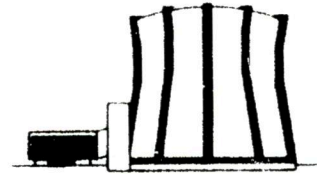


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NUCLEAR SCIENCE CENTER
409/845-7551

May 20, 1999

99-0132

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Revised Amendment to the Nuclear Science Center's Technical Specifications

- Reference:
1. Texas A&M University Nuclear Science Center Reactor License R-83
 2. Texas A&M University Nuclear Science Center Letter #98-0009
 3. Texas A&M University Nuclear Science Center Letter #98-0010
 4. Safety Evaluation for the Production of Iodine-125 at the Texas A&M University Nuclear Science Center
 5. NRC Information Notice 97-34

Dear Sir,

In January 1998, the Texas A&M University Nuclear Science Center (NSC) sent two letters to the NRC requesting approval for a change and modification to the NSC's Technical Specifications (Facility License No. R-83, Docket No. 50-128). Please see the enclosed NSC correspondences #98-0009 and #98-0010. Mr. Theodore Michaels has been point of contact for reviewing the NSC's technical specification change request. There have been several letters between the NSC and Mr. Michaels concerning these technical specification changes and Mr. Michaels visited the NSC in October 1998. This letter reviews the NSC's technical specifications change intentions and answers Mr. Michaels's remaining questions concerning the proposed experiment that will produce iodine-125 from the activation of xenon-124 gas.

It is the intent of the NSC to continue with both technical specification changes. The first concerns minor changes that reflect changes in regulations. This change is outlined in NSC letter #98-0009.

The second change concerns the proposed new xenon irradiation experiment as outlined in NSC letter #98-0010. There are two changes involved with this new experiment. The first change involves placing a limit on xenon-125 produced and maintained in pool inventory. The second change involves the addition of a technical specification that would make a new facility

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air monitoring (FAM) channel mandatory when an appreciable amount of xenon-125 exists in the containment building. These technical specification changes as well as NRC approval are deemed necessary to produce an amount of xenon-125 over 1000 Ci.

The Revised Technical Specification Changes

The following are the proposed NSC Technical Specification changes outlined in NSC letter #98-0010.

Monitoring for ^{125}Xe and ^{125}I is necessary during these experiments; therefore, Section 3.5, Radiation Monitoring Systems and Effluents, of the Technical Specifications should have a new sub-section added. Section 3.5.3 should read as follows.

3.5.3 Xenon and Iodine Monitoring

Applicability

This specification applies to the radiation monitoring systems necessary to monitor and control the concentration of any effluent releases during the production of ^{125}I from the radioactive decay of ^{125}Xe .

Objective

The objective is to assure that sufficient radiation monitoring information is available to the operator to insure that the health and safety of the general public is not endangered during the production of ^{125}I .

Specification

No experiment that involves active handling of ^{125}Xe and ^{125}I may be performed unless the following radiation monitoring systems are operable. No experiment may be performed, except decay of ^{125}Xe , unless the ^{125}Xe effluent monitoring channel is operable.

<u>Radiation Monitoring Systems*</u>	<u>Number</u>
^{125}Xe Effluent Monitoring Channel	1
^{125}I Air Monitor	1

- * For periods of maintenance to the ^{125}Xe effluent monitoring channel, the intent of this specification will be satisfied if it is replaced by building gas samples.

Basis

Normal facility effluent monitors are not calibrated for ^{125}Xe or ^{125}I . The ^{125}Xe channel provides information to operators in the event there is a significant release of ^{125}Xe during the production of ^{125}I .

3.6.4 **Xenon Irradiation for Iodine Production**

Applicability

This specification applies to the experiments that produce I-125 from the activation of enriched ^{124}Xe and the decay of ^{125}Xe .

Objective

The objective is to prevent excessive release of radioactivity by limiting the quantity and radioactive material inventory of the experiment.

