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50-166

United States Nuclear Regulatory Commission
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Rockville, Maryland 20852-2738
ATTN: ALEXANDER ADAMS, JR

June 7, 2004

Enclosed please find the University of Maryland's response to the request for additional information as it pertains to sections six through ten of the Safety Analysis Report (SAR).

I declare under penalty of perjury that the foregoing is true and correct.

Executed on June 7, 2004

Alsheikhly

[Signature] Mohamad Al-Sheikhly, Director
University of Maryland Training Reactor
License Number R-70, Docket number 50-166

A053

6.0 ENGINEERED SAFETY FEATURES

23. Chapter 6.0, Engineered Safety Features. The SAR states there are [redacted] external entrances into the confinement. Technical Specification 4.4, Confinement, states that prior to reactor startup, isolation of these doors is visually verified. Once verified and the reactor is made critical, are these entrances alarmed in some way to alert the operator that confinement is unsecured if someone opens one inadvertently, or are they locked during the visual? Disposition of these doors is not specified in the SAR.

Response:

The [redacted] doors that enter into the confinement, [redacted] are equipped with status indicators that allow the operator to determine if the door state changes during operation. These indicators change from green to yellow if the door is opened and are displayed on the auxiliary console.

7.0 I&C SYSTEMS

24. Section 7.2, Design of Instrumentation and Control Systems. This section describes a system performance/reliability analysis for the bistable trips, console scram, and rod control circuits. Have there been any notable problems in the operating experience for these systems that would call into question the analytical results?

Response:

These systems have proven to be extremely reliable since their installation. At no time has the reactor scram systems or trips failed to perform their intended functions during routine inspections and trip challenges performed during the start up check list.

25. Section 7.4, Reactor Protection System. As detailed in this section, the reactor protection system provides a number of redundant and diverse inputs into the scram logic. Please provide a description as to the separation/isolation these various inputs are afforded throughout the reactor facility.

Response:

The scram and control circuits receive their AC power [redacted] All I & C cabling are routed separately from non I & C feeds such as video and AC outlet cabling. This includes separate high voltage cabling for safety I and II as well as the two CIC monitors. Conductivity, flow, and temperature monitors from the water handling room feed into the console [redacted]

26. Sections 7.3, Reactor Control System. In the manual mode, rod up movement is interlocked such that only one rod can be raised at a time. Is it possible to raise one rod and inadvertently lower another simultaneously, and if so, could this present a problem?

Response:

It is possible to raise one rod and lower another rod simultaneously. In fact it is standard practice when doing a flux balance to do this exact process. Whereas it is placing the reactor in a safer, more conservative mode when adding negative reactivity, this presents no adverse situation to reactor control or safety.

27. Section 7.3.3, RCS Interlocks. Please clarify the first sentence in paragraph 5, where it states that "the regulating rod motor leads are removed from manual operation and connected to the output of the servo-amplifier." Is this just the turning of a switch or a more involved procedure?

Response:

It is simply a matter of moving a switch from the "STEADY STATE" position to the "AUTOMATIC" position.

28. Section 7.7, Radiation Monitoring Systems. This section has a discussion regarding the multiple roles of the area radiation monitors (i.e., reactor protection, engineered safety features actuation, and health physics protection for the facility inhabitants). Upon the loss of the normal electrical power supply, RPS and ESF actuation is automatically initiated. However, it appears that the protection function for the facility inhabitants is lost. Please provide comments as to the acceptability of this situation.

Response:

Technical Specification 3.6 section 2 provides that in the event that both channels are inoperable, a portable alarming meter or a meter that is observable shall be utilized to monitor the facility. Furthermore, if the facility is in a black out condition, it will not be inhabited.

8.0 ELECTRICAL POWER SYSTEMS

29. Section 8.0, Electrical Power Systems. Describe how the separation of electrical power cables and those cables associated with the experiments is accomplished in order to prevent any electromagnetic interference with the reactor protection instrumentation.

Response:
Experiments that require electrical power are fed from the outlets located around the perimeter of the facility. These outlets do not share a common breaker with control and instrumentation.

