CHRONOLOGICAL HISTORY
OF
NEPA

Nuclear Energy for Propulsion of Aircraft

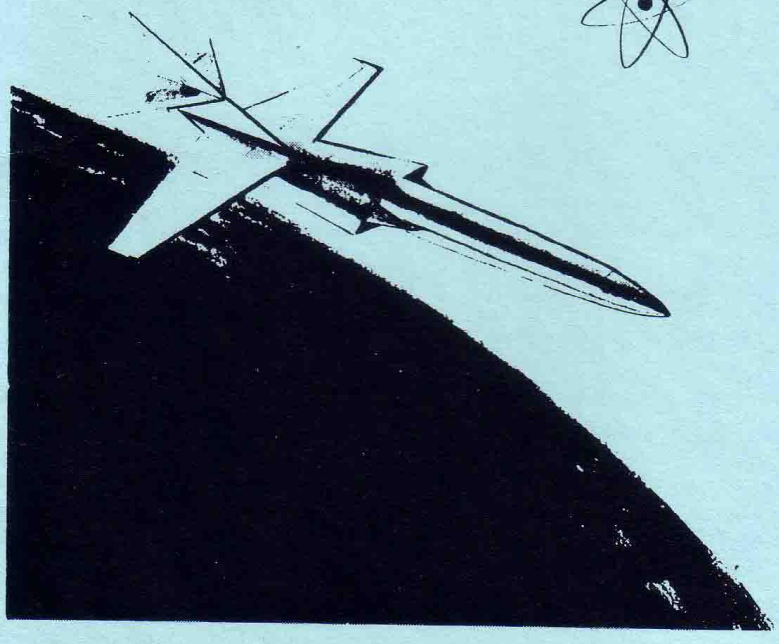
and

GE-ANP

General Electric Aircraft Nuclear Propulsion Program

1946 - 1961

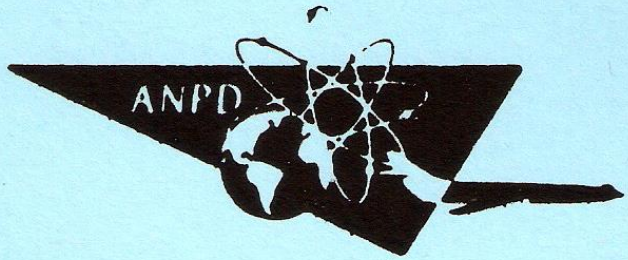
GIVING WINGS TO THE ATOM

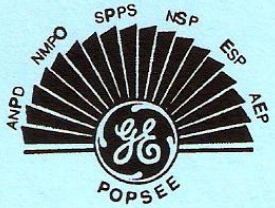


ATOMIC PRODUCTS DIVISION

GENERAL ELECTRIC

AIRCRAFT NUCLEAR PROPULSION DEPARTMENT
CINCINNATI 15, OHIO





This booklet was prepared as a memento
of the 45th Anniversary Reunion of POPSEE
August 21, 1996

CHRONOLOGICAL HISTORY OF NEPA AND GE-ANP

1941 - An early champion of nuclear flight was Col. Donald Keirn, an Air Force power plant specialist at Wright Field in Dayton, Ohio. Keirn went to England to consult with Sir Frank Whittle, Britain's jet engine pioneer, and returned with details of Whittle's engine. He then acted as liaison between the Air Force and General Electric in producing the first U.S. jet engine. In the course of developing the first jet engine, Keirn got to know D.R. Shoults, then an engineering executive at General Electric Co. who became responsible for coordinating the GE efforts with aircraft manufacturers. Keirn and Shoults spent time together discussing linking the jet engine with nuclear power for the propulsion of aircraft. Shoults left GE after the War for a different industrial employer, but in the next decade came back to GE to be Manager of the GE Aircraft Nuclear Propulsion Program. Keirn continued to pursue support from other sources.

