Reactor has been ''destabilized'' in any manner. The Georgia Tech Research Reactor is designed to reduce the likelihood and mitigate the consequences of uncontrolled releases of radiation. For example, the design and configuration features as discussed for issue (4) provides considerable assurance that the Georgia Tech Research Reactor has not and will not be ''destabilized'' due to the previously postulated concerns expressed by the Petitioner.

A recent safety evaluation of the Georgia Tech Research Reactor by the NRC staff is associated with the Order to Convert from High Enriched Uranium (HEU) to Low Enriched Uranium (LEU).[16] The associated safety evaluation considered all potential safety analyses that are effected by the change out of the fuel, including potential design basis accident scenarios. This safety evaluation was issued on the bases that the pertinent reactor design features (1) continue to acceptably ensure that the health and safety of the public is protected for the HEU fuel and (2) have also been demonstrated to be acceptable for the LEU fuel.

The Petitioner raised concerns on various structures, systems and components at the research reactor. First, the ability of the containment building steel structure at the Georgia Tech Research Reactor to control releases of radioactive material was questioned. In this regard, the containment leak rate is tested, in accordance with Technical Specification 4.3.b, for at least 2.0 pounds per square inch gauge (psig), which is the design basis pressure. Technical Specification 4.3.b requires that leakage from the containment building shall not exceed 1.0 percent of the building air volume in 24 hours at 2.0 psig over-pressure. Actual test results show that leakage is about one-half of that value. Containment building structural requirements based on expected external pressures have been estimated capable of withstanding internal pressures of at least 7.5 psig.[17] This leakage integrity, and the testing and design margin, provide assurance that radioactive materials will not be released in an uncontrolled manner from the Georgia Tech Research Reactor containment.

The design function of the shield and crane support wall to mitigate potential radiation exposures was also questioned by the Petitioner. The steel-reinforced concrete wall inside the containment extends about 34 feet above the outside ground level. A safety function of the steel-reinforced concrete wall is shielding during potential design basis accident conditions.[18] The design calculations for this shielding function have been reviewed and independently verified. This review finds that the calculations conservatively modeled radioactive source terms and containment configuration.

The Petitioner also raised an issue of a potential ''runaway chain reaction.'' The Georgia Tech Research Reactor is designed with two independent and diverse shut down systems: the reactor scram system and the top reflector drain system. These systems have significant shut down capability and have been shown, both analytically and experimentally, capable of withstanding any excess reactivity condition.[19] These analyses show that the Georgia Tech Research Reactor can meet (with substantial margin) the Technical Specification 3.1.a requirements to be shut down (i.e., subcritical by at least 1.0 percent delta k/k with both the highest reactivity worth shim-safety blade and the regulating rod fully withdrawn). Further, specific design features of the Georgia Tech Research Reactor prevent or mitigate reactivity and power increase conditions. Analyses[20] show that both the HEU and LEU fuels are designed to withstand maximum credible reactivity worth/power excursion conditions without damage, including maximum reactivity addition conditions. As indicated in SAR, this analysis technique has been verified by test data.[21] This degree of shut down capability and provisions for mitigation of design basis accidents is consistent with other U.S. research reactor designs, has been verified by data and NRC staff review, and provides assurance that the Georgia Tech Research Reactor can be safely shut down for any credible condition, including analyzed accident conditions.

The Petitioner also raised concern that a previous accident analysis assumed a fuel loading accident that was considered ''incredible'' and no analysis of this scenario was performed in the current SAR.[22] The SAR states: During refueling operations, all control elements are required to be fully inserted and the top D_2O reflector drained to storage. Following the refueling operation, the reactor startup will be accomplished with standard practice. Under these conditions, a sudden introduction of reactivity is impossible.''[23] Although the NRC staff agrees with the licensee that this accident is not credible, the NRC staff did verify that the results would be acceptable in the unlikely event of such an accident. Specifically, in the safety evaluation for the Order to Convert from HEU to LEU,[24] the NRC staff found that (1) the previous safety evaluation[25] remained valid in that the HEU fuel would not be damaged by the fuel loading accident and (2) the reactivity characteristics of the LEU compared to the HEU fuel are such that the maximum fuel temperatures of the LEU fuel would be less than the temperature for the HEU fuel during the potential fuel loading accident. Therefore, the NRC staff finds that, although the fuel loading accident analysis was not and need not be performed in the current SAR for the Georgia Tech Research Reactor, the potential results, if the analysis were to be performed in the current SAR, would remain acceptable for both fuel types.

The Petitioner also raised a concern regarding the emergency cooling capabilities at the Georgia Tech Research Reactor. The research reactor is designed with an emergency cooling system.[26] The system, as required by Technical Specification 3.7, consists of a passive tank capable of providing cooling for 30 minutes, and two separate long term supplies, only one of which is required for a total of 12 hours of cooling. (It should be noted that in the SAR the licensee assumed that (1) the long term cooling supply connections are prevented or interrupted, (2) a complete core meltdown and conservative fission product release occurred, and (3) conservative radiological exposure conditions existed. These assumptions were used in a calculation to demonstrate

[16] ''Georgia Institute of Technology, (Georgia Tech Research Reactor); Order Modifying Facility Operating License No. R–97,'' 60 FR 32516, June 22, 1995.

[17] SAR, Section 4.3.2, *Provisions for Insuring Leak-Tightness,* page 49.

[18] SAR, Section 4.3 *Description of Reactor Containment Building,* Section 4.3.1 *General Layout,* pages 42–9.

[19] SAR, Section 5.6, *Shutdown Margins.*

[20] SAR, Section 5.10, *Accident Analyses,* page 139–144.

[21] SAR, Section 5.9.1 *Comparison of Calculations with SPERT–II Experiments,* pages 137–8.

[22] SAR, Section 5.10.3 *Fuel Loading Accident.*

[23] SAR, Section 8.4.2 *Fuel Loading Accidents.*

[24] Letter from Marvin M. Mendonca, NRC, to Dr. Ratib A. Karam, Georgia Institute of Technology, ''Issuance of Order Modifying License No. R–97 to Convert from High- to Low-Enriched Uranium—Georgia Institute of Technology (TAC No. M85896),'' Enclosure 3 Safety Evaluation, Section 2.14.5 Fuel Loading Accident.

[25] U.S. Atomic Energy Commission, Safety Evaluation by the Directorate of Licensing, Docket No. 50–160, Georgia Institute of Technology, Section 6.0 *Accident Analysis,* page 12, dated December 19, 1972.

[26] SAR, Section 4.4.8.3, *Emergency Cooling System,* pages 87–90.