30. Section 8.0, Electrical Power Systems. Describe any needs for electrical power that may be required for placing/maintaining experimental equipment in a safe condition.

Response:
Experiments that require electrical power to be considered safe would be considered a "Special Experiment" as described in the Tech Specs. This type of experiment requires approval by the Reactor Safety Committee. The Committee will not approve any experiment that jeopardizes the safety of the facility in the event of a power failure.

9.0 AUXILIARY SYSTEMS

31. Chapter 9, Auxiliary Systems and Chapter 11, Radiation Protection Program and Waste Management. There is no mention of the reactor building floor drain system in either of these SAR chapters. Decontamination activities and minor valve and fitting leakages of reactor coolant would be potentially contaminated. Are the floor drains all routed to the sump located in the water handling room or are they routed to the sanitary system?
Please discuss.

Response:

All floor drains empty into the sump. See SAR Fig 5.1

32. Section 9.2.3, Fuel-Rod Transfer Cask. The SAR states that the fuel rod transfer cask weighs [redacted] Provide a discussion on the procedures, equipment, and lifting [redacted] with this load handling at MUTR.

Response:

See Fig 3.2 of the SAR regarding the crane position. [redacted]
The procedures would be considered a "Special Experiment" and will be written in conjunction with the Radiation Safety Officer and the Reactor Safety Committee.

33. Section 9.3, Fire Protection. This section states that a water sprinkler system provides the fire suppression in the reactor building. Is the drain system sized to handle the water volume created by actuation of the sprinkler system to prevent both migration of radiological contamination outside the building and potential flooding of the water handling room?

Response:

The water room sump is designed to handle the first 1200 gallons of drainage. [redacted] In the event [redacted] or unmonitored [redacted] the PGFD is equipped to collect water from the sump area into a tanker truck equipped with onboard pumps which are capable of removing water at a rate that is faster than the fire suppression can deliver.

34. Section 9.3, Fire Protection. If the sprinkler system actuates when the building is unoccupied, how will the fire department or security be made aware of it?

Response:

[redacted]

35. Section 9.4, Communication System. Is the audible evacuation alarm separate from the intercom system? If it is, please provide a brief description of the system design.

Response:

The evacuation alarm [redacted] is independent of all other systems [redacted] It is simply an audible alarm that is triggered by the operator from the control console.

36. Figure 9.5, page 9-8. The locations of the fire alarm pull boxes and speaker intercom locations are not clear. Figure 9.5 should be revised, with the locations of the fire alarm pull boxes and intercom speakers clearly identified.

Response:

The figure listed does indeed list both pull station and intercom locations.

37. Section 9.5, Possession and Use of Byproduct, Source, and Special Nuclear Material. Please confirm that you want to maintain the current license special nuclear material and byproduct material limits in your renewed license.

Response:

