

September 10, 2015

Mr. Vito Nuccio  
Reactor Administrator  
Department of the Interior  
U.S. Geological Survey  
PO Box 25046 MS 911  
Denver, CO 80225-0046

SUBJECT: U.S. GEOLOGICAL SURVEY – REQUEST FOR ADDITIONAL INFORMATION  
REGARDING THE THERMAL-HYDRAULIC ANALYSIS OF THE USGS TRIGA  
RESEARCH REACTOR TO SUPPORT THE LICENSE RENEWAL REVIEW  
(TAC NO. ME1593)

Dear Mr. Nuccio:

The U.S. Nuclear Regulatory Commission (NRC) is continuing its review of the U.S. Geological Survey (USGS) application dated January 5, 2009 (a redacted version of the safety analysis report is available on the NRC's public Web site at [www.nrc.gov](http://www.nrc.gov) under Agencywide Documents Access and Management System Accession No. ML092120136), as supplemented, for the renewal of Facility Operating License No. R-113 for the USGS TRIGA Reactor.

During our review, questions have arisen for which additional information is needed. The enclosed request for additional information (RAI) identifies the additional information needed to complete our review. We request that you provide responses to the enclosed RAI within 45 days from the date of this letter.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.30(b), you must execute your response in a signed original document under oath or affirmation. Your response must be submitted in accordance with 10 CFR 50.4, "Written communications." Information included in your response that is considered sensitive or proprietary, that you seek to have withheld from the public, must be marked in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Any information related to security should be submitted in accordance with 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements." Following receipt of the additional information, we will continue our evaluation of your renewal request.

V. Nuccio

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If you have any questions about this review, or if you need additional time to respond to this request, please contact me by telephone at (301) 415-0893 or by electronic mail at [Geoffrey.Wertz@nrc.gov](mailto:Geoffrey.Wertz@nrc.gov).

Sincerely,

*/RA/*

Geoffrey A. Wertz, Project Manager  
Research and Test Reactors Licensing Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-274  
License No. R-113

Enclosure:  
Request for additional information

cc: See next page

U.S. Geological Survey TRIGA Reactor

Docket No. 50-274

cc:

Environmental Services Manager  
480 S. Allison Pkwy.  
Lakewood, CO 80226

State of Colorado  
Radiation Program  
HMWM-RM-B2  
4300 Cherry Creek Drive South  
Denver, CO 80246

Timothy DeBey  
Reactor Manager  
U.S. Geological Survey  
Box 25046 - Mail Stop 424  
Denver Federal Center  
Denver, CO 80225

Test, Research, and Training  
Reactor Newsletter  
University of Florida  
202 Nuclear Sciences Center  
Gainesville, FL 32611

V. Nuccio

- 2 -

If you have any questions about this review, or if you need additional time to respond to this request, please contact me by telephone at (301) 415-0893 or by electronic mail at [Geoffrey.Wertz@nrc.gov](mailto:Geoffrey.Wertz@nrc.gov).

Sincerely,

Geoffrey A. Wertz, Project Manager  
Research and Test Reactors Licensing Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-274  
License No. R-113

Enclosure:  
Request for additional information

cc: See next page

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**ADAMS Accession No.: ML15252A009**

\*concurrence via e-mail

NRR-088

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| NAME   | GWertz        | ELee            | JStaudenmeier | AAdams       | GWertz       |
| DATE   | 09/09/2015    | 09/09/2015      | 09/09/2015    |              |              |

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REQUEST FOR ADDITIONAL INFORMATION AND CLARIFICATION

FOR THE RENEWAL OF

THE U.S. GEOLOGICAL SURVEY TRIGA REACTOR

LICENSE NO. R-113; DOCKET NO. 50-274

The U.S. Nuclear Regulatory Commission (NRC) is continuing its review of the U.S. Geological Survey (USGS) TRIGA Reactor (GSTR) license renewal application dated January 5, 2009 (a redacted version of the safety analysis report is available on the NRC's public Web site at [www.nrc.gov](http://www.nrc.gov) under Agencywide Documents Access and Management System (ADAMS) Accession No. ML092120136), as supplemented. During our review, questions have arisen for which additional information is needed. This request for additional information (RAI) identifies the additional information needed to complete our review. We request that you provide responses to this RAI within 45 days from the date of this letter.

1. The NRC staff performed confirmatory calculations based on the GSTR thermal-hydraulic analysis (T-HA), provided by letters dated May 17, and October 31, 2013 (ADAMS Accession Nos. ML13162A662, and ML13311A047 (redacted version), respectively). The NRC staff's confirmatory calculations indicated that the limiting core configuration (LCC) provided did not result in stable power and flow conditions. As such, a determination of the departure from nucleate boiling ratio (DNBR) could not be established. The NRC staff requests that USGS provide a T-HA for their proposed LCC that results in stable power and flow conditions (stability) with a DNBR of 2.0 or greater. The NRC staff has identified the following items that USGS should consider in the analysis:
  - a. The outer dimension (OD) of the fuel element diameter used in the LCC was 1.47 inches (in.). Information from the fuel vendor (General Atomics) indicates that the fuel OD may be as large as 1.478 in. Verify the correct OD for the TRIGA fuel elements used at GSTR and adjust the hydraulic diameters or other affected parameters from the USGS LCC T-HA, if necessary.
  - b. The parameters chosen that defined the flow area of the limiting hot channel do not appear to be consistent for performing the limiting sub-channel analysis. The flow area appears to be approximately 20 percent larger than the limiting channel flow area, as determined by the NRC staff in their confirmatory analysis, due to non-conservative assumptions in the selection of the hydraulic channel orientation relative to the limiting fuel elements. Determine a limiting hot channel flow area conservative for the LCC T-HA.
  - c. If any assumptions were used in the updated LCC T-HA with regard to any difference between the temperature of the bulk pool water versus the temperature of the core inlet (at the lower core support (grid) plate entrance to the fuel array), provide supporting validation information to substantiate any assumptions used, as necessary.

Enclosure