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June 24, 2011

US Nuclear Regulatory Commission
Document Control Desk
Washington DC 20555
Attention: Linh Tran, Senior Project Manager
Francis DiMeglio, Senior Project Manager

Re: **Docket 50-326 Relicense, RAI dated April 5, 2011 (TAC ME1579), extension granted to July 1st, 2011.**

Dear Ms Tran, Mr DiMeglio:

Please find attached the response regarding your request for additional information.

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

Executed on June 24, 2011

G. E. Miller

Dr. George E. Miller

A020
NRR

UCI RESPONSE TO:

OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR ADDITIONAL INFORMATION

UNIVERSITY OF CALIFORNIA IRVINE NUCLEAR REACTOR FACILITY
LICENSE NO. R-116

DOCKET NO. 50-326

The U.S. Nuclear Regulatory Commission (NRC) staff is continuing the review of your application for renewal of Facility Operating License No. R-1 16, dated October 18, 1999, as supplemented by letters dated October 23, 1999, January 27, 2010, July 14, 2010, and October 20, 2010. During our review, additional questions have arisen for which we require information and clarification. Our review conformed to the Interim Staff Guidance on the Streamlined Review Process for Research Reactors and NUREG-1537.

Please address and provide the requested information to the following within 30 days of the date of the transmittal letter:

(1) NUREG -1537, Chapter 7, "Instrumentation and Control Systems," recommends that a description be provided of the Reactor Protection System listing the protective functions and the parameters monitored to detect the need for protective action. Chapter 7 of the SAR, as supplemented, includes the mention of a Seismic Switch and the set point for a reactor scram. However no discussions were provided for the Seismic Switch or the rationale for the reactor trip set point. In addition, the proposed technical specifications stated a Limiting Condition of Operation which requires a Seismic Switch with a trip set point different from that in the SAR. Please provide a discussion regarding the Seismic Switch and an analysis describing the reactor scram associated with the seismic switch trip set point.

RESPONSE

The facility has recently installed a new seismic switch and added a section 7.2.12. to our SAR as provided below. This switch has a calibration certificate dated 10/28/2010 provided by the manufacturer and we will determine from them a recommended frequency for recalibration. The technical specifications will be revised to include the 3.0%g setting as the required value. This will provide adequate assurance of reactor SCRAM in the event of a modest seismic event. It should also be noted that the completed seismic upgrade to the building housing the reactor, reported earlier, was designed to strengthen the building to withstand forces well in excess of this value without significant structural damage.

7.2.12. Seismic Trip.

A seismic trip channel that will scram the reactor if a significant ground ,motion is detected is provided in case the operator should be incapable of performing this action, since operating procedures call for a reactor scram to be initiated in the event of a significant earthquake. The motion sensor (MitiGator, Kinemetrics Inc.) contains three accelerometers sensing motion in three orthogonal directions. Any direction sensing a motion in excess of 3.0% of the force of gravity (0.030g) trips a relay that opens the SCRAM circuit indicating an "EXTERNAL SCRAM" to the console. This sensor stores the motion that caused the trip in memory and this can later be read out via an RS232 connection. 3.0%g is within the range accepted as represented by MM IV motion (1.1-3.4%g). Such motion is described as perceived as light shaking and causing none to very little damage. The channel remains tripped until manually reset by means of a push-button.

(2) NUREG-1537, Chapter 13, "Accident Analysis," recommends maximum hypothetical accident (MHA) doses analysis to the public. The MHA analysis presented in the SAR, as supplemented, is incomplete in that (1) while providing considerable information, it does not provide a clear presentation of the analyzed MHA scenario, and (2) it does not discuss the dose to non-occupational occupants in unrestricted areas adjacent to the reactor facility and non-occupational occupants of Rowland Hall such as students, faculty, visitors, etc. Please provide a discussion regarding the scenario for the MHA and a dose assessment for the maximum exposed individual member of the public in the unrestricted areas of Rowland Hall and in unrestricted areas adjacent to the reactor facility. Please describe the assumptions used and any systems, plans, procedures, or stay times for which credit is taken in the analysis.

RESPONSE.

We regret we have not been able to complete re-analysis of the MHA as of this date. We respectfully request a further month to complete this. At the same time we will be submitting a revised discussion of the ^{41}Ar releases from the facility to take account of the recently completed revisions to our ventilation system. We would undertake to provide these by August 1st, 2011.

(3) NUREG 1537, Chapter 4, "Reactor Tank and Pool," recommends that consideration be given to methods for assessing and preventing corrosion to the tank exterior. From the NRC's Inspection Report dated January 13, 2011, it is noted that ground water from rain and irrigation has been observed in fuel storage pits and in monitoring wells in the in- ground spaces around the exterior of the reactor tank. Please provide a discussion describing the impact to the reactor tank liner and other structures, as applicable, associated with this groundwater incursion. Since this groundwater incursion may cause corrosion, in your discussion, please describe how corrosion can be detected for the reactor tank and other structures, as applicable. Please include a discussion regarding detection of leakage from the reactor tank.

