# AEROTEST OPERATIONS, INC.

Aerotest Radiography and Research Reactor (ARRR)

# UPDATED SAFETY ANALYSIS REPORT (USAR)

REVISION 0 [PROPOSED R0]

DOCKET No. 50-228
License No. R-98

Aerotest Operations, Inc.
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## 1.5 SUMMARY OF OPERATIONS

The ARRR provides a neutron source for research and development and services, mainly neutron radiology. Irradiation services for activation analyses have included: crude oil and hydrocarbon samples for oil companies; plastic slides impregnated with microscopic quantities of fissionable materials; ocean silt samples for the Bureau of Mines; and, silver iodide in snow samples from cloud seeding. Other irradiation services have included: calibration of power reactor fission detectors; radiation damage effects studies of solid state electronic components; detection of gunshot residue in paraffin; lattice deformation studies in ammonium perchlorate; and, spallation experiments with uranium dioxide.

Currently, the ARRR is operated for an eight hour shift five days a week, plus four hours every Saturday. Figure 1-2 shows the annual operating hours for the ARRR from 1966 to 2004.

## 1.6 COMPLIANCE WITH THE NUCLEAR WASTE POLICY ACT OF 1982

Section 302(b)(1)(B) of the Nuclear Waste Policy Act of 1982 provides that the NRC may require, as a precondition to issuing or renewing an operating license for a research or test reactor, that the applicant shall have entered into an agreement with the Department of Energy (DOE) for the disposal of high-level radioactive waste and spent nuclear fuel. Aerotest Operations, Inc has a fully executed contract with DOE (DOE Contract: DE-CR01-83NE44484, dated July 14, 1983) (Reference 3) that provides that DOE retain title to the fuel and that DOE is obligated to take the spent fuel and/or high-level waste for storage or reprocessing when the ARRR facility is decommissioned. Because the ARRR has entered into such a contract with DOE, the applicable requirements of the Waste Policy Act of 1982 have been satisfied.

## 1.7 FACILITY HISTORY AND MODIFICATIONS

| Date: | Event: |
|---|---|
| April 16, 1965 | Construction Permit No. CPRR-86 issued by the Atomic Energy Commission to Aerojet-General Nucleonics for the construction of a 250 kW pool-type reactor at the Aerojet-General Nucleonics plant near San Ramon, California. |
| July 2, 1965 | Facility License number R-98 is issued for the Aerojet General Nuclear Industrial Reactor (AGNIR) |
| July 9, 1965 | AGNIR achieves initial criticality. |

# 4.0 REACTOR

## 4.1 SUMMARY DESCRIPTION

The ARRR (originally AGNIR) is a modified TRIGA Mark I reactor. It is an open pool type reactor with the pool (i.e., reactor tank) located below ground level (Figure 4.1-1). The ARRR was designed and constructed by the Nuclear Division of Aerojet-General in 1964. The reactor achieved initial criticality on July 9, 1965 with a licensed steady-state thermal power limit of 250 kW. There is no pulsing capability which is sometimes a design feature for similar reactors. The "Aerojet-General Nucleonics Industrial Reactor (AGNIR): Hazards Summary Report (AN-1193)," (Reference 4.9.1) summarizes the safety analysis used to license the ARRR.

### 4.1.1 TRIGA Reactor – General Description

The ARRR is a light water cooled and moderated reactor with the water also serving as a neutron reflector and biological shielding. Water, moving by natural convection, is employed as the primary reactor coolant. The coolant serves to remove the heat of fission from the fuel. The ARRR also includes a flow path through a heat exchanger if forced convection cooling of the reactor is desired. The primary circulating system draws water from near the top of the pool and pumps it through a heat exchanger where a secondary loop removes heat from the primary coolant. The secondary water is pumped through a forced air cooling tower which cools the secondary water by evaporation. The pool water is returned to the bottom of the pool where it is discharged tangentially to cause a spiraling of the cooling water. A demineralizer system circulates the reactor coolant through a filter and demineralizer to maintain required water chemistry.

The reactor fuel elements, reflector elements, control rods, control rod drive mechanisms, and control rod drive controls were purchased from the General Atomics Company and were incorporated into the ARRR without any significant changes. The standard "G" ring core grid plate design was provided by General Atomics and manufactured by Aerojet. All other components were designed and constructed by Aerojet or their subcontractors.

The reactor also contains the following facilities for experiments which are described in USAR Chapter 10, Experimental Facilities and Explosives:

(1) Neutron Radiography Facility;

(2) Graphite Thermal Column;

(3) Glory Hole Facility;

(4) Vertical Tubes;

(5) Central Core Irradiation Facility;

(6) Triangular Incore Irradiation Facilities;

(7) Incore Irradiation Capsules;