

OCT 28 1993

PUBLIC

030-32695

The Curators of the University  
Of Missouri  
ATTN: J. Charles McKibben  
Associate Director  
Research Reactor, Research Park  
Columbia, MO 65211

Dear Mr. McKibben:

This refers to your letter dated August 20, 1993, requesting written concurrence that the Stage II experiments in the Actinide Research Project (TRUMP-S) will not require an amendment to License No. 24-00513-39. We concur with your assessment that the scope of the proposed final experiments in Stage II, involving mixing actinides, are covered under your Broad Scope Material License, as described in your application dated February 27, 1992, and that an amendment to your license is not required.

We base our decision on the results of our review of the described proposed final experiments involving the mixing of actinides, including the chemical hazard analysis dated September 16, 1993. In addition, a re-evaluation of the information provided in the addendum to Attachment C, dated August 7, 1992, involving an evaluation of off-site maximum dose for the Stage II experiments, has been completed.

If you have any questions or require clarification on any of the information stated above, you may contact John Madera or Cassandra Frazier of my staff at (708) 790-5625.

Sincerely,

Roy J. Caniano, Chief  
Nuclear Materials Safety Branch

cc: J. Glenn, NMSS  
R. Lickus, RIII

RIII  
*[Signature]*  
Frazier/bt  
10/28/93

RIII  
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Madera  
10/28/93

RIII  
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Caniano  
10/28/93

RIII  
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Axelson  
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Berson  
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NMSS  
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Vacca  
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OGC  
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REQUEST FOR TECHNICAL ASSISTANCE

DATE: September 20, 1993

TO: John Glenn, Chief, Medical, Academic, and Commercial  
Use Safety Branch, NMSS

*JRM 9/20/93*  
FROM: Roy Caniano, Chief, Nuclear Materials Safety Branch  
Region III

LICENSEE: University of Missouri LICENSE NO. 24-00513-39

\_\_\_\_\_ Control No. \_\_\_\_\_ (enclosed)

X Letter Dated 8/20/93 & 9/16/93 (enclosed)

\_\_\_\_\_ Suggested change in licensing procedure (enclosed)

\_\_\_\_\_ Other (see remarks)

Problem/Issue: Licensee is requesting written concurrence that Stage II experiments (involving mixing actinides) in the Actinide Research Project will not require an amendment to their license.

Action Required: Expedite review of licensee's Actinide Research Project dated August 20, 1993, including a review of the analysis submitted by the licensee, of the chemical hazards of mixing actinides elements, dated September 16, 1993.

Alternatives Considered: 1). Review licensee's procedures for use of licensed material to determine if amendment required. 2). Review the licensee's chemical hazards analysis to determine if their evaluation of the need to not have an emergency plan (refer to 10 CFR 30.32(i)(1)(i)), submitted with the license application, may be effected by mixing the actinides.

Recommended Alternative: Recommend performing all the alternatives mentioned above.

Remarks: The Region reviewed University of Missouri renewal application dated February 27, 1992. The application contains the following statement regarding use of licensed material " Currently, a research project has been funded at the University of Missouri, the objective of which is to make basic scientific measurements to obtain thermochemical properties data using small amount (one gram or less in any one experiment) of depleted uranium or transuranic (TRU) material" Based partly on this statement and other information in the application, it is Region III's conclusion that an amendment request is not required. However, we request a review of the chemical hazard analysis as it relates to the EP evaluation previously submitted to determine if an amendment to the EP evaluation may be required.

Regional Reviewer: Cassandra Frazier

Reviewer Code: R-3

Reviewer Phone No. (708) 790-5704



UNIVERSITY OF MISSOURI-COLUMBIA

Research Reactor Center

Research Park  
Columbia, Missouri 65211  
Telephone (314) 882-4211  
FAX (314) 882-3443

August 20, 1993

U.S. Nuclear Regulatory Commission  
Region III  
Materials Licensing Section  
799 Roosevelt Road  
Glen Ellyn, IL 60137

Attention: Mr. John Madera, Chief

Dear Mr. Madera:

Enclosed you will find a description of the final experiments in Stage II of the Actinide Research Project (TRUMP-S) that we are planning to undertake in the Alpha Laboratory located at the University of Missouri-Columbia Research Reactor Center. This description provides an update of experimental progress in the TRUMP-S research project. We believe the scope of these final Stage II experiments are covered under Broad Scope Materials License No. 24-00513-39 as described in the materials submitted in support of the license application dated February 27, 1992, including the August 7, 1992 addendum to Attachment C of the application.

