

UNIVERSITY *of* MISSOURI

RESEARCH REACTOR CENTER

December 19, 2011

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Mail Station P1-37
Washington, DC 20555-0001

REFERENCE: Docket 50-186
University of Missouri-Columbia Research Reactor
Amended Facility License R-103

SUBJECT: Written communication regarding "University of Missouri – Columbia – Request for Additional Information, Re: License Amendment, Center Test Hole (TAC No. ME1876)"

By letter dated August 6, 2009, the University of Missouri-Columbia Research Reactor (MURR) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) to amend the Technical Specifications, which are appended to Facility License R-103, that would authorize the implementation of an engineered safety device that would prevent operation of the reactor unless the center test hole canister or strainer is inserted and latched onto the inner reactor pressure vessel. Approval of this Amendment would allow greater flexibility and capacity in the center test hole for the irradiation of high specific activity radioisotopes that are used for radiopharmaceutical research and cancer treatments.

By letter dated June 1, 2010, as part of the facility license renewal process, the NRC requested additional information and clarification regarding the proposed Amendment in the form of seven (7) questions. By letter dated August 31, 2010, the MURR responded to those questions.

By letter dated December 27, 2010, the NRC requested additional information and clarification regarding the proposed Amendment in the form of five (5) questions. By letter dated January 31, 2011, the MURR responded to those questions.

On July 1, 2011, the NRC requested additional information and clarification regarding the proposed Amendment in the form of four (4) questions. By letter dated July 11, 2011, the MURR responded to those questions.

On December 15 and 16, 2011, by telephone and electronic mail (e-mail), the NRC (Alexander Adams, Jr., Senior Project Manager) requested clarification on the usage of the "center test hole Strainer" and its relationship to the Technical Specifications (TS). Enclosed is a more detailed description of the Strainer and revised TS pages based on this discussion.



If there are any questions regarding this response, please contact me at (573) 882-5319. I declare under penalty of perjury that the foregoing is true and correct.

Sincerely,



John L. Fruits
Reactor Manager

ENDORSEMENT:

Reviewed and Approved,



Ralph A. Butler, P.E.
Director

Attachments: 1. Revised Technical Specification 3.3, Pages 3 of 5 and 5 of 5

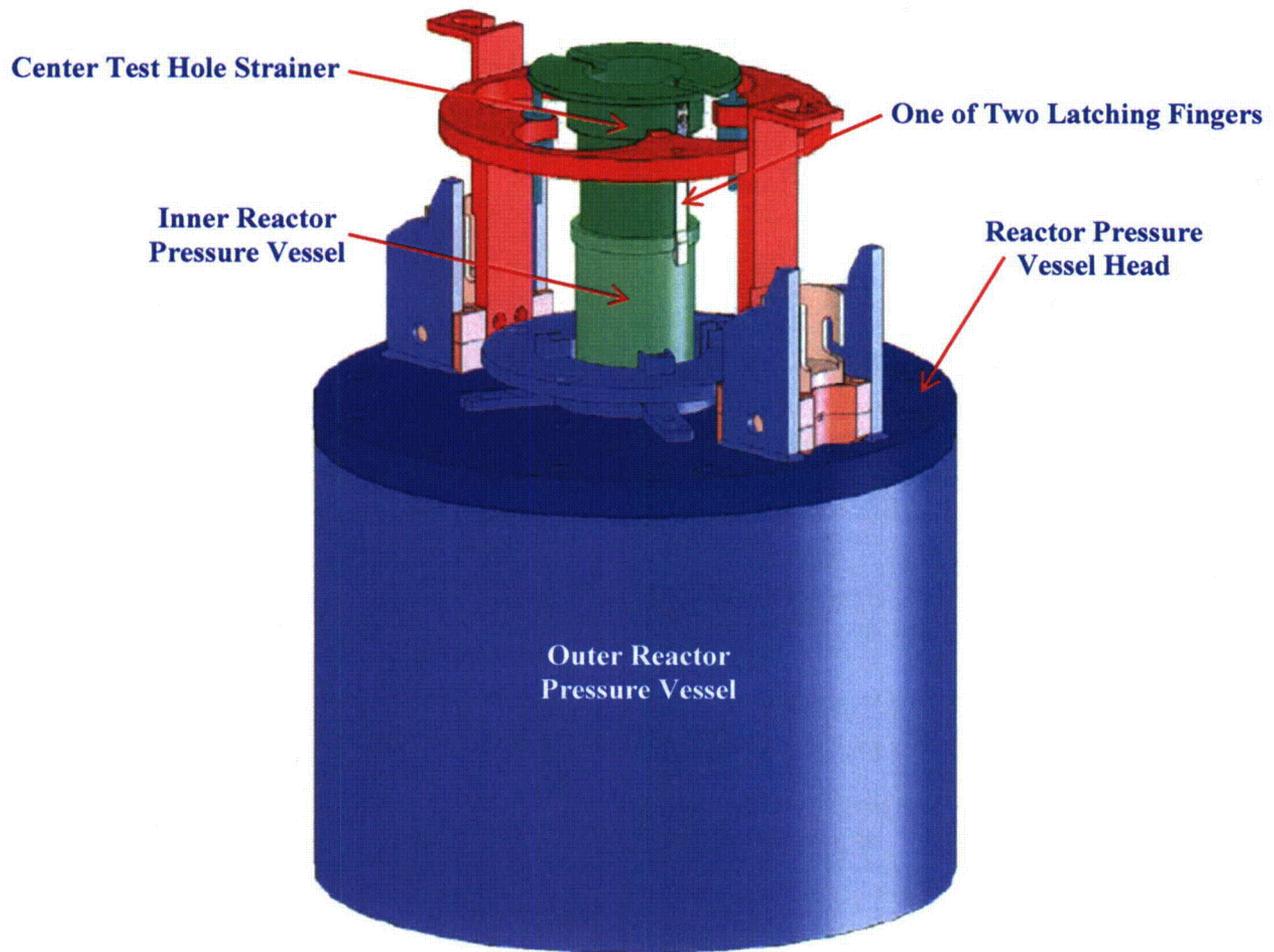
xc: Reactor Advisory Committee
Reactor Safety Subcommittee
Dr. Robert Duncan, Vice Chancellor for Research
Mr. Craig Basset, U.S. NRC
Mr. Alexander Adams, U.S. NRC