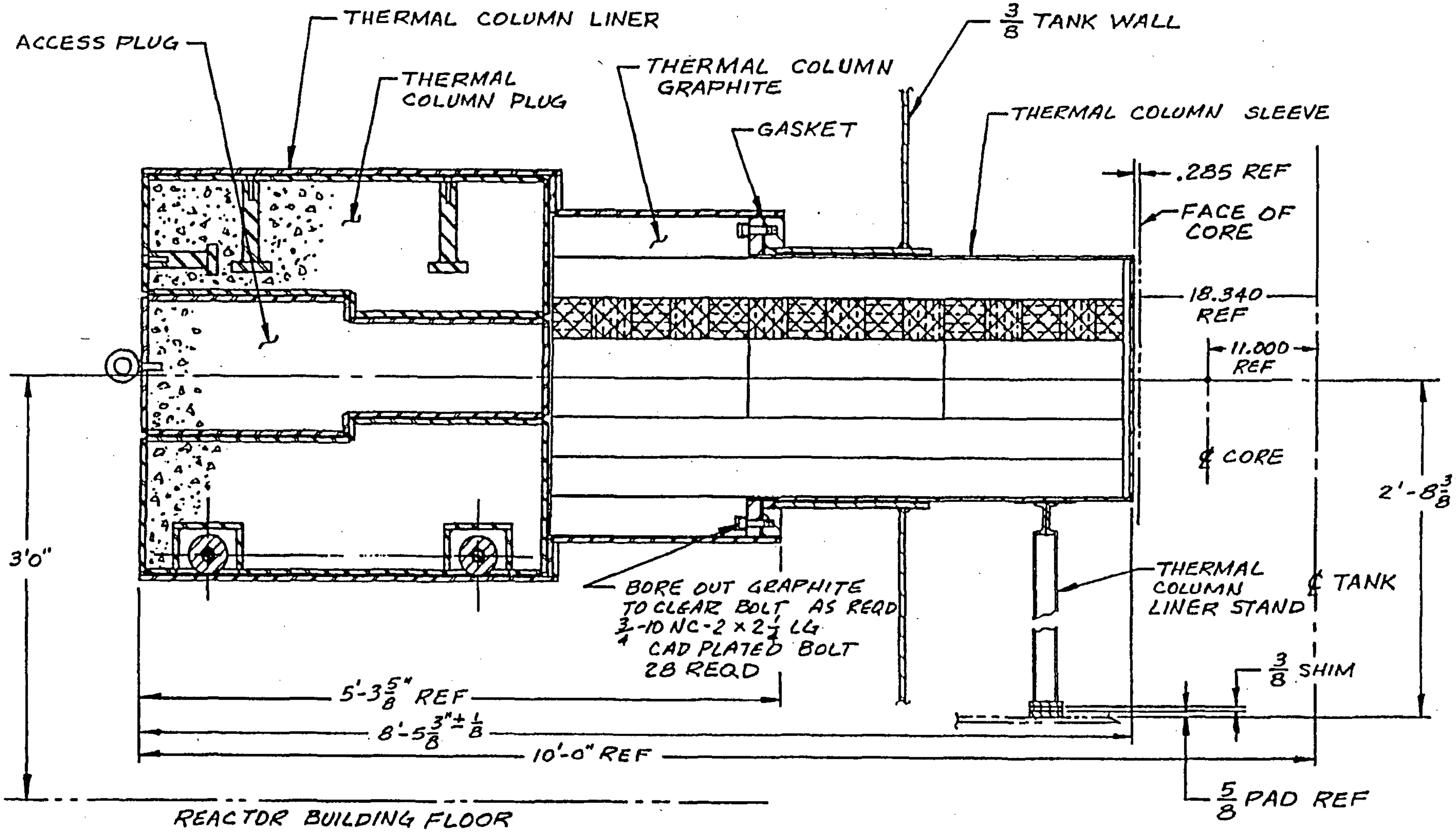
It is the desire of the licensee to maintain the current level of SNM.

