



**NUCLEAR SCIENCE CENTER**

Dr. Sean M. McDeavitt  
Director, TEES Nuclear Science Center  
Texas A&M University  
Texas A&M Engineering Experiment Station  
1095 Nuclear Science Road, 3575 TAMU  
College Station, TX 77843-3575

June 3, 2016  
Docket Number 50-59 / License No. R-23

2016-0032

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington DC 20555  
Ref: 10 CFR 50.90

**SUBJECT:** Supplemental Information Regarding Texas A&M University License Amendment Request Dated November 11, 2015 for the AGN-201M Reactor, Facility License R-23, Docket Number 50-59 (ADAMS Accession No. ML15315A027)

Attn: Mr. Alexander Adams, Jr., Chief  
Research and Test Reactors Branch  
Office of Nuclear Reactor Regulation

Mr. Patrick M. Boyle, Project Manager,  
Research and Test Reactors Branch  
Office of Nuclear Reactor Regulation

The purpose of this letter is to provide supplemental information, regarding the Texas A&M University (TAMU) license amendment dated November 11, 2015 (Agency-wide Documents Access and Management System (ADAMS) Accession No. ML15315A027), for the Aerojet General Nucleonics Model 201-Modified (AGN-201M) Reactor, Facility License R-23, Docket Number 50-59. Specifically, TAMU is proposing to modify the license condition and technical specification (TS) enclosed in the TAMU letter dated March 3, 2016 (ADAMS Accession No. ML16063A384), in response to a request for additional information from the Nuclear Regulatory Commission (ADAMS Accession No. ML16032A022). These changes supersede the proposed license and TS Section 4.5 changes contained in our noted letter of March 3, 2016

Changes are being proposed to the AGN-201M License R-23 to ensure the AGN-201M fuel, special nuclear material (SNM) and reactor components are stored at the Texas A&M Engineering Experiment Station Nuclear Science Center (NSC) facility. The license is being clarified concerning the use and operation of the AGN-201M reactor and the use and possession of the AGN-201M fuel, SNM, and byproduct material produced during past operation. Enclosure 1 contains the new proposed changes to the AGN-201M License.

A new TS Section 3.5 is being proposed to specify the location of the AGN-201M reactor components while stored at the NSC facility. The proposed TS also restrict access to the AGN-201M reactor components. In addition, changes to the new proposed TS Section 4.5 are being made to confirm surveillances of the AGN-201M reactor components are performed to document that all components are stored in specified secured locations and are protected from damage or tampering while at the NSC facility. New changes are proposed for the AGN-201M TSs Sections 4.0, 5.2, and 5.3., while the fuel, SNM, and reactor components are stored at the NSC facility. Enclosure 2 contains the new proposed TS changes.

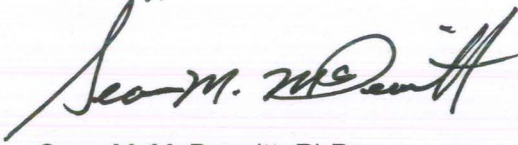
Once the AGN-201M fuel, SNM and reactor components have been relocated and stored at the NSC facility, TAMU will be seeking regulatory approval from the NRC based on the November 11, 2015, application for the unrestricted release of the Zachry Engineering Center. In addition, TAMU will be clarifying the license and TSs as necessary.

This supplemental information does not change the initial no significant hazards determination stated in the November 11, 2015, application. Should you have any questions regarding the information provided in this submittal, please contact Mr. Jerry Newhouse at (979) 845-7551 or via email at [newhouse@tamu.edu](mailto:newhouse@tamu.edu).