These Stage II experiments will not increase the probability or consequences of accidents previously evaluated in the issuance of Broad Scope Materials License No. 24-00513-39 and do not present a reduction in the safety margin of the experiments.

We request your written concurrence that these Stage II experiments in the Actinide Research Project do not require an amendment to License No. 24-00513-39.

We appreciate your prompt attention to this matter. If you have any questions, please contact John Ernst at 314-882-5226.

Sincerely,

John P. Ernst, CHP  
Manager  
Reactor Health Physics

Reviewed and Approved:

J. Charles McKibben  
Associate Director

Enclosure

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AUG 26 1993

REGION III

AUG 26 1993



COLUMBIA KANSAS CITY ROLLA ST. LOUIS

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August 20, 1993

Final Stage II Experiments  
Actinide Research Project

The objective of Stage I and Stage II of the Actinide Research Project is to make basic scientific measurements of the fundamental thermochemical properties for the actinides (depleted uranium, neptunium-237, plutonium-239, and americium-241) and rare earth elements in order to predict separation efficiencies. The final part of Stage II of the research project will involve the use of mixtures of actinides in order to test the separation efficiencies measured earlier.

The project was originally approved by amendments to two licenses held by The Curators of the University of Missouri. The uranium and plutonium were covered by License No. SNM-247, amendment 12 (March 19, 1990) and amendment 16 (May 13, 1991). The neptunium and americium were covered by License No. 24-00513-32, amendment 74 (April 5, 1990) and amendment 78 (April 30, 1991). The original license amendments are the subject of a Subpart L proceeding (ASLBP No. 90-613-02 MLA) that is now before the Commissioners of the USNRC. With the July 14, 1993 issuance of a separate broad scope materials license for the University of Missouri Research Reactor (MURR) the project is now covered by one license, No. 24-00153-39.

The experiments, facilities and equipment used to accomplish the research are described in detail in the original amendment request and in numerous filings and depositions in the Subpart L proceeding, as well as in the request for the new license. The experiments these documents describe were Stage I and all but the end of Stage II of the Actinide Research Project. These thermochemical experiments were accomplished using single actinides in less than 1 gram quantities.

The research is now reaching the final part of Stage II of the project. The final series of experiments in Stage II envision using mixtures of the same actinides in which the sum of actinide masses will not exceed 1 gram. Conducting experiments with mixtures of the actinide materials does not increase the risk to the experimenters or the public. In fact, the risks associated with use of a mixture of actinides are smaller than those associated with use of one gram of a single more radioactive actinide. The handling procedures and the facilities will be the same ones developed and demonstrated safe for similar research activities over the last three years. The proposed research does not change the actinides involved nor require an increase in possession limits. The only difference from the experiments described in the filings and depositions in the Subpart L proceeding is that a mixture of actinides will be used rather than a single actinide.

Evaluations of offsite maximum doses in the event of an accident demonstrate that Stage II experiments, including mixed actinides, do not involve a significant hazard to the health and safety of the public. These evaluations were provided in Attachment C and an August 7, 1992 addendum to Attachment C of the application for license 24-00513-39. The evaluations show that in an incredible accident scenario involving the total material within the license possession limit, taking no credit for safety features and filtering, the total effective dose equivalent is estimated to be 21% of the dose limit that requires an emergency plan for a materials license. Although an emergency plan is not required for the experiments, the facility where the research is conducted is subject to an NRC approved R-103 License emergency plan.