July 1945 - Shortly before the first nuclear explosion at Alamogordo, New Mexico, Col. Keirn, Chief of Power Plant Lab at Wright-Patterson Air Force Base requested information as to possible application of atomic energy to aircraft from Dr. Vannevar Bush of the Manhattan District. Bush advised Keirn to defer such application because efforts were directed to urgent development of an explosive.

Aug. 1945 - Smyth Report gave public some knowledge of atomic bomb and the potential of atomic energy. Gordon Simmons Jr., a young engineer involved in construction of K-25 plant at Oak Ridge, addressed .letter to Sherman Fairchild stating that he would like to be connected with a company interested in applying nuclear energy to propulsion of aircraft. His thoughts had been stimulated by J. Carlton Ward Jr., President of Fairchild Engine & Airplane Corp., who had expressed the strategic advantages to be gained by harnessing nuclear energy to power large aircraft.

Oct. 1945 - Conference held in Fairchild's New York office at which Fairchild decided to make presentations to the military services for sponsorship of such a project. After numerous conferences and consultations, the Army Air Force decided to sponsor a single unified project with NACA participating.

Jan. 1946 - Meeting held at Pentagon of all interested agencies and aircraft engine companies; after concurrence, the Air Force asked the industry members to select one of their companies as the single manager of the group effort and the prime contractor to the Air Force. Fairchild Engine & Airplane Corp. was selected as the leader.

May 28, 1946 - NEPA Project began officially with signing of AAF letter of intent by General Spaatz and Maj. Gen. Leslie Groves. Associated with Fairchild were Allison, United Aircraft, Wright Aeronautical, General Electric, Westinghouse, Continental Aviation, Lycoming, Northrop, Flader and Menasco Mfg. Co. Member companies were to have a voice in technical phases of the NEPA Program and could assign personnel to the working organization. The goal was a feasibility investigation and research leading to the adaptation of nuclear energy as a means of propulsion of aircraft for tactical utility. Letter-contract authorized expenditure of $200,000; subsequent 18 amendments increased funding to $5.25 million.

July 15, 1946 - NEPA Project offices moved into suite of rooms in Raleigh Hotel on West 72nd St. New York City.

Aug. 30, 1946 - NEPA Report No. 2 recommended construction and testing a complete nuclear power plant and the continuing development of a high temperature reactor.

Sept. 4, 1946 - NEPA personnel moved to Oak Ridge, Tenn. occupying space in AEC Administrative Building.

Sept. 24, 1946 - NEPA offices moved to S-50 Area near K-25 Power Plant. (Previously used for pilot operation of a uranium-enrichment technology known as S-50 Thermal Diffusion, which used high pressure steam to separate the isotopes of uranium for use in atomic bombs). This move gained proximity to ORNL experimental facilities and access to Manhattan District classified reports. NEPA secured the part time services of a team of consultants including eminent nuclear specialists.

Nov. 1946 - Hiring began, but moved slowly because Oak Ridge housing quota for NEPA was limited. (Oak Ridge was still a closed city.) The constant crises concerning the continuation and future of NEPA and resulting hiring moratorium created job insecurity in minds of many technical candidates.

Feb. 1947 - NEPA came under AEC Subcommittee of the Joint Research & Development Branch.

Mar. 1947 - Important milestone passed: NEPA staff recommended major effort concentrate on direct air-cooled ceramic reactor used with a turbo-jet engine. Member companies and government agencies concurred.

Oct. 1947 - NEPA Staff undertook a design study of a supersonic turbojet missile; this study continued to summer 1948.

Dec. 1947 - R & D Board of Defense Dept. recommended that NEPA Program proceed on priority basis as a coordinated project with AEC. NEPA personnel totaled 264 of which 107 were technically trained. Due to lack of laboratory facilities, materials work was confined to literature surveys, particularly high temperature alloys and ceramics.

Jan. 1948 - Finletter Report recommended intensifying research efforts on nuclear plane.