Oath of Affirmation

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Sincerely,



Sean M. McDeavitt, PhD

Director, TEES Nuclear Science Center

*Submitted with Level 2 Delegate Authorization from Dr. Yassin Hassan in letter dated February 8, 2016  
(ADAMS Accession No. ML16043A048)*

Attachment: Supplemental Information

Enclosure 1: License Changes

Enclosure 2: Technical Specification Changes

cc:

Mr. William Dean, Office Director  
United States Nuclear Reactor Commission  
Office of Nuclear Reactor Regulation

Mayor, City of College Station  
P.O. Box Drawer 9960  
College Station, TX 77840-3575

Mr. Michael Young, President  
Texas A&M University 1246 TAMU  
College Station, TX 77843-1246

Governor's Budget and Policy Office  
P.O. Box 12428  
Austin, TX, 78711-2428

Dr. M. Katherine Banks, Vice Chancellor  
and Dean  
Dwight Look College of Engineering  
3126 TAMU  
College Station, TX 77843-3126

Radiation Program Officer  
Bureau of Radiation Control  
Dept. of State Health Services  
Division for Regulatory Services  
1100 West 49th St., MC 2828  
Austin, TX 78756-3189

Dr. Dimitris Lagoudas, Deputy Director  
Texas A&M Engineering Experiment Station  
3470 TAMU  
College Station, TX 77843-3577

Technical Advisor  
Office of Permitting, Remediation &  
Registration  
Texas Commission on Environmental  
Quality  
P.O. Box 13087, MS 122  
Austin, TX 78711-3087

Dr. Narasimha Reddy, Assistant Agency  
Director for Strategic Initiatives and  
Centers  
Texas A&M Engineering Experiment Station  
3470 TAMU  
College Station, TX 77843-3577

Test, Research and Training Reactor  
Newsletter  
P.O. Box 118300  
University of Florida  
Gainesville, FL 32611-8300

Dr. Yassin Hassan, Department Head  
Nuclear Engineering  
Texas A&M University  
Nuclear Engineering Department  
3133 TAMU  
College Station, TX 77843-3133

Mr. Jerry Newhouse,  
NSC Assistant Director  
Texas A&M Engineering Experiment Station  
3575 TAMU  
College Station, TX 77843-3575

Dr. John Hardy  
Reactor Safety Board Chairman Texas A&M  
University  
3255 TAMU  
College Station, TX 77843-3255

Mr. Scott Miller,  
NSC Manager of Reactor Operations  
Texas A&M Engineering Experiment Station  
3575 TAMU  
College Station, TX 77843-3575

Dr. Latha Vasudevan  
Radiological Safety Officer  
Texas A&M University  
Environmental Health and Safety  
1111 Research Parkway  
College Station, TX 77843-4472

Mr. Jeremy Osborn  
AGN-201M Reactor Supervisor  
Texas A&M University  
Nuclear Engineering Department  
3133 TAMU  
College Station, TX 77843-3133

## **ATTACHMENT**

### **TEXAS A&M UNIVERSITY**

#### **AEROJET GENERAL NUCLEONICS MODEL 201-MODIFIED REACTOR**

#### **LICENSE NO. R-23; DOCKET NO. 50-59**

#### **SUPPLEMENTAL INFORMATION**

### **1.0 INTRODUCTION**

The purpose of this supplement is to provide information regarding the license amendment request (LAR) to amend Facility Operating License No. R-23, dated November 11, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15315A027), for the Texas A&M University (TAMU) Aerojet General Nucleonics Model 201-Modified (AGN-201M) reactor and as supplemented by letter dated March 3, 2016 (ADAMS Accession No. ML16063A384). The November 11, 2015, LAR requested Nuclear Regulatory Commission (NRC) review and approval of changes to the license and technical specifications (TSs) associated with relocating the special nuclear material (SNM), fuel, and reactor components of the AGN-201M reactor from the Zachry Engineering Center (current location) and storing these items at the Texas A&M Engineering Experiment Station (TEES) Nuclear Science Center (NSC) Training Research Isotope Production General Atomics (TRIGA) reactor site for up to five years.

Once the AGN-201M fuel, SNM, and reactor components have been relocated and stored at the NSC site, TAMU will be seeking regulatory approval from the NRC based on the November 11, 2015 application for the unrestricted release of the Zachry Engineering Center. In addition, TAMU will be clarifying the license and TSs as necessary.

