ATTACHMENT A

Requested Amendment Changes

1. Current Technical Specifications in R-84. Remove page 2 and 3, insert new page 2 and 3 (inclosed).

2. Pending Technical Specifications Docket 50-170. Remove page 39, insert new page 39 (inclosed).

3. Pending Safety Analysis Report, Docket 50-170. Remove pages 3-7, replace with pages 3-7, 3-7a, 3-7b. Remove 3-10, replace with 3-10. Remove 3-11, replace with 3-11. Remove Fig 3-5, replace with Fig 3-5A.

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ATTACHMENT A #1

Current Technical Specifications in R-34. Remove page 2 and 3, insert new page 2 and 3 (inclosed).

b. Pulse Mode - Operation in the pulse mode shall mean that the reactor is intentionally placed on a power excursion by making a step insertion of reactivity above critical with the transient rod, utilizing the scrams in Table I and the interlocks in Table II.

5. Cold Critical

Cold critical shall mean the critical condition when temperatures of the reactor fuel and bulk reactor water are equal (less than 40 degrees C).

6. Operable

A system or device shall be considered operable when it is capable of performing its intended functions in a normal manner.

7. Experiment

Experiment shall mean:

a. Any apparatus, device, or material placed in the reactor core region, in an exposure facility, or in-line with a beam of radiation originating from the reactor core.

b. Any operation designed to measure reactor parameters or characteristics.

8. Exposure Facilities

The exposure facilities associated with the AFRRI-TRIGA reactor shall be:

a. Exposure Room #1

b. Exposure Room #2

c. Pneumatic Transfer System

d. Reactor Pool

e. Portable Beam Tube

9. Channel Check

A channel check is a qualitative verification of acceptable performance by observation of channel behavior. This verification shall include comparison of the channel with other independent channels or methods measuring the same variable.

SECTION I: FACILITY DESCRIPTION

A. Reactor Building

1. Areas of the reactor building including: the reactor room, the control room suite, ER rooms 1, 2, and 3, and the warm storage-decontamination area shall have a

separate branch of the AFRRI ventilating system. The effluent from the reactor building ventilating system shall exhaust through absolute filters to a stack having a minimum elevation that is 18' above the roof level of the highest building in the AFRRI complex.

2. The reactor room shall contain a minimum free volume of 22,000 cubic feet.

3. The ventilating system air ducts to the reactor room shall be equipped with positive sealing dampers activated by fail-safe controls that will close off the ventilation to the reactor room automatically upon an alarm of the reactor room continuous air monitor.

4. The reactor room shall be designed to restrict air leakage when the positive sealing dampers are closed.

B. Reactor Core

1. The reactor core shall consist of standard TRIGA Mark F reactor fuel elements and a minimum of two (2) thermocouple instrumented TRIGA Mark F reactor fuel elements; Zr/H ratio of 1:1.7 (nominal), with stainless steel cladding; as described in Amendment No. 7 to the AFRRI Facility License No. R-84. The fuel elements shall be placed in a close packed array.

2. There shall be: four single core positions occupied by the three standard control rods and the transient rod; a neutron start-up source with holder; and positions for possible in-core experiments.

3. The core shall be cooled by natural convective water flow.

4. In-core experiments shall not be placed in adjacent fuel positions of the B-ring and/or C-ring.

5. Any burnable poison used for the specific purpose of compensating for fuel burnup or long term reactivity adjustments shall be an integral part of the manufactured fuel elements.

6. All fuel elements not in the reactor core shall be stored and handled in accordance with the provisions of 10 CFR 70. Irradiated fuel elements and fueled devices shall be stored in an array which will permit sufficient natural convective cooling by water or air such that the fuel element or fueled device temperature will not exceed design values.

SECTION II: OPERATIONAL LIMITATIONS AND RESTRICTIONS

A. Basic Safety Parameters

1. The maximum steady state power level shall be one megawatt.

ATTACHMENT A #2

Pending Technical Specifications Docket 50-170. Remove page 39, insert new page 39 (inclosed).

Objective

The objective is to assure that fuel which is stored will not become critical and will not reach an unsafe temperature.

Specification

All fuel elements not in the reactor core shall be stored and handled in accordance with the provisions of 10 CFR 70. Irradiated fuel elements and fueled devices shall be stored in an array which will permit sufficient natural convective cooling by water or air such that the fuel element or fueled device temperature will not exceed design values. Such an array will contain not more than 12 fuel elements in a single storage rack.