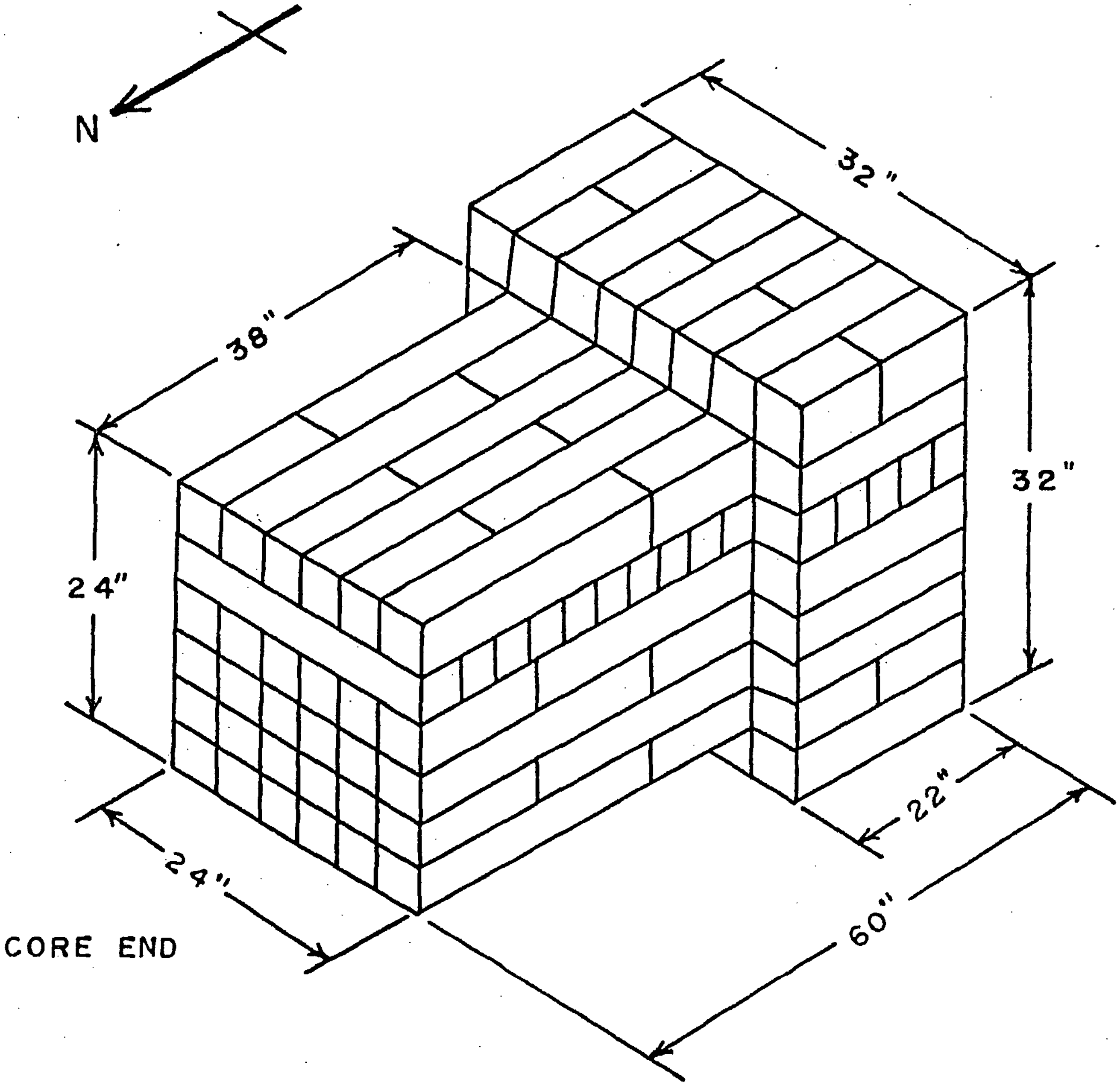
10.0 EXPERIMENTAL FACILITIES AND UTILIZATION

