



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION III  
2443 WARRENVILLE ROAD, SUITE 210  
LISLE, ILLINOIS 60532-4352

October 19, 2010

Mr. Steven Benedict, Executive Director  
University of Michigan  
Office of Campus Sustainability  
1239 Kipke Drive  
Ann Arbor, MI 48109

SUBJECT: NRC INSPECTION REPORT NOS. 030-06958/10-01(DNMS),  
030-01988/10-01(DNMS), AND 070-00192/10-01(DNMS) (FORM 591M Part 1),  
UNIVERSITY OF MICHIGAN, ANN ARBOR, MICHIGAN

Dear Mr. Benedict:

On August 23 through 27, 2010, the U.S. Nuclear Regulatory Commission conducted routine inspections at your Ann Arbor and Dearborne, Michigan campuses, respectively. The inspection results were discussed with Mark Driscoll of your staff during a final telephonic exit briefing conducted on September 21, 2010.

These inspections were an examination of activities conducted under your license as they relate to radiation safety and to compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, independent measurements, and observation of activities in progress. Within the scope of these inspections no violations of NRC requirements were identified; therefore, no response to this letter or the enclosed NRC Form 591M is required.

In accordance with Title 10 of the Code of Federal Regulations (10 CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

S. Benedict

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Should you have any questions concerning these inspections or enclosed reports, please contact Darrel Wiedeman of my staff at (630) 829-9808.

Sincerely,

Handwritten signature in cursive script that reads "Kenneth J. Lambert for".

Tamara E. Bloomer, Chief  
Materials Inspection Branch

Docket Nos. 030-01988, 030-06958 and 070-00192  
License No. 21-00215-04, 21-00215-06, and SNM-179

Enclosure:  
Inspection Report Nos. 030-1988/10-01(DNMS);  
030-06958/10-01(DNMS); 070-00192/10-01(DNMS)

cc w/encl: Mark Driscoll, RSO, University of Michigan

**SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION**

1. LICENSEE/LOCATION INSPECTED The Regents of the University of Michigan: Radiation Safety Service 1239 Kipke Dr. Ann Arbor, MI 48109 REPORT NUMBER(S) 2010-01		2. NRC/REGIONAL OFFICE U.S. Nuclear Regulatory Commission Region III 2443 Warrenville Road, Suite 210 Lisle, Illinois, 60532	
2. DOCKET NUMBER(S) 030-6958 3. 030-01988 4. 070-00192	5. LICENSEE NUMBER(S) 21-00215-04 6. 21-00215-06 7. SNM-179	5. DATE(S) OF INSPECTION 8/23-27/2010 Exit on 9/21/2010	

**LICENSEE:**

The inspection was an examination of the activities conducted under your license as they relate to radiation safety and to compliance with the Nuclear Regulatory Commission (NRC) rules and regulations and the conditions of your license. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector. The inspection findings are as follows

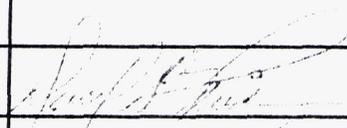
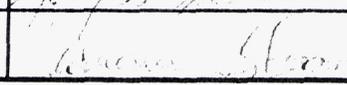
- 1. Based on the inspection findings, no violations were identified.
- 2. Previous violation(s) closed.
- 3. The violation(s), specifically described to you by the inspector as non-cited violations, are not being cited because they were self-identified, non-repetitive, and corrective action was or is being taken, and the remaining criteria in the NRC Enforcement Policy, NUREG-1600, to exercise discretion, were satisfied

\_\_\_\_\_ Non-cited violation(s) were discussed involving the following requirement(s).

- 4. During this inspection certain of your activities, as described below and/or attached, were in violation of NRC requirements and are being cited. This form is a NOTICE OF VIOLATION, which may be subject to posting in accordance with 10 CFR 19.11

**Statement of Corrective Actions**

I hereby state that, within 30 days, the actions described by me to the inspector will be taken to correct the violations identified. This statement of corrective actions is made in accordance with the requirements of 10 CFR 2.201 (corrective steps already taken, corrective steps which will be taken, date when full compliance will be achieved). I understand that no further written response to NRC will be required, unless specifically requested.

Title	Printed Name	Signature	Date
LICENSEE'S REPRESENTATIVE	Mark Dricoll		
NRC INSPECTOR	Darrel G. Wiedeman		9/21/2010
Branch Chief	Tamara Bloomer		9/21/2010

INSPECTION RECORD

Region III Inspection Report No. 2010-01

License No. 21-00215-04 Docket No. 030-01988 (Broadscope, self-shielded/self-contained irradiators)

License No. 21-00215-06 Docket No. 030-06958 (pool irradiator)

License No. SNM-179 Docket No. 070-00192 (Pu/Be sources)

Licensee (Name and Address):

**The Regents of the University of Michigan Radiation Safety Service  
Occupational Safety & Environmental Health  
University of Michigan  
1239 Kipke Drive  
Ann Arbor, MI 48109**

