds of loans required by the agriculturists and that this agency should be the co-operative agency. The Co-operative Department has already made a start in this direction by launching its Full Finance Scheme in selected areas in this State. The Committee has recommended that this scheme should be extended to all Development Blocks in this State immediately and to all other areas in this State as soon as possible and in any event by the end of the Third Plan period. In order to ensure that the co-operatives play a much bigger roll than at present in agricultural development the Committee has recommended that the basic policy which the Government should adopt should be that all Government aids to agriculturists should be made available only through co-operatives. This policy is to be implemented progressively taking into account the availability of the required number of co-operatives. A Development Block should be taken as the unit for implementing this policy from stage to stage. With a view to ensure the expeditious implementation of this policy a definite date should be fixed for a group of Development Blocks according to a phased programme for bringing this policy into force in those Development Blocks. Due publicity for the dates so fixed should be given well in advance and it should be announced that on and from the date fixed for each Block all takkavi, medium and short-term loans will be discontinued in that Block. According to the

Committee the objective which the Government should have before them should be to set up at least one multi-purpose co-operative society in each village to serve the local agriculturists as a service co-operative catering to all their cultivation needs like fertilisers, seeds, credit, etc.

The Government have ordered that in the areas in which the Full Finance Scheme is working no takkavi loan should be granted. The Full Finance Scheme will meet only the short-term and medium-term needs of the agriculturists. As regards long-term credit the loans given by the Land Mortgage Banks alone will not be adequate. The Committee has therefore recommended that long-term takkavi loans should continue to be granted even in the Full Finance Scheme areas for the purpose of land improvement. The Committee has drawn attention to the fact that the loans that are at present being made available by co-operatives to landless cultivating tenants, marginal cultivators, sub-marginal cultivators, etc., is negligible because of the risk involved in lending to them. It has recommended that short-term loans to the required extent should be granted by co-operatives to these categories of borrowers on the security of the crops raised by them. The Committee has also recommended that the Government should give a guarantee to the financing banks agreeing to make good one half of the loss, if any, incurred by them in cases in which short-term loans given by them on the security of the crops raised by landless cultivating tenants, etc., become irrecoverable on account of failure of crops due to unexpected causes like pest-attack, drought, etc.

Co-operative farming.

The Committee has given a brief history of co-operative farming in this State and has pointed out that the idea of co-operative joint farming has been before the country for quite a long time. It has expressed the hope that the proposal for the universal adoption of co-operative joint farming as the future pattern of our country's agriculture will be considered by all concerned dispassionately untrammelled by other considerations and that in effecting the changeover to voluntary co-operative joint farming the Government will receive the requisite measure of enlightened co-operation from the agriculturists and others interested in stepping up agricultural production. It has also recommended that the Commissioner of Food Production should be designated as the authority for implementing all co-operative farming schemes and that co-operative tenant farming societies should be formed wherever there are large compact contiguous blocks of lands belonging to Hindu Religious and Charitable institutions.

Commercial crops.

As the progress in the achievement of the targets of additional production of commercial crops under the Second Five-Year Plan has been poor so far, the Committee has urged that vigorous measures should be taken to accelerate the pace of progress in order to achieve the targets in full by the end of the Plan period. It has suggested that the target for the increased production of irrigated groundnut should be stepped up and that a special drive should be launched for coastal planting of coconut palms particularly in the districts of Tanjore and Ramanathapuram. The Committee has suggested the raising of the target of increased acreage under cashew fixed for achievement by the end of the Second Plan period and has recommended that a comprehensive tobacco development scheme covering the entire State should be launched very soon. The other recommendations of the Committee relating to Commercial Crops are: every step should be taken to increase the production of fruits to as high a level as possible, greater attention being paid to increasing the production of varieties of nutritious fruits which are already popular with the masses and the prices of which will be within the reach of the common man and also those varieties of fruits like grapes for developing which the conditions in this State are very favourable; an orchard-*cum*-nursery and horticultural research centre should be established at the Sathanur Product Dam site taking advantage of the facilities available there and the possibility of setting up similar centres in other irrigation dam sites should be investigated.

Agricultural research.

The Committee is of the opinion that fundamental research should be accorded a prominent place in the current and future research programmes of the Agricultural Department and that the highest priority should be given to rice research. It has also called for the intensification of research work on pulses in order to evolve improved varieties of strains of pulses largely consumed in this State with a view to put an end to the chronic deficit of pulses in this State and its perpetual dependence on supplies from outside the State. The Committee has pointed out that the present arrangement under which there is only one Crop Specialist for both millets and pulses put together is not satisfactory and has urged the immediate revival of the post of Pulses Specialist which was abolished sometime ago.

Agricultural extension.

The Panchayat Union should, in the opinion of the Committee, provide the local leadership for implementing the agricultural plans formulated for its jurisdiction and act as the local committee for agricultural development. Each Panchayat Union should be asked to constitute at the earliest opportunity a Committee solely for attending to the work of stepping up agricultural production within its jurisdiction under section 53 (*b*) of the Madras Panchayats Act, 1958.

The Committee has made various suggestions for the improvement of agricultural extension work, among them being, the giving of publicity to the various concessions extended to agriculturists, the utilisation of the Project Information Offices at the sites of the Irrigation projects as information centres of the Agricultural Department the production and exhibition of documentary films in colour depicting the improved cultivation practices advocated by the Agricultural Department weaving them round simple and appropriate stories and the taking of selected batches of agriculturists at Government cost to Agricultural Research Stations, Government Farms and the farms of prize-winners in the crop

(*Continued on page* 35)

Industrial Housing:

Liberalised Assistance from Government

The Government of India have, with a view to increasing the tempo of construction activity under the subsidised Industrial Housing Scheme in the employer's sector, given a few important concessions to the Industrialists who come forward to construct houses for the workers.

The loan assistance has been increased from 37½ per cent to 50 per cent of the approved cost in addition to the 25 per cent of the approved cost as outright subsidy. Fifty per cent of the loan is disbursed when construction reaches plinth level and the balance is given when it reaches roof level. Fifty per cent of the subsidy is paid on the completion of construction and the balance on receipt of audited accounts and acceptance by Government. The period of repayment of loans has been increased at the request of the employers from 15 years to 25 years. The State Government will allot suitable developed plots and they themselves can sanction the projects instead of recommending to Central Government for sanction, thus avoiding delay.

In spite of this liberalised pattern of assistance, there has been poor response from employers. Out of the Rs. 45 crores set apart for this scheme in the Second Five-Year Plan, Rs. 16 crores are still available for employers.

The State Government on their part have sanctioned the construction of 100 two-roomed and 200 one-roomed tenements at a cost of Rs. 18 lakhs for the Government Press Workers. Sanction has also been accorded to the construction of 100 houses for workers in the Public Works Department Central Workshop at a cost of Rs. 6.10 lakhs. It is also proposed to construct 250 houses for the State Transport Workers.

At the recent Conference of the representatives of employers and employees, convened by the State Government it was put forth on behalf of employers that since the actual cost of construction of a two-roomed tenement exceeded that of the ceiling cost fixed by Government of India, the cost of construction should be worked out realistically and then only the subsidy given would be beneficial. But it was pointed out that this may be due to the cost of the lands at different places and that the lands and houses were, after all, the property of the employers. It was also made clear that the provision had been exhausted under the Industrial Co-operative Housing Scheme and the only way open to them was to avail of the funds allotted for private employees' housing proposals.