Mar. 1948 - Congressional Aviation Board urged NEPA be given highest priority in atomic energy research.

June 1948 - Lexington Project created by contract between AEC and MIT with Walter Whitman as director.

Sept. 1948 - Lexington Report predicted a nuclear powered aircraft feasible and could be achieved in 15-20 years at cost of $2 billion.

Nov. 1948- Materials Laboratory completed in remodeled Building F-b. Dec. 1948- Total NEPA personnel 444 (164 technical).

Feb. 1949 - Nuclear Powered Flight Program became joint effort of Air Force, Navy, AEC and NACA, implemented by establishment of an Aircraft Nuclear Propulsion group at ORNL with prime responsibility for reactor and shield.

May 1949 - Medical unit established as NEPA Medical Department to provide routine dispensary care and physical examinations. Dr. Buyniski began investigations of diagnosis of beryllium poisoning and exposure to combustion products of liquid metals, lithium and sodium.

July 1949 - Industrial Hygiene Control Unit established to monitor fabrication of beryllium and beryllium carbide as well as radiation safety in laboratories.

Oct. 1949 - NEPA personnel total 658 (270 were technically trained). Average salary of BS Degree with 10 years experience was $475 per month (slightly above national average). Starting salary for new graduates averaged $300. The cost of renting a three bedroom house in Oak Ridge was increased to $90 per month.

Oct. 1949 - An article in the Oak Ridger newspaper, reprinted from the Louisville Courier-Journal, described NEPA as one of the most interesting and least publicized Oak Ridge activity. 'Most of the 600 employees are persons of high technical or scientific rank, seeking to find some way to use atomic energy to make airplanes fly". During 1949 the greatest achievement was the divided shield concept (shielding of the crew compartment) which reduced gross weight by 30% to 650,000 pounds. Studies were also conducted on binary bismuth cycle, ternary liquid metals cycle, helium compressor jet and turbo-jet cycles, fabrication of beryllium carbide bodies, solubility of container materials in various liquid metals, and testing of liquid metals handling in circulation rigs. Plans were made for Tug-tow Tests by the Air Force. Design of a critical experiment facility was completed and some components built and tested. A small-scale air cycle power plant was constructed using a turbojet engine and electrical heat source. Circulating fuel type reactors were studied and posed new materials and shielding problems. A survey of jet engine manufacturers was made to establish limitations on engine size and characteristics.

Nov. 1949- AEC began ANP research project at ORNL.

Jan. 1950 - Concept of water-moderated reactor patented by Thornton and Corbin made operation of a reactor in an aircraft feasible.

Mar. 1950 - Aircraft Reactors Branch established in AEC; assumed responsibility for AEC part of NEPA.

Aug. 1950- NEPA personnel peaked at 676 (18 PhD, 49 MS, 128 BS). General Manager was T.A. Sims Jr.; Director of Technical Division was M.C. Leverett. Technical Director and Chief Engineer was A. Kalitinsky. Several NEPA people were assigned to work with ORNL on the design of the Aircraft Reactor Experiment (ARE). The Critical Experiment Building was completed and NEPA test equipment was installed.

Nov. 15, 1950 - Fairchild entered into contract with AEC for work related to nuclear aspects of the then current Aircraft Nuclear Propulsion Program (ANPP). This resulted in modifications to Fairchild-Air Force prime contract. (Almost simultaneously Fairchild was advised of Air Force - AEC decision to consider first phase of ANP program at an end).

Jan. 1951 - Air Force decided that the program had advanced to the stage of "hardware development" and the stage of feasibility studies should be closed. The mission of the NEPA project had been accomplished. The hardware development phase would be carried out by the General Electric Company and responsibility for the aircraft was placed with Consolidated Vultee Aircraft Company.