Location (Authorized Site) Being Inspected:  
**Ann Arbor, MI, campus**

Licensee Contact: Mark Driscoll, RSO Telephone No. 734-647-2251

Priority: 2 Program Code: 03510, 02110 and 022120

Date of Last Inspection: 3/10-13/2008 Date of This Inspection: 8/23-27/2010 (exit on 9/21/2010)

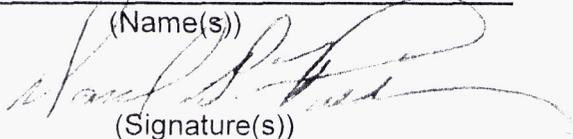
Type of Inspection: (x) Increased Controls (X) Announced  
( ) Unannounced (X) Routine ( ) Special

Next Inspection Date: 8/2012 (x) Normal ( ) Reduced  
Justification for reducing the routine inspection interval: N/A

Summary of Findings and Actions:

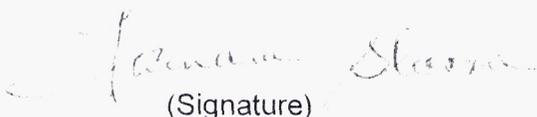
- (X) No violations cited, clear U.S. Nuclear Regulatory Commission (NRC) Form 591 or regional letter issued
- ( ) Non-cited violations (NCVs)
- ( ) Violation(s), Form 591 issued
- ( ) Violation(s), regional letter issued
- ( ) Followup on previous violations

Inspector(s) Darrel G. Wiedeman/Michel Lafranzo  
(Name(s))

  
(Signature(s))

Date 9/21/2010

Approved (Name) Tamara Bloomer

  
(Signature)

Date 9/21/10

## PART I-LICENSE, INSPECTION, INCIDENT/EVENT, AND ENFORCEMENT HISTORY

1. AMENDMENTS AND PROGRAM CHANGES:

(License amendments issued since last inspection, or program changes noted in the license)

<u>AMENDMENT #</u>	<u>DATE</u>	<u>SUBJECT</u>
95	3/29/2010	added IC requirements and Ra-226 to license

2. INSPECTION AND ENFORCEMENT HISTORY:

(Unresolved issues; previous and repeat violations; Confirmatory Action Letters; and orders)

**A special inspection was conducted on October 29, 2009, because of a reported medical event involving an under dosage of iodine-131 (mIBG) to a pediatric patient. An apparent violation of 10 CFR 35.41(a)(2) was identified. The licensee responded with a letter dated October 27, 2009, that described their corrective actions. During this inspection the inspectors verified that the licensee implemented the corrective actions described in their letter dated October 27, 2009. This issue is now considered closed.**

**This was a routine inspection of the licensee's radiation safety program.**

3. INCIDENT/EVENT HISTORY:

(List any incidents, or events reported to NRC since the last inspection. Citing "None" indicates that regional event logs, event files, and the licensing file have no evidence of any incidents or events since the last inspection.)

**On May 22, 2008, the licensee reported (NMED No. 090665) that an ECD, Varian model 02-001972-00, serial No. A-339 showed .009 microcuries of removable contamination on its annual leak test. The licensee removed the source from service and returned it to the manufacturer for disposal. This item is now considered closed.**

## PART II - INSPECTION DOCUMENTATION

1. ORGANIZATION AND SCOPE OF PROGRAM:

(Management organizational structure; authorized locations of use, including field offices and temporary job sites; type, quantity, and frequency of material use; staff size; delegation of authority)

**Under license No. 21-00215-04 of the broadscope license the licensee also has four self-shielded/self-contained irradiators. Under license No. 21-00215-06 the licensee has one pool irradiator and is used for research purposes to irradiate samples. The irradiator, is a custom made wet storage pool irradiator containing cobalt-60 sealed sources. The pool is 16 feet deep, five feet in diameter, and holds 5,000 gallons of water. The source bundle is situated 11.5 feet below the water surface when in the shielded position and is raised above the water to irradiate materials (i.e., tissue, fruit flies, polymers, computer chips). The RPC has authorized 4 researchers to use the irradiator, however, Rob Blackburn is the principal authorized user. This irradiator is located in a specified building on the Ann**

Arbor campus. The irradiator unit is used daily to irradiate a variety of inanimate specimens.

Under license No. SNM-179 the licensee has sources that are used infrequently as a source for neutron experiments (Howitzer experiments) and student instruction.

2. SCOPE OF INSPECTION:

(Identify the inspection procedure(s) used and focus areas evaluated. If records were reviewed, indicate the type of record and time periods reviewed)

**Inspection Procedure(s) Used: MC 2800, 87134, 87132, 87131, 87122, and 87126**

This licensee is a State of Michigan owned and operated university. Currently the licensee has a student population of 39,515 students at the Ann Arbor campus, 8,642 students at the Dearborn campus and 7,773 students at the Flint campus. The University hospital and medical facility is an 880 bed hospital located within the university complex. The licensee has an annual workload of approximately 9,000 routine nuclear medicine studies/year. During this inspection the human research programs and medical programs were reviewed. During this inspection the licensee had 350 active permits that were previously approved by the Radiation Safety Committee and included 1,143 laboratories that were approved for use of radioactive materials. At this time the licensee has approximately 3,458 monitored and trained radiation workers.

