APPENDIX E

NOTE: All areas indicated in field notes are not required to be addressed during each inspection

INDUSTRIAL/ACADEMIC/RESEARCH INSPECTION FIELD NOTES

Region I

Inspection Report No. 95-001 License No. 20-01537-02
20-01537-10
20-01537-12

Licensee (Name & Address): Docket No. 030-00763
Massachusetts Institute of Technology 030-09177
77 Massachusetts Avenue 030-21272
Cambridge, MA 02139

Radiation Protection Office is located in Building 20 (617-253-2180).

Licensee Contact FX Masse (Campus RPO)" Telephone No. 617-253-9217

Last Amendment No. 49, 05, 01 Date of Amendment 5/26/92,
8/9/94,
5/31/91

Priority: 2/3/3 Program Code 01100/03510/03510

Date of Last Inspection 1/12-14/93
Date of This Inspection 3/8-10/95 (Note: 3/13 was fax)

Type of Inspection:
( ) Announced (X) Unannounced
(X) Routine ( ) Special
( ) Initial (X) Reinspection

Next Inspection Date 3/97 (X) Normal ( ) Reduced ( ) Extended

Summary of Findings and Action:

( ) No violations cited, Clear 591 issued
( ) Violation(s), 591 issued
(X) Violation(s), Regional letter issued
( ) Followup on Previous Violations

Were non-cited violations identified during this inspection? ( ) Y (X) N
Was proprietary information reviewed by or received by the inspector? ( ) Y (X) N

Inspector: Kathleen Ortiz (Signature) Date 3-22-95

Inspector: Tony Lamastra (Signature) Date 3-22-95

Approved: M. S. Peluso (Signature) Date 4/5/95

1. INSPECTION HISTORY ( ) N/A - Initial inspection

A. Violations were identified during any of the last two inspections or two years, whichever is longer (X) Y ( ) N

B. Previous NOV dated 2/9/93

C. Open violations from previous inspections:

Requirement	Violation	Corrective Action Taken (Y/N)	Status Open/Closed
DOT violation .....retracted in letter dated 5/17/93			

D. Explain any previous violation(s) not corrected or repeated (X) N/A

2. ORGANIZATION AND SCOPE OF PROGRAM

A. Organizational Structure (An organization chart and campus map are attached.)

* Bob McCunney, Director of Environmental Medical Service
↑
*+ FX Masse, Radiation Protection Officer (RPO)
↑
*+ Mitchell Galanek, Campus Associate RPO
↑

4 Associate RPOs, 1 Health Physicist (HP), 6 Technicians (union employees) and a secretary. They are as follows:

+ Thomas Fuller, Asst. Officer
+ Donald Heas, Asst. Officer
+ William Irwin, Asst. Officer
+ Judi Reilly, Asst. Officer
+ Deying Sun, Health Physicist
+ Robert Burgess, Technician
+ Steven Greenlaw, Radwaste Technician
+ Scott McLaughlin, Technician
+ William Prescott, Technician
+ Geoffrey Sirr, Technician
+ Kevin White, Technician
+ Doreen Charbonneau, secretary

NOTE: T. Fuller, D. Sun, S. Greenlaw and K. White spend half of their time at MIT and the other half at Whitehead Institute, which is located across the street from the campus radiation protection office.

+ Fred McWilliams, Reactor Associate RPO
+ Marcia Austin, Reactor Assistant RPO
+ Sonya Shortkroff, Dy-165 (radiochemical) packaging
+ Noi Limpa-Amara, Reactor personnel involved in Dy-165 production
+ Paul Powell, RPC member
+ Alan Davison, RPC member
+ Harry Hemond, RPC Chairperson
+ Alan Herbert, P-32 user
+ ShangZhe Xu, I-125 user

+ Individuals contacted during inspection
* Individuals present at exit meeting

1. Meets license requirements [L/C] (X) Y ( ) N
2. Multiple authorized locations of use and/or laboratories ( ) Y (X) N
   If yes, may use ATTACHMENT A as a guide for location(s) or lab(s) inspected and note lab numbers where violations are found. ( ) N/A
3. Briefly describe scope of activities, including types and quantities of use involving byproduct material, frequency of use, staff size, etc.