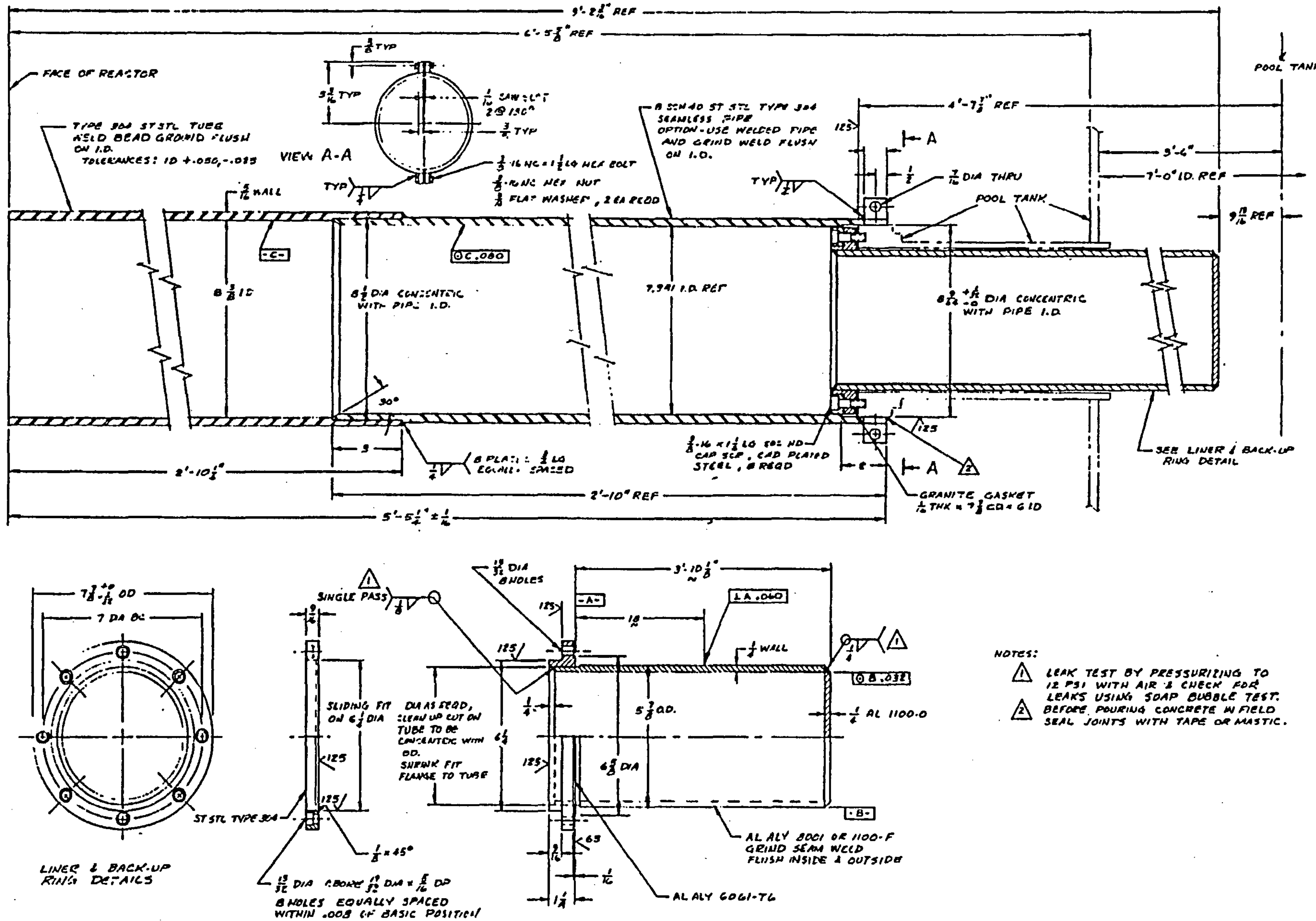
38. Section 10.2, Experimental Facilities. Provide a more detailed description of the functional design of the Thermal Column, Beam Ports and Through Tube experimental facilities. For example, from the description provided it is not clear if these facilities require an air exhaust system or if beam tubes must be filled with demineralized water to provide shielding. Additionally, Figures 10.3, "Beam Tube," 10.4, "Beam Tube Plugs," and 10.5, "Through Tube" are not legible (apparently due to their reduced size). Please provide clearer illustrations that are of a larger size. Enlarging each figure to 8½ by 11 inches should be sufficient.

