THE AGENCY'S PROGRAMME FOR 1965-1966

At the seventh session of the Agency's General Conference in 1963, it was decided to introduce biennial programming within the framework of annual budgets beginning in 1965. In working out the programme, account has been taken of the experience gained in the first six years of the Agency's existence, and of the long-term programme approved by the General Conference.

The following are some of the main points of the programme for 1965 and 1966, which was approved in the 1964 session.

Technical Assistance and Training

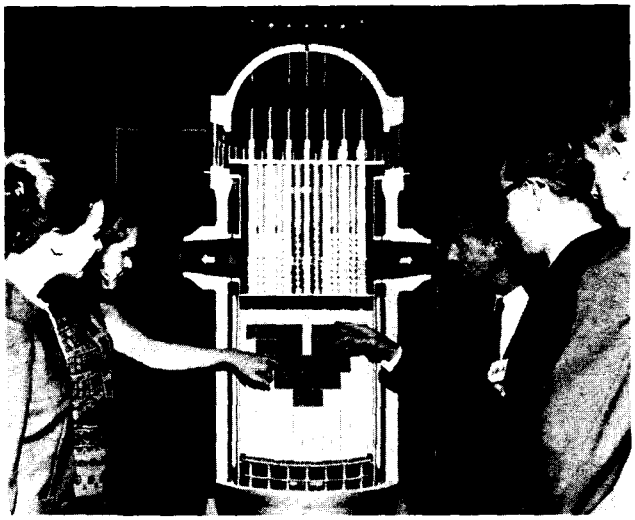
The number of requests from Member States for technical assistance is expected to continue to grow in 1965 and 1966, mainly because Member States which received bilateral assistance for the establishment of research reactors seek multilateral aid after the reactors have reached criticality and a nucleus of laboratories has been established. The estimated value of requests for 1965 is $2 900 000 and of projects expected to be approved, $899 000; for 1966 the estimates are $3 150 000 and $1 187 000 respectively.

For 1964, the Board has approved requests involving the services of 42 experts and equipment worth $345 000. In addition, technical assistance projects approved under the UN Expanded Programme of Technical Assistance provided in 1964 some 32 experts and equipment estimated at $73 000. The implementation of several projects initiated in 1964 will continue in 1965.

Next year the combined Agency/EPTA programmes will require approximately 760 man-months of technical assistance experts in various peaceful uses of nuclear energy; a conservative estimate at this time would indicate that of this total approximately one third may be provided under EPTA. In 1966, requirements are estimated at 790 man-months, of which 250 will be provided under EPTA.

With regard to equipment, requests exceeding $1.3 million were received for 1964 and only $345 000 could be approved. It is expected that in 1965 requests would continue to increase and the Agency may need about $450 000 of which approximately $100 000 can be expected to be available under EPTA. By 1966, the total is expected to rise to $480 000, with little or no increase in the funds available under EPTA.

As in previous years, the Agency expects to be called upon to assist certain Member States in making arrangements to receive technical assistance directly from other Member States. It will also act as Executing Agency for two projects already approved under the Special Fund, and it may be required to assist in the preparation of further Special Fund projects, both in 1965 and 1966.



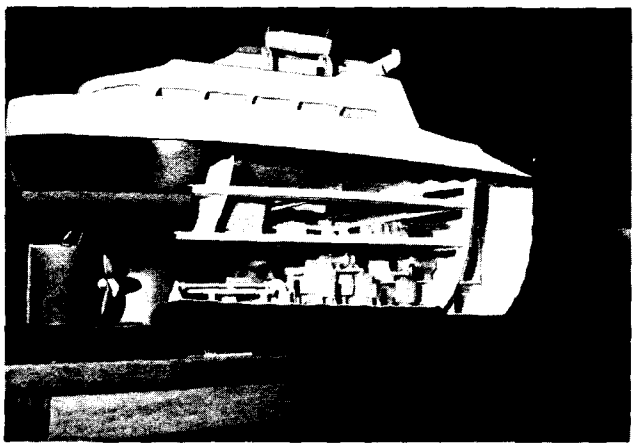
Model of the 463 MW(e) Yankee power reactor being explained on the US stand at Geneva (US AEC photo)

No further preliminary assistance missions are planned for 1965-66 but, since the Agency cannot render effective assistance without being aware of changes in conditions in various countries, it will be necessary to dispatch similar but smaller missions. It is therefore planned to send three such missions to various continents in 1965 and a similar number in 1966.

