OAK RIDGE NATIONAL LABORATORY
OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX Y
OAK RIDGE, TENNESSEE 37831

August 21, 1984

Mr. Philip Wagner, Project Manager
U. S. Nuclear Regulatory Commission Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 70611

Dear Mr. Wagner:

Subject: Initial Response to PSC Letter on LCO 4.1.9 (P-84223, dated August 14, 1984)

I expect that a lot of the questions and differences between the ORNL and PSC views can be resolved at the August 23 meeting at Region IV in Arlington; however, I thought it might be useful to write down my replies and comments in advance. The item numbers correspond to those in the attachment to P-84223.

1. Our understanding of LCO 4.1.9 is that it limits the core conditions such that the region outlet thermocouples can be relied upon to give an adequate estimate of maximum core temperatures. If any region flows were stagnated or reversed, the outlet temperature measurements would not be able to indicate the status of the region fuel temperatures. The name of the LCO implies that it provides operating restrictions to limit "core temperature rise", which is misleading. ORNL comments about "nonconservative features" are covered in item 3.

2. Our comment that the current approach is "overly conservative" stems from the fact that, according to our calculations with the ORECA code, region flow stagnation is almost impossible to achieve under normal operating conditions. Hence the extra restrictions put on the operation by LCO 4.1.9 appear to be unnecessary. From a safety standpoint, we would have no complaints about the current LCO.

It is also our impression that the proposed ORNL scheme would be easier to implement (which is PSC's problem) and enforce (which is NRC's problem), so we would leave that evaluation to others.

PSC notes th t the current scheme minimizes the number of orifice adjustments required in going from low to high power, and that this is desirable. It appears to us that a scheme such as in ORNL's proposal, which starts out going for equal outlet temperatures at very low powers, would require simpler, if not fewer, manipulations. In any case, from our experience with sticking drives, it would seem beneficial to operate them occasionally to keep them limber.

3. Our comments about non-conservative features of the current LCO 4.1.9 had to do with the "hole" in LCO 4.1.7 between T<950F and on-scale on Fig. 4.1.7-1. PSC's proposed fix in their item 3 would cure that problem. Our other concern was that since PSC's stagnation analysis was

done for steady-state equilibrium cases only, it doesn't necessarily follow that it would be conservative for transients, especially those involving rapid power and flow reductions from full power. Our subsequent analyses of representative shutdowns using ORECA have indicated that this would not be a problem, however.

4. The low-flow measurement situation will hopefully be clarified at the meeting. From what we have observed, however, it is difficult to tell what the "real" low-range flow is. The plant data logger appears to have several estimates, and PSC's HISTORY code has an elaborate scheme for estimating it. Sometimes these estimates vary widely, and sometimes they are all quite different from "heat balance" estimates of the flow. We assume that the plant operators use panel readouts of the low-range d/p cells, which should give them good estimates. However, from the data we obtained, these readings don't necessarily make it to the DAS, which we understand is what PSC uses to determine if they are approaching or violating a tech spec limit. A good flow estimate is important in that it is a primary parameter in both the old and proposed versions of LCO 4.1.9. Additionally, estimates of core power in the low range are also subject to considerable % of reading error. We believe that an "official" estimate of core power during shutdowns should include calculated afterheat.

5. In addition to commenting on the relative merits of the proposed approaches, (which we cover above), PSC states that ORNL's proposed test to observe flow redistributions is unacceptable because stagnation would occur long before it could be detected. This is contrary by an enormous margin to what our ORECA code calculations indicate, and is a very important point to pursue. If PSC has observed such behavior on FSV, then the fidelity of ORECA and GAT's RECA code (which generally "agrees" with ORECA) is in question. These codes have been used extensively in NRC safety evaluations, and if indeed there is such a discrepancy, some verification tests would be advisable.

Yours truly,

Syd Ball

S. J. Ball, Manager
HTGR Safety Studies for NRC

cc: J. C. Cleveland
R. B. Foulds DAE/RES
R. M. Harrington
R. Ireland NRC/RIV
T. S. Kress
A. P. Malinauskas
D. L. Moses
Frank Novachek PSC (3)
G. L. Plumlee, III NRC/FSV
P. M. Williams NRC/NRR