



Terrance G. Alexander, Executive Director

March 29, 2007

U.S. Nuclear Regulatory Commission
Document Control Desk or Security Desk
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738

**RE: Reply to Notice of Violation
University of Michigan
NRC Inspection Report 030-01998/07-002 (DNMS)
Material License No. 21-00215-04**

Material Inspection / Decommissioning Branch:

During a Nuclear Regulatory Commission (NRC) inspection completed on January 25, 2007, two violations of NRC requirements were identified at the University of Michigan (U-M). The NRC Inspection Report 030-01988/07-02 was dated February 16, 2007 and the U-M was granted an extension until March 30, 2007 to reply.

Please find below the U-M written explanation to the two Severity Level IV notice of violations.

1.0 10 CFR20.1402 – Verify Compliance with 25 millirem / year Exposure Requirement

1.1 Cited Violation

The licensee did not make surveys to assure compliance with 10 CFR 20.1402, which limits radiation exposure to 25 millirem per year from residual radioactivity that is distinguishable from background. Specifically, the licensee released for unrestricted use the Simpson Memorial Institute on June 14, 1999 and demolished the Neuroscience Building on April 11, 2002, without having conducted adequate surveys of the buildings to verify compliance with the 25 millirem / year exposure requirement.

1.2 Reason for Violation

The U-M does not contest this violation. However, the U-M believes that although the surveys conducted do not rise to the standard in guidance such as NUREG/CR-5489 or NUREG-1757, the surveys and evaluations conducted did provide a reasonable basis upon which to conclude with some certainty that there was no detectable residual activity in either building at the time they were released for unrestricted use. Nonetheless, the U-M agrees that better, more technically sound decommissioning methods can be used and should be adopted. Staff will be trained in the newer methodologies and procedures developed that incorporate the methods.

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Regulatory Analysis:

The actions of the University of Michigan were premised in part upon our interpretation of otherwise complex and intertwined rules in both 10 CFR 30.36 and Subpart E in 10 CFR 20. The provisions of Subpart E of 10 CFR 20 by themselves apply principally to "end-of-license" decommissioning.

In particular, the definitions for the term "decommissioning" in both 10 CFR 20.1003 and 10 CFR 30.2 define it to mean:

"to . . . reduce residual radioactivity to a level that permits: (1) release of the property for unrestricted use *and termination of the license* . . . "

In developing this definition for "decommissioning", the NRC expressly declined to remove the phrase "termination of the license" from the definition noting that for the purposes of the regulations, decommissioning "is a term for a process that ultimately leads to termination of an NRC license. . ." (62 Federal Register 39083 / July 21, 1997).

In contrast, as was the case for both the Neuroscience Building and the Simpson Memorial Institute, site and building releases do not always involve termination of an NRC license. In such building "end-of-use" cases, licensee requirements are outlined in the provisions of 10 CFR 30.36(d).

10 CFR 30.36(d) requires a licensee to commence decommissioning of:

"... any separate building or outdoor area *that contains residual radioactivity* such that the building or outdoor area is unsuitable for release in accordance with *NRC requirements*. . . "

The NRC requirements are those specified in 10 CFR 30.36(j) which requires that

As the final step in decommissioning, the licensee shall . . .

(2) Conduct a radiation survey of the premises where the licensed activities were carried out and submit a report of the results of this survey, unless the licensee demonstrates in some other manner that the premises are suitable for release in accordance with the criteria for decommissioning in 10 CFR Part 20, subpart E. The licensee shall, as appropriate

(i) Report . . . levels of radioactivity . . . in units of megabecquerels (disintegrations per minute or microcuries) per 100 square centimeters . . .

The principle criterion in Subpart E of Part 20 is in 10 CFR 20.1402:

"A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem / year . . . "

Thus, under 10 CFR 30.36(d) and (j), it appeared to the U-M that the provisions of 10 CFR 20.1402 apply *only* when a licensee determines that there actually is residual radioactivity. Upon a finding of residual radioactivity, the licensee (per 10 CFR 20.1402) must then determine if it exceeds the 25 millirem / year limit in 20.1402. If so, only then must the licensee engage in decommissioning activities to reduce the residual radioactivity and prepare a final site survey with results reported in the units specified in 10 CFR 30.36(j).