The shortage of specialists, trained personnel and educational facilities in the various aspects of nuclear power and in the application of radioisotopes remains one of the main problems in those Member States that endeavour to develop nuclear energy programmes or to introduce new techniques to improve public health, industrial development and agricultural yields. The assistance provided by the Agency will consist of awarding fellowships and research grants, placing visiting scientists, lecturers and professors in institutes in developing countries and organizing regional and international training courses, etc.

The Agency will continue to assist in establishing regional training centres, and expects requests for visiting professors during 1965 and 1966 to be about 40 annually. Because of shortage of funds it will not be possible to meet all requests.

The Agency's two mobile radioisotope laboratories have so far provided training for about 1400 students in the Far East, Latin America and Europe. They will continue to be used, particularly in countries in Africa where facilities for training in the general techniques of handling radioisotopes do not yet exist.



Nuclear ship propulsion at the exhibition. Belgian model of a tanker equipped with a Vulcain reactor (UN photo)

Nuclear Power and Reactors

The Agency hopes that it will be able to publish an evaluation of the results of the Third Geneva Conference and to follow up any particular technical or economic conclusions which warrant further investigation. Studies of the comparative economics of conventional and nuclear power will have to be continued over several years because the costs of conventional and nuclear power in different areas vary from year to year; these studies will also determine the advantage of introducing one or the other.

It is expected that Member States will continue to seek the Agency's assistance in studies on the prospects of nuclear power in their respective countries. During 1962 and 1963 such studies were carried out in Korea, Pakistan and the Philippines. To meet similar requests in the future, three nuclear power survey missions and one or two missions to assist reactor projects may be expected in 1965 and 1966.

As a sequel to the Agency's study on the economic aspects of integrating nuclear power plants in electric power systems, it is planned to continue in 1965, with the assistance of a panel of experts, the study of methods for estimating costs of nuclear power plants in one country on the basis of known or assumed costs in another country.

The Agency has, in the past, published detailed reports on the experience gained in three Member States regarding the design, construction and operation of nuclear power plants. It plans, in 1965 and 1966, to cover a wide range of reactors in more Member States.

Two further volumes of the "Directory of Nuclear Reactors" are to be published in 1965 and 1966; they will provide comprehensive information on the operational characteristics and design features of reactors newly put into operation or nearing completion.

A panel on the technical and economic aspects of the utilization of plutonium as a power reactor fuel is expected to reveal a considerable amount of information on the technology and cost of processing, fabricating, handling and behaviour of plutonium in operating reactors. Since the production of plutonium in commerical power reactors has increased, it is considered appropriate to plan a second meeting on the subject in 1966.

The application of nuclear energy to saline water conversion is of great interest to many Member States. The Agency will continue design studies with emphasis on installations producing both electric power and fresh water, and research contracts will be granted to supplement available information. The Agency plans to review the situation every six months with the help of a panel of experts. Where appropriate, the Agency expects to be able to support installations intended for demonstration and international projects of this type. These efforts will be principally directed to obtain data on installations for developing countries.

The Agency will continue to promote and support international co-operation in research reactor physics through such projects as that based on the Norwegian zero-power reactor (NORA) which embraces co-operative programmes with Norway, Poland and Yugoslavia. It will pursue work on research reactor utilization to a great extent on a regional basis; it plans to issue a manual on reactor experiments which may lead to an agreed code of practice for research reactor operation. Meetings are planned in 1965 and 1966 to discuss some of the newer techniques for obtaining information on reactor physics, needed in the design of power reactors.

The Agency will continue to assist and advise Member States in the assessment of the safe design, operation, proper siting and containment of new reactors. Meetings are planned on the subject of containment to discuss hazards from reactors near large population centres. With regard to reactor safety, the Agency plans to set up groups of experts which can evaluate hazards of nuclear stations as well as of nuclear merchant ships in harbours and waterways.

In respect of nuclear fuels, the Agency will continue to assist Member States in securing information on different aspects of the production, treatment and utilization of source, special and other nuclear materials, nuclear metallurgy, radiochemistry, technology, fabrication of nuclear fuel elements and nuclear electronics.

A number of symposia and panel meetings are planned on a variety of subjects, including physical, radiochemical and metallurgical research using small quantities of fissile material; nuclear electronics; non-destructive testing and acceptance procedures for reactor containment and pressure vessels; neutron sources for activation analysis; use of low-energy, high intensity particle accelerators in re-

search, in medicine and industry; solvents in reprocessing; equipment for diffusion-type processes.