Before land could be acquired, certain conditions had to be fulfilled without which acquisition of land may take years. A list of such conditions are available with the Collectors and Revenue Divisional Officers and interested employers can always have access to it. If, even after the conditions are fulfilled, there was still delay in acquisition of lands, the matter may be brought to the notice of the Government.

It was suggested that in order to make employees ultimate owners of the houses the 50 per cent loan which the employers have to return and the 25 per cent of cost which they are required to find may be recovered from the workers themselves over a period of years as in the case of co-operative housing societies, etc. The loans may even be foreclosed by adjusting payments like houses, etc., towards the loans. It was pointed out that it is not the intention of the Government that, under the industrial housing scheme, the workers should ultimately own the houses. But the employers must first take advantage of the present scheme and then convert it into a co-operative scheme if possible.

When it was complained that iron and steel were not readily available, the employers were informed that the position has improved considerably and if the employers submitted a consolidated list of their requirements district-wise necessary action can be taken quickly. The question of legislation in this matter will be discussed at the All-India Conference to be held in Mount Abu next month.

The Government are unhappy to note that the assistance given by the Centre has not been fully utilized. Another target of six months has been fixed and it is hoped that concrete details of the schemes the employers may formulate will be forthcoming in this period. The Government expect that the private employers will take up this matter more seriously and tackle this very important problem of labour housing as, in any event, sooner or later, they will have to find housing for their workers. If they do not take advantage of the assistance offered under the Second Five-Year Plan now, probably they will have to bear the entire burden themselves later, without any assistance from the Government.

It is hoped that the employers would be able to formulate specific schemes before the next conference which is expected to be held in the first week of September 1959.

Kharagpur B. Tech. Degree Recognised by State Electricity Board

The Madras State Electricity Board in line with the other engineering departments of the Government of Madras, has directed that the B.Tech. Degree of the Indian Institute of Technology, Kharagpur, in Civil, Mechanical and Electrical Engineering be recognized as equivalent to the B.E. Degree of the Madras University in the respective branches of the Engineering, for purposes of appointment to the posts under the Madras State Electricity Board.

Handloom Seminar

The two-day Handloom Seminar of the Southern States, held on 4th and 5th June at Madras, with Sri A. Bhagavantha Rao, Minister for Industries, Andhra Pradesh, presiding has recommended that a provident or thrift fund should be constituted for weavers within the co-operative fold with an equal contribution from the Central Government funds. The Seminar accepted a proposal that mill production should be pegged at 4,000 million yards for internal consumption and recommended that a trade delegation comprising handloom mercantile and handloom weavers co-operative interests be sent to our traditional markets to recapture and develop our export trade. It was also urged that handloom textiles should figure as a specific item in trade agreements executed by Government of India with foreign Governments instead of including it as an item under textiles.

The Seminar considered the problems of the handloom industry peculiar to the Southern States, under four broad subject-heads, viz., Organization, Production, Finance and Marketing.

The Seminar recommended the running of training classes in designs for the benefit of working weavers in the evenings with financial aid from the Cess Fund and also urged the deputation of weavers to weaving centres within and outside the State with financial assistance to the extent of two-thirds of the expenditure, subject to a maximum of Rs. 200 per mensem from the Cess Fund. In order to see that all the employees in weavers co-operatives are trained, the Seminar recommended that schemes for training of the employees of apex and primary weavers co-operatives should be introduced in all States.

It was also agreed that it is necessary to provide facilities for demonstration and for training in modern techniques and that to this end at least one textile institute should be set up in each State.

The Seminar urged that the Government of India should review the scheme of expansion of power-looms contemplated under the Second Five-Year Plan in view of the fact that the demand for cloth anticipated during the plan had not materialised. It was further urged that power-looms should be subject to the same restrictions in regard to the production of reserved categories of cloths, as the organised mill sector.

In view of the present trend of rising demand for the finer varieties of cloth, the Seminar felt that without imported long staple cotton, the handloom sector cannot meet this demand. It therefore recommended that sufficient quantities of long staple cotton be imported and allocated to the mills on condition that this yarn should be made available only to handloom weavers and not to power-looms or weaving looms. The Seminar also felt strongly that necessary imports of machinery should be allowed to facilitate the indigenous industry to manufacture superfine, mercirised and other fancy yarn. Until such time as indigenous production of these types of yarn picked up it was felt, that import of limited quantities of these yarn required by the handloom industry may be permitted with suitable safeguards. It was also felt that the quantities of art-silk yarn made available to handlooms in the Southern region was meagre and it was urged that about fifty per cent of the imported art-silk yarn should be made available to handlooms in the Southern region.

The Seminar felt that urgent steps should be taken to work out suitable administrative arrangements for the equitable distribution of indigenous dyes and chemicals as also those that are imported by the State Trading Corporation. In respect of imported Coal-tar dye, the Seminar was agreed that the earlier system under which the actual users were permitted to import their requirements may be restored.

The Seminar took note of the fact that there exists a disparity between the rates at which yarn is available to the handloom industry and the weaving mills; the weaving section of a composite mill was able to obtain yarn at a much cheaper price than is available to the handloom industry. It was felt that there is imperative need to remove this disparity. In order to enable the co-operative spinning mills to withstand the competition of established joint stock mills set up at much cheaper cost, the Seminar requested the All-India Handloom Board to examine with sympathy the question of extending financial assistance to co-operative spinning mills in the first five years, of their establishment.

The Seminar felt that the cut from Rs. 200 crores to Rs. 160 crores imposed on the overall provision for handloom and other small-scale industries would result in the planned target of employment not being fulfilled and suggested that the Government of India and the Planning Commission should be requested to restore the cut.

The Seminar also considered the requirements of the Small Scale Industry Sector during the Third Five-Year Plan. In view of the vast potentialities for employment and the fact that foreign exchange commitments in the small-scale industries sector are very little, the Seminar recommended that a much higher provision should be made in the Third Five-Year Plan for all industries in the Small Scale Sector.

The Seminar unanimously recommended the establishment of a Co-operative Financing Agency for Weavers Co-operative Societies and Industrial Co-operative Societies wherever desired.

The Seminar felt that the credit facilities available from the Reserve Bank of India towards working capital of Apex Weavers Societies is very inadequate to meet their requirements. Therefore, the Seminar recommended that the Government of India may be requested to arrange with the Reserve Bank of India to make credit available to Apex Weavers Societies up to 10 times the paid-up share capital plus reserve fund of the Apex Weavers Societies concerned.

The Seminar also recommended that the working capital for all Weavers' Co-operatives including Industrial Co-operative Societies may be increased from Rs. 300 to Rs. 500 per loom.

The Seminar also stressed the need for the establishment of a finance corporation particularly to give financial assistance to weavers outside the co-operative fold. It was agreed that Industrial Co-operatives should be formed to assist this class of weavers. It was strongly urged that the opportunity provided should be availed of to produce quality goods for the export market by taking advantage of the supervision and control that would be available in this class of societies.

The rebate scheme in the handloom industry was also discussed by the Handloom Seminar of Southern States, and the consensus of opinion was that the time was not opportune yet for the immediate abolition of the scheme. It was further felt that any further decrease in the rate of rebate was neither advisable nor possible now.