No. of registered RAM users: 2143
No. of Labs: 611
No. of RAM pkgs rec'd: 2994 in 1994
No. of authorizations (No. of PIs): 154
No. of times the RPO hotlab was used in 1993 and 1994: 22 and 10
No. of iodination facilities: 3

Typical radionuclides include H-3, C-14, I-125, S-35, P-33, and P-32.

Gammacell 40 and 220 used 108 and 30 times in 1995 respectively. The number of authorized users for the gammacell 40 and 220 are 26 and 48 respectively.

B. Radiation Protection Committee required [L/C] (X) Y ( ) N

1. RPC fulfills license requirements [L/C] ( ) Y (X) N
2. Records maintained [L/C] (X) Y ( ) N

C. Radiation Protection Officer

1. Authorized on license [L/C] (X) Y ( ) N
2. Fulfills duties as RPO (*) Y ( ) N

*See Section 22 (PEF) for details

D. Use by authorized individuals [L/C] (X) Y ( ) N

Remarks: The RPC is committed to meeting at least once in each calendar quarter. However, they failed to do so. The RPC met on 12/1/92, 4/13/93, 6/23/93, 10/27/93, 1/26/94, 5/24/94, 10/5/94, and 1/10/95. VIOLATION

All proposed RAM users must be authorized by the MIT RPC.

Currently 34 authorizations are past their expiration date and pending review and approval. A sample of authorizations that have expired are described in the following table:

Authori-zation	Dept.	Date Expired	Group Re-training Date	Comments
NRL-C	Nuc Reactor Lab	12/31/87	None	Deficiency letter sent 1/3/95
PFC-D	PFC	2/29/92	2/8/94	
LNS-W	LNS	10/31/92	None	Misfiled in 10/23/93 after initial review; RPC never reviewed.
NML-N	Magnet Labs	7/31/93	None	
7-AO	Biology	12/31/93	None	Authorization terminated

These authorizations have not been renewed within the appropriate time frame of 2 years. **VIOLATION** In addition, the group re-training has not taken place within the required frequency. **VIOLATION**

The licensee is authorized to use RAM on the MIT campus; at Lincoln Laboratories in Lexington, Massachusetts; and at the Bates Linear Accelerator in Middleton, Massachusetts. The Gammacell 220 is located in Room 68-0022 in the Biology Building on the MIT campus. The Gammacell 40 is located at Bldg. E17 on the MIT campus. The Middleton facility has sealed sources. The Lexington facility has 2 labs in 2 different buildings and the primary radionuclides used are sealed sources. This inspection was limited to the MIT campus.

Gammacell 40 was moved from E17-629 to E17-613 without an amendment to the MIT Irradiator license. **VIOLATION** In addition, the licensee does not compare the key log with the use log for the irradiators. Due to time limitations, this concern was not followed-up on during this inspection.

3. TRAINING, RETRAINING, AND INSTRUCTIONS TO WORKERS

A. Instructions to workers/students per [10 CFR 19.12] (X) Y ( ) N
B. Training program required [L/C] (X) Y ( ) N

1. If so, briefly describe training program:

Each person who wishes to use RAM is required to register with the Radiation protection Office. Each person is interviewed and given a lecture on radiation protection by an RPO staff member. The registration interview-lecture takes about 90 -150 minutes.

Physical plant (housekeeping and maintenance) and Campus Patrol (security) personnel are both given annual reviews of radiation hazards and appropriate precautions by the RPO staff, with initial training provided by their supervisor. Clerical and other departmental personnel who work in the vicinity of RAM are offered the opportunity to attend (by general notification) an annual lecture on radiation hazards and appropriate controls given by an RPO staff member.

Retraining of laboratory workers has evolved into a very successful schedule of retraining on a two-year basis in conjunction with the two-year review and renewal of each laboratory use permit. A special training session is scheduled in which the terms and conditions of that renewal permit is thoroughly reviewed with all laboratory personnel. This opportunity is also utilized to review all handling precautions and procedures relative to the general use of RAM at MIT.