The following provides an overview of the implementation of this licensing request and its interface with a corollary request associated with the TEES NSC LAR dated October 14, 2015 (ADAMS Accession No. ML15287A148) regarding receipt and storage of the AGN-201M fuel, SNM, and reactor components at the NSC facility:

1. Upon receipt of the NSC amendment authorizing storage of the AGN-201M fuel and SNM, TAMU will begin preparations for transfer of fuel, control rods and the neutron startup source to the NSC Fuel Storage Vault. The physical transfer to the NSC is further dependent upon the following:
  - a. NRC approval of the 9979 AF package (currently under NRC review) for the fuel transfer;
  - b. NRC approval of a QA Plan for TAMU's use of the 9979 AF package to meet the requirements of 10 CFR 71, Subpart H (under development).

2. Following transfer of the of fuel, control rods, and the neutron startup source, the remaining AGN-201M reactor components and support equipment will then be moved to the NSC facility where the following apply:
  - a. Fuel and SNM will be possessed under the NSC License R-83 (note that the possession changes to the NSC license upon formal receipt of the shipment).
  - b. Reactor components, including some potentially activated and/or contaminated, will continue to be possessed under the AGN-201M License R-23, while stored at the NSC facility for up to five years.
  - c. While AGN materials are in transit from the Zachry Engineering Center to the NSC facility, the governing licensing documentation will be the AGN-201M License R-23.
3. Regarding the potential for contamination and activation within the AGN-201M reactor complex in the Zachry Engineering Center, TAMU will seek regulatory approval from the NRC for the unrestricted release of Zachry Engineering Center following implementation of an NRC approved Final Status Survey (FSS) plan and NRC acceptance of the associated TAMU radiological surveys. Given the relatively low external neutron fluence rate during past operation and the fully enclosed design of the AGN-201M reactor, no significant residual activation or contamination is expected to be present after removal of the reactor and associated components.

Changes are being proposed to the AGN-201M License R-23 to ensure that while the AGN-201M fuel, SNM, and reactor components are stored at the NSC facility, the license is clarified concerning the authorized use, operation, and possession of these items. Specifically, while stored, the fuel and SNM will be governed by the NSC License R-83 and the reactor components will continue to be governed by the AGN-201M License R-23.

A new TS Section 3.5 is being proposed to specify the location of the AGN-201M reactor components while stored at the NSC facility. The proposed TS also will restrict access to the reactor components. In addition, changes to the new proposed TS Section 4.5 are being made to confirm that all reactor components are stored in a specified secured location, monitored for potential migration of radioactive contamination, and protected from damage or tampering while stored at the NSC facility.

New changes are also being proposed to clarify the AGN-201M TSs 4.0, 5.2, and 5.3 while the AGN-201M fuel, SNM, and reactor components are stored at the NSC facility.

## **2.0 PROPOSED LICENSE CHANGES**

The following changes to the AGN-201M License R-23 supersede the proposed changes in the March 3, 2016 letter. The changes are being made to ensure that while the AGN-201M fuel, SNM, and reactor components are stored at the NSC facility, the license is clarified regarding the use and operation of the AGN-201M reactor, and the use and possession of the AGN-201M fuel, SNM, and reactor components.

## 2.1 Section 2.B.(1)

Section 2.B.(1) is being changed to remove the words “use and operation”. This change to the license is being made because use and operation of the reactor while being stored at the NSC facility will not be possible.

## 2.2 Section 2.B.(2)

Section 2.B.(2) is being deleted in its entirety, because the AGN-201M fuel and Pu-Be neutron startup source have their physical and regulatory control transferred to the R-83 license. Therefore, the AGN-201M fuel and Pu-Be neutron startup source shall no longer appear in the R-23 license when the November 11, 2015, LAR is approved and implemented.

## 2.3 Section 2.B.(3)

Section 2.B.(3) is being changed to delete any reference to the NSC License R-83. In addition, changes are proposed to this section of the license to indicate that the byproduct and SNM produced by the operation of AGN-201M reactor have occurred in the past.

Assuming that some activation of the non-fuel components has occurred which would produce small amounts of byproduct material, 10 CFR 30 possession authorization is required to remain in the AGN-201M License while the reactor components are stored at the NSC facility. Therefore, Section 2.B.(3) of the License remains applicable while the AGN-201M reactor components are stored at the NSC facility.

The byproduct and SNM produced in the fuel could have been deposited on the surfaces of the core tank from direct contact with the fuel, 10 CFR 70 possession authorization is required to remain in the AGN-201M License. Therefore, Section 2.B.(3) of the License remains applicable while the AGN-201M reactor components are stored at the NSC facility.