The Seminar had come to the conclusion that the scheme of grant of rebate on sales of handloom cloth had been the major item of assistance to the Handloom Industry and had provided the requisite incentive for the handloom cloth thereby boosting up internal sales during the period this scheme had been in vogue. Past experience had shown that even a reduction in the rate of rebate had had very adverse effects on the quantum of sales. Under these circumstances the general consensus of opinion was that time was not opportune yet for the immediate abolition of the rebate scheme and that therefore it must be allowed to continue. It was further felt that any further decrease in the rate of rebate was also neither advisable nor possible now. The rates of rebate must also be uniform in all the States.

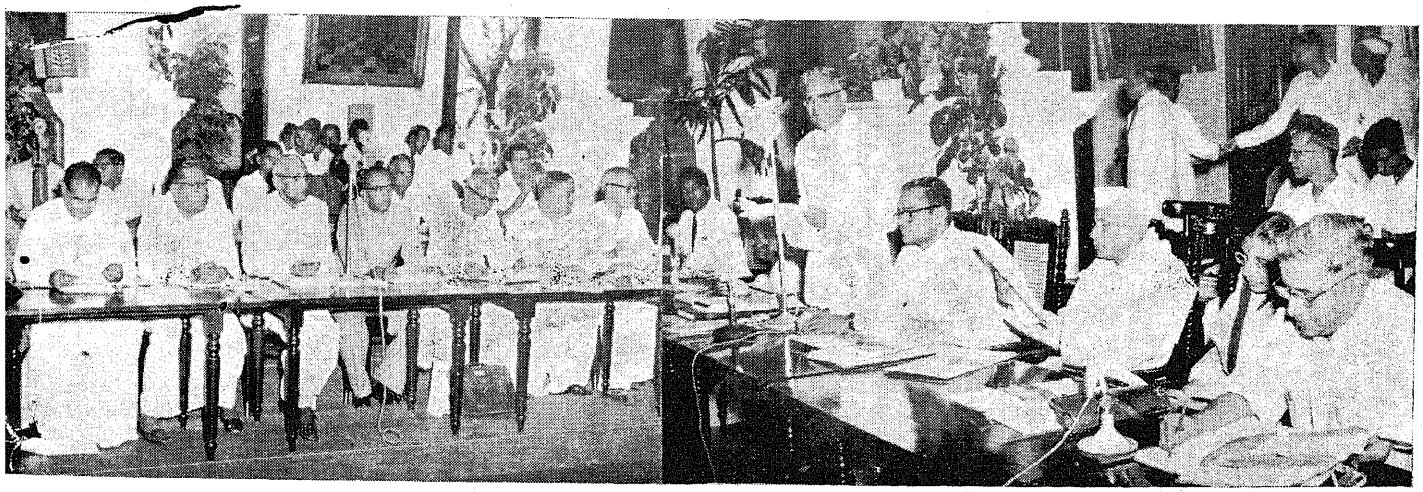
However, the Seminar admitted the policy of rebate cannot be continued for ever and that it had its own inherent defects which have got to be set right with appropriate measures to be taken by the several States in the manner in which the situation may demand. Some of Andhra Pradesh delegates desired that while accepting this, they or any other State who may so desire may be permitted to abolish rebate and utilise the amount so saved for the development of the industry.

The Seminar was further of the unanimous opinion that the provision made within the ceiling for rebate is grossly inadequate to meet the normal expenditure on this item in the several States. The heavy difference between the normal expenditure and the plan provision had so far been met by way of special grants towards 'backlog' outside the ceiling. In view of the fact that rebate is a variable factor the quantum of which cannot be fixed with any amount of accuracy and the large amount involved in the rebate scheme and the need to provide sufficient funds for the other very important schemes included in the plan for the development of the Handloom Industry, the Seminar strongly recommended that the provision for rebate must be outside the ceiling and subject to adjustments from time to time.

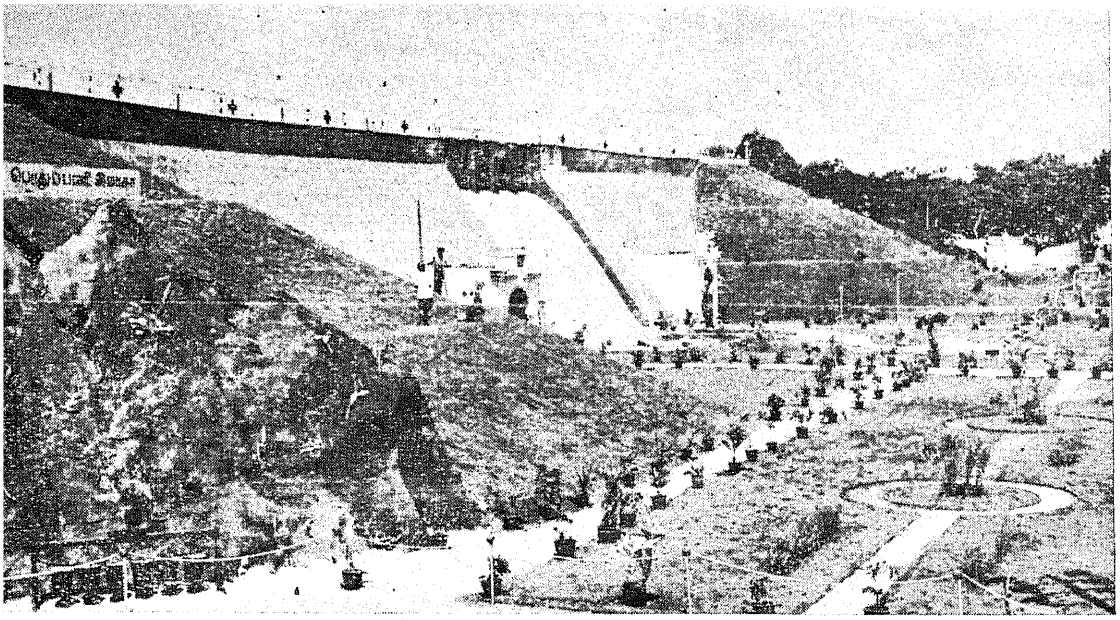
The scheme put forth by the Minister for Industries, Madras, in his inaugural speech was generally welcome. Under this scheme, instead of the present practice of allowing rebate of every sale of handloom cloth, either wholesale or retail, by the co-operatives, the primary societies might be allowed to market their cloth without any rebate, at the prices to be fixed by them, to any agency they chose. It would be necessary to constitute a fund to which would be credited all the amounts allotted under rebate. Rebate at a higher or a lower rate could be made available to the Apex society in any year depending on the amount available in the fund and the need for such assistance.

The Seminar after discussing this scheme, felt that it may be necessary to provide adequate financial assistanc eto Apex societies for this purpose and to allow sufficient time to primary societies to adapt their production to suit the requirements of the proposed Purchase Scheme.

