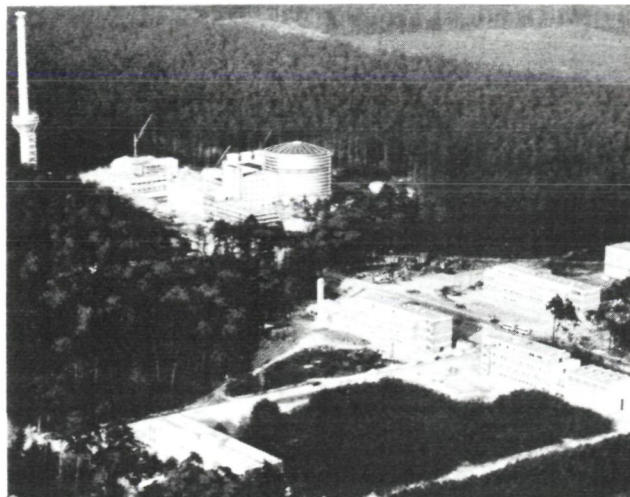


The establishment near Juelich will have two research reactors of British design, one of them a 5 MW (thermal) swimming pool reactor of the Merlin type, probably to be completed by 1960/61, and the other a 10 MW (thermal) heavy water reactor of the Dido type. At this centre also, a number of laboratories and other facilities are under construction or being planned.

Of the research reactors already in operation, a 1 MW (thermal) swimming pool reactor has been functioning at Garching, near Munich, since October 1957. At Frankfurt University, a 50 kW (thermal) water boiling reactor has been in operation since January 1958. A similar reactor has been operating at the Hahn-Meitner Institute for Nuclear Research in Berlin since July 1958. A fourth reactor, of the swimming pool type with a thermal output of 5 MW, went critical at Geesthacht-Tesperhude, near Hamburg, in October 1958. These four research reactors were supplied by US firms. Finally, a 10 kW Argonaut type reactor, located at Garching, near Munich, became critical in June 1959; this is the first reactor to be built, on the basis of American plans, exclusively by scientists and technicians of the Federal Republic.

For reactor fuel, the Federal Republic of Germany has to depend almost entirely on uranium supplies from abroad. Agreements for fuel supplies



Research establishment near Karlsruhe. In the background, towards the left, is the Reactor FR 2

have been concluded with Canada, the United Kingdom and the United States. Uranium prospecting within the country has so far resulted in the discovery of only one small deposit. An experimental facility for ore dressing started functioning late last year.

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## NUCLEAR FUEL SUPPLIES

When the International Atomic Energy Agency was set up nearly three years ago, it was widely believed that it would soon become a world bank or broker for the supply of nuclear fuel. Some observers now seem to feel that this promise has been rather slow to come to fruition. A little closer analysis would, however, show that the promise can be fulfilled only in a certain objective context, and to the extent that this context exists, the development of the Agency's role has been commensurate with the actual needs of the situation.

If it was ever believed that immediately upon its establishment the Agency would start supplying nuclear fuel for a large number of projects in its Member States, the belief could only have sprung from certain assumptions which are not entirely tenable. One such assumption probably related to the world demand for nuclear fuel which is dependent upon the rate and volume of growth of the atomic industry. Generally speaking, the installation of atomic plants consuming large quantities of fuel (e. g. power reactors) has been somewhat slower than was anticipated by many people a few years ago. And since the countries

which depend on nuclear fuel supplies from outside are often those which are less advanced in atomic technology, the development of projects involving such supplies must be preceded by a period of preparatory training, experiment and research. Furthermore, some of these countries had already obtained the supplies needed for their first reactors under bilateral agreements before the Agency's machinery came into operation; further requirements in most cases will arise after the initial supplies have been spent or after sufficient experience has been gained for the installation of new plants.

The rate and urgency of demand are also related to the volume of potential supplies. If the sources of supply are scarce or small, demand tends to be acute; in such an event the Agency would probably have been faced with more urgent and numerous demands than it has hitherto received. But it is now quite clear that so far as the source materials (e. g. natural uranium) are concerned, there is no danger of scarcity; in fact the world production is probably in excess of the present demand. Even as regards

what the Agency's Statute describes as "special fissionable material" (i. e. material which is completely fissile or is enriched in fissile isotopes, e. g. enriched uranium), the world output seems adequate to sustain the foreseeable growth of the peaceful atomic industry. While many countries will have to depend on external supplies of this material, efforts to procure them are not likely to be unduly accelerated by any spectre of general scarcity.

### Correct Perspective

It must, however, be emphasized that these factors do not minimise the significance of the Agency's role as a supplier of nuclear fuel, but any objective evaluation of that role must take these factors into account so that both the potentialities and the accomplishments may be viewed in the correct perspective. And it is important that these be viewed in this perspective lest it should be imagined that the Agency remains a silent spectator in the midst of a hectic bilateral trade in atomic fuel. The international trade in nuclear fuel is smaller than many people seem to assume; while exact figures for the whole world are not available, it is certain that not more than a few hundred kilogrammes of fissile material could have passed in bilateral trade in the course of about five years of peaceful atomic pursuits in many parts of the world. In a context of such dimensions, the beginning made by the Agency in less than three years of its life can hardly be considered insignificant.

It is important to remember that after its establishment the Agency had necessarily to devote at least a year or so to the difficult task of organizational foundation. Only after an administrative and technical machinery reasonably adequate for an organization of 70 countries had been established could the Agency take a fruitful interest in its operational aims and activities. So far as the supply operations were concerned, the first task was to build up a stock of materials from which supplies could be made. It might be pointed out that even before this could be done the Agency was called upon to arrange the supply of 3 tons of natural uranium for a research reactor in Japan.