April 30, 1951 - Termination date for NEPA Project. At this date, a formal cycle selection had not been made. The two major cycles of interest were the liquid- coolant (sodium) cycle and the direct air cycle. During the five year life of the Fairchild NEPA contract, total funding reached $23.84 million; (40.3% for salaries and wages, 24.2% for subcontractors). The high average quality in both experience and performance of NEPA personnel was attested by the fact that 38 separate industrial companies and research laboratories made vigorous efforts to employ NEPA personnel at the time of termination. Many technical people had numerous offers from which to choose.

May 1, 1951 - General Electric initiates ANP program in Aircraft Gas Turbine Division (AGT) in Cincinnati aimed at development of power plant for eventual flight test. Eighty-seven NEPA project people joined GE and continued work at Oak Ridge while facilities at Evendale, Ohio were prepared for the nuclear research. D.R. Shoults was Project Manager and M.C. Leverett was Manager of Engineering. First six months' effort devoted to evaluation of the two cycles. In October the direct air cycle was selected for development and work on liquid metals was phased out at GE. Total personnel 450.

July 1951 - Fuel sheet composed of uranium dioxide-stainless steel core with stainless steel cladding was successfully fabricated. This metal clad cermet core fuel sheet was the basis for the direct cycle reactors used in all High Temperature Reactor Experiments (HTRE-1, HTRE-2 and HTRE-3) tested in Idaho.

May 1952 - AEC approved use of part of National Reactor Testing Station (NRTS) at Arco, Idaho as flight test base.

July 1952 - AEC and Defense Dept. informed Joint Committee on Atomic Energy (JCAE) that plans were being made for flight test of a nuclear propulsion system in the 1956-58 period utilizing a modified B-36 as the test bed.

Aug. 1952 - Oak Ridge operations and personnel moved to Cincinnati (Bldg. D).

Dec. 1952 - Office for ANP established to coordinate AEC and Air Force participation in program. Maj. Gen. Donald Keirn named director.

Jan. 1953 - Eisenhower Administration began. Charles Wilson named Secretary of Defense.

Mar. 1953 - Air Force Scientific Advisory Board recommended cutting back ANP by 50 percent on grounds that activities unwarranted by state-of-the-art and rate of progress.

April 1953 - National Security Council ordered AEC and Defense Dept. to cancel ANP Program on grounds of budget savings and program not in national interest. Secretary of Defense Wilson termed the nuclear plane a “shitepoke” and ordered the program canceled. Wilson defined a “shitepoke” as “a great big bird that flies over the marshes, does not have much of a body or speed to it or anything, but it can fly”.

May 1953 - Joint Committee called for meeting with Secretary of Air Force Talbott and Deputy Secretary of Defense Keyes. “Cancellation” of project termed misinterpretation of order. Reorganization of project underway. ANP Program redirected toward applied research and development on limited funds basis. A series of high temperature reactor experiments (HTRE) were scheduled to develop and prove-out the reactor power plant. (Personnel total 1300).

Sept. 1953 - Aircraft Nuclear Propulsion Department (ANPD) established under GE Atomic Products Division.

Dec. 1953 - Air Force informed AEC of its renewed interest in manned nuclear aircraft and asked AEC to expedite experimental work.

Jan. 1954 - GE Savings & Stock Bonus Plan initiated with U.S. Savings Bonds having six year maturity.

April **1954** - Director of ANP Project, Maj. Gen. Keirn, advised Joint Committee that nuclear aircraft could be in operation in half scheduled time if given high priority. Joint Committee approved report by R & D Subcommittee calling for crash” effort on ANP Project. Report sent to President Eisenhower, Secretary of Defense and Chairman of AEC.

June 1954 - GE-ANP personnel reduced by 40 percent to about 800.

July 1954 - Joint Pratt & Whitney and ORNL program established to develop indirect liquid metal cycle propulsion system.

July 1954 - The concentric ring fuel element design was proven successful using fuel sheet of Nichrome clad uranium dioxide cermet core. This design was the basis for all HTRE reactors.