Specifications

- (a) ^{124}Xe activation experiments shall be controlled such that the total single experiment activity produced is limited to no more than 2000 Ci of ^{125}Xe .
- (b) The total facility ^{125}Xe inventory of all experiments shall not exceed 3500 Ci.

Bases

These specifications are intended to prevent exceeding the air concentration limits for causing an emergency action level greater than an alert.

The NSC has procedures for alert conditions and the goal is to prevent an accidental release that would produce an emergency greater than an alert.

Modification of the Current Experiment Authorization (EA-26) (Iodine-125 Production)

The current experiment authorization was approved by the Texas A&M University Reactor Safety Board (RSB) on November 07, 1998. The experiment authorization will be modified to accommodate recent events and calculations. These modifications will explicitly include:

1. Activation and inventory limits of xenon-125 per experiment,
2. Facility xenon monitoring,

3. Fume hood specifications,
4. Iodine monitoring system description during handling and the personnel thyroid monitoring program,
5. Experiment handling procedures,
6. Emergency procedures.

These modifications will be up for approval by the RSB in a meeting scheduled at the end of May.

NSC Position

The NSC proposes to continue operation under the current and modified Experiment Authorization (EA-26). The NSC requests to continue with the technical specification change as outlined in this letter. These changes are in anticipation of increasing the activity of xenon-125 produced in the future. The remainder of this letter will address the areas of concern the NRC had with the general experiment.

NRC Questions on the Experiment

From a conversation between you and Mr. Sanchez in March 1999, you proposed four main concerns that you would like the NSC to address. They are listed below:

1. Confusion was generated due to two fence line dose calculations in the safety analysis report.
2. What will be the pressure and temperature inside the experimental device during irradiation?
3. Would the handling booth constitute a fume hood?
4. The NRC would like to see a statement in the safety analysis report which states that all materials used in the design were chosen due to their ability to withstand radiation.

Answers and Comments to the NRC Questions and Concerns

Answer: 01

The first calculation was a dose calculation performed at the NSC fence line while the second more involved calculation calculated the dose rate at 1.8 kilometers away from the site. After reviewing both calculations and comparing both to the radiation levels outline in the Revised Appendix 1 of NUREG-0849 Emergency Action Levels (NRC Information Notice 97-34), we determined that 3,500 Ci of xenon-125 could be released without causing a site emergency. Therefore, the NSC Technical Specifications will have a xenon-125 inventory limit of 3,500 Ci.

Answer: 02

The weakest point in the design is the pressure detector diaphragm used during the transfer of the xenon gas to the decay chamber. The diaphragm is rated up to 300 psi. Our calculation, based on very conservative assumptions, shows that the pressure of the irradiator will be much less than 300 psi. Along with this calculation, the NSC has modified the irradiator to allow for pressure measurement in the irradiation cylinder during irradiation. This will determine the exact pressure in the irradiator.

It should be noted that the experiment has two containment boundaries. The failure of the primary boundary does not mean that the secondary containment will be breached as well.

Answer: 03

In order to constitute a fume hood, the face velocity must be 100 cfm or greater in the handling booth. The previous design of the handling booth did not meet this specification. The current approach is to place the suction hose directly into the irradiation device to make the device itself a fume hood. Preliminary results indicate that this approach works.

Answer: 04

The NSC has revised the Safety Analysis Report to include a statement regarding the selection of materials due to their ability to withstand anticipated radiation levels.

Conclusion

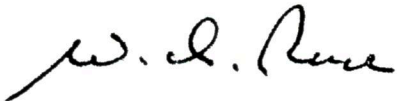
The NSC will operate the xenon experiment to produce iodine-125 according to the restrictions outlined Experiment Authorization EA-26. There will be modifications that will be brought for approval by the RSB at the end of May.

The NSC requests to continue with the application for the technical specification change as submitted in this letter.

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We appreciate the comments and review by the NRC and trust that this satisfies all remaining questions concerning this new experiment.

Sincerely,



Dr. W. D. Reece
Director

WDR/tll

Enclosures: NSC correspondence #98-0009 & #98-0010

xc: 12110/Central File
Theodore Michaels USNRC