## 3.0 **PROPOSED TECHNICAL SPECIFICATION CHANGES**

The proposed TS pages included in Enclosure 2 have been paginated to fit into the current AGN-201M TSs. As a result of adding the new TS Section 3.5 and TS Section 4.5 to the TSs new pages 11a and 14a have been created, in addition a repagination of TS page 15 was required.

### 3.1 New Proposed TS Section 3.5

TAMU is proposing a new TS Section 3.5. The new TS Section 3.5 will require AGN-201M reactor components while stored at the NSC facility be located in specified secured locations. The AGN-201M reactor components will be stored in two locations at the NSC facility: the Accelerator Building and in a cargo container.

The November 11, 2015, LAR describes the packaging and transport of the AGN-201M reactor components from the Zachry Engineering Center to the NSC facility. Once the components have been transported to the NSC facility, a receipt inspection shall be

performed to verify no damage has occurred to the AGN-201M reactor components during transport. The AGN-201M reactor components will be placed in their specified storage locations.

The new proposed TS Section 3.5 will require reactor components be stored in a secured fenced area in the Accelerator Building. In addition, the proposed TS adds a requirement that access to the secured fenced area be controlled by the AGN-201M Reactor Supervisor or designee. These new TS requirements will verify that while the AGN-201M reactor components are stored at the NSC facility they are in a secured location, and will not be tampered with or damaged.

The following AGN-201M reactor components will be stored at the NSC facility in the Accelerator Building:

- a. AGN-201M reactor control panel and associated electronic equipment
- b. AGN-201M Shield Tank, Reactor Tank, Core Tank, and associated internal components

All other reactor components shall be stored in the cargo container at the NSC facility in a secured area.

The new proposed TS Section 3.5 shall require the cargo container be locked closed and a tamper proof seal affixed to verify the AGN-201M reactor components remain secured and undamaged. The TS also restricts access to the cargo container to only personnel authorized by the AGN Reactor Supervisor or designee. In addition, the proposed TS Section 3.5 requires if personnel enter the cargo container a radiation and contamination survey shall be performed, the cargo container inventory verified, and the container shall be locked and a new tamper proof seal affixed to the cargo container upon exiting.

### 3.2 Section 4.0

TAMU is proposing to change TS Section 4.0. TS Section 4.0 states that surveillances specified in this section are not required to be performed during the specified surveillance period if the reactor has not been brought critical or is maintained in a shutdown condition extending beyond the specified surveillance period. This will be the case while the AGN-201M reactor components are stored at the NSC facility for up to five years.

TAMU is proposing to add the following exception to the TS, "with the exception of Section 4.5." Adding this exception will require new proposed TS Section 4.5 to be implemented while the AGN-201M reactor components are stored at the NSC facility. This assures that the reactor components are in their specified locations, undamaged and secured while stored at the NSC facility for up to five years.

### 3.3 Section 4.5

TAMU is proposing changes to TS Section 4.5. Proposed TS Section 4.5 in the March 3, 2016 letter is being superseded in its entirety by this new TS Section 4.5. The proposed TS Section 4.5 has been rewritten to verify all AGN-201M reactor components are in specified locations at the NSC facility, have not been damaged or tampered with, and

contamination is monitored. TS Section 4.5 requires the following surveillances and defined actions that shall be taken if the TS surveillances are not met:

#### Accelerator Building

For all AGN-201M reactor components stored in the Accelerator Building at the NSC facility proposed TS Section 4.5 requires that a quarterly inspection be performed to verify the reactor components are present in the secured fenced area, and have not been tampered with or damaged. If evidence of damage or tampering of the AGN-201M reactor components is observed (e.g. tearing or damage to the exterior packaging of the AGN-201M reactor components), the Director of Nuclear Engineering or designee shall be notified, a special report in accordance Technical Specification Section 6.9.3 shall be transmitted to the NRC, and TAMU shall take appropriate corrective actions to assess the damage and to prevent recurrence.