Isotope and Radiation Sources

In agriculture, the Agency will work in close collaboration with FAO and other interested international organizations. Many developing countries are becoming interested in participating in the co-ordinated research programmes on the use of isotopes and radiation in rice and maize cultivation. The Agency plans to expand these programmes in 1965 and 1966 to meet the needs of these countries. A similar programme will be initiated for co-ordinated research on tree crops of agricultural importance to many countries. A symposium on the use of isotopes and radiation in soil-plant nutrition studies, plant pathology and weed control will be held in 1965, and radiotracer measurements of plant nutrient supply, transformation and movement in soil and plants will be continued.

Other major lines of activity will include studies on irrigation, soil moisture and structure; insect control by irradiation; pesticides, weed killers and residues; plant breeding and genetics; meat and milk production, and animal disease control.

Food preservation and disinfestation by irradiation will be further studied. The wholesomeness problem associated with irradiated foods is in the process of being resolved and irradiated potatoes, bacon, wheat and wheat products have been cleared for human consumption in a few countries. Recent developments indicate rapid progress and the number of inquiries and requests to the Agency, especially from developing countries, are steadily increasing. It is planned to co-operate with the Food and Agriculture Organization and the World Health Organization on a technical meeting in 1965 on the microbiology of irradiated food. A symposium on over-all progress in food irradiation is planned for 1966 or 1967 and a training course may be organized in 1966.

Regarding the disinfestation of food and the control of the transmission of disease, the Agency is seeking to establish a pilot plant for grain disinfestation by irradiation. This involves special missions to interested countries to evaluate suitable locations and advise on the planning, financing and construction of the plant. Large-scale experiments in a programme of radiation elimination of harmful organisms from food and feed should begin with the aid of consultants.

Several panels and symposia are planned in the field of radiation biology - in dosimetry and radiobiology.

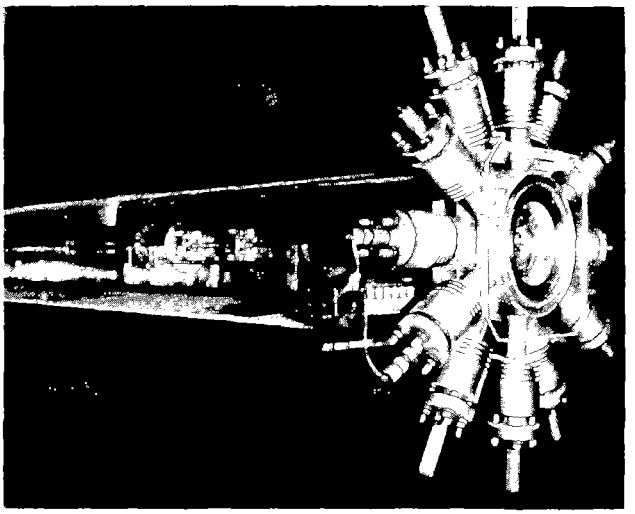
The Agency's efforts to assist the development of nuclear medicine, especially of its physical aspects, through training, expert advice, research and information, have met with success in the developing countries. Certain projects are nearing completion, such as the co-ordinated research programme on the use of

Quest for information at the Geneva exhibition (UN photo)

calcium-47 and the international calibration of thyroid radioiodine uptake measurements. Research contracts, on the application of isotopes in medicine, have resulted in a better understanding of certain diseases such as congenital haemolytic anaemias, hydatid cyst disease and infestation with hookworm prevalent in some developing countries. The number and scope of requests for advice and support in nuclear medicine have substantially increased in 1964. This trend is expected to continue in 1965-66. WHO will be invited to co-operate in all activities dealing with isotope and radiation source applications in medicine, with the ultimate aim of establishing a close link between the programmes of the two organizations.

The Agency has an important function in directing adequate attention of the developing countries that have radiotherapy facilities to the physical aspects of the use of isotopes and radiation sources. It will be necessary to consider, in 1965, the appointment of a second regional adviser on radiotherapy in one of the areas where projects of this nature are under way. (The first regional officer renders advice and assistance to 16 Member States in the Far East.) During 1966, a second advanced international training course on the physics of radiotherapy will be organized. The Agency will also continue to act as an international clearing house for physical data needed for accurate radiotherapy and to provide such data at nominal cost.