July 1954 - Fabrication techniques were developed establishing hydrided zirconium as a practical solid moderator material. This simplified reactor design, and the material was used in the High Temperature Reactor Experiment No. 3 (HTRE-3).

Aug. 1954 - Critical experiments were initiated at Evendale to provide data for the design of HTRE-1.

Oct. 1954 - Idaho Test Station (ITS) achieved Section status in ANPD. Manager of the ITS (“Remote Site”) was W.H. (Bill) Long.

Oct. 1954 - Air service for GE-AN P personnel to ITS was initiated by the Air Force. Later, a C-46 was retrofitted with passenger seats and a galley for this “Site Elite” service. The non-stop flight from Wilmington OH to Idaho Falls was made in 8 hours.

Feb. 1955 - AEC reported progress on direct cycle reactor exceeded expectations and authorized additional funds to be spent in fiscal 1955.

April 1955 - Air Force issued requirements for 125-A Weapons System high- performance, nuclear-powered aircraft and initiated program with project office at Wright Field, Dayton. Competition for airframe studies began.

June 1955 - AEC and Defense Dept. agree to accelerate ANP program with objective of testing prototype about 1959.

Sept. 1955 - Test aircraft flown with 3 megawatt reactor aboard a modified B-36 (called X-6), to measure radiation from reactor in flight. A total of 44 flights were made in two years from Carswell Air Force Base, Fort Worth, TX to Roswell, NM. where the reactor was powered-up over the desert area. A B-50 aircraft followed with the radiation instrumentation. (The B-36 is currently being restored at Fort Worth).

Sept. 1955 - Pratt & Whitney authorized to work on indirect (liquid metals) cycle reactor. Construction of CANEL Facility (Connecticut Aircraft Nuclear Engine Laboratory) started to accommodate expansion of ANP Program. (Effort on indirect cycle was reduced to secondary status in Sept, 1957).

Nov. 1955 - Air Force directed team-up of General Electric with Convair and Pratt & Whitney with Lockheed to proceed with propulsion systems for high- performance aircraft.

Dec. 1955 - Yttrium oxide addition to uranium dioxide was found to stabilize the fuel in air to 2600 °F. Jan. 1956 - GE-ANP personnel 1700. HTRE No.1 test operated on schedule in Initial Engine Test (IET) Facility in Idaho. This direct cycle water-moderated reactor with Nichrome clad fuel elements was used to power a turbojet engine successfully.

Mar. 1956 - Ceramic fuel elements composed of beryllium oxide-uranium oxide- yttrium oxide were successfully tested in-reactor at **2500 °F.**

June 1956 - Air Force Chief of Staff General LeMay told Joint Committee he was interested in achieving nuclear flight at earliest practical date. Maj. Gen. Keirn said ground test possible in 1959 and first flight in 1960.

Aug. 1956 - Revised fiscal 1957 program resulted in 18 months slippage in program schedule. Defense Dept. policy decision cut back ANP Program.

Dec. 1956 - HTRE-2 test reactor operated successfully at Idaho Test Station. In the following two months of testing over 150 hours of nuclear powered turbojet engine operation were completed.

Dec. 1956 - Meeting of Defense Dept. and Budget Bureau officials with the President in Augusta GA eliminated effort on indirect cycle and reduced effort on direct cycle development.

Jan. 1957 - AF Scientific Advisory Board recommended less emphasis on engine and airframe development, more on reactor research and development.

Feb. 1957 - GE-ANP Program personnel total 2900.

Feb. 1957 - A test of 4000 ceramic tubular fuel elements in a special insert in HTRE-2 showed that water vapor corrosion of beryllium oxide was a major problem. (Note: This problem was later solved by a process of co-extruding beryllium oxide fuel elements with a coating of yttrium oxide stabilized zirconium oxide).