2.	Training program implemented	(X) Y ( ) N
3.	Periodic training program required	(X) Y ( ) N
4.	Periodic training program implemented	( ) Y (X) N
5.	Records maintained	(X) Y ( ) N

C. Individuals understanding of procedures and Regulations is adequate (X) Y ( ) N

1.	Current operating procedures	(X) Y ( ) N
2.	Emergency procedures	(X) Y ( ) N
3.	Use of survey instrumentation	(X) Y ( ) N

D. Revised Part 20

Workers cognizant of requirements for:

1.	Radiation Protection Program [20.1101]	(X) Y ( ) N
2.	Annual dose limits [20.1301, 1302]	(X) Y ( ) N
3.	New forms 4 and 5	( ) N/A (X) Y ( ) N
4.	10% monitoring threshold [20.1502]	(X) Y ( ) N
5.	Dose limits to embryo/fetus and declared pregnant worker [20.1208]	(X) Y ( ) N
6.	Grave Danger Posting [20.1902]	(X) N/A ( ) Y ( ) N
7.	Procedures for opening packages [20.1906]	( ) N/A (X) Y ( ) N
8.	Sewer disposal limits [20.2003]	( ) N/A (X) Y ( ) N

NOTE: Deficiencies in this area, while not always a violation, should be brought to the attention of licensee management at the exit meeting and in the cover letter transmitting the inspection report or NOV.

Remarks: The inspector attended a portion of an initial training session. The training session usually lasts 2 - 2.5 hours. The inspector attended the survey instruments portion of the training course. The instructor demonstrated a good understanding of radiation protection and incorporated real life experiences.

The inspector reviewed the ancillary personnel re-training file. Six training sessions were held in 10/94 for campus police. Shop employees were trained in 5/93. training for housekeeping personnel was not performed. **VIOLATION.**

In addition to the failure to train groups at the time of authorization renewal as described in the remarks portion of Section 2 of this report, the following example of failure to re-train personnel is as follows. A random check of selected records indicated that authorization 7-AJ was renewed in 3/94, but received group re-training on 2/6/95. Authorization 5-AL-2 was renewed in 6/94, but received group re-training on 3/7/95. **VIOLATION**

4. INTERNAL AUDITS, REVIEWS OR INSPECTIONS

A. Audits are required [L/C] (X) Y ( ) N
B. Audits or inspections are conducted (X) Y ( ) N

(1) Audits conducted by MIT
(2) Frequency WEEKLY SURVEYS and ANNUAL ALARA REVIEWS

C. Content and implementation of the radiation protection program reviewed annually by the licensee [20.1101(c)] ( ) Y (X) N
D. Records maintained [20.2102] (X) Y ( ) N

Remarks: The RPC charter requires a complete review of the radiation protection Program at least once each year. This was not conducted for 1993. **VIOLATION**

The inspectors reviewed the 1994 annual audit. Mostly the audit is comprised of record checks and it does not consist of performance based approach to auditing. There is very little verbiage in the audit report. Concern about the use of audits to identify problems in the RP program (as shown by the numerous violations) was discussed with management at the exit.

5. FACILITIES

A. Facilities as described in license application [L/C] (X) Y ( ) N
B. Describe any Self-contained dry-source-storage irradiators [Part 36] and/or survey instrument calibrators (model, radionuclide, activity, use, etc.) ( ) N/A

MIT calibrates their own survey instruments with a radium sealed source. The licensee purchased a JL Shephard Model 81-6 calibrator (Type 6810 capsule; 3 Ci of Cs-137) and is planning to use it in the future for calibration of survey instruments. At the time of the inspection, the device was in storage and has never been used.

AECL Gammacell 220 irradiator (4,000 Ci of Co-60). In addition to the interlocks described in the manufacturer's manual, this irradiator is equipped with an interlock which prevents the hinged parts of the shield collar from being opened except when the drawer is in the sample load position.

NOTE: The Gammacell 220 license application has the Gammacell 40 test as part of it. The licensee furnished the inspectors with the correct test (attached).