RESPONSE

No evidence to this date of corrosion to the reactor pool tank from the outside has been detected, nor corrosion to other structures beyond that by incursion into the storage pits described to NRC in various communications several years ago. The tank is protected by impermeable wrapping as described in our SAR. However in order to mitigate the possibility of corrosion induced by the unanticipated ground water from the outside, the facility has recently installed a permanent pump and level measuring sensor in the closest monitoring well with the goal of maintaining the ground water level surrounding the pool tank to below the level of the concrete tank. This is more fully described in the revised SAR section 4.2 appended in full below.

In addition, routine sampling for radioisotopes will be made of pumped water in order to assure that no water from the inside of the tank is detected in the outside water.

Furthermore, procedures have been implemented that include regular monitoring and recording of the pool water level so that any leakage of water from the pool to the outside ground would be detected as soon as possible so that counter measures could be instituted. The instrumentation that enables this is described in Section 7.2.9. of our SAR and is also appended below. Some of this information has been transmitted earlier but is included for ease of referring to the complete section.

4.2 Reactor Tank and Pool

4.2.1. Description.

The pool consists of an aluminum tank liner 10 ft wide by 15 ft long and 25 ft deep (Fig. 4-2), 1/4 inch thick on the sides and 1/2 inch thick on the bottom supported by reinforced concrete. At the core end, 2 ft 6 in of concrete surround the liner and 4 ft 6 in of concrete are below the liner to provide support and reduce soil activation (Fig. 4-3).