Feb. 1957 - Littlewood Committee of Defense Dept. began review of ANPP. Joint Committee called Defense Dept. and AEC officials to testify on status of ANP Program; urged efforts to achieve early flight for prototype nuclear system. Defense Deputy Secretary Quarles said no flight date would be set until propulsion system was developed adequate for military plane. Joint Committee sent letter to Quarles expressing concern about lack of firm program objectives and lack of direction. Defense Dept. appointed ad hoc panel of General Officers (Mills Panel) to review ANP Program and missions contemplated.

Feb. 1957 - GE Management Association Ladies Night Dance was held at Castle Farm with Lionel Hampton Orchestra providing music and entertainment for 1300 couples.

April 1957 - Joint Committee urged Defense Dept. to proceed with vigorous ANP program; met again with Secretary Quarles to emphasize its concern. Quarles testified that program objectives had been established for ground and flight-test propulsion systems with first flight in 1960. Littlewood Committee report recommended ANP development program be carried through flight test stage.

May 1957 - Budget Bureau sent directive to executive agencies requiring fiscal 1959 budget be held at same or lower level than FY58. Canterbury Panel of Air R & 0 Command recommended development of low-level nuclear plane.

June 1957 - Unified project direction under Maj. Gen. Keirn was formed to coordinate AEC and Defense Dept. activities. Mills Report recommended early fabrication and flight testing of prototype propulsion system in 1960's. Test aircraft to be immediate objective. Deputy Secretary Quarles approved Air Force program.

Sept. 1957 - A major increase in performance of metallic fuel element reactors resulted from finding that unclad hydrided zirconium moderator components were capable of operation in air at 1200 °F.

Sept. 1957 - Budgetary ceilings cause slippage in time schedule for ground test of direct cycle system. P & W efforts on indirect cycle reduced to low level.

Oct. 1957- Soviet Sputnik launched into orbit.

Oct. 1957 - Hunsaker Committee established to review hazards of nuclear plane and recommend national policy. Rep. Price, Chm. R & D Sub-committee, after trip to Russia, sent letter to the President urging early flight program in view of Russia's success with Sputnik; expressed concern over lack of well defined objectives and target dates.

Nov. 1957 - GE-ANPD Organization with 3140 employees consisted of ten Sections under D. R. Shoults as General Manager.

Dec. 1957 - Production of high-purity yttrium metal with low thermal neutron absorption cross-section was begun in large quantities.

Dec. 1957 - Hunsaker Committee report expressed concern over potential hazards of nuclear flight over land; recommended test flights be made from island or coastal base. Joint Chiefs said such action was premature.

Jan. 1958 - President Eisenhower requests his science advisor, Dr. Killian, to review ANP program; Dr. Bacher appointed chairman of study committee.

Feb. 1958 - Bacher Committee recommended greater emphasis on advanced materials capable of producing higher performance reactor. With recommendation of Dr. Killian and Dr. Bacher, the President approved. Early flight proposal of Air Force was postponed.

April 1958- Unclad hydrided yttrium used as a moderator component was shown to be stable in air to 1600 °F, thus promising increased performance for metallic fuel element reactors.

May 1958- GE-ANP Spring Swing Dance held at Castle Farm; tickets $1.00 per person included refreshments and door prizes.

June **1958** - Air Force dropped 125-A Weapons System and replaced with CAMAL Mission (Continuous Airborne Missile Launching and Low-level Penetration System). CAMAL more realistically reflected the "state-of-the-art" of the A-Plane, specifying low altitude bombing attack at subsonic speeds.

June 1958 - General Electric Theater presented on CBS Television network on Sunday evenings with Ronald Reagan as host and frequent star.

Aug. 1958 - GE Employees Activities Association (GEEAA) Recreational Park officially opened to GE employees and their families. Participating in ceremonies were ANP'ers Ray Currens and Gert Shuette.

Oct. 1958 - The development of a high performance ceramic reactor based on beryllium oxide was accelerated to meet longer range goals of the Air Force.