AECL Gammacell 40 Irradiator has 3,600 Ci of Cs-137 as of 12/29/72. The licensee's tie-down documentation indicates room E17-629 as the room for the irradiator. However, the licensee decided to have AECL (Nordion), the manufacturer, move the irradiator to another location. The NRC was not informed of the move. The NRC found this **VIOLATION**. After the exit meeting on Friday March 10, 1995, the licensee submitted an expedite amendment request to authorize the new location of the irradiator. The amendment was approved and a copy faxed to the licensee on Monday, March 13, 1995.

Training for irradiator users include a formal radiation safety course, passing an exam, and OTJ training. The user must demonstrate the safe use of irradiator before being allowed to operate it without supervision. Each user must wear a dosimeter and log in whenever he/she will use the irradiator. The log will include date, length of irradiation, and name of operator. Surveys of this room and an operational check of the irradiator are conducted monthly by MIT Radiation Protection staff. In the event of an emergency, the user must turn off the irradiator, leave and secure the room, and notify the RPO. Area rad monitors are set to alarm at 2 mrem/minute. Leak tests are conducted every six months and analysis is performed by the Radiation Protection Office.

1. Maintenance of safety-related components performed by authorized persons [L/C] (X) Y ( ) N
2. Access to keys and/or material controlled [20.1801, 1802, L/C] (X) Y ( ) N
3. Access to high/very high radiation areas controlled [20.1601, 1602, L/C] (X) Y ( ) N
4. Adequate protection of shield integrity, fire protection [L/C] (X) Y ( ) N

Remarks: Next inspector please compare the key use log versus the gammacell use log to verify that all users of the irradiator are authorized to use it. Time limitations prevented this double check during this inspection.

6. MATERIALS

A. Isotope, chemical form, quantity and use as authorized [L/C] ( ) Y (X) N
B. Licensed materials secured to prevent unauthorized removal or access [20.1801, 1802] (X) Y ( ) N
C. Leak tests and Inventories [L/C]

1. Performed as required ( ) N/A (X) Y ( ) N
2. Adequate analysis methodology and sensitivity ( ) N/A (X) Y ( ) N
3. Records maintained [L/C] (X) Y ( ) N

Remarks: Leak tests are performed every six months and analyzed by the licensee.

The licensee had requested a limit of 300 mCi for Am-241, which would include 2 troxler gauge sources. The current license did not reflect this request and the Am-241 (as sealed sources) had inadvertently been left of the license. The licensee's Am-241 sealed source physical inventory indicated a possession in excess of 300 mCi (318 mCi). However, on March 7, 1995, the licensee subsequently performed another more thorough inventory and has tallied the Am-241 sealed source inventory to 245 mCi; thus within their possession limit. The previous inventory included several sealed sources more than once and therefore was in error. A corrected copy of the license has been prepared and sent to the licensee.

The licensee's inventory of unsealed Am-241 was 4.5 nCi.

The licensee committed to indicating on the sealed source inventory/leak test forms if the source is in storage.

CHIPS Physical Inventory		
Radionuclide	In-house Activity (mCi)	License Limit (mCi)
C-14	13.897	100
H-3	526.15	1500
I-125	108 (includes waste)	1000
P-32	600 (includes waste)	1000
S-35	1233 (includes waste)	1000

7. RADIATION SURVEYS

A. Instruments and equipment:

1. Appropriate operable survey instrumentation possessed and readily accessible [L/C] (X) Y ( ) N
2. Calibrated as required [20.1501, L/C] ANNUAL (X) Y ( ) N
3. Calibration records maintained [20.2103(a)] NI

B. Briefly describe area survey requirements [20.1501(a), L/C]:

Area surveys are performed by MIT Radiation Protection staff. The frequency of radiation dose rate and contamination (removable) surveys are dependent upon the quantities used. Action taken when removable contamination level exceeds 100 dpm is noted. Researchers perform "end-of-work" surveys for contamination only.