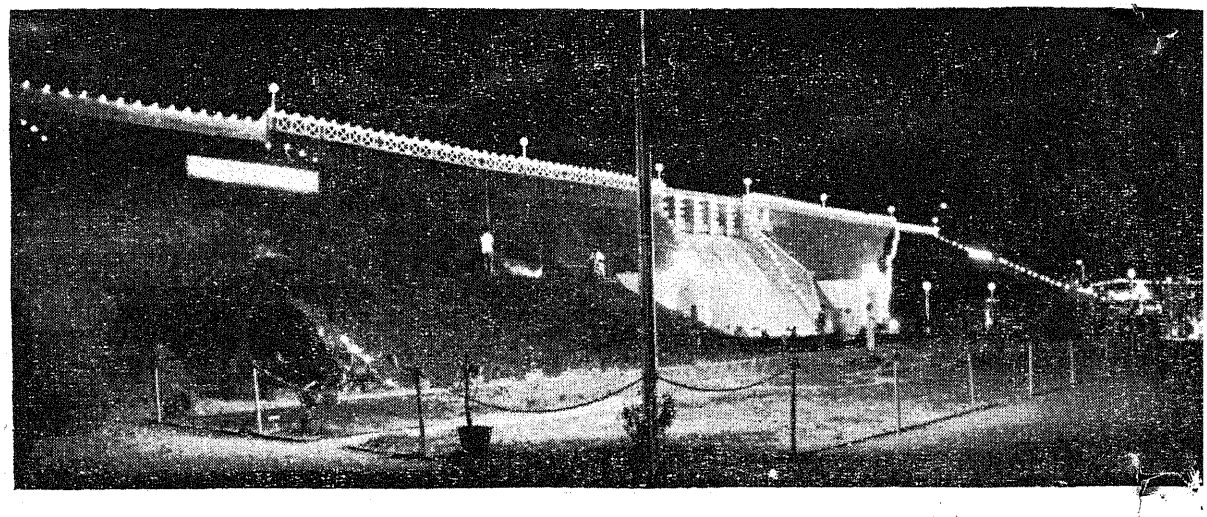
The Seminar also felt that the time for checking and clearing the backlog rebate claims outstanding as on 31st March 1958 should be extended till the end of September 1959.



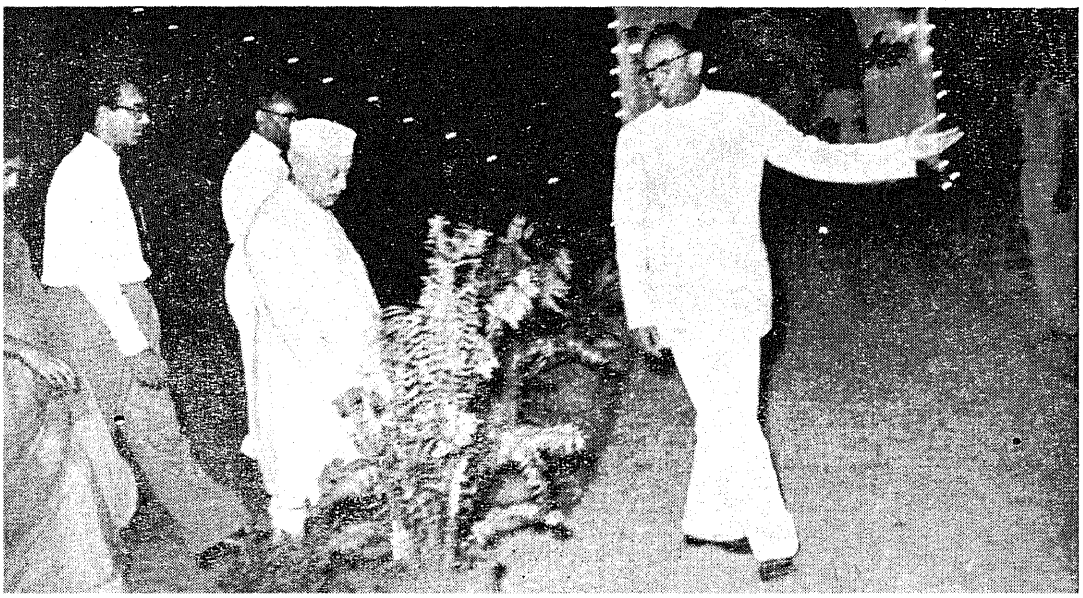
A Seminar on Handloom Industry was held in Madras on 4th and 5th June, in which the States in the Southern region took part. Sri R. Venkataraman, Minister for Industries, is seen addressing the Seminar.



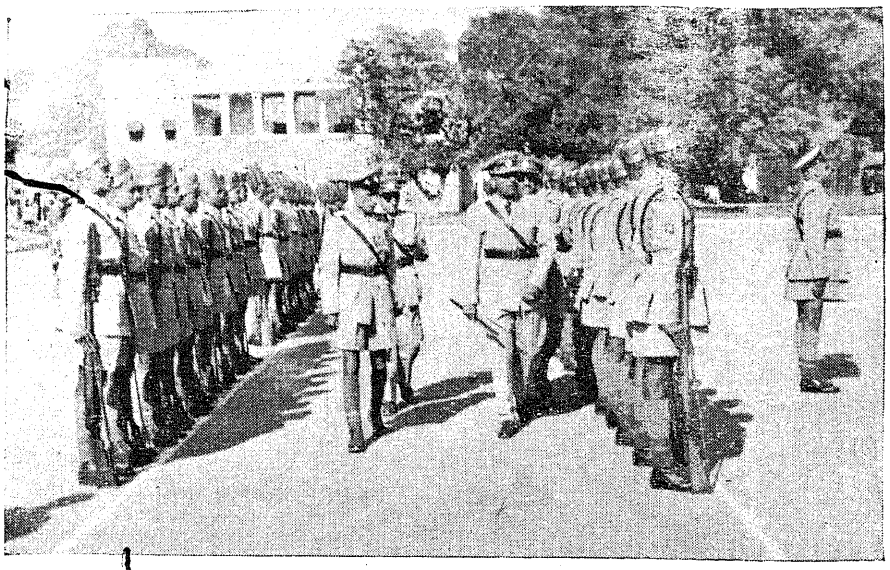
A view of the Model of Vaigai Dam at the Red Cross Centenary Exhibition.



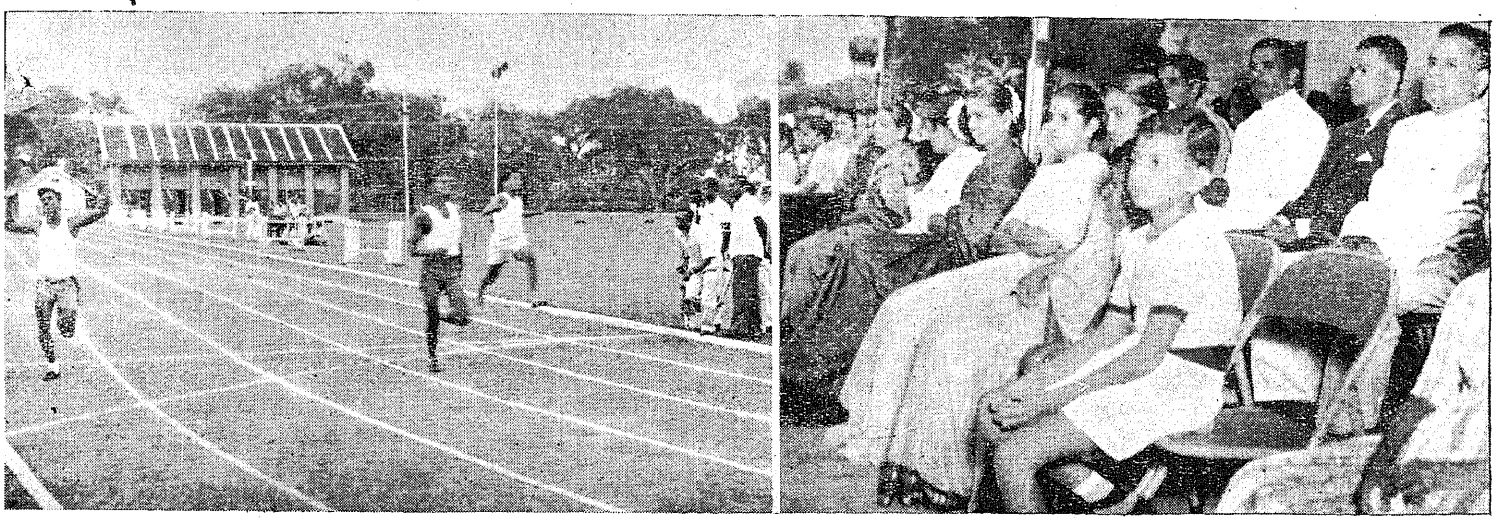
The Dam as seen at night.