Nov. 1958 - Heat Transfer Reactor Experiment No. 3 began test at NRTS in Idaho. HTRE-3 was a development test assembly consisting of controls, shielding, direct cycle reactor and two modified J-47 jet engines with dual combustion chambers all mounted on railroad cars for moving out and into lET. The reactor was 51 inches diameter, 34.7 inches core length, 43.5 inches length overall with beryllium reflector and made up of 151 hex-shaped moderator cells of unclad hydrided zirconium with 3 inch bore for the fuel elements. The fuel element cartridges were concentric ring design, 19 stages each 1.5 inches long. The fuel elements sheet rings had 8ONi-2OCr alloy cladding over fully enriched uranium cores. Total weight of the powerplant assembly was twenty tons. During the shake-down test a power excursion melted some fuel elements. HTRE-3 was returned to lET hot shop for disassembly resulting in six months delay.

Dec. 1958 - Budgets for AEC and Defense Dept. cut back to $75 million each for fiscal 1960.

Dec. 1958 - Aviation Week broke the "news" that USSR had flight tested a nuclear-powered bomber and showed alleged photos of the Soviet plane. Newspaper editorials criticized the Administration for foot-dragging and Congressmen called for more funding to meet the Soviet threat. Defense Secretary McElroy was highly skeptical and Pres. Eisenhower said there was no reliable evidence of any kind and he was not changing the program to achieve early flight.

Dec. 1958 - GE-ANP employee paychecks and pay information set up on punch card system and printed by the IBM 650 Computer.

Feb. 1959 - Deputy Secretary of Defense Quarles briefed JCAE on ANP Program reiterating that the Program had to remain oriented toward development of a nuclear propulsion system rather than production of an aircraft until the material problems were solved. Representative Price countered with a challenge to the Eisenhower Administration to make an administrative decision and set a target date for achievement of nuclear flight. Convair was selected for airframe contractor.

April 1959 - At Rep. Price's suggestion, Deputy Secretary of Defense Quarles accompanied members of JCAE subcommittee to Evendale, Ohio along with government officials and congressmen for a first-hand look at the ANP Project. They toured the GE-ANP Evendale facilities and were briefed on direct cycle propulsion system developments. Price sensed that Quarles was influenced positively by what he saw.

May 7, 1959 - Deputy Secretary Quarles met AEC, Air Force and Navy officials to discuss the nuclear airplane. Both Maj. Gen. Keirn and Rep. Price felt that Quarles had decided to support a flight program. (Note: Although Quarles had been unwilling to support a crash program urged by DOD, he had protected ANP against those who might attempt to kill it, i.e. Defense Secretaries Wilson and McElroy).

May 8, 1959 - Quarles died of a heart attack. JCAE Open Hearings postponed indefinitely. Thomas Gates succeeded Quarles as Deputy Secretary of Defense, but felt unqualified to evaluate the ANP Program. That job fell to Dr. Herbert York, Director of Research and Engineering in Dept. of Defense, with supervision over all R & D projects, including ANP. York with Dr. A. Biehl prepared a new report on ANP.

June 7, 1959 - York gave his decision to JCAE and Rep. Price that ANP should be reoriented toward development of more advanced materials and that greater emphasis be placed on the, indirect cycle. All target dates for nuclear flight were eliminated.

June 1959 - HTRE-3 with refueled core returned for test at lET facility.

July 1959 - Congressional hearing before Subcommittee on R & D of JCAE. First session on ANP Program.

July 1959- Major redirection of reactor design from metallic to ceramic core.

Aug. 31, 1959 - Maj. Gen. Keirn retired from his dual role as Chief of ANP Office and Deputy Chief of Staff for Nuclear Systems in the Air Force. He was replaced by Brig. Gen. Irving Branch. D.R. Shoults left GE-ANP Program, transferring to GE New York Office. Sam Levine became Acting Manager.

Sept. 1959 - X-211 Turbojet Engine built in Evendale and tested in PUT cell using conventional fuel.