Since at that time the Agency did not have any established stock of nuclear materials, it had to depend on certain ad hoc arrangements in order to meet the Japanese request. But it was clear that for future operations there must be certain ready sources of supply and an established framework of supply procedures. Although offers of nuclear materials by Member States were made as early as 1957, it was not until recently that the Agency was able to make formal arrangements in regard to potential supplies. This was accomplished with the conclusion on 11 May 1959 of agreements with the United Kingdom, the United States and the USSR which placed a total 5 140 kilogrammes of contained U-235 at the disposal of the Agency. In other words, it is less than a year

since the Agency was equipped with a sufficient amount of nuclear fuel to meet possible requests from Member States.

### Enriched Uranium for Finland

Within six months of the conclusion of agreements with the supplying countries, the Agency received the first request from a Member State for the supply of enriched uranium. The request came from Finland where plans are now well advanced for the installation of two atomic reactors. One of them will be a reactor of the Triga Mark II type, manufactured by the General Dynamics Corporation in the United States, and the other a critical assembly, i. e. a reactor of a very simple type which does not generate any appreciable amounts of power. The Finnish Government asked for the Agency's assistance in securing fuel for both reactors.

After preliminary enquiries, the Agency found that the United States would be the best possible source for the supply of fuel for the Triga reactor, which will be uranium enriched to 20 per cent in the isotope U-235. Following authorization by its Board of Governors, the Agency entered into negotiations with the United States Government on the price and terms for obtaining this enriched uranium fuel, and a project agreement is expected to be concluded soon. It may be pointed out in this connexion that under the agreement between the United States and the Agency on the supply of nuclear materials, the price will correspond to the charges for domestic distribution published by the US Atomic Energy Commission.

The Finnish authorities have also asked for the Agency's assistance in the transfer of the Triga reactor from the United States, and the necessary arrangements are being negotiated.

The critical assembly, for which plans are now being prepared by experts in Finland, will use 10 per cent enriched uranium as fuel. After considering the results of initial enquiries, the Agency has begun negotiations on the terms and conditions for obtaining the material from the Soviet Union. The Soviet Government has informed the Agency that it will be willing not only to supply the material but also to fabricate the fuel elements. The supply agreement between the Soviet Union and the Agency provides that the prices of materials made available by the USSR will be based on a scale of charges corresponding to the lowest international prices in force at the time of delivery.

Both the Triga reactor and the critical assembly will be located at the Institute of Technology at Otaniemi, Helsinki, and used for training and research; the critical assembly will also be used at a later stage for the simulation of power reactors. The installations will remain under the supervision of the Finnish Atomic Energy Commission. The Triga will

be the first reactor in Finland, and assistance in securing fuel for this reactor and for the critical assembly will constitute the first Agency projects involving the supply of enriched uranium from the pool of this material placed at its disposal by the United Kingdom, the USA and the USSR.

### Further Operations

While preparations for these projects are now well advanced, there are also indications suggesting the possibility of further operations of this kind. A few months ago, the Agency received an enquiry from the Austrian Government as to whether and under what conditions it would be possible for the Agency to supply uranium enriched up to 90 per cent in the isotope U-235 for a 5 MW reactor now being constructed near Vienna. The Agency's agreements with the Soviet Union, the United Kingdom and the United States provide that the special fissionable materials that these countries can supply will be of an isotopic enrichment of up to 20 per cent. The agreements with the UK and the USA, however, also provide that the materials may be enriched to a higher degree if the parties so agree and if the fuel is used for materials testing or research.

The Agency made a preliminary enquiry with the three Governments as to whether they would be in a position to supply the fuel needed for the Austrian reactor. In reply, the United States and the United Kingdom Governments indicated their ability to do so, as well as the prices to be charged. The results of the preliminary enquiry have been communicated to the Austrian Government, and further negotiations are now in progress.

It may also be recalled in this connexion that at the Agency's last General Conference the Tunisian delegate announced that his Government would approach the Agency for the supply of 10 kilogrammes of enriched uranium. It would thus appear that more and more countries are gradually recognizing the advantages of securing nuclear fuel from the Agency rather than directly from the supplying countries. It is also a happy augury that the countries which are in a position to supply fuel have given evidence of their desire to strengthen the Agency's role as an international channel of supply.

In the final analysis, the success of this role will depend on the willingness of both the supplying and the recipient countries to make use of the newly-created international machinery. So far as the recipient countries are concerned, a predominant consideration would naturally be the ease and speed with which the transactions are carried out. In this respect the Agency has already established a creditable record. In less than two years of its existence it completed one major supply operation, which does not compare unfavourably with the record of bilateral transactions by the most highly advanced countries with a well established administrative machinery and large organizational and technical resources. Again, it might be pointed out that in response to the request from Finland, which was received early in November 1959, the Agency took less than three months to have the project approved by its Board of Governors, at the next meeting held in January, and to initiate active steps for its execution. With the completion of this project, the pattern will have been set and, it is hoped, the Agency will steadily move towards the fulfilment of the role which is envisaged for it in its Statute.

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## MOBILE EXHIBITION IN MEXICO

Since January this year, a mobile atomic energy exhibition has been touring the principal cities of Mexico. In organizing this exhibition, the National Nuclear Energy Commission of Mexico was assisted by the International Atomic Energy Agency which has

placed its second mobile radioisotope laboratory at the disposal of the Mexican authorities.

In many States of the Republic, the visit of the mobile laboratory has given a powerful impetus to