In addition, proposed TS Section 4.5 requires that once a quarter, a radiation and contamination survey be conducted around the exterior of the stored AGN-201M reactor components to verify that contamination is not migrating. If detectable loose surface contamination exceeds levels acceptable for an unrestricted area, the reactor components exterior shall be decontaminated and repackaged as necessary.

#### Cargo Container

For the AGN-201M reactor components stored in the cargo container at the NSC facility, proposed TS 4.5 requires a quarterly inspection of the cargo container to verify the container is locked and the tamper proof seal has not been broken. In the event the tamper proof seal is found broken, the Director of Nuclear Engineering or designee shall be notified, a radiation and contamination survey, and an inventory of the cargo container shall be performed. In addition, a special report in accordance Technical Specification Section 6.9.3 shall be transmitted to the NRC. TAMU shall also take appropriate corrective actions to evaluate how the seal was broken, to assess any damage to the AGN-201M reactor components and support equipment, and to prevent recurrence.

In addition, proposed TS 4.5 requires that once a quarter a radiation and contamination survey be conducted around the exterior of the cargo container to verify that contamination is not migrating from the contained reactor components. If detectable loose surface contamination exceeds levels acceptable for an unrestricted area, the cargo container exterior shall be decontaminated and the source of contamination identified and secured.

### 3.4 Section 5.2

TAMU is proposing to delete TS Section 5.2 in its entirety. Once the AGN-201M fuel and SNM have been stored in the NSC Fuel Storage Vault, TS Section 5.2 will no longer be applicable and therefore deleted.

### 3.5 Section 5.3

TAMU is proposing to change TS Section 5.3 to reflect the condition of the Zachry Engineering Center once the AGN-201M reactor components have been removed and



stored at the NSC facility. Upon NRC approval of the unrestricted release of the Zachry Engineering Center, TS Section 5.3 will no longer be applicable and therefore deleted.

#### **4.0 TECHNICAL SPECIFICATION IMPLEMENTATION**

TAMU is requesting implementation of the proposed license and TS changes based on specific events related to the transfer of the AGN-201M fuel, SNM, and reactor components to the NSC facility as follows:

- a. Upon receipt and acceptance of AGN-201M fuel, control rods, and the neutron startup source at the NSC facility, License Change 2.B.(2) and TS 5.2 shall be implemented.
- b. Upon receipt and acceptance of the AGN-201M reactor components at the NSC facility, the proposed License Changes 2.B.(1), 2.B.(3), and Technical Specification Sections 3.5, 4.0, 4.5, and 5.3 shall be implemented.

ENCLOSURE 1

TEXAS A&M UNIVERSITY

FACILITY LICENSE R-23, DOCKET NO. 50-59

AMENDED FACILITY OPERATING LICENSE

AGN-201M REACTOR

PROPOSED CHANGES TO THE LICENSE

2. Facility License No. R-23 is hereby amended in its entirety to read:

A. This license applies to the homogeneous nuclear Reactor model AGN-201M, Serial No. 106 (the Reactor), owned by the Texas A&M University (the licensee), located on its campus at College Station, Texas and described in the application for license dated June 13, 1957, and subsequent amendments and supplements thereto, including the application for license renewal dated May 31, 1977, and supplements thereto dated September 29, December 11 and December 18, 1978 and March 23, 1979.

B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses the Texas A&M University:

(1) Pursuant to Section 104c of the Act and 10 CFR, Chapter 1, Part 50, "Licensing of Production and Utilization Facilities", to possess the Reactor as a utilization facility at the designated location in College Station, Texas, in accordance with the procedures and limitations set forth in this license.

(2)

DELETED

(3) Pursuant to the Act and 10 CFR Parts 30 and 70 to possess, but not separate, such byproduct and special nuclear materials that has been produced by the operation of the reactor.

C. This license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 3a, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

ENCLOSURE 2

TEXAS A&M UNIVERSITY

FACILITY LICENSE R-23, DOCKET NO. 50-59

AMENDED FACILITY OPERATING LICENSE

AGN-201M REACTOR

PROPOSED CHANGES TO THE TECHNICAL  
SPECIFICATIONS

watt, and that the total gamma, thermal neutron, and fast neutron dose rate in the accelerator room is less than 15 mrem/hr at reactor power levels less than or equal to 5.0 watts and the thermal column filled with water.