UNIVERSITY OF MISSOURI-COLUMBIA

Research Reactor Facility

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September 16, 1993

U.S. Nuclear Regulatory Commission  
Region III  
Materials Licensing Section  
799 Roosevelt Road  
Glen Ellyn, IL 60137

Attention: Ms. Cassandra Frazier, Senior Reviewer/Health Physicist

Dear Ms. Frazier:

Enclosed you will find an answer to the question you posed in our September 15, 1993 phone conversation. The specific question we attempted to answer is the following:

Is there any chemical reaction that could occur upon mixing the actinides that would increase the hazard associated with the proposed experiments?

If you need information that the attached evaluation does not provide, please do not hesitate to contact John Ernst at 314-882-5226. The proposed schedule has experiments starting the first week of October, however, the results of the current experiments may alter the schedule somewhat. We will of course await your notification before proceeding with the proposed experiments. We appreciate your prompt attention to this matter.

Sincerely,

John P. Ernst, CHP  
Manager  
Reactor Health Physics

Reviewed and Approved,

J. Charles McKibben  
Associate Director

Enclosure



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UNIVERSITY OF MISSOURI - COLUMBIA  
MURR INTRA-DEPARTMENT CORRESPONDENCE

Date: 93.09.16  
To: John Ernst  
From: Turk Storvick, C. Leon Krueger  
Subject: Chemical hazards of mixing actinide elements

We do not expect any reactions between actinides or their compounds which will increase the hazard associated with the proposed TRUMP-S experiments. The actinide elements are chemically very similar to each other. This statement implies that they are expected to interact only weakly with each other, and to chemically form similar products when reacting with other reagents. The interaction between one actinide and another is expected to be similar to the well studied (and very weak) interactions between members of lanthanide series. These expectations apply to alloys and solutions of the metallic (reduced forms) of the elements as well as to salts (oxidized forms) and their solutions.

Our familiarity with the experience of the IFR program and with other processes involving mixed actinides provides empirical evidence of the applicability of the above arguments.

*Thomas Storvick*  
*C. Leon Krueger*



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

October 7, 1993

MEMORANDUM FOR: Roy J. Caniano, Chief  
Nuclear Materials Safety Branch, Region III

FROM: E. William Brach, Deputy Director  
Division of Industrial and  
Medical Nuclear Safety, NMSS

SUBJECT: REQUEST FOR TECHNICAL ASSISTANCE ON REVIEW OF UNIVERSITY  
OF MISSOURI ACTINIDE RESEARCH PROJECT

We have reviewed your subject request of September 24, 1993 for assistance on the review of the proposal by the University of Missouri to mix small amounts of actinides in less than a gram quantity. In the information included in your request, the licensee claims they already addressed the mixing of actinides in their license renewal application. The licensee makes reference to an August 7, 1992 addendum to their license application which evaluated the offsite maximum dose of the Stage II experiments, including mixing of actinides. If this submittal was not acceptable or if it did not adequately support conclusions on mixing of actinides, then the licensee should be requested to provide the dose evaluation as required in 10 CFR 30.32(i)(1)(i). The licensee's letters dated August 20, 1993 and September 16, 1993 appear to support the earlier referenced evaluation that the mixing of the actinides presents risks which are less than and are bounded by the experiments described in the August 7, 1992 correspondence. FCSS has also reviewed the Technical Assistance Request and agrees that the proposed experiments by the licensee involving mixing of actinides can be bounded by the same 10 CFR 30.32 evaluation performed for single actinides.

A handwritten signature in cursive script, appearing to read "E. William Brach".

E. William Brach, Deputy Director  
Division of Industrial and  
Medical Nuclear Safety, NMSS

cc: R. Pierson, FCSS

OCT 14 1993





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Research Reactor Facility

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September 16, 1993

U.S. Nuclear Regulatory Commission  
Region III  
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799 Roosevelt Road  
Glen Ellyn, IL 60137

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Reactor Health Physics

Reviewed and Approved,

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Associate Director

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SEP 20 1993

REGION III



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*Tammie Stewart*  
*C. Leon Krueger*



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August 20, 1993

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