The inspectors toured the Hospital Blood Bank, Medical Science Research Building, Biological Research Building, and Oncology Research Building and observed the sources being used for research purposes. All sealed sources were leak tested at 6-month intervals (every April and October) and the leak test records showed <.005 microcuries of removable contamination.

During this inspection of the broad scope license the inspectors interviewed researchers, physicians, physicists, medical technologists and observed licensed activities at the following university owned and operated facilities:

University of Michigan Hospital and Medical Center, Nuclear Medicine Department;  
Cyclotron Facility;

University of Michigan Hospital and Medical Center, Radiation Oncology;

University of Michigan, Radiation Safety Office;

Irradiators located at: U of Mi Medical Center Blood Bank, Medical Science Research Building, Biological Medical Science Research Building and the Life Sciences Building;  
Dearborne campus;

Willowrun facility;

Neutron Laboratory;

University of Michigan, Plant Operations office;

and, North Campus Transfer facility.

According to the licensee staff that were interviewed, since the last NRC inspection there have been no fires, explosions, or fatalities involving radioactive materials, or over exposures to radiation. The inspectors did not identify anything contrary to the above statements made by licensee staff. The inspectors reviewed the licensee's incident/event

logs for the period CY 2007-2010. During this period, 43 events/incidents were documented by the licensee and reviewed by the inspectors. It was the view of the inspectors that the licensee took appropriate corrective actions in response to these events. No violations of NRC requirements were identified.

### Nuclear Medicine Program

At the time of this inspection the permittee had 27 full-time nuclear medicine technologists and 13 authorized user (physicians) that work in the department. The permittee conducts approximately 50 diagnostic procedures per day. 60-70% of the annual work load is wholebody scans and cardiac scans. The remaining workload consists of bone, liver, and I-131 thyroid scans. During 2009, the permittee performed 193 wholebody scans with iodine-131, 99 hyperthyroid treatments and 90 thyroid cancer treatments. The inspectors reviewed 10 random samples of written directives. During this inspection it was observed that the permittee routinely uses syringe shields and the technologists were properly wearing wholebody and extremity dosimetry. The inspector also observed an administration of 50 millicuries of liquid iodine-131 to a thyroid cancer patient. No problems were observed with the administration of the iodine-131.

### Research Activities

The permittee authorized approximately 325 researchers to perform non-human research activities with microcurie quantities of carbon-14, sulphur-35, iodine and/or hydrogen-3. The NRC inspectors conducted independent radiation surveys in all research laboratories and did not identify any contamination or unusual/unexpected radiation levels. The radiation safety staff perform periodic wipe tests of the research labs looking for removable contamination. No significant contamination has been identified during the period 2008-2010.

### Brachytherapy Program

The inspectors reviewed seven (7) high-dose remote afterloader treatment charts and three (3) eye plaque treatment charts for treatment for cancer of the eye with iodine-125. No medical events were identified.

The inspectors interviewed the authorized user (physician), medical physicist, nuclear medicine technologists and the radiation safety staff regarding their understanding of the definition of a medical event, who to report the medical event to and how they determine if a medical event occurred. All individuals had a good understanding of the definition of a medical event and who to report a medical event to.

### 3. INDEPENDENT AND CONFIRMATORY MEASUREMENTS:

(Areas surveyed, both restricted and unrestricted, and measurements made; comparison of data with licensee's results and regulations; and instrument type and calibration date)

Confirmatory measurements were made during the NMMSS inspection and during the inspections of various research laboratories and waste holding areas. All independent

measurements were in agreement with the licensee's survey results. No unusual or unexpected radiation levels were identified.

4. VIOLATIONS, NCVs, AND OTHER SAFETY ISSUES:

(State the requirement, how and when the licensee violated the requirement, and the licensee's proposed corrective action plan. For NCVs, indicate why the violation was not cited. Attach copies of all licensee documents needed to support violations.)

**No violations of the NRC Order or License Conditions were identified.**

5. PERSONNEL CONTACTED:

(Identify licensee personnel contacted during the inspection, including those individuals contacted by telephone.)

\*# Mark Driscoll, RSO  
\*# Radiation Safety Staff  
\*# Terry Alexander, Executive Director, Office of Campus Sustainability  
\*# Steven Benedict, Director, Occupational Safety & Environmental Health  
Captain Joe Piersante, University Police Dept.  
Michael Hartman, Assistant Professor, Nuclear Engineering

Use the following identification symbols:

# Individual(s) present at entrance meeting on August 23, 2010  
\* Individual(s) present at exit meeting on August 27, 2010

A telephone Exit meeting was conducted on September 21, 2010, with Mr. Driscoll