The facility shielding in conjunction with radiation monitoring, control, and restricted areas is designed to limit radiation doses to facility personnel and to the public to a level below 10 CFR 20 limits under operating conditions, and to a level below criterion 19, Appendix A, 10 CFR 50 recommendations under accident conditions.

### 3.5 AGN-201M Reactor Components

#### Applicability

This specification applies to all AGN-201M reactor components stored at the NSC facility.

#### Objective

To verify the AGN-201M reactor components, are in specified secured locations, not tampered with, and undamaged while stored at the NSC facility.

#### Specifications

##### 1. Accelerator Building at the NSC Facility

AGN-201M reactor components shall be stored in a secured fenced area in the Accelerator Building. The AGN-201M Reactor Supervisor or designee shall control access to the secured fenced area.

The following AGN-201M reactor components shall be stored in the Accelerator Building:

- a. AGN-201M reactor control panel and associated electronic equipment
- b. AGN-201M Shield Tank, Reactor Tank, Core Tank, and associated internal components

##### 2. Cargo Container at the NSC Facility

The AGN-201M reactor components shall be stored in a secured cargo container and a tamper proof seal affixed. Access to the cargo container shall be restricted to personnel authorized by the AGN-201M Reactor Supervisor or designee.

#### Bases

These Technical Specifications ensure that the AGN-201M reactor components are secured and undamaged while stored at the NSC facility.

## 4.0 SURVEILLANCE REQUIREMENTS

Actions specified in this section, with the exception of Section 4.5, are not required to be performed if during the specified surveillance period the reactor has not been brought critical or is maintained in a shutdown condition extending beyond the specified surveillance period. However, the surveillance requirements must be fulfilled prior to subsequent startup of the reactor.

### 4.1 Reactivity Limits

#### Applicability

This specification applies to the surveillance requirements for reactivity limits.

#### Objective

To assure that reactivity limits for Specification 3.1 are not exceeded.

#### Specification

- a. Safety and control rod reactivity worths shall be measured annually, but at intervals not to exceed 16 months.
- b. Total excess reactivity and shutdown margin shall be determined annually, but at intervals not to exceed 16 months.
- c. The reactivity worth of an experiment shall be estimated or measured, as appropriate, before or during the first startup subsequent to the experiment's insertion.

#### Bases

The control and safety rod reactivity worths are measured annually to assure that no degradation or unexpected changes have occurred which could adversely affect reactor shutdown margin or total excess reactivity. The shutdown margin and total excess reactivity are determined to assure that the reactor can always be safely shutdown with one rod not functioning and that the maximum possible reactivity insertion will not result in reactor periods shorter than those that can be adequately terminated by either operator or automatic action. Based on experience with AGN reactors, significant changes in reactivity or rod worth are not expected within a 16-month period.

### Specification

- a. All portable radiation survey instruments assigned to the reactor facility shall be calibrated under the supervision of the Radiological Safety Office annually, but at intervals not to exceed 16 months.
- b. Prior to each day's reactor operation or prior to each reactor operation extending more than one day, the reactor room high radiation area alarm (Ref. 3.4e) shall be verified to be operable.
- c. A radiation survey of the reactor room; reactor control room, and accelerator room shall be performed under the supervision of the Radiological Safety Office annually, but at intervals not to exceed 16 months, to determine the location of radiation and high radiation areas corresponding to reactor operating power levels.

### Bases

The periodic calibration of radiation monitoring equipment and the surveillance of the reactor room high radiation area alarm (Ref. 3.4e) will assure that the radiation monitoring and control systems are operable during reactor operation.

The periodic radiation surveys will verify the location of radiation and high radiation areas and will assist reactor facility personnel in properly labeling and controlling each location in accordance with 10 CFR 20.

## 4.5 Reactor Components Stored at the NSC Facility

### Applicability

This applies to the surveillance requirements of the AGN-201M reactor components stored at the NSC Facility.

### Objective

To verify the AGN-201M reactor components remain stored in specified locations and undamaged while at the NSC facility.

