## Eclipse Expedition Goes to Canary Islands

The U.S. National Committee for the International Geophysical Year of the National Academy of Sciences has announced that a joint expedition from Sacramento Peak Observatory, Sunspot, N.M., and the High Altitude Observatory, Boulder, Colo., will observe a total eclipse of the sun on 2 October from a site in the Canary Islands off the coast of Africa. The expedition is being given logistic support by the Geophysics Research Directorate of the Air Force Cambridge Research Center.

This expedition is one of four groups which will observe the eclipse as part of the follow-up to the International Geophysical Year known as International Geophysical Cooperation—1959. The expedition will make a second attempt to carry out experiments that were unsuccessful because of cloud cover during last October's IGY eclipse expedition to the Danger Islands in the Pacific.

The location for this year's observation site was selected in part because it offered the best chance of clear weather. It is at the southern tip of Fuerteventura in the Canary Islands. The Spanish Government has offered full cooperation.

The Sacramento Peak–High Altitude Observatory group hopes to observe a spectacular but very brief eclipse phenomenon known as the flash spectrum. More than 2 years were spent in preparing the equipment for studying this event, which lasts a maximum of about 50 seconds.

The flash spectrum occurs both at the beginning and at the end of eclipse totality. Parts of the sun's lower atmosphere, which ordinarily look dark against the bright background of the sun's disc, suddenly appear to flash out when the background is blocked off by the moon.

Also conducting studies of the eclipse will be teams from the University of Minnesota, the University of Wisconsin, the National Bureau of Standards Boulder Laboratories, and the Naval Research Laboratory. Paul Kellogg and Edward Ney of the Minnesota group, working in French West Africa, will seek to test their recently presented theory that the solar corona consists of trapped charged particles similar to the Van Allen radiation belt that rings the earth. Their work is supported by the National Aeronautics and Space Administration and the Office of Naval Research.

Wisconsin scientists on the Canary Islands will attempt to compile maps of the sun's corona and to obtain measurements farther out in the corona than ever before, in order to study change of temperature with height. Their project is supported by the National Science Foundation.

Other observations to be made will seek to determine the effects of the eclipse on the radio-reflecting qualities of the atmosphere and changes in oxygen airglow emissions in the upper atmosphere. Findings will be significant not only to basic research but also in preparation for future attempts to send instrumented rockets to the vicinity of the sun.

## AEC Announces Program To Develop Thermal Breeder Reactors

The Atomic Energy Commission has initiated a long-range program to develop effective thermal breeder reactors that would make full use of the latent energy in thorium. Responsibility for the program, to be known as the Thermal Breeder Reactor Program, has been assigned to the commission's Oak Ridge Operations Office.

Thorium is an element which when bombarded with neutrons is converted to fissionable uranium-233. It is more abundant in the earth than natural uranium. However, there are fewer known reserves that can be exploited for commercial use than in the case of natural uranium.

A thermal breeder reactor is a reactor in which the nuclear chain reaction is sustained by neutrons moderated or slowed down to thermal (heat) energies and in which more fissionable material is produced than is consumed. In the initial loading of the thorium-uranium cycle, thorium is inserted in a reactor fuel with either uranium-235 or uranium-233, both fissionable materials. The chain reaction is sustained by the uranium while the thorium is converted to new uranium-233. The uranium-233 produced is then available to replace the fissionable material use during the reactor's operation.

The new program has as its objective the development of a thermal breeder reactor capable of converting thorium to fissionable fuel material at a doubling time of not more than 25 years. The term *doubling time* refers to the time necessary for a reactor to produce enough excess fissionable material to start up a second similar reactor.

The new program also involves a reorientation of work on the Fluid Fuel Reactor Program previously conducted for the commission by the Brookhaven National Laboratory (Upton, N.Y.) and the Babcock and Wilcox Company, Lynchburg, Va.) on the Liquid Metal Fuel Reactor (LMFR) concept and by the Oak Ridge National Laboratory (Oak Ridge, Tenn.) on the Aqueous Homogeneous Reactor (AHR) and Molten Salt Reactor (MSR) concepts. Much of the work on these projects has been directed toward the development of reactors of these concepts for the production of economic electric power. During fiscal year 1960, research and development on the AHR, MSR, and LMFR concepts, except as applicable to the new program, will be discontinued and there will be a transferral of financial support to the new program.

The commission's decision to reorient the Fluid Fuel Program towards implementation of the Thermal Breeder Reactor Program was based on the results of a study by a special task force of scientists and engineers convened by the commission in January 1959 to make a comparison of the reactor concepts included in the Fluid Fuel Program. As a result of task-force estimates of the power costs of large-scale fluid fuel reactors and of the cost and scope of research and development compared with estimates for other reactor concepts in advanced stages of development, the commission concluded that there is little incentive for further development of fluid fuel reactors as an approach to the attainment of low-cost nuclear power in the near future. Therefore, the commission decided to reorient its fluid fuel effort toward the use of the latent energy in thorium and natural uranium through a long-range development program. Because all three of the fluid fuel reactor systems were found by the task force to be potentially capable of develoment as breeder reactors, the new Thermal Breeder Program may include one or more of the concepts included in the Fluid Fuel Program.

In the initial phases, the new program will be a basic research and development effort and will include an evaluation of reactor technology to determine the most promising type of thermal breeder reactor for continued long-range development. Any work continued on present fluid fuel reactor concepts will be conducted in the framework of the broader Thermal Breeder Reactor Program.