C. Performed as required [20.1501(a), L/C] NI
D. Records maintained [20.2103, L/C] NI
E. Protection of members of the public

1. Licensee made adequate surveys to demonstrate either (1) that the TEDE to the individual likely to receive the highest dose does not exceed 100 mrem in a year, or (2) that if an individual were continuously present in an unrestricted area, the external dose would not exceed 2 mrem in any hour and 50 mrem in a year [20.1301(a)(1), 1302(b)] (X) Y ( ) N
2. Unrestricted area radiation levels do not exceed 2 mrem in any one hour [20.1301(a)(2)] (X) Y ( ) N
3. Records maintained [20.2103, 2107] (X) Y ( ) N

Remarks:

8. RADIOACTIVE WASTE ( ) N/A

A. Disposal ( ) N/A

1. Decay-in-storage (100 days) ( ) N/A

a. Procedures approved [20.2001(a)(2), L/C] (X) Y ( ) N
b. In accordance with [L/C] (X) Y ( ) N
c. Labels removed or defaced [20.1904(b)] (X) Y ( ) N

2. Special procedures performed as required [L/C] (X) Y ( ) N
3. Liquid scintillation (LS) media and animal carcasses per [20.2005] ( ) N/A (X) Y ( ) N
4. Improper/unauthorized disposals [20.2001] ( ) Y (X) N
5. Records maintained [20.2103(a), 2108, L/C] (X) Y ( ) N

B. Effluents ( ) N/A

1. Release into sanitary sewer [20.2003] ( ) N/A (X) Y ( ) N

a. Material is readily soluble or readily dispersible [20.2003(a)(1)] (X) Y ( ) N
researcher responsible for experiment is also responsible for ensuring that any material put in the sanitary sewer is readily soluble and dispersible
b. Monthly average release concentrations do not exceed Appendix B values [20.2003] (X) Y ( ) N
c. No more than 5 Ci of H-3, 1 Ci of C-14 and 1 Ci of all other radionuclides combined released in a year [20.2003] (X) Y ( ) N
d. Procedures to ensure representative sampling and analysis properly implemented [20.1501(a)(2), L/C] NI

2. Release to septic tanks [20.2003] (X) N/A ( ) Y ( ) N

a. Within unrestricted limits [App B,Table 2] ( ) Y ( ) N

3. Waste incinerated ( ) N/A ( ) Y (X) N

a. License authorizes [20.2004(a)(3)] ( ) Y ( ) N
b. Licensee directly monitors exhaust ( ) Y ( ) N
c. Airborne releases evaluated and controlled [20.1501, 1701] ( ) Y ( ) N

4. Control of effluents and ashes [20.1201, 1301, 1501, 2001, L/C] {See also IP 87102, RG 8.37} (X) Y ( ) N

a. Compliance with air emissions requirements in Part 20:

Licensee has demonstrated compliance with air emission requirements in 10 CFR Part 20 (X) Y ( ) N

Basis for compliance determination (circle one or more: provide basis below)

__X__(1) Measured concentrations of radionuclides in air effluents are below Appendix B, Table 2 concentrations (and external dose < 50 mrem/yr)

____(2) Bounding calculations show that air effluents could not exceed Appendix B, Table 2 concentrations (and external dose < 50 mrem/yr)

__X__(3) Dose modeling shows that dose equivalent to the individual likely to receive the highest dose does not exceed 10 mrem/yr

____(4) Licensee does not possess sufficient radioactive material to exceed Part 20 requirements

Basis for Determination: Licensee ran the COMPLY code and determined the EDE to be 4.8E-6 mrem/yr. The licensee also tracks the percentage of MPC days they have released via effluent. The 1994 totals were approximately 15% of the new Part 20 limits.

b. Description of effluent monitoring program

1. Monitoring system hardware equipment adequate (x) Y ( ) N
2. Equipment calibrated as appropriate ( ) Y (x) N/I
3. Air samples/sampling technique (charcoal, HEPA, etc.) analyzed with appropriate equipment (x) Y ( ) N

Remarks: The inspector observed a radwaste technician perform a survey on a bag of S-35 waste that was held for more than 10 half-lives. A concern was noted that the bag had needles puncturing through it and the technician was only wearing latex gloves. The licensee has recently changed their policy for sharps waste to be inside a puncture-proof container.

The inspector observed the technician drive the forklift into the wall next to the doorway. The wall was being repaired at the time of the exit meeting due to structural damage. This concern was raised to the licensee's management and subsequently resolved prior to exiting.

