

GE-ANP Good Fallout

The GE-ANP program completed more than 120 hours operation of an advanced type reactor coupled to two modified J-47 turbojet engines. Sixty five hours of this operation was continuous, and both reactor and engines performed in accordance with all design specifications. In addition to completing the first endurance run of the aircraft nuclear propulsion system turbo-jet engine, the GE X-39, the GE-ANP program produced significant contributions to the nuclear field as detailed below.

SIZE — The bulky and very heavy nuclear reactors designed for land or shipboard use have been greatly reduced in size and weight. Sea and land-based reactors weigh between 500 and 1000 tons. Reactors designed for aircraft have been reduced in weight to about 100 tons.

SHIELDING — Great quantities of data were collected in shielding experiments. Much of this is directly applicable to the design of nuclear-powered spacecraft and manned spacecraft that must pass through the earth's radiation belts as well as protect their occupants from other radiation hazards in space travel.

METALLURGY — The ANP program claims credit for such developments as a new nickel-molybdenum alloy that increases the operating life of reactors; new technology in the field of high temperature liquid metal pumps, seals, heat exchangers and instrumentation; new corrosion data on various alloys with lithium, sodium, sodium potassium, lead, bismuth and various fused salts; techniques for fabricating large components of beryllium.

FUEL ELEMENTS — The ANP program developed the metallic dispersion fuel element now widely used in other reactors. Great refinements were made in the use of ceramics. Considerable work was accomplished in developing advanced manufacturing techniques. Development of the homogenous BeO-UO₂ fuel element which is expected to have wide application was started.

REACTOR THEORY — Much information was made available on calculational methods. One technique of reactor analysis that was introduced was the so-called C-5 program. Another was the "Multi-group One Dimensional Transport Theory (Reactor) Neutron and Photon Analysis." Heat transfer calculational techniques that were developed are now being employed in the Pluto nuclear ramjet project. In addition, the ANP program established the fundamental stability of nuclear power plant control systems.

SYNTHETIC OILS — Considerable successful work was performed on the development of oils that could withstand the environment of a nuclear-powered aircraft for 1000 hours. Normal oils would congeal.

ELECTRONICS — Development of the first electronic components, for control of an atomic reactor, which operated successfully at 845° F and in high intensity radiation for more than 1,000 hours. Much data was collected on the effects of radiation on electronic components, and work was advanced on the development of components that can withstand the radiation environment. A wide application of this work to spacecraft is expected

SAFETY — A number of significant fission-product dispersal experiments were conducted to determine the effects of the release of fission products from metallic fuel elements both in the air and on the ground. The results showed the margin of safety to be far greater than originally anticipated.