### Specifications

- a. Cargo Container
  1. Once a quarter a survey of the cargo container is required to verify that the tamper proof seal has not been broken. In the event the seal is found broken, the Director of Nuclear Engineering or designee shall be notified and an inventory of the cargo container shall be performed. In addition, a special report in accordance Technical Specification Section 6.9.3 shall be transmitted to the U.S. NRC.

2. Once a quarter a radiation and contamination survey shall be conducted of the exterior of the cargo container to verify that contamination is not migrating from the contained components. If detectable loose surface contamination exceeds levels acceptable for an unrestricted area, the cargo container exterior shall be decontaminated and the source of contamination identified and secured.
- b. NSC Accelerator Building
1. Once a quarter the secured fenced area in the Accelerator Building shall be inspected to verify all reactor components are present and have not been damaged. If evidence of damage or tampering of the AGN-201M reactor components is observed, the Director of Nuclear Engineering or designee shall be notified. In addition, a special report in accordance Technical Specification Section 6.9.3 shall be transmitted to the U.S. NRC.
  2. Once a quarter a radiation and contamination survey shall be conducted around the exterior of the stored AGN-201M reactor components to verify that contamination is not migrating from the contained reactor components. If detectable loose surface contamination exceeds levels acceptable for an unrestricted area, the reactor components shall be decontaminated and repackaged as necessary.

### Bases

These surveillances shall verify the components necessary for reassembly of the AGN-201M reactor remain secure, undamaged, and that the radiological conditions of storage remain unchanged.

## 5.0 DESIGN FEATURES

### 5.1 Reactor

- a. The reactor core, including control and safety rods, contains approximately 660 grams of U-235 in the form of 20% enriched  $\text{UO}_2$  dispersed in approximately 11 kilograms of polyethylene. The lower section of the core is supported by an aluminum rod hanging from a fuse link. The fuse melts at a fuse temperature of about  $120^\circ\text{C}$  causing the lower core section to fall away from the upper section reducing reactivity by at least  $5\% \Delta k/k$ . Sufficient clearance between core and reflector is provided to insure free fall of the bottom half of the core during the most severe transient.
- b. The core is surrounded by a 20 cm thick high density ( $1.75 \text{ gm/cm}^3$ ) graphite reflector followed by a 10 cm thick lead gamma shield. The core and part of the graphite reflector are sealed in a fluid-tight aluminum core tank designed to contain any fission gases that might leak from the core.



- c. The core, reflector, and lead shielding are enclosed in and supported by a fluid-tight steel reactor tank. An upper or "thermal column tank" may serve as a shield tank when filled with water or a thermal column when filled with graphite.
- d. The 6 ½ foot diameter, fluid-tight shield tank is filled with water constituting a 55 cm thick fast neutron shield. The fast neutron shield is formed by filling the tank with approximately 1000 gallons of water. The complete reactor shield shall limit doses to personnel in unrestricted areas to levels less than permitted by 10 CFR 20 under operating conditions.
- e. Two safety rods and one control rod (identical in size) contain less than 15 grams of U-235 each in the same form as the core material. These rods are lifted into the core by electromagnets, driven by reversible DC motors through lead screw assemblies. De-energizing the magnets causes a spring-driven, gravity-assisted scram. The fourth rod or fine control rod (approximately one-half the diameter of the other rods) is driven directly by a lead screw. This rod may contain fueled or unfueled polyethylene.

## 5.2 Fuel Storage

DELETED

## 5.3 Reactor Room, Reactor Control Room, Accelerator Room

The AGN-201M reactor and associated components currently housed in the Zachry Engineering Center in the Reactor Room, Control Room, and Accelerator Room, shall be transported and stored at the NSC Facility. Until the Zachry Engineering Center has been approved for unrestricted release, the AGN-201M License R-23 shall remain in effect for these rooms.

Access to the Reactor Room, Control Room, and Accelerator Room shall be controlled by the AGN-201M Security Plan.

## 6.0 ADMINISTRATIVE CONTROLS

### 6.1 Organization

The administrative organization for control of the reactor facility and its operation shall be as set forth in Figure 1 attached hereto. The authorities and responsibilities set forth below are designed to comply with the intent and requirements for administrative controls of the reactor facility as set forth by the Nuclear Regulatory Commission.