Basis

The limits imposed by this specification are conservative and assure safe storage and handling. Experience shows it requires approximately 67 fuel elements, of the design used at AFRRI, in a close packed array to achieve criticality. Calculations show that in the event of a storage rack failure with all 12 elements falling in a contact configuration the mass would be less than that required for critcality.

5.0 REACTOR BUILDING AND VENTILATION SYSTEM

Applicability

This specification applies to the building which houses the reactor.

Objective

The objective is to restrict the amount of radioactivity released into the environment.

Specifications

a. Areas of the reactor building including: the reactor room, the control room suite, ER rooms 1, 2, and 3, and the warm storage-decontamination area shall have a separate branch of the AFRRI ventilating system. The effluent from the reactor building ventilating system shall exhaust through absolute filters to a stack having a minimum elevation that is 18' above the roof level of the highest building in the AFRRI complex.

ATTACHMENT A #3

Pending Safety Analysis Report, Docket 50-170. Remove pages 3-7, replace with pages 3-7, 3-7a, 3-7b. Remove 3-10, replace with 3-10. Remove 3-11, replace with 3-11. Remove Fig 3-5, replace with Fig 3-5A.

The lines of contact between the poured light concrete roof and the reinforced concrete walls are further sealed by flashing, expansion joint material, and roofing compound.

All reactor building exterior doors are well fitted and weatherstripped with good-quality, commercial, interlocking-type stripping at the top and sides. The bottoms of the doors are provided with interlocking thresholds.

3.2.2 Reactor Building Ventilation

The AFRRI ventilation system supplies filtered and conditioned air to the laboratories and offices of the Institute. The ventilation system is a standard industrial type that mixes outside (new) air with recirculating building air, which is then conditioned to meet recognized standards for air quality. The air supplied to laboratories is approximately 85% outside air; air supplied to offices is approximately 25% outside air. The supply air is filtered thru a 25% roughing filter and an 85% final filter. The cleaned air is then heated or cooled to approximately 55^{o}F. Then it is passed by air handlers thru supply ducts to terminal devices, which are capable of changing the air to the temperature set by a thermostat in the area to be serviced. The entire system consists of several branches that supply and exhaust the different sections of AFRRI.

One branch is of special interest in the control of possible airborne radiation hazards that may arise from actions or operations involving the TRIGA reactor. That branch services select areas within the reactor building. Several smaller branches serve fume hoods and other sources of possible airborne radioactive contamination. The reactor branch and other branches are installed in a parallel manner, using the same supply and exhaust. However, the reactor related area is held negative with respect to other areas within the complex. The area of interest is shown in the block diagram (Figure 3-5).

The select portions of the reactor building included in the branch are the reactor room; the Exposure Rooms 1, 2, and 3; the warm storage and decontamination room; and the reactor control room suite. The branch is subdivided into three parallel legs that service these areas. These areas are supplied air from the building supply air. Air is then single-passed thru each parallel leg, exhausted thru a set of absolute filters, monitored, and then released via the AFRRI stack.

Air from the building system is supplied to the legs of the reactor branch thru a single supply damper. This damper (which allows air movement) is held open only as long as there is airflow in the exhaust ducts beyond the absolute filters. A flow-sensitive switch that senses a loss of exhaust flow would send a signal to close the supply damper, thus stopping the supply of air to the entire branch.

To provide isolation capabilities in the event of airborne contamination, the reactor room air ducts (both supply and exhaust) are provided with sealing dampers. When closed, these dampers prevent air movement into or out of the reactor room via the ventilation system.

These dampers may be opened or closed from three points: a radiation-sensing device to sample air from the reactor room; a manual operate button in the control room; and each damper manually. The dampers are located so that access to them can be achieved without entering the reactor room. The dampers will be a "close on fail" type to insure a safe configuration in the event of system failure.

The location of the control room suite and its proximity to the reactor room requires air control primarily in the event of an airborne release. Since entry into the reactor room would be thru this area and since action stations would be established in this area, the area is held negative with respect to the rest of AFRRI, but positive to the reactor room. During normal conditions, air is circulated parallel to the reactor room; however, during airborne radiation conditions, the exhaust damper closes with the reactor room dampers. This causes a buildup of pressure relative to the reactor room, causing leakage into that room either thru the installed conduits or thru the entrance door if entry becomes necessary. To allow any small overpressures from the reactor room to vent in a controlled manner after long-term shutdown of the system, small vent lines with atmospheric relief dampers communicate from the reactor room to the stack.

