

Development activities include efforts to optimize the design of coated particles and to improve the fabrication process for fuel compacts. Also included are development of ZrC coating for the fuel particle and development of monolithic fuel rods.

In conclusion, the fuel R&D activities for the first core of HTTR have been completed and this fuel has been verified to meet the HTTR safety design requirements. Activities to develop advanced fuels for the second core of HTTR are both underway and planned.

HTGR PROGRAMME IN THE UNITED STATES OF AMERICA

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In the USA, the HTGR is being developed by the US Department of Energy within the Division of HTGRs, which is a part of the Office of Advanced Reactor Programs. This program is supported by a user/utility group, Gas-Cooled Reactor Associates, and a team of contractors. Table 1 shows the HTGR contractors and their areas of responsibility. National program funding during FY-1990 was \$22.3 M and FY-1991 funding is currently \$25.0 M.

Fuel design, development and demonstration activities are being conducted by General Atomics and Oak Ridge National Laboratory. A summary of the responsibilities for each follows:

General Atomics:

- Fuel/Core Design
- Fuel Performance Requirements
- Fuel Fabrication/Qualification
- Fuel Test Specifications
- Performance Codes/Models/Predictions
- Technology Development Plans

Table 1 - HTGR CONTRACTORS

Nuclear Island	General Atomics (GA) ABB Combustion Engineering, (CE) Bechtel National (BNI)
Balance-of-Plant	Stone & Webster (SWECS)
Technology	Oak Ridge National Lab. (ORNL)
Utility/User	Gas Cooled Reactor Associates (GCRA)

Oak Ridge National Laboratory:

- Fuel Capsule Irradiation Tests
- Postirradiation Examinations and Analysis
- Fuel Testing Under Accident Conditions
- Fission Product Behaviour Tests
- Fuel Performance/Qualification Assessments
- Technology Development Plans

During FY-1990, the US continued work in cooperative projects with the KFA - Forschungszentrum Jülich and the Japan Atomic Energy Research Institute. These activities included preparation of capsules HRB-21 and HRB-22 for irradiation in the HFIR reactor, and post irradiation examination and analysis for the HFR-B1 capsule which was irradiated at the Petten establishment in the Netherlands. The HRB-21 and -22 irradiations will provide performance data for high quality US and Japanese fuel, respectively. The HFR-B1 irradiation test included designed-to-fail fissile particles which were subjected to varying amounts of water vapor in order to quantify fission product release during fuel hydrolysis.

Post irradiation examination and analysis continued on capsules HRB-17 and HRB-18. These irradiation tests, contained a known number of coated particles with exposed fuel kernels, and were the first to include water vapor injections to investigate the release of fission products from failed fuel during hydrolysis.

During FY-1990 DOE continued the Fission Product Transport Test Program with the French Commissariat à l'Energie Atomique in the COMEDIE in-pile loop at the SILOE reactor at Grenoble. The COMEDIE loop has been modified to accommodate tests to examine fission product plate-out distribution in the primary circuit and to examine fission product lift-off from simulated steam generator tubes during depressurization transients including in some cases, fission product washoff during moisture ingress.

Activities during FY-1990 have been focused on preparations for an integral loop checkout test (without fuel) and the preparation and approval of test specifications and operating procedures for the first COMEDIE test.

Other activities included installation of the high temperature core-conduction-cooldown test furnace at ORNL, which will be used for testing of irradiated fuel compacts under accident conditions.

Finally, US fuel performance experts participated in the MHTGR Cost Reduction Study which is a major effort within the US commercial MHTGR program. The objective of this study is to improve the economics of the MHTGR relative to alternatives. It is scheduled for completion in FY-1991 and may result in changes to the core design as well as to other systems of the plant.