In accordance with the recommendation by the Economic and Social Council of the United Nations stressing the application of science and technology for the benefit of the developing countries and the priorities established in the long-term programme for the Agency's activities, the programme for 1965 and 1966 aims at increased training in the application of isotope techniques to problems of evaluating and developing water resources. The Agency has already carried out a number of field experiments. Investigation in Greece



"Alice II", a dummy fuel element under heat and pressure, used for studying reactor heat problems. From the Netherlands display at Geneva (UN photo)

was completed in 1963 and the results are of importance in future development of water resources in the region. The field experiment in the Great Lake in Cambodia demonstrated that the Stung Sen does not contribute appreciably to the silting up of the Great Lake. Other investigations are still in progress in Turkey and Jordan, and in the region of Trieste. The results of the latter investigation are expected to have an important bearing on the water requirements for drinking purposes and for the production of hydroelectric power.

The Agency's advisory and experimental service for the application of isotope techniques to the development of water resources has, during 1963, reviewed about 25 requests, eight of which developed into projects. The present rate of approximately four inquiries per month indicates that the increasing need for advice and assistance will necessitate an expansion of this activity. By 1965 it is expected that new techniques will be ready for wider use. Further practical guides will be prepared on these methods.

Health, Safety and Waste Management

A number of manuals will be prepared, where appropriate in collaboration with other bodies such as WHO. Subjects will include safe use of isotopes in hydrological field research; radiation shielding in some typical operations; safe use of isotopes in agricultural field research; decontamination of premises and equipment; use of personnel protective equipment; personnel dosimetry by devices other than film badges or ionization chambers. Other manuals will deal with hazards analysis for "hot" laboratories (which handle radioactive materials) and safety evaluation of harbour and narrow waters for nuclear ships.

Regional study groups will review radiation protection in developing countries, and various forms of technical advice and assistance will be given. Further development of the Agency's mutual emergency assistance plan will be considered on lines similar to the Agreement in connection with Radiation Accidents concluded between IAEA and Denmark, Sweden, Norway and Finland.

Considerable attention will be devoted to radioactive waste management. Technical reports will be issued on waste treatment, co-operative waste management operations will be investigated, and technical advice given on practical problems. A code of practice will be prepared on radiation safety requirements in uranium and thorium mines and further detailed information developed on transport and packing of radioactive materials.

Research and Services in Physical Sciences

The Agency will seek to promote efficient use of research reactors and production of radioisotopes and to stimulate co-ordinated research, in which laboratories of different countries participate. Four missions will be sent to developing countries.

In physics, pulsed neutron research and reactor noise analysis as well as work on nuclear data have been introduced into the programme. Symposia will be held on pulsed neutron research; inelastic scattering of neutrons in solids and liquids; the physics and chemistry of fission; neutron gamma radiation in fissile materials; plasma physics and controlled nuclear fusion research. The distribution of calibrated standards from the Agency's Laboratory will be continued and expanded.

Further work will be done in chemical analysis, and in the measurement and analysis of low-level radioactivity. Field studies will continue in the co-ordinated rice and maize research contract programmes in which a number of countries are using radioisotope methods to improve methods of cultivation and crop yields. In water resources development, the Agency will expand its analytical service.

Work will continue in the field of medical physics. The Laboratory will receive a number of fellows from Member States for training in physics, chemistry, low-level radioactivity, agriculture, medical physics, water resources development and electronics.

Safeguards

The Agency's responsibilities for the application under bilateral and multilateral arrangements of safeguards against the diversion of materials to military use are increasing. The review of the safeguards system for nuclear materials, nuclear reactors and small research and development facilities is being completed in 1964. Later the system may be extended to include installations for fabrication of nuclear fuel and recovery of scrap, for reprocessing irradiated fuel and for the transport and storage

of nuclear materials. It will be necessary in 1965 and 1966 to formulate detailed procedures for these. The Agency expects to make arrangements with Governments for co-operation in the testing of these procedures on reactors and on nuclear materials processing plants.

Methods for nuclear materials accounting need to be improved because of the extension of Agency safeguards to high-power reactors and nuclear materials chemical plants. These methods will include sampling and analysis of nuclear materials, such as unirradiated and irradiated fuel, reprocessing plant solutions and products from reprocessing plants. The Laboratory will assist in studies in methods of sampling and analysis of nuclear materials. A contract will be placed for the development of practical equipment for non-destructive analysis by gamma spectrometry following the establishment in 1964 of a feasible technical approach to the problem. Methods for non-destructive analysis of irradiated fuel elements, as well as other techniques related to the accounting of reactor fuel elements, will be further investigated. Contracts will be placed also for the development of practical equipment based on the most promising techniques.