C. Waste Management ( ) N/A

1. Waste compacted [L/C] (X) Y ( ) N
2. Storage area(s) ( ) N/A

   a. Protection from elements and fire [L/C] (X) Y ( ) N
   b. Control of waste maintained [20.1801] (X) Y ( ) N
   c. Containers properly labeled and area properly posted [20.1902, 1904] (X) Y ( ) N
   d. Package integrity maintained [L/C] (X) Y ( ) N

3. Packaging, Control and Tracking [App. F.III] [20.2006(d)]:

   Note: The licensee's waste is likely to be Class A.

   a. Not packaged for disposal in cardboard or fiberboard boxes [61.56(a)] (X) Y ( ) N
   b. Liquid wastes solidified, i.e., less than 1% freestanding liquid, and void spaces minimized [61.56(a), (b)] (X) Y ( ) N
   c. Does not generate harmful vapors [61.56] (X) Y ( ) N
   d. Structurally stable (will maintain its physical dimensions and form under expected disposal conditions) [61.56(b)] (X) Y ( ) N
   e. Packages properly labeled [App. F.III.A.2] (X) Y ( ) N
   f. Licensee conducts a QC program to ensure compliance with [61.55, 56] and includes management evaluation of audits [App. F.III.A.3] N/A
   g. Shipments not acknowledged within 20 days after transfer are investigated and reported [App. F.III.A.8] (X) N/A ( ) Y ( ) N

4. Transfers to land disposal facilities ( ) N/A

   a. Transferred to person specifically licensed to receive waste [30.41, 20.2001(b)] (X) Y ( ) N
   b. Each shipment accompanied by a manifest prepared as specified in Section I of Appendix F [20.2006(b), App. F.III.A.4] (X) Y ( ) N
   c. Manifests certified as specified in Section II of Appendix F [20.2006(c)] (X) Y ( ) N

D. Records of surveys and material accountability are maintained [20.2103, 2108] (X) Y ( ) N

Remarks: LSV shipments: 5 in 1993, 7 in 1994 and 1 in 1995. Upon review of the waste manifests all tritium and carbon-14 activities are identical, 0.05 mCi. The licensee's data which is generated by the laboratory personnel indicate a much lesser number. This discrepancy was discussed with the licensee. The licensee stated that they had to use 0.05 mCi at their vendor's request. Because the vendor's activity is much more conservative, this is no longer an issue from a safety nor a compliance base. To illustrate this point, here are few examples:

Date of Shipment	Licensee's ^{3}H activity (μCi)	Vendor's ^{3}H activity (μCi)	Licensee's ^{14}C activity (μCi)	Vendor's ^{14}C activity (μCi)
2/18/93	31	600	22	600
3/24/93	594	1350	18	850
6/24/93	140	1350	54	1350
9/23/93	154	1500	92	1400

From 2/18/93 to 6/14/94 the licensee made 13 radwaste shipments. Most of these shipments were shipped as LSA (UN2912); others were shipped as RAM (UN2982). Only one shipment was shipped as exclusive use LSA. This shipment contained the dewatered resins from the reactor.

9. RECEIPT AND TRANSFER OF RADIOACTIVE MATERIAL

A. Describe how packages are received and by whom: ( ) N/A

All RAM packages are received at the shipping and receiving facility (Bldg. 20), where immediate notification of MIT Radiation Protection Office is automatically implemented. An RPO member usually monitors all such packages within 3 hours of receipt. The effectiveness of this program is enhanced by the fact that all purchase orders for RAM are processed through the RPO with records maintained such that all incoming RAM shipments are anticipated by the individuals responsible for package monitoring. All incoming shipments are checked against this record. MIT has no mechanism for receiving RAM packages except for during normal working hours of the Receiving facilities.

B. Written package opening procedures established and followed [20.1906(e)] (X) Y ( ) N
C. All incoming packages with DOT labels wiped, unless exempted (gases and special form) [20.1906(b)(1)] (X) Y ( ) N
D. Incoming packages surveyed per [20.1906(b)(2)] (X) Y ( ) N
E. Monitoring in (C) and (D) above, performed within time