Sept. 1959 - DOD changed objectives of CAMAL mission to speed of Mach 0.8- 0.9 at 35,00 feet with potential life of 1000 hours.

Oct. 1959 - HTRE-3 became critical and initially operated at 10 megawatts, meeting or exceeding all expectations.

Nov. 1959- Six GE-ANP Scientists made first public review of the developments in rare earth metal technology (primarily yttrium) and refractory metal thermocouples at joint ASM-AEC Symposium in Chicago.

Nov. 1959 - GE-ANP personnel totaled 3650.

Dec. 1959 - HTRE-3 endurance tested at full power (31.8 megawatts) for 126 hours, 65 hours continuous operation with nuclear-power jet engines. Maximum fuel element temperature was 2030 °F. All components were in excellent condition. Both the reactor and engines performed in accordance with all design specifications. (Note: The HTRE-3 mobile test assembly is still intact at the Idaho Test Site).

May 1960 - Dave Shaw became Manager GE-ANP Department.

May 1960 - Flight Engine Test Facility (FET) completed at Idaho in a two acre building providing for operation of ground test prototype nuclear power plants mounted on test dollies as well as flight power plants mounted in an air frame mock-up. Also included in this facility were a hot shop with remote master-slave manipulators and a radioactive materials laboratory.

Nov. 1960 - Dr. Herbert York, Director of Defense R & D, concluded that the Nuclear Powered Flight Program did not measure up in competition for money and manpower. There was no longer a need for nuclear-powered aircraft in view of development of ICBM, short-range missiles, nuclear submarines, mid-air refueling and the many U.S. air bases in Europe.

Jan. 1961 - President Kennedy's Administration began. Robert McNamara appointed Secretary of Defense. The ANP Program received his personal attention and with the advice of Dr. Herbert York, he concluded that one of the budgetary items that could be trimmed at no cost to the nation's security was the nuclear airplane.
Mar. 1961 - AEC directed all contractors to discontinue any work related to nuclear-powered aircraft in view of President Kennedy's decision to cancel development program for nuclear military aircraft.

April 1961 - Ralph J. Cordiner elected President and CEO of General Electric Co. succeeding Robert Paxton.

May 1961 - National ANP Program terminated. In the 15 years of the ANP Program a total of $2 billion was spent on research and development. GE's Nuclear Materials & Propulsion Operation (NMPO) was established by AEC for continuation of basic research work on high temperature nuclear materials. Both Evendale Laboratories and Idaho Test Station continued work on future reactor projects including the 630A and 710 programs. General Manager of GE-NMPO was W. H. (Bill) Long. The GE-NMPO contract with the AEC continued until 1968.

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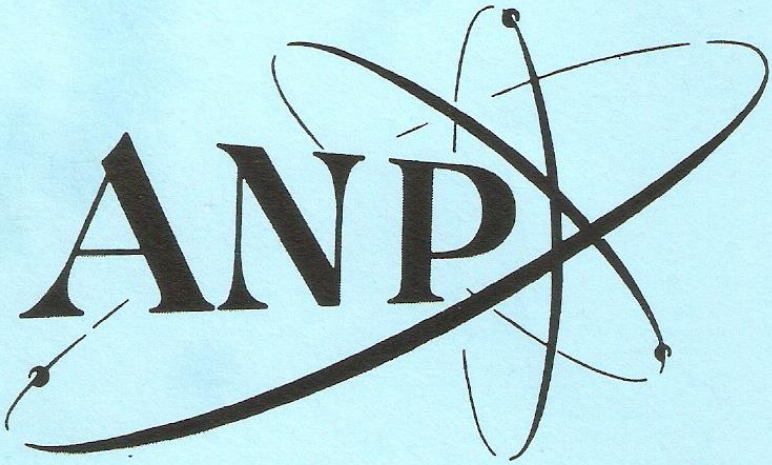
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