U-M Building Release Evaluations:

In both facilities, we believed our evaluations and surveys provided a substantial basis upon which we could reasonably conclude that — after all licensed activities completely ceased (including waste collection, general lab cleanup, and transfer of stocks to new locations of use) — there was no residual contamination in either facility that was distinguishable from background, let alone in amounts necessary to result in a TEDE of 25 mrem / year to an average member of any critical group (as required in 10 CFR 20.1402). As noted in the Notice of Violation, the U-M follows a “zero tolerance” for residual contamination as part of its overall and routine contamination control program as well as for the purposes of facility release. To do so, Radiation Safety Service / OSEH staff use calibrated radiological instrumentation, employ good health physics practices, and decontaminate any detectable contamination to background levels.

The U-M relied on traditional survey methods which our experience has indicated have been quite sufficient to identify very low-levels of contamination from the types of tracer radionuclides typically used in medical research labs. For instance, both buildings were part of the medical campus and held several typical small medical research labs. There were no overt indications that either building went through any major renovation. In addition, the activities in both facilities throughout a period of at least 10 years were well known based upon the history of approvals and uses within the memory of current staff. Those uses were well monitored and understood because all use of radioactive materials at the U-M are subject to tight controls and approvals. Researchers are restricted in what they may order and use. They are required to conduct periodic surveys and labs are routinely visited by OSEH-RSS staff in accordance with the requirements of the U-M Byproducts Materials license. Although these factors were not well-documented within the context of a formal historical site assessment, the totality of knowledge allows for a reasonably certain conclusion that that usage in those buildings consisted of the typical tracer isotopes such as H-3, C-14, P-32, S-35, I-125, and Cr-51.

Accordingly, our selection of survey methods and instrumentation was premised largely upon such historical knowledge albeit not well documented and not complete for the life of each building. The conclusion that the two buildings were acceptable for unrestricted use was based on numerous direct survey instrument measurements along with swipes counted in a sensitive liquid scintillation counter and the results were compared against background values for each area surveyed. Experience has shown that these methods are very sensitive identifiers of both short-lived and long-lived medical research isotope tracer contamination. H3, C14 and S35 would be the principal and, very likely, the only long-lived contaminants in both buildings. These radionuclides have extremely high screening Derived Concentration Guideline Levels (DCGL) [well in excess of 1,000,000 dpm/100 cm² as published by the NRC and are well above the applicable instrumentation background thresholds and expected minimum detectable activities (MDA)].

Based on traditional survey methodologies, the U-M concluded that there was no residual radioactivity and no further need to proceed with the provisions for decommissioning specified in 10 CFR 30.36(j).

As a result, the records for the close-out surveys for both buildings did not record results in units of dpm/100 cm² typical of published DCGLs that directly relate surface contamination to TEDE. Accordingly, the survey results were not recorded in dose-based units directly comparable to the 25 millirem / year limit in 10 CFR 20.1402. In hindsight, those units would better serve to document the results of the University's survey efforts and will be included in reports for future 30.36(d) building releases.

In conclusion:

We understood the provisions of 10 CFR 30.36(d) and (j) to be premised upon a determination of residual radioactivity. We believed we reached a reasonable conclusion that neither facility contained residual radioactivity based upon our knowledge of operations in those facilities and upon comprehensive radiological surveys using traditional methodologies. As such, we were of the opinion that the requirements for conducting decommissioning in the manner specified in 10 CFR 30.36, including the requisites for the final site survey documentation outlined in 10 CFR 30.36(j), were not applicable. However, we agree with the NRC that technically sound survey methodologies outlined in documents such as NUREG/CR-5489 and NUREG-1757 are more comprehensive, defensible, and uniform than the traditional methods used in the past. These newer methodologies provide stronger certainty in results and will establish a level of national conformity that will permit the U-M and the NRC to better respond to inquiry and scrutiny.

1.2 Corrective Steps Taken and Results Achieved

The U-M has initiated the following corrective steps:

- (1) The Radiation Safety Service / OSEH health physicist staff has initiated a review of the various decommissioning references available, including NUREG/CR-5849, MARSSIM, NUREG-1757, Regulatory Guide 1.86 and other related documents. The Radiation Safety Officer (RSO) will conduct introductory training on NUREG/CR-5849 for the Radiation Safety Service / OSEH technical staff.
- (2) Radiation Safety Service / OSEH has made arrangements for hands-on and classroom training on decommissioning methodologies with respect to meeting the 10 CFR 20.1402 dose requirement (25 millirem/year) from the primary author of NUREG/CR-5849, Mr. James Berger, CHP / DeNuke Services, Oak Ridge, TN. At this time, the proposed training will cover methodologies from NUREG/CR-5849 and will incorporate those portions of MARSSIM, NUREG-1757, and Regulatory Guide 1.86 that apply to a technically sound and effective decommissioning process.
- (3) The RSO and members of the health physicist staff have met with Jim Berger, CHP / DeNuke Services in March 2007 and conducted a walk-around of various locations within the Phoenix Memorial Laboratory.

