acceptable design bases for the Georgia Tech Research Reactor containment, that is leakage rate and shielding functions, as previously discussed.) The Petitioner's concern relates to the time required to make the manual connections to the backup water supplies and potential radiation exposures during this process. These connections are made outside the containment structure. The 30 minutes cooling period flow is designed to be provided by gravity flow from the previously mentioned passive tank through two redundant fast acting, fail safe valves. This cooling ensures no fuel damage or radiation release effect in the event of the loss of coolant accident in that 30 minute time period. The NRC staff concludes, based on a walk through with the licensee, that 30 minutes continues to be an acceptable time to make the connections. The long term emergency cooling connections could be accomplished within the 30 minute time period and there would be no increased radiation exposure while making these connections. Therefore, the previous NRC staff conclusion in licensing the Georgia Tech Research Reactor remains valid, that is, there will be acceptable emergency cooling of the core in the event of the loss of coolant accident.

The Petitioner also raised a concern on the reduction in shielding for the cobalt-60 storage pool, caused by the use of water from this storage pool to provide one of the two alternate long term water supplies for emergency cooling of the research reactor. The emergency cooling function effect on radiation levels from the cobalt-60 pool was reviewed and independently verified. This evaluation has found that the reduction in water above the cobalt-60 sources for the long term reactor emergency cooling function would not significantly affect the shielding of the cobalt-60 source, i.e., there will remain sufficient water for shielding. This was confirmed with the Georgia EPD, the licensing authority for the cobalt-60 source, and the Georgia Tech Research Reactor licensee. Therefore, the use of the cobalt-60 pool for emergency cooling of the Georgia Tech Research Reactor would not adversely impact that function or radiation safety.

The Petitioner raised a concern regarding the use of hot channel factors and engineering uncertainty factors. The SAR analyzed the fuel design to establish safety limits considering power peaking conditions (hot channel factors) and conservative fuel manufacturing tolerance (engineering uncertainty factors). Consistent with research reactor regulatory policy, the SAR verified that these safety limits would not be exceeded or even approached, so that no fuel damage would occur.²⁷ The NRC staff finds that these conclusions remain valid for both the current HEU fuel and for the LEU fuel as documented in the Order to convert from HEU fuel.²⁸

The Petitioner also had a concern related to the reasonableness of assuming a scram after pump failures in the SAR. The SAR paragraph in question states: "The loss of the primary D₂O pump or the secondary cooling water pump can result in undesirable reactor operating conditions. These systems are therefore provided with high temperature and low flow interlocks with the reactor scram circuitry. Of the two pump failures, the loss of the D₂O pump is the more serious. Two independent low D₂O flow scram interlocks, and loss of electrical power interlocks have been provided in the reactor safety instrumentation. It is therefore acceptable to assume that the reactor will scram because of low flow shortly after an electrical power failure or the more serious case of pump seizure." 29 These interlocks provide redundant and diverse scram functions for the Georgia Tech Research Reactor. The NRC staff concludes that in the unlikely event that one of the independent low D₂O flow scram interlocks were to fail or be inoperable, the other low D₂O flow scram interlock would scram the reactor. These redundant scram interlocks are required by Technical Specification 3.2.a. Additionally, the high D₂O temperature and loss of electrical power scram interlocks provide additional assurance that the reactor will scram on potential pump failure events. Based on the redundancy of the low D₂O flow scram interlocks and the additional redundancy from diverse scram interlocks such as the high D₂O temperature scram interlocks, the NRC staff concludes that it is acceptable to assume that the reactor will scram for the potential pump failure analysis.

The Petitioner also asserted that plutonium and cesium-137 were not included in the core burnout analysis. For the core burnout analysis, data show that the assumed release fractions from the fuel of isotopes in the SAR are conservative and that plutonium, cesium, or other particulate isotopes would not be released.³⁰ Furthermore, page 196 of the SAR states that the source term includes daughter products of the released volatile fission products, which would include cesium-137 as a daughter product of released isotopes. Based on the above quoted data and consideration of volatile fission product decay daughters, the release assumptions are acceptable.

The Petitioner also indicated that there were errors in the Georgia Tech Research Reactor SAR. These alleged errors include the following: That the half-life of iodine-131 was incorrectly specified; that the geologic data are inadequate; that population data are outdated; that the radiation exposure calculational technique and data used to estimate design basis accident radiological doses are outdated; that incorrect names were used for State of Georgia organizations; and that a 30 year wind rose was needed.

Regarding the half-life of iodine-131, there was a typographical error where 1.92 hours was typed instead of 192 hours. This has been corrected by the licensee in a January 1995 SAR revision.

The geologic data presented by the licensee in the SAR, along with other data and information that were provided by the Petitioner, DPW, the Georgia Geologic Survey and the licensee, have been evaluated and discussed by the NRC staff in issues (4) and (7) of this Partial Director's Decision. Based on these evaluations by the NRC staff, the geologic data do not change the previous staff conclusions in licensing the Georgia Tech Research Reactor and the NRC staff does not possess any information which would suggest that the geologic information for the research reactor is not acceptable.

The population data presented by the licensee were from the 1990 census rather than from current City of Atlanta or other estimates on population as stated by the Petitioner. The use of the 1990 census data are acceptable because it is the latest official U.S. census data. The use of such data as implemented in the Georgia Tech Research Reactor SAR and the Technical Specifications is consistent with reactor licensing practices for restricted area, exclusion area and low population zones.

The radiation exposure calculational technique and data used to estimate design basis accident radiological doses (SAR Appendices B and C) were reviewed and found to be conservative and therefore acceptable for use.

Regarding the use of incorrect names for State of Georgia organizations, this was a failure of the licensee to

²⁷ SAR, Section 5.7, *Thermal—Hydraulic Safety Parameters*, pages 127–135.

²⁸ Letter from Marvin M. Mendonca, NRC, to Dr. Ratib A. Karam, Georgia Institute of Technology, Enclosure 3 Safety Evaluation, Section 2.11 *Thermal-Hydraulics.*

²⁹ SAR, Section 8.2.2 Pump Failures