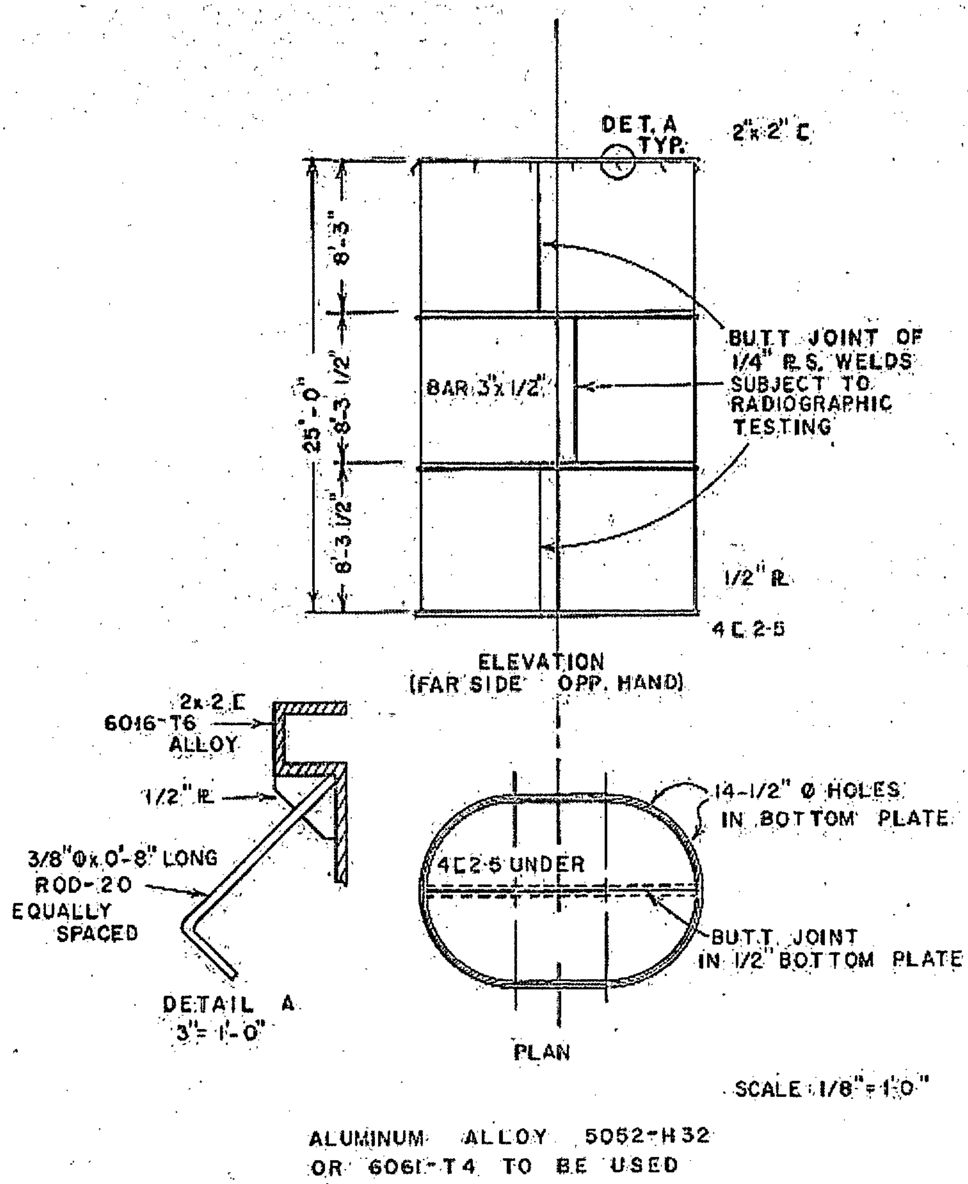

Fig 4-2 Reactor Aluminum Tank Liner

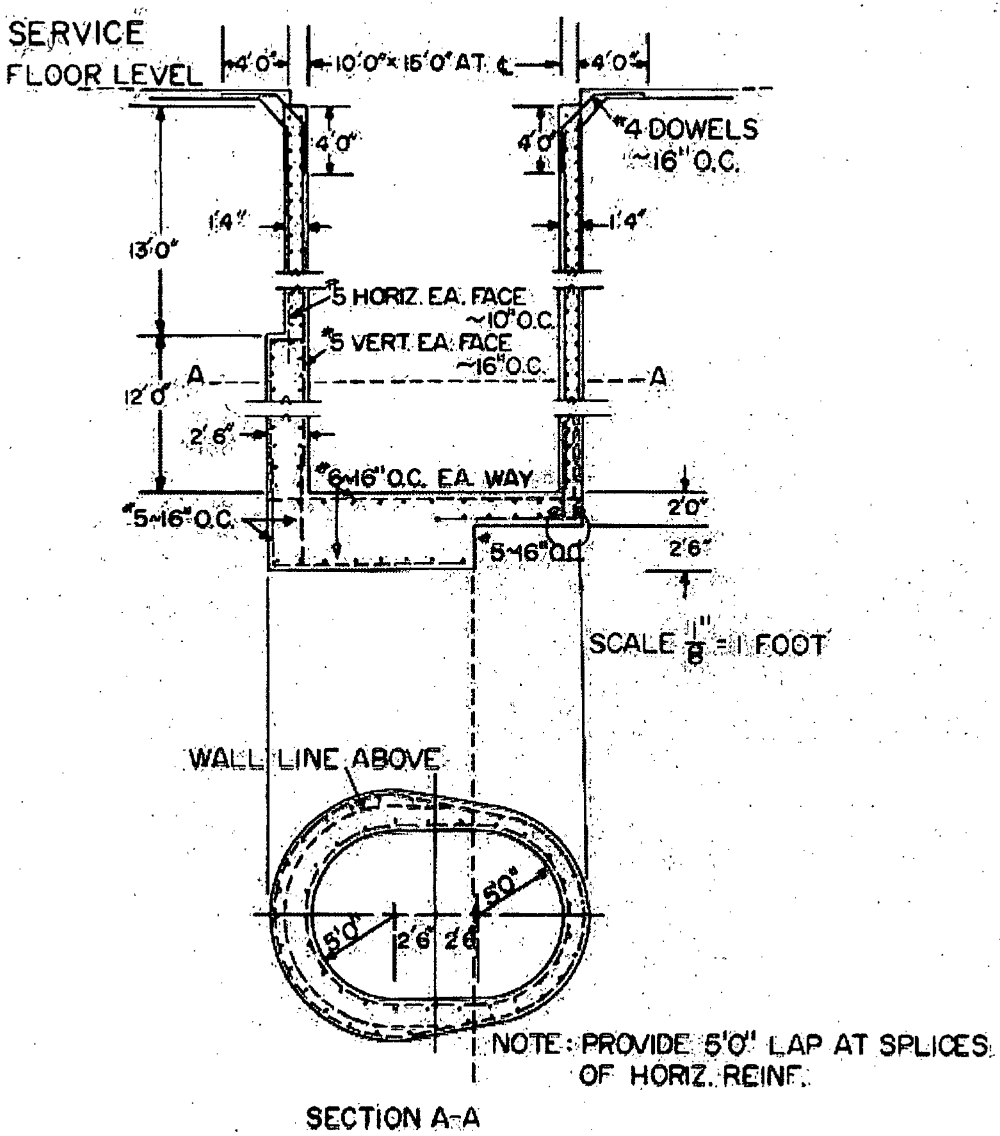

FIG. 4-3 Concrete Reactor Tank

The liner and the concrete pit was constructed to the design and specifications used by Gulf General Atomic for their Mark III TRIGA installation in San Diego. The design is considered to be more than adequate to endure earthquake induced ground motions. An extensive leak-testing procedure coupled with weld radiography at 20% of the welds was performed to ensure integrity of the aluminum liner. The leak tests were repeated with the liner in place on its foundation to ensure against damage during shipping and handling. All surfaces of the tank were tested for iron particles that were removed by grinding before the tank was filled with water.

