Tech Research Reactor. By letter dated May 11, 1995, the State Geologist responded to the NRC staff.<sup>10</sup> The letter stated, in part, that:

I have reviewed the letters from a petition to shut down the Georgia Tech Research Reactor. The letters suggest (1) that the reactor overlies the Wahoo Creek Formation, which is not a suitable nor a stable foundation material; (2) that there is an earthquake risk, particularly from the Brevard Zone; (3) that unique geologic fractures, particularly horizontal fractures, might cause large quantities of ground water to seep into the reactor and cause problems. My review indicates that the petition's suggestions are specious.

The Wahoo Creek formation is one of many geologic formations of the Piedmont Physiographic Province. The fact that the Wahoo Creek Formation weathers into "slabs" is not relevant; in situ, it is a competent rock adequate to provide suitable foundation for the reactor. Comparison of the foundation characteristics of weathered and in situ rock material is not reasonable nor appropriate.

Georgia is a relatively aseismic state and earthquakes are rare. The Brevard Zone should not be considered as an "earthquake fault".

The proximity of the Brevard Zone to the reactor is not relevant. Fractured rock, which is ubiquitous to the Piedmont, underlies the reactor. There are no data to suggest that horizontal fractures having high water yielding characteristics underlie or are even near the reactor. From a hydrogeological point of view, there are no known unique features of the reactor site to suggest that ground water would affect reactor safety.

The Piedmont extends from Alabama to New Jersey and occupies many tens of thousands of square miles. The comments made in the petition would apply at virtually any location in the Piedmont. In addition, the petition cites several reports published by the Geologic Survey Branch of The Georgia Environmental Protection Division. The reports cited were prepared under my direction; I personally reviewed and approved them. There are no data in these reports that indicate the reactor at Georgia Tech is not safe or poses an environmental threat.

These findings confirm the NRC staff geologic and seismic conclusions presented in issue (7), and further support the related data and design for the Georgia Tech Research Reactor as discussed under this issue. These findings confirm that further analysis or testing is not needed for hydrogeological conditions at the Georgia Tech Research Reactor.

The Petitioner also indicated that "\* \* a sinkhole appeared next to the reactor years ago and was filled in. A [w]itness to that is still very much

alive." The Petitioner provided the NRC staff with information to contact the witness. This individual said that while he and two other individuals were walking from the facility, one of the individuals fell into a sinkhole to the armpits or so, and the two other individuals helped him get out. This individual also stated that the sinkhole was near the waste storage tank facility and that the time frame was somewhere between the late 1960s and middle 1970s. The area near the waste storage tank facility was physically examined while going over the area on foot at about 3 feet intervals. No sinkhole was observed.

In addition, the NRC staff questioned several members of the Georgia Tech Research Reactor staff. One of these Georgia Tech Research Reactor staff members recalled the sinkhole referred to by the Petitioner. However, none of the questioned Georgia Tech staff members recalled any other sinkholes at the research reactor facility. This was further confirmed by discussions with selected NRC staff members with experience related to the Georgia Tech Research Reactor. These NRC staff members were not aware of any sinkholes at the facility other than the one of concern to the Petitioner.

Additionally, drawings of the research reactor site <sup>11</sup> and physical examination of the research reactor facility and site showed no major drainage paths (other than the 72 inch storm drain line previously discussed) that could impact the Georgia Tech Research Reactor.

Construction drawings and records 12 were also reviewed and selected portions of the installation examined by the NRC staff to determine the vulnerability of the foundation structure for the Georgia Tech Research Reactor to the phenomena that were raised in the Petition. The drawings showed the bottom of the Georgia Tech Research Reactor containment building steel shell about 25 feet below finished grade. The drawings indicated that the Georgia Tech Research Reactor containment building is anchored by bolts to a steelreinforced concrete pad about 1 foot thick and to a ring foundation that extends approximately another 12 feet down under the concrete pad. Further, examination of selected portions of the foundation and containment structure found the structure consistent with the construction and drawing details. Construction test boring records also showed that the pad and ring foundation rest on material that meets

or exceeds construction specifications for safe bearing capacity. The construction test boring records showed the material at the bottom of the foundation ring to be moderately hard to hard gray gneiss. As previously discussed in issue (4) and in this issue, no information has been provided by the Petitioner or is known to the NRC staff to suggest that this foundation and support structure are not as designed or are not acceptable.

Sinkholes develop in soils or in limestone as solution cavities. Although sinkholes could develop in the soil fill material surrounding the Georgia Tech Research Reactor facility, there is no credible source for sinkhole development. Sinkholes cannot develop in or significantly affect gneiss such as that on which the Georgia Tech Research Reactor foundation is built. Therefore, the development of sinkholes near or underneath the Georgia Tech Research Reactor is not a credible event.

Even in the unlikely event of failures of the 72 inch storm drain line or the Orme Street line previously mentioned, erosion or sinkhole effects could not be expected to affect the Georgia Tech Research Reactor, since the lines are far from the research reactor containment relative to these potential effects, and the design of the reactor facility is such that it would not be impacted by such phenomena. The 72 inch storm drain is about 100 feet from the reactor containment and passes below the northwest corner of the laboratory and office building which is adjacent to the containment building. The footings for the office building, which measures approximately 90 by 130 feet, were founded on the partially weathered rock. Assuming the 72 inch line did collapse where it passes under the building, approximately a 20 feet square section of the northwest corner of the building could be affected. This section of the building houses laboratories, offices, and storage areas. Radioactive materials are not stored in this area. The remaining portion of the facility, particularly the research reactor containment building, would not be affected because of the design characteristics of the foundation and support material as previously discussed.

DPW verified that the Orme Street line is 10 to 12 feet in diameter and is about 1200 feet from the Georgia Tech Research Reactor. The sinkhole that resulted from the failure of the Orme Street line was a sinkhole approximately 50 feet in radius, which is at the upper limit of sinkhole size in the Atlanta area based on DPW experience. Based on this experience

<sup>&</sup>lt;sup>10</sup> Letter from William H. McLemore, State Geologist, Georgia Department of Natural Resources, to Marvin M. Mendonca, NRC Staff, May 11, 1995.

<sup>&</sup>lt;sup>11</sup> SAR, Figures 4.2 and 4.3, pages 29 and 30.
<sup>12</sup> Letter from R. A. Karam, Georgia Tech, to D. M. Collins, U.S.N.R.C., dated October 22, 1993.