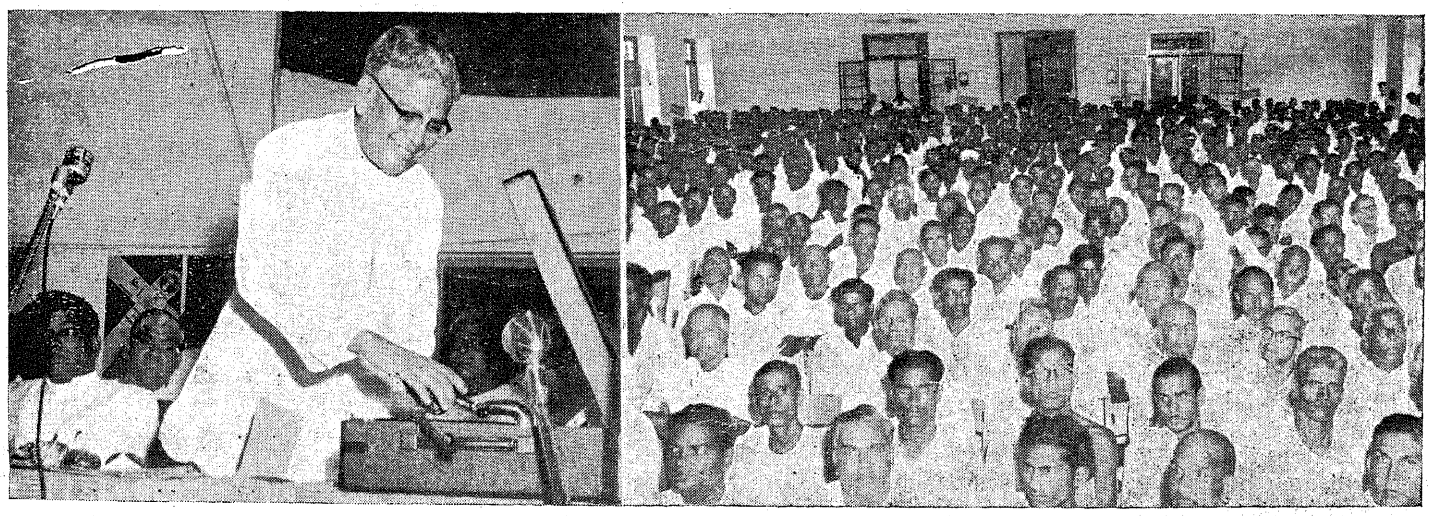
Governor's visit to the Stall.



The Passing out parade of the Police Training College at Vellore took place on 7th June 1959. Sri Kuppusamy, Deputy Inspector-General of Police took salute on the occasion. Photo shows Sri Kuppuswamy inspecting the guard of honour presented by the out-going Cadets. The annual sports were also held on the same day,



The sports in progress.



The 14th Tamil Nad Co-operative Conference was held on 6th June 1959 at Madras. Photo shows the Conference being inaugurated by Sri R. Venkataraman, Minister for Industries and Co-operation, by playing the song on Co-operation recorded on a gramophone disc.

(*Continued from page* 18)

These industries are operating on a small scale in the districts of Salem, Ramanathapuram, Madurai, Malabar, South Kanara, Chingleput and Coimbatore. The main reason for their being not so popular as they may be expected to be appears to be the lack of capital with the rural population for purchasing the machinery.

To encourage cottage industries, the Electricity Department is offering power at the same cheap rate as for agricultural pumping. With the implementation of the Five-Year Plan it is expected that most of rural industries will get electric power and raise the standard of living of the villager.

The Planning Commission is attaching great importance for these household and small industries in the Second Plan. They consider that this would be the principal method of liquidating the unemployment and also creating a marketable surplus of consumer goods to meet the increase in demand arising from investment on heavy industries, construction work and social work. They have provided a sum of Rs. 40 crores per year or Rs. 200 crores during the Plan period. This forms about 14-1|2 per cent on the allocation of investment on industries.

Economics of Rural Electrification.

The problem involved in rural electrification is the question of supplying power economically to small loads scattered over long distances. Financing of rural electrification cannot be subjected to the normal test of return on investment.

Experience has shown that even in some of the Western Countries, where the standard of living is higher and farm holdings are large, it has been found that return on investment is not adequate, at least initially. In the case of rural areas in this country, the problem is more difficult as the concentration of load per unit area is much less and the growth of load also slow, owing to the very low standard of living.

It is recognized that unless electricity is extended to rural areas, the standard of living of the common man cannot be raised expeditiously and if the conventional test for financial investment is applied, rural electrification cannot be accomplished. Two primary considerations arise in connexion with the plan for rural electrification, the first being the question of minimising the capital cost in rural extensions and the second being the problem of making good the direct financial loss in the initial stages of development.

The standard of living of the rural population of the region is very low. The extent of use of electricity by them will depend upon the price of electricity being sufficiently low to be within their reach. Furthermore, the use of electricity in agricultural products is closely related to its incidence on the cost of the produce. Granting the need for rural electrification, it is essential that everything possible is done to make electricity available to rural areas at the lowest price practicable. The possibility of doing this will depend on the extent to which the cost of producing and distributing electricity can be reduced.

Financial and Government Aid for Rural Electrification Scheme.

There is no definite financial policy in regard to rural electrification in India. The Five-Year Plan attaches considerable importance to the use of electricity in rural areas and has suggested that the States should set up a special machinery on the lines followed by the Rural Electrification Administration in the United States of America.

There has also been a suggestion in some quarters that in order to augment the financial resources required for the expansion of rural electrification, certain portion of the proceeds of taxation on the sale of electricity and the betterment levy on properties which are supplied with electricity could be credited to the Electricity Development Fund.

Firka Development Schemes.

The Madras Government launched the Firka Development Scheme as early as 1946. Special consideration is being shown for schemes in the firka areas and revenue deficits are subsidized from the Rural Welfare Fund.