An ion exchange resin purification system operates 24/7 to reduce conductivity and pH. Water quality measurements are performed routinely to assure its effectiveness.

The tank was installed in an excavated pit shown in the photograph, Fig 4-4, before the concrete shell was poured and before backfill. The tank was double wrapped with hot tarred felt before the concrete surround was poured to provide a water barrier to prevent corrosion from the surrounding concrete. Backfill was then used surrounding the concrete shell and consolidated to specified standards.

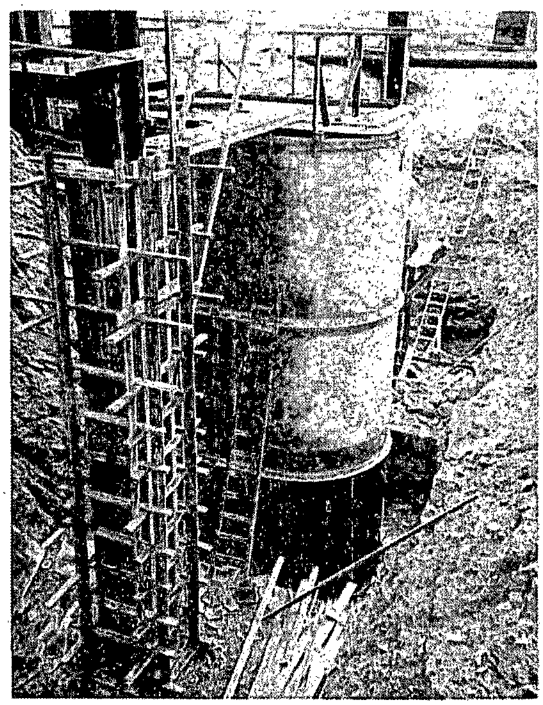

Fig 4-4 Reactor Tank Liner Installation

4.2.2. Ground Water and Potential Corrosion Issues.

The geology of the excavation to accommodate the reactor tank is such that layers of shale are embedded in sandstone and brecchia making a "basin" containing the backfill, the sides of which are relatively impermeable. Pre-construction drillings showed complete absence of water to a depth of over 40 feet in any location beneath Rowland Hall. However, it was discovered following occupancy and completion of landscaping that water accumulates in this "basin" as a result of irrigation of landscaping adjacent to Rowland Hall, and the occasional rainfall. To monitor and reduce this accumulation wells were drilled to a depth of about 35 feet adjacent to Rowland Hall on the north and west sides. Automatic sump pumps are installed in those wells. However it was found that these do not fully tap into the "basin" area adjacent to the reactor tank, so a third well was drilled within the reactor room approximately 9 feet from the western edge of the aluminum liner, just off its center line.

4.2.3. Well Pump and Level Monitor

Because of concerns expressed about future tank corrosion, an automated pump system (Grundfos Model SQE 90 with a PumpSaverPlus Model 111P Controller) has been installed in the interior well to maintain a low water level - which rises after significant rainfall, landscape irrigation or irrigation pipe failure. This pump actuates on a preset timed schedule and then pumps until dry. In addition a water level sensor (Siemens MPS series Model 7MF1570-1NA01) and is installed so the actual water level in the well above 34 feet below the floor (4 feet below the bottom of the concrete tank) is read out (Precision Digital, ProVu Model PD6000-6R3) in the reactor room. Any rise to the 4 foot level or higher will be cause for investigation of pump timing settings and/or effectiveness. A reading device (Informer) for the PumpSaverPlus allows for such investigation. Samples are routinely taken of the water being removed and are assayed by gamma-ray spectrometry. Significant levels of natural decay products are always observed, indicating there is a natural soil content of uranium and thorium which dissolves in the percolated water. Potential pool water radionuclides are specifically sought in this assay.

7.2.9. Water Level Monitoring Channel. A stainless steel float switch (Innovative Components, Model CLM-2000-SS) is installed in the pool that provides a read-out and alarm system (Preview Model 5714). An alert level is provided at the control console with an alarm at the security dispatch point. No automatic make-up is provided, so procedures require recording approximate make up quantity and new level. The level monitor reports the level in approximately 12 mm increments. For this pool, 25 mm corresponds to 80 gallons of water. Records are examined annually so as to detect any deviation from normal evaporation rates. The central alarm level is set at about 12 inches below the pool rim (indicator reading 0). The alert level is set at about 2 inches above that level (reading 18) and indicates that water should be added to preserve dashpot action on the REG and SHIM rods. The reading calibration is 8.7 units per inch.