Another leg of this branch supplies air to the Exposure Rooms (ER1, 2, and 3) and the warm storage-decontamination area. The conditioned supply air is carried thru ducts to these areas. The exhaust air is drawn through the filter bank and, along with the other legs, is exhausted thru an exhaust stack.

After being pulled from the various serviced areas by fan EF1, the exhaust air is pulled thru a set of absolute filters that insure stoppage of particulate material 0.3 microns or larger with a 99.97% efficiency. The filter bank will nominally consist of prefilters, roughing filters, and absolute filters. Filters are tested upon installation to insure that no leakage occurs. The filter buildup is measured by a differential pressure method. They are replaced when pressure reaches manufacturer's recommended levels. Isokinetic sampling is done on all air exiting the stack, and radiological monitoring is then performed. Readouts and alarms for both flow and radiological levels are in the control room, and are set according to the current limits given in appropriate instructions. Normal airflow rate thru the exhaust stack is about 35,000 CFM.

3.2.3 Reactor Room

The reactor room (Room 3161) contains approximately 1,800 square feet of floor space and has a ceiling height of approximately 18 feet and contains the open surface of the TRIGA Mark-F reactor pool. Adjacent to the reactor room is the reactor administration/control room (Room 3160), five offices (Rooms 3155 through 3159), and Hall 3106. The only access to these rooms is from Hall 3106 in the reactor administration/control area. Large, sealed windows provide visual observaprotection in confining the reactor room air in the event that the other double doors are inadvertently opened. These doors are automatically locked by a local security system mounted near the doors. Additionally, during nonduty hours they are key-locked. The local security system will unlock the doors when operated by special ID badges or when the system is momentarily bypassed by a Reactor Operator. Special badges are issued only to reactor branch personnel, their superiors, and other personnel designated by the Director of AFRRI. The security system limits access to the reactor administration/control area to those personnel essential to reactor operations. The local security system does not prohibit personnel from leaving the reactor administration/control area during normal-duty hours when not secured by the key lock.

3.2.4 Reactor Room Confinement

The reactor room contains approximately 1,800 square feet of floor space, has a ceiling height of approximately 18 feet, and a volume of about 32,400 cubic feet. The reactor building construction and ventilation system design allow confinement of the reactor room air volume. The external walls of the reactor room are constructed of reinforced ordinary (Portland) concrete. The roof of the reactor room is made of ordinary concrete poured over a corrugated steel form supported by steel roof trusses. The roof is sealed and waterproofed by the application of roofing compound. The contact surfaces between the concrete roof and the reinforced concrete external walls are further sealed by flashing, expansion joint material, and roofing compound. The interior walls of the reactor room are formed from ordinary concrete blocks in Portland cement mortar and most of the walls are plastered and painted on one side. The doors and hatches leading to the reactor room are kept closed and locked and are sealed with compressible rubber garlute. The windows between the reactor room and the reactor control room and adjacent offices are sealed and cannot be opened. All penetrations in the walls and floor for conduits and piping are also sealed.

In the event of the release of airborne radioactivity within the reactor room, radioactivity will be detected by the reactor room primary continuous air monitor (CAM). The high radiation alarm set point of the reactor room primary CAM will initiate automatic closure of the reactor room dampers. The reactor room is then confined. The four dampers, upon closing, actuate microswitches which complete light circuits for four indicator lights in the reactor room control room. The dampers may also be closed or reset (opened) manually from the reactor control room.

In order to accommodate significant changes in barometric pressure or a change in the reactor room air temperature that could appreciably alter the pressure in the reactor room, a special normally-closed atmospheric relief valve connects the reactor room directly to the atmosphere. A rise or fall in pressure sufficient to cause structural damage to the reactor room would open the atmospheric relief valve, allowing air to be expelled from the room to the atmosphere through a pipe attached to the stack.

3.3 REACTOR WATER PURIFICATION AND COOLANT SYSTEMS

The systems of the AFRRI-TRIGA Mark-F reactor associated with the reactor coolant are the primary cooling system, the secondary cooling system, the primary water purification system, the makeup water system for the primary coolant, and the reactor pool Nitrogen-16 (N^{16}) diffuser.

The open, nonpressurized reactor pool contains approximately 15,000 gallons of light, demineralized water. Natural convection of the water in the reactor pool disperses the heat generated by the reactor core. The reactor tank water level is monitored by a float-activated switch. A drop in the reactor tank water level of ~6 inches causes an immediate reactor scram, and activates several alarms.