The Revenue deficits subsidized from the Rural Welfare Funds were as follows:—

	RS.
1949-50	18.900
1950-51	14.200
1951-52	65 700
1952-53	90,800

Community Projects.

Subsequently, the Central Government sponsored the Community Project Schemes under Indo-United States Aid Scheme. The Community Project Administration in December 1953 granted a loan of Rs. 30 lakhs to the department for execution of schemes in these areas and they were fully utilized.

National Extension Service and Community Development Block Areas.

With the sponsoring the "National Extension Service" areas, the Firka Development Schemes have been merged with this. During 1957-58, a loan of Rs. 39.01 lakhs was made available to the department for extension of electricity supply to these areas. In the department, priority is being given to these extensions in National Extension Service and Community Development Block areas.

Subsidy for Rural Electrification.

A rural extension is adjudged remunerative if the annual revenue over a ten-year period is at least 10 per cent of the capital cost of the extension. It was found that such an extension when added on to the existing operating system had not affected the financial sources of the system. The 10 per cent remuneration was to cover the following charges:—

	PER CENT.
Cost of power	1
Operation and maintenance charges ..	3
Depreciation	2½
Interest	3½
	10

This was found adequate during the prewar period. With the present day increased cost of materials and equipments, it was found that the actual working expenses amount to about 18.2 per cent as indicated below:—

	PER CENT.
Cost of power	3.3
Operation and Maintenance charges ..	7.2
Depreciation	3.5
Interest	4.2
	18.2

If the addition of a rural extension is not to affect adversely the present position of self-remunerative aspect of a district, the extension should give at least an annual return of 18 per cent of the capital investment. The present figure of 10 per cent return for considering an extension remunerative is obviously inadequate.

It has become a practice nowadays to go in for special guarantee at the rate of Rs. 50 per horse power per annum even to get this 10 per cent return. The need for insisting on a special guarantee had in a way affected the rural electric development. This could not be avoided as the department is a commercial organization and capital works cannot be undertaken unless they are bringing forth a certain return. In a number of cases, the applicants are prepared to pay the necessary special guarantees, which indicates the persistence of demand for power. It is obvious that rural extension schemes cannot be self-sufficient and cannot be formulated without a subsidy.

The subsidy can be in the form of (i) an outright grant to meet the capital either full or in part or (ii) an annual subsidy to meet the short fall of revenue required to cover the working expenses including interest.

The grant of subsidy for rural extension of schemes has already been taken up by the Board with the State Government and the subject is under active consideration.

Electrification of Harijan Cheries.

It has been decided as a policy of the Board that for all new schemes, the Panchayat Board should be persuaded to include at least a few street lights in the Harijan cheries. The Government are now diverting Rs. 1.5 lakhs per annum from the Harijan Welfare Fund as grant-in-aid to the Electricity Board to extend electricity to the Harijan cheries.

Conclusion.

The availability of electric supply in rural areas is not only a help to increase the agricultural output but is of considerable importance. The availability of electric light and running water with modern sanitation narrows the margin between the amenities of urban and rural houses. This should reduce the apparent comparative glamour of City life which is a contributing factor to the exodus from the countryside. With supply of electricity, the rural area becomes a bright centre of social life with more possibilities to cheerful entertainment. The introduction of electricity to the villages will improve the rural standard of living. The availability of electric light and small motors at reasonable cost should act as an incentive to the introduction of cottage industries thereby giving employment to many who would otherwise have to leave their rural homes to find work in the towns.

(*Continued from page* 10)

thermonuclear reaction. They await conclusive proof, however, from further experiments at higher temperatures, for there is the possibility that they could have come from other complex processes in the discharge tube.

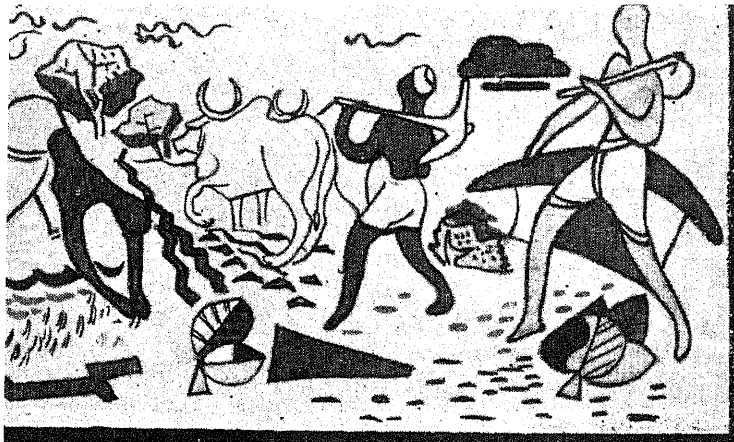
Temperatures of millions of degrees cannot, of course, be measured with thermometers of any kind. They would vaporize. A spectrograph is used instead. This instrument determines the frequency of the light emitted by the atoms moving in the hot gas, hence the speed of the atoms, and from this, their temperature.

Most important results from Zeta are, first, the high temperatures attained; second, the relatively long periods the gases have been held from the walls. The scientists responsible now feel that there is no reason why the much higher temperatures and longer discharge periods needed for a useful power output should not eventually be achieved.

Zeta itself is being improved. For one thing, its condenser bank is being expanded to provide a much greater discharge than hitherto. Later this year it may attain a temperature of 15 million degrees or more, and hold it for even longer than five-thousandths of a second. Design of a bigger and better Zeta is also in progress. Zeta II may perhaps attain 100 million degrees, and so produce as much, or more, power than it consumes. In turn, Zeta II may lead to the construction of an economic prototype—stage three of the project. Then would come stage four: the construction of commercial H-power stations.

Numerous problems face both scientists and engineers. New methods may be needed to heat the gas, measure the temperatures, and handle electricity in large quantities. But some things seem fairly certain. There need be no limit to a fusion station's capacity; it could produce thousands of megawatts. Its fuel could be extracted on site from sea-water piped straight to the plant. The system may also dispense with the necessity for steam generation, regarded hitherto as unavoidable in producing electricity. It may channel its power directly into the national supply.

The scientists cannot predict just when fusion power will become reality. But they are full of enthusiasm and confidence; they are convinced that it must come in the not too distant future; and that Britain will play a leading part in its achievement.



COOPERATIVE

FARMING

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The philosophy of co-operative farming is being slated by its opponents with fanatical zeal which naturally makes one pause and ponder over. They too have the interest of the country at heart. And they cannot but command the respect which they deserve.

They feel that the individual initiative, which has been the cause for the growth of the civilization itself, would be curbed, resulting in the decrease of production. Co-operative farming would curtail individual liberty and lead to regimentation which is an attribute of communism. The difficulties involved in this costly experiment are so insurmountable that they would lead to the disintegration of rural life itself.

These arguments have, of course, force and justification but the idea of co-operative farming is to be viewed mainly in the context of the urgency for land reforms and increased food production. The fall in food production, despite much-vaunted individual initiative, is really deplorable. The atmosphere for and the encouragement of individual initiative have been there for all these years. But they have not augmented agricultural production and agricultural efficiency as desired. The co-operative farming would increase the collective initiative of the people when they co-operate with one another to increase their agricultural yield.