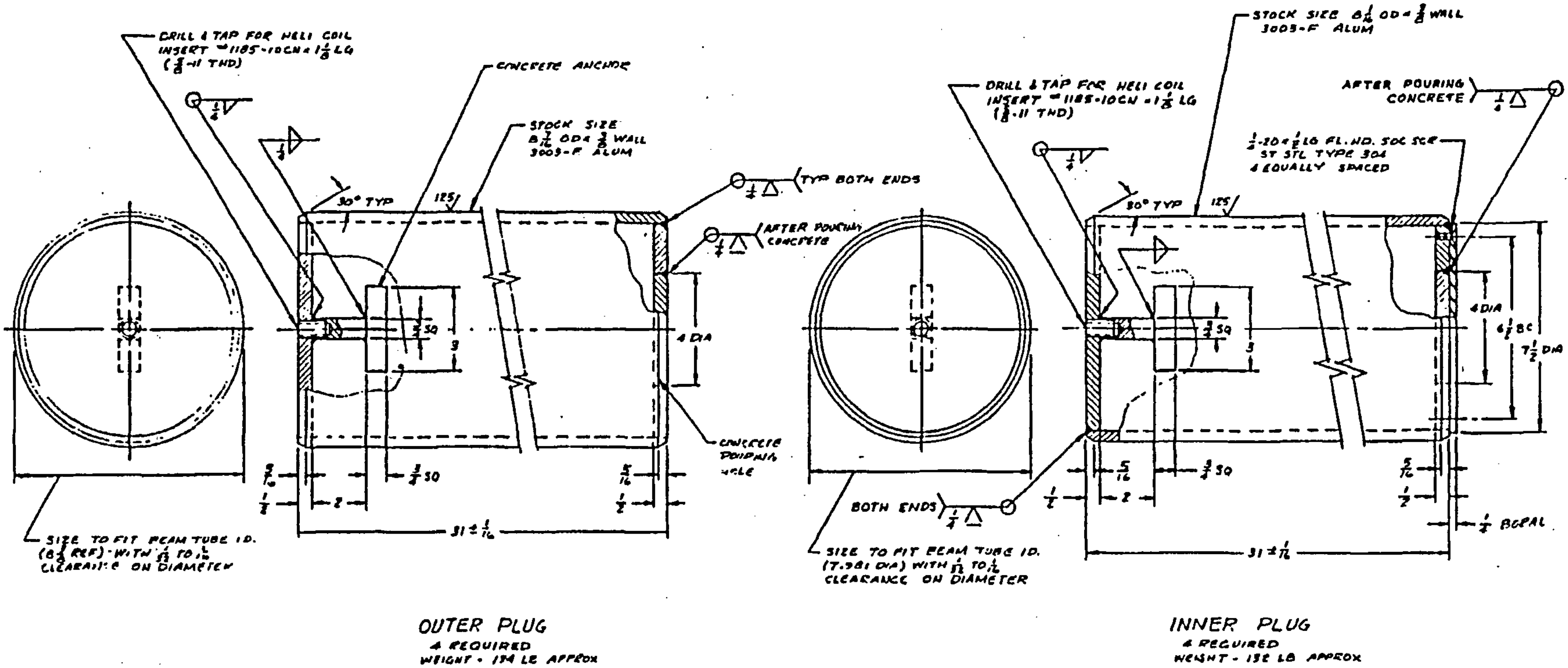
Response:

See Attached


THERMAL COLUMN LINER
ACCESS PLUG
THERMAL COLUMN PLUG
THERMAL COLUMN GRAPHITE
3/8 TANK WALL
GASKET
THERMAL COLUMN SLEEVE
.285 REF
FACE OF CORE
18.340 REF
11.000 REF
℄ CORE
2'-8 3/8"
℄ TANK
THERMAL COLUMN LINER STAND
3'0"
BORE OUT GRAPHITE TO CLEAR BOLT AS REQD
3/4-10 NC-2 x 2-1/4 LG CAD PLATED BOLT
28 REQD
5'-3 5/8" REF
8'-5 3/8" ± 1/8
10'-0" REF
3/8 SHIM
5/8 PAD REF
REACTOR BUILDING FLOOR


N
32"
38"
32"
24"
22"
24"
60"
CORE END


FACE OF REACTOR
POOL TANK
TYPE 304 ST STL TUBE WELD BEAD GRIND FLUSH ON I.D. TOLERANCES: ID +.050, -.035
VIEW A-A
8 SCH 40 ST STL TYPE 304 SEAMLESS PIPE OPTION - USE WELDED PIPE AND GRIND WELD FLUSH ON I.D.
GRANITE GASKET
SEE LINER & BACK-UP RING DETAIL
LINER & BACK-UP RING DETAILS
ST STL TYPE 304
AL ALY 6061-T6
AL ALY 3003 OR 1100-F GRIND SEAM WELD FLUSH INSIDE & OUTSIDE
NOTES:
1 LEAK TEST BY PRESSURIZING TO 12 PSI WITH AIR & CHECK FOR LEAKS USING SOAP BUBBLE TEST.
2 BEFORE POURING CONCRETE IN FIELD SEAL JOINTS WITH TAPE OR MASTIC.