3.3.1 Primary Cooling System

The primary cooling system consists of the reactor tank, the primary pump, the tube side of the shell-and-tube heat exchanger, and associated piping, valves, and fittings, all situated at elevations above the top of the core. The primary pump draws water from the reactor pool through the suction line, located in the reactor pool approximately 4 feet beneath the pool surface. The primary pump passes the water through the tube side of the heat exchanger at a rate of approximately 350 gallons per minute (gpm). The water is then returned to the reactor pool through the return line, located in the reactor pool approximately

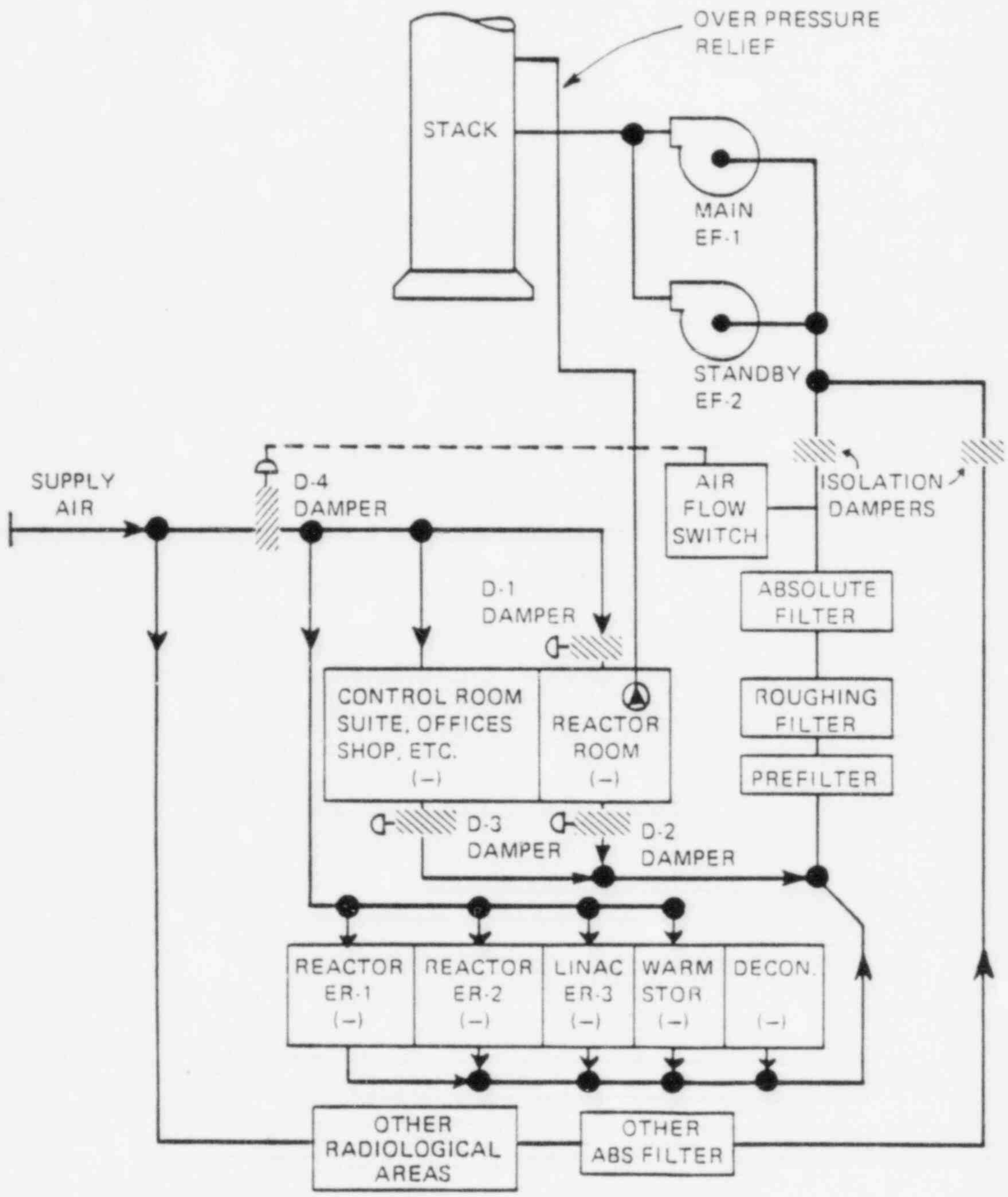

Fig. 3-5A Schematic Air Flow Diagram