The Prime Minister has said times without number that there would be no element of compulsion in introducing the methods of co-operative farming. But people should have a sense of sacrifice as they had during the days of non-co-operation movement. The stake involved in not increasing food production early is too great : What the critics fear will happen if production is not increased without much delay. They fear communism but in fearing communism, they seem to invite it, for the failure of co-operative farming is the success of communism.

On economic and sociological considerations, co-operative farming is the appropriate technique for increasing agricultural production in a socialistic pattern of society. Economically it is fully justified because the land, capital and labour will be put to better productive use under co-operation than under individual operation. Co-operative credit which is the life blood for sustaining agriculture in any form of operation is better secured and more adequately for co-operative units than for individuals.

Nor is this all. Co-operative farming is the best method of land use. It provides the solution for the subdivision and fragmentation of holdings which, according to economists, is the prime factor for low yields in agriculture. It secures for the individual farmer the resources and economy of a large-scale organisation. It produces larger agricultural goods for the community and better profits for the individual. Economists like Margaret Digby and Otta Schiller are inclined to think that individual farming on co-operative pattern as in co-operative farming would be a viable experiment in farm production.

There is no doubt that in a country where the size of the individual holdings is small and the resources of individual farmers are slender, co-operative farming holds great promise of achievement.

(*Continued from page 26*)

competitions. The Committee has recommended that a District Agricultural Advisory Council should be constituted in each district for reviewing the extension material being put across to ryots in that district. It has also recommended the constitution at the State level of a State Agricultural Advisory Board similar to the State Livestock Improvement Board and the State Fisheries Advisory Board consisting of top ranking officers connected with agricultural development in the State and practical agriculturists of State-wide reputation under the Chairmanship of the Minister for Agriculture.

The Committee has held that the present provision for agricultural and animal husbandry in the schematic budget of Stage I and Stage II Blocks is very inadequate and should be increased substantially. It was also recommended that the control of the Collector over the Block Development Officer should be made real and effective, that the level of performance of the Block Development Officer in implementing the agricultural programme in the Block should be made the criterion for assessing his efficiency and that inefficient Block Development Officers should be weeded out periodically. Another recommendation of the Committee is that Gramasevaks in each Development Block should be broadly classified into two roughly equal groups called 'production' and 'amenities' groups and that the Gramasevaks coming under the former group should exclusively attend to the work relating to agriculture, animal husbandry and co-operation.

The Third Five-Year Plan.

According to the Committee's assessment the total production of foodgrains in a normal year would have been stepped up from 44 lakhs tons at the end of the First Plan period to 53 lakhs tons by the end of the Second Plan period. When this level of production is attained the State will be surplus by about 3 lakhs tons in a favourable year while in case the seasonal conditions are adverse there will be a deficit of about 5 to 7 lakhs tons. The aim of the Third Plan should be to establish self-sufficiency even in an adverse year and at the same time allow for an increase in the per capita consumption on the basis of an annual increase in population by about 2 per cent and also provide for a safety margin. The Committee has, therefore, recommended that the State should aim at an achievement of at least an additional production of 20 lakhs tons by the end of the Third Plan period which will represent roughly a 38 per cent increase in production. The Committee is confident that such an increase is productive is possible if the different aspects of the food production programme are intensified in the light of the recommendations made by it in its report.

Facsimile of special postage stamp to be issued by the Post Office of India on June 15, 1959 *on the occasion of the* 40*th anniversary of the International Labour Organisation.*

The main motif of the stamp, which is in the denomination of 15 *naye Paise, is based on the famous sculpture "Triumph of Labour" by D. P. Roy Ghoudhuri and the Triangular Seal of the I.L.O.*

State Transport

The fleet strength of the department was reduced to 450 from 470. An average number of 328 buses were operated daily and they brought in a total collection of Rs. 15,23,184 after covering 1,116,384 miles. 11,853,608 persons travelled by these buses in that month.

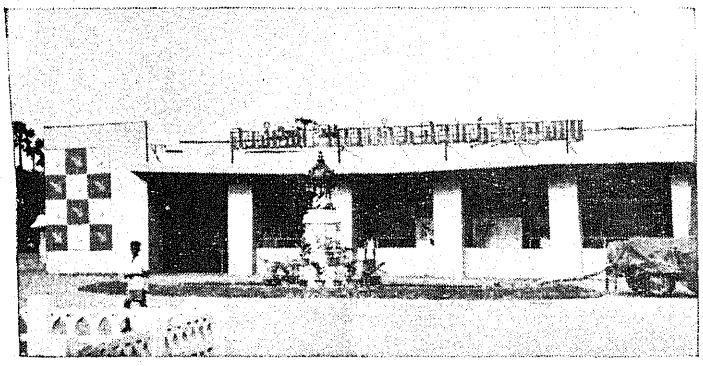
Specials were operated to Tambaram, Pulicat, Ennore, Tirupporur and Ponneri.

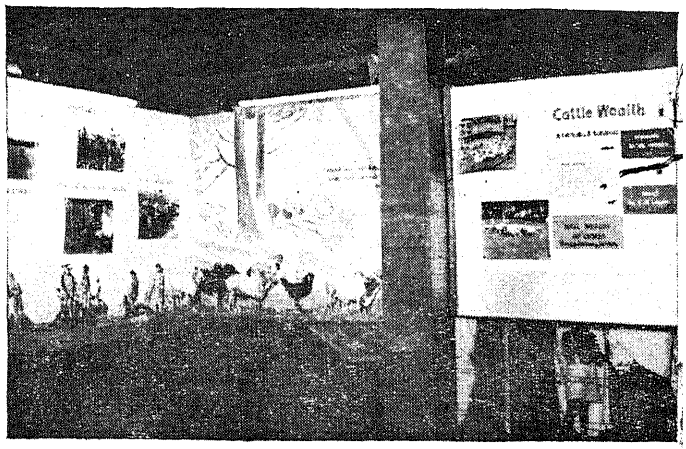
Kanyakumari Branch.—The fleet strength was 90 and an average number of 62 buses were operated daily and 302,548 miles were covered. 1,026,003 passengers were carried and the total collections for the month amounted to Rs. 2,82,777.84.

Specials brought in a revenue of Rs. 1,230.60 nP.