After having reviewed the various NUREG references regarding decommissioning activities, meeting with Mr. Berger, and observing the decommissioning survey techniques currently underway at the U-M Ford Nuclear Reactor, the Radiation Safety Service / OSEH staff are making strong efforts to learn and apply technically sound decommissioning methodologies in conformance with NRC expectations.

1.3 Corrective Steps that Will Be Taken to Avoid Further Violations

- (1) The U-M will review and modify procedures for the routine close-out of radioactive materials laboratories and facilities for unrestricted use and improve the quality of recordkeeping associated with those close-outs.
- (2) The U-M will develop, implement, and document procedures for 'end-of-use' building decommissioning efforts, separate from those that apply to routine laboratory close-outs, in accordance with 10 CFR 30.36(j) and 10 CFR 20.1402. All future radiological surveys conducted for an end-of-use building or facility release evaluation will be conducted and documented in a manner that applies technically sound decommissioning methodologies in which the Radiation Safety Service / OSEH technical staff will be trained.

1.4 Date When Full Compliance Will Be Achieved

We expect full compliance on or before October 1, 2007.

2.0 10 CFR 30.35(g)(3) – Single Document Listing Formerly Designated Restricted Areas

Cited Violation

10 CFR 30.35(g)(3) requires, in part, that a list contained in a single document must be kept of all areas designated and formerly designated restricted areas as defined in 10 CFR 20.1003. As of January 25, 2007, the U-M failed to account for all areas designated as restricted areas prior to 1990 in its list of restricted areas.

2.1 Reason for Violation

For a number of years, the U-M has maintained a list of areas where radioactive materials have been used or stored including restricted and controlled areas, and areas where sealed sources were used or stored. Records and databases do exist prior to 1990. However, these are in multiple formats or in older electronic forms. We believe we have a comprehensive collection of historical data on past locations of use and storage, but it will require a significant effort to retrieve it, assess it, and re-consolidate it into a single document or data source.

2.2 Corrective Steps Taken and Results Achieved

Radiation Safety Service / OSEH initiated an initial assessment of historical radiological records and compilations with respect to the procurement of licensed materials and locations of use. Although in various media formats, the historical records appear to be intact and fairly well organized, so a list of formerly designated restricted areas should be able to be constructed over time.

2.3 Corrective Steps That Will Be Taken to Avoid Further Violations

The U-M will compile available historical data (data prior to 1990) on locations of use and will consolidate the available data into a list identifying the types of restricted areas required to be documented in 10 CFR 30.35(g)(3)(I). This will be contained in a single document. The document will be reviewed every two years and updated if necessary.

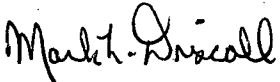
2.4 Date When Full Compliance Will Be Achieved

Full compliance will be achieved by April 1, 2008. The historical assessment of radiological records prior to 1990 will be a very labor-intensive and time-consuming project.

Thank you for your time and consideration with respect to this inspection response. In addition, a special thanks for allowing the U-M a two-week extension in which to respond to these notice of violations. The U-M has attempted to respond completely and accurately to the two Level IV violations noted in NRC Inspection Report No. 030-01998/07-002.

Please do not hesitate to contact me at Radiation Safety Service / OSEH [(734) 764-6200] should you have any questions, comments, or concerns regarding any response noted in this correspondence.

Sincerely,



Mark L. Driscoll
Director / Radiation Safety Officer
Radiation Safety Service / OSEH

MLD/DAP/JAM/mld/dap
[NRCInspectResponse012507.doc]

cc: Terry Alexander, PE, CIH, Director, Occupational Safety & Environmental Health
Henry Baier, CIH, Associate VP, Facilities & Operations, Business & Finance
Mike McCann, Senior Health Physicist, Nuclear Regulatory Commission (Region III)
Ruthann Nichols, Ph.D., Chair, Radiation Policy Committee