MARGEE P. STOUT
My Commission Expires
March 24, 2012
Montgomery County
Commission #08511436



The center test hole Strainer is briefly described on Page 2 of the original application, dated August 6, 2009, to Amend the Technical Specification appended to Facility License R-103. The Strainer is installed to preclude the possibility of any foreign objects from entering the flux trap region if the reactor is operated without the Center Test Hole Canister inserted. The Strainer latching mechanism is of the exact same design as that of the Center Test Hole Canister. When installed, the Strainer is positively determined by a latching mechanism located at the top of the assembly. The latching mechanism consists of two Inconel or Stainless Steel fingers which secure the Strainer to the upper portion of the inner reactor pressure vessel. The fingers, which are attached to the upper section (head piece) of the Strainer by four (two per finger) countersunk, stainless steel screws, are positioned 180 degrees apart and are totally independent of one another. The Strainer latching mechanism has not been modified or altered from its original design and no failures have occurred in the nearly 45 years of operation.



As described on Page 5 of the responses, by letter dated July 11, 2011, to the Request for Additional Information (RAI), a special removal tool, with an overall length of approximately 20 feet, is required to unlatch and remove the center test hole canister from the inner pressure vessel. The head of the removal tool must be inserted into the center test hole canister wear ring in order to spread the latching fingers

sufficiently to disengage the canister from the inner pressure vessel. This same tool is also used to remove the Strainer from the inner pressure vessel.

The overall length of the center test hole Strainer is only 7 inches; therefore it does not enter into the flux trap region of the core and hence there is no reactivity contribution to the reactor when it is installed. Essentially, the only time that it is used is to perform reactivity measurements of the center test hole canister (empty and with experiments loaded) at very low powers (at or below 50 kW, or less than 0.5% of the MURR full core power level of 10 MW). Reactivity measurement methodology was previously described in detail in the response to Question 10.5.e, by letter dated August 31, 2010, from the relicensing RAIs, by letter dated June 1, 2010.

Below are two photographs of the center test hole Strainer.





TECHNICAL SPECIFICATION

UNIVERSITY OF MISSOURI RESEARCH REACTOR FACILITY

Number 3.3

Page 3 of 5

Date _____

Amendment No. _____

SUBJECT: Reactor Safety System (continued)

Manual Scram	1	1	1	Push Button at Control Console
Center Test Hole	2 ⁽⁶⁾	2 ⁽⁶⁾	2 ⁽⁶⁾	Scram as a result of removing the center test hole removable experiment test tubes or strainer

- (1) Flow orifice or heat exchanger ΔP (psi) in each operating heat exchanger leg corresponding to the flow value in the table.
- (2) Not required below 50 KW operation if natural convection flange and pressure vessel cover are removed or in operation with the reactor subcritical by a margin of at least 0.015 ΔK .
- (3) Trip pressure is that which corresponds to the pressurizer pressure indicated in the table with normal primary coolant flow.
- (4) Flow orifice ΔP (psi) corresponding to the flow value in the table.
- (5) Core ΔP (psi) corresponding to the core flow value in the table.
- (6) Not required if reactivity worth of the center test hole removable experiment test tubes and its contents or the strainer is less than the reactivity limit of specification 3.1.h. This safety function shall only be bypassed with specific authorization from the Reactor Manager.

Bases

- a. The specifications on high power, primary coolant flow, primary coolant pressure, and reactor inlet temperature provide for the safety system settings outlined in specifications 2.2.a, 2.2.b, and 2.2.c. In Mode I and II operation the core differential temperature is approximately 17°F.



TECHNICAL SPECIFICATION

UNIVERSITY OF MISSOURI RESEARCH REACTOR FACILITY

Number 3.3

Page 5 of 5

Date _____

Amendment No. _____

SUBJECT: Reactor Safety System (continued)

The scrams from the primary and pool coolant isolation valves (507A/B and 509) leaving their full open position provide a first line of protection for a loss of flow accident in that system initiated by an inadvertent closure of the isolation valve/s.

The power level interlock (PLI) scram provides assurance that the reactor cannot be operated with a power level greater than that authorized for the mode of operation selected on the Mode Selector Switch. The PLI scram also provides the interlock to assure that the reactor cannot be operated in Mode I with a pool or primary coolant flow scram by-passed.

The facility evacuation and reactor isolation scrams provide assurance that the reactor is shutdown for any condition which initiates or leads to the initiation of an evacuation or isolation.

The manual scram provides assurance that the reactor can be shutdown by the operator if an automatic function fails to initiate a scram or if the operator detects an impending unsafe condition prior to the automatic scram initiation.

The center test hole scram provides assurance that the reactor can not be operated unless the removable experiment test tubes or the strainer is inserted and latched in the center test hole. This is required any time the reactivity worth of the center test hole removable experiment test tubes and the contained experiments or the strainer exceeds the limit of specification 3.1.h. (Ref. Section 3.5 of Add. 3 to HSR). The center test hole scram may be bypassed if the total reactivity worth of the removable experiment test tubes and the contained experiments or the strainer does not exceed the limit of specification 3.1.h and is authorized by the Reactor Manger.