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15 January, 1999

Theodore Micheals
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Mail Stop 11B20
Washington, DC 20555-0001

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Dear Mr. Micheals,

As per our conversation last week, I am reporting a change in the Safety Analysis Report for our facility. Starting during Christmas break, the University began modifications to our building's HVAC system, which is separate from the reactor facility. However, the Reactor Safeguards Committee believes that this system is explicitly mentioned in our SAR (Hazards Summary Report, 1961) and that an unreviewed safety question may be involved. I will provide a chronology of events and a description of actions taken in this 30-day letter. In order to meet the intent of the SAR, several modifications to the reactor's own ventilation system have been undertaken. I believe that you will find that the overall result is enhanced safety, both during normal operations and accident conditions.

On 2 December 1998, I learned that the University's Department of Facilities Planning had signed a contract to replace the building's HVAC system. I immediately contacted Mr. Conway of Brack and Associates, the engineering firm involved in the design, to learn the details of the proposed system. Mr. Conway informed me that the system was to change from 100% outside air to recirculation flow. The engineering firm was under the impression that 100% outside air was required for fume hoods, most of which have been removed. The reactor was not considered in their design. After checking, I found that page 37 of our SAR states that: *No building air will be recirculated.* I informed the engineer that some changes to the plan must be made. The engineering firm then sent Facilities a letter stating my concerns and informed me that Facilities would contact me. No contact was made. On 23 December 1998, work was started on the building, so I sent Facilities a letter stating that certain modifications to their design that would have to be made to ensure that the intent of our SAR was maintained. On 6 January 1999, I met with the Department of Facilities and the engineering firm, at which point we found a compromise in changes to both the building and reactor bay system, which are separate. On 7 January 1999, I notified the Safeguards Committee that there might be an unreviewed safety question involved and they concurred. I contacted Ted Micheals at the NRC with a brief description and indicated that this report would soon follow.

As Reactor Manager, I have requested and implemented several changes to preserve the intent of our Safety Analysis Report. I believe that the logic of the previous system was such that if radioactive gases entered the building from the reactor bay, they would be quick dispersed. Unlike many other facilities, we did not maintain a negative pressure inside the reactor bay. Instead, the building was held under high positive pressure by the

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100% outside air system. With recirculation in effect, this pressure differential might not be maintained, especially since the reactor bay also utilized 100% outside air. Additionally, it should be noted that under the old system the reactor bay was also held at positive pressure with respect to atmospheric, but at a pressure less than the remainder of the building.

With relicensing concerns in mind, I decided to implemented a different solution. The reactor facility had recently purchased an Eberline AMS-4 particulate/iodine/noble gas monitor. This unit was positioned at the point of highest expected airborne radioactivity concentration (directly above the top of the reactor tank). An existing exhaust fan in the top of the reactor bay was reactivated. This fan is at the highest point in our facility and exhausts well above the remainder of the building. Although not specifically mentioned in the original SAR, the fan was part of the original equipment installed to keep concentrations below MPC values in the event that those values were reached during accident conditions. Based on historical discussions with faculty members, this fan was permanently shut down due to the lack of air monitoring equipment to show compliance with the then newly established release limits. The fan has been coupled to the new air monitor's alarm and fail relays, namely to shut down the fan in the event that a high level of airborne radioactivity is detected or the monitor fails one of its self-diagnostic routines. A manual shutoff switch is also present in the control room. The dampers on the outside air ventilators to the reactor bay were shut off and the dampers closed. A flow rate check of the exhaust fan was made and found to be 884 cfm. Negative pressure differential was confirmed by opening each of the doors to the reactor bay. At this flow rate, this will give a change of air every three hours. (Our minimum bay volume is 144,000 ft^3.) However our existing Safety Analysis Report calls for the system to change air three to four times per hour. I believe that the intended wording was an air change every three to four hours, as our original system would not meet this requirement either. Four 500 cfm outside air ventilators only provided an air change every 1.2 hours. Four changes per hour would require a fan nearly twelve feet in diameter! These ventilators are to be permanently sealed off to maximize our negative pressure differential.

During normal operations our principal airborne radioactive effluent is ^{41}Ar. Historically, we have never seen any occupational exposure due to its presence in the reactor bay (it is a submersion dose nuclide and would therefore be measured by existing film badges). Exhausting this effluent through the fan is preferable, since this provides a controlled release at the highest point in our facility. This maximizes atmospheric dispersion to give the lowest possible public dose. Previously, the outside air ventilators caused this byproduct material to be released through penetrations in the reactor bay to the outside atmosphere at all elevations. (The reactor bay was under positive pressure with regard to atmospheric, but negative with regard to the building.) The air monitoring equipment coupled to the exhaust fan also provides for a controlled release. With the fan off and the outside air ventilators, airborne radioactivity will be better confined to the reactor bay during accident conditions, especially since the initial pressure differential will be negative.

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Calculations of releases during normal operation are to be performed to establish set-points for the air monitoring system. Until this is accomplished, the set-points will be set at 10CFR20 Appendix B effluent concentration values, for ^{137}Cs, ^{131}I, and ^{41}Ar for each of the respective detectors. The first two are likely to be the limiting case for a fuel failure in air and the last for normal operations or noble gases from a fuel failure in water. The Reactor Safeguards Committee has authorized operation subject to the aforementioned air constraints. Upon approval of the Safeguards Committee, calculations taking into account dispersion before reaching the exhaust fan and hours of operation will likely allow these set-points to be set closer to occupational DAC values. Essentially, this binds the reactor to maintaining unrestricted area limits inside the restricted area and may preclude extended full power operation. Reactor operation has been limited to maintenance activities until the system is declared fully operable.

The changes to the air handling system in the reactor bay are not purely a result of the changes to the building system. For some time, these modifications have been proposed to occur as a part of relicensing. The facility had purchased the new air monitoring system in preparation for relicensing. These changes were to be incorporated into the revised SAR currently in process. However, the changes in the building system precipitated the early implementation of these modifications. The new layout provides better monitoring, a fixed release point, a negative pressure in the reactor bay under the control of the reactor facility, and a better confinement in the event of accidents. A more quantitative analysis will be provided in our revised Safety Analysis Report, which will be submitted in full at the time of relicensing. On a side note in support of the new building HVAC system, personnel have been complaining for many years that a 100% outside air system does not perform well in the state of Kansas, where the seasonal temperature changes are often extreme.

Sincerely,

Brendan C. Ryan

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