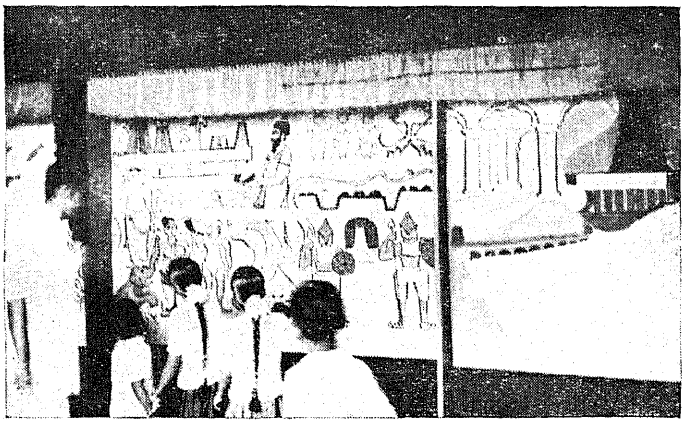
Revised Prices for Chemical Fertilisers

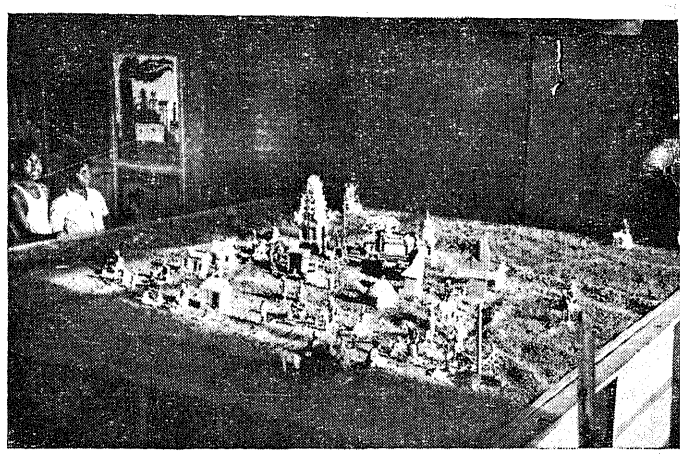
The price structure for Chemical Fertilisers sold under the Government Trading Scheme in the State has been revised taking into account certain revisions made in the distributor's margin and in the margin for administrative cost so as to work the scheme on a no profit no loss basis. The revised consumers' prices (per ton) are: Ammonium Sulphate Rs. 390·80; Urea Rs. 761·60; Ammonium Sulphate Nitrate Rs. 462·90 and Calcium Ammonium Nitrate Rs. 370·20.





The Department of Information and Publicity participated in the Chitrai Exhibition held at Madura in April-May. The Photos shows the exterior of the Stall and some of the exhibits.





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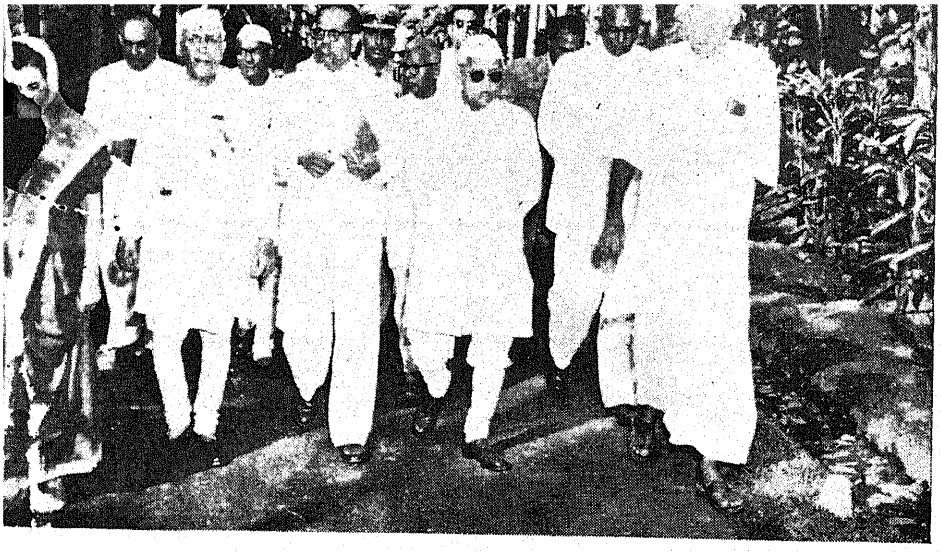
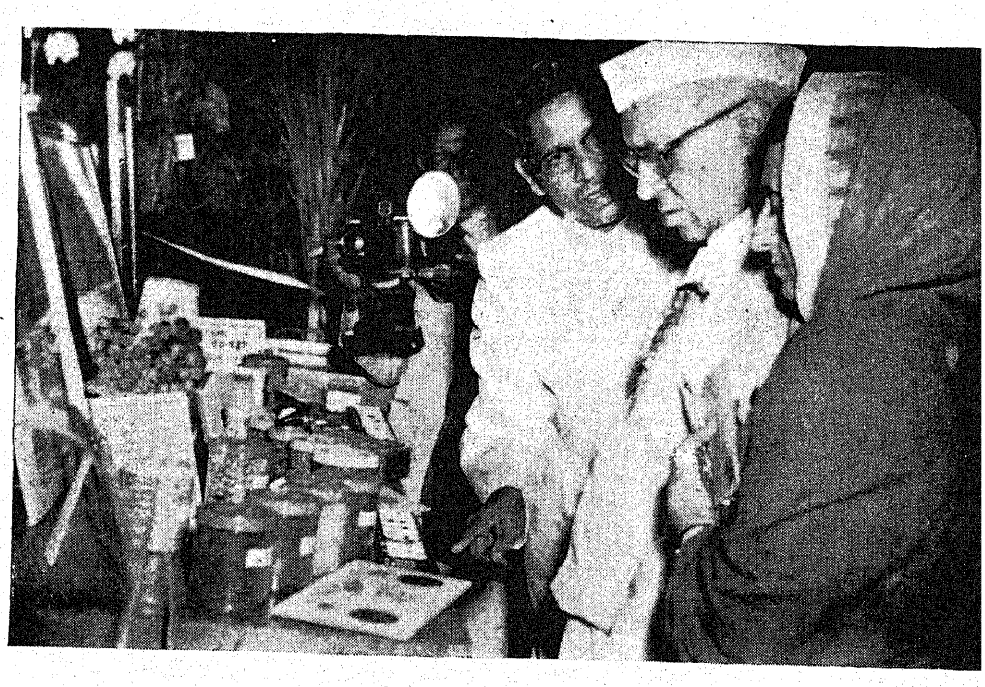
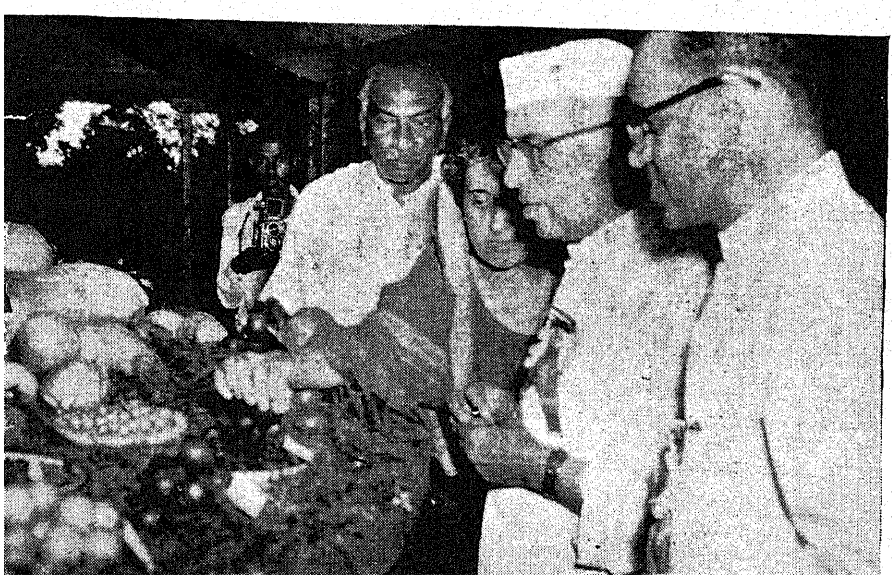


The Prime Minister and party going round the Kallar fruit gardens.

AT THE KALLAR FRUIT GARDENS





The Prime Minister viewing with interest some of the fruits of the Kallar fruit gardens.

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