NOTES:
1. FILL BOTH PLUGS WITH ORDINARY CONCRETE (150 LB / CU FT APPROX)
2. MACHINE AFTER FILLING WITH CONCRETE.
3. MARTIN HARDCOAT AFTER MACHINING

39. Section 10.2.4, Pneumatic Transfer System. Provide a more detailed description of the pneumatic transfer system design and operation and the administrative controls governing its use. Specific topics to be addressed include the source(s) of CO_2, potential consequences of a stuck/immovable rabbit assembly and design features and/or administrative controls provided to preclude or mitigate this occurrence, manual and automatic timing modes of operation, system venting, and design features which preclude the potential for a failure within this system to result in a loss of pool water inventory.

Response:

The Pneumatic Transfer System is supplied with CO_2 by means of a standard cylinder that is secured to the wall in the hot room. The resulting circumstances that would occur from a "stuck" rabbit capsule are of an extremely low risk of causing either core damage or loss of pool water due to the fact that the rabbit experiments are limited to a maximum of $1.00 reactivity and the CO_2 piping is routed to exit the source tank vertically on a path that routes to the top of the security cage. Flooding of the rabbit receiver could reach a level equal to the height of the tank water and not above. Timing of the insertion is controlled from the auxiliary console with the operator controlling the insertion. Capsule ejection may be set to automatically occur at the end of a preset time with the operator having a manual return switch mounted in the same location as the insertion. The capsule is then returned to a receiver in a sealed glove box in the hot room which is the same location as the sample started its path into the core. The glove box is equipped with a fan which vents the box into the bay area. The glove box is also equipped with a radiation monitor which provides a display at the operators console and the door which allows entry into the hot room. Procedures governing the operation of the system are contained in OP105R12 Installation of Experiments.

40. Section 10.2.5, Other Locations. This section states that the reactor grid plate and reactor pool tank may be utilized to conduct experiments. Provide a more detailed description of the functional design of these facilities, the type of experiments that are typically conducted at these locations, and if any special precautions or limitations are needed to ensure their safe use.

Response:

The standard review format must be followed before conducting any experiment. In addition to the standard review, all experiments must be evaluated against the experimental maximum for reactivity worth.

42. Section 10.3, Experiment Review. Regulatory Position C.3.a(1) of Regulatory Guide 2.2 states that no experiment should be performed without review and approval by a technically competent Safety Review Group or Committee. From the discussion presented in Section 10.3 of the SAR and Technical Specification 6.5, it is not clear if all experiments categorized as "routine" have been previously reviewed and approved by RSC. Please clarify.

Response:

The standard review format must be followed before conducting any experiment. The review program states that any experiment conducted for the first time is considered a "Special Experiment" and as such is required to undergo approval by the Reactor Safety Committee.

43. Section 10.3, Experiment Review. Please clarify in the SAR that all new (modified routine and special) experiments will go through a 50.59 review.

Response:

The standard description clearly states that no new experiment may be classified as routine or modified routine. The sentence in section 10.3 that currently states "Any experiment that requires modification of the reactor facility or interfaces with control and/or safety systems will be reviewed for 10 CFR Part 50.59 compliance." Shall be replaced with "Any new or special experiment will be reviewed for 10 CFR Part 50.59 compliance."

44. Section 10.3, Experiment Review. This section notes that quantities of TNT less than 25 mg can be irradiated but calculations must show that the pressure produced (if detonation occurs) is less than the failure pressure of the container. The overpressure from detonation of 25 mg of TNT (from Regulatory Guide 1.91, Rev. 0) in small containers can be significant [redacted] For larger containers the overp[redacted] administrative controls you have to ensure that the necessary calculations are performed and performed correctly, if TNT were to be irradiated.

Response:

Irradiation of any quantity of explosives would be considered a "special" experiment. And as such must be approved by the Reactor Safety Committee. As part of the review process, the committee members must be satisfied that the container would have passed a 50.59 review and will meet all requirements associated with the irradiation, including being satisfied that the container is of sufficient to withstand any potential over pressure.