February 12, 2002

Dr. Thomas E. Murley
9106 McDonald Drive
Bethesda, MD 20817

SUBJECT: RESPONSE TO YOUR LETTER TO MR. THOMAS KING, DATED
                NOVEMBER 12, 2001

Dear Dr. Tom Murley:

Thank you for your participation in and written comments on the High-Temperature Gas-Cooled Reactor (HTGR) Safety and Research Issues Workshop that was held at NRC on October 10-12, 2001. In your letter of November 12, 2001, you raised concerns regarding the migration of fuel pebbles into the non-fuel inner zone of the pebble-bed modular reactor (PBMR) and the potential for sudden increases in reactivity caused by pebble-bed compaction.

Unfortunately, recent events and their impact on our mail system significantly delayed our receipt of your letter and, therefore, this response. As you may know, Tom King retired from the NRC at the end of December, and I have taken his place as Director of the Division of Systems Analysis and Regulatory Effectiveness. In response to your concerns, we recognize that fuel-pebble migration and pebble-bed compaction are issues that need to be considered and are including the specific issues you raise as topics for investigation in our preapplication activities and forthcoming NRC Advanced Reactors Research Plan.

Our PBMR research efforts to date have included preliminary in-house scoping calculations to evaluate the reactivity insertions caused by postulated compactions of the pebble bed core. Donald Carlson, of my staff, performed these calculations immediately after the October workshop in response to your questions. His initial results are consistent with the published compaction analysis results for similar pebble-bed designs.

In following up on the compaction issue, we intend to (1) identify credible scenarios that could lead to global or localized compaction of the pebble bed core (e.g., seismic events, local pebble bridging), (2) use available test data and modeling results to help bound the maximum rates and extent of compaction to be considered, and (3) employ coupled reactor kinetics and thermal feedback models in evaluating the resulting reactivity and power excursions under various initial and boundary conditions (e.g., initial core at zero power, equilibrium core at full power, scram failure, and rod withdrawal).

Credible power transients resulting from pebble-bed compaction and other HTGR reactivity insertion events will be considered in determining the accident testing requirements for HTGR fuels.

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In closing, I would like to thank you again for your insightful comments. Please feel free to contact me (fxe@nrc.gov, 301-415-7499) or Dr. Carlson (dec1@nrc.gov, 301-415-0109) if you would like to further pursue any comments or questions in this area.

                                    Sincerely,

                                    /RA/

                                    Farouk Eltawila, Director
                                    Division of Systems Analysis and Regulatory Effectiveness
                                    Office of Nuclear Regulatory Research

cc:
W. Travers, EDO
S. Collins, NRR
A. Thadani/R. Zimmerman, RES
J. Larkins, ACRS

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                                        Farouk Eltawila, Director
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                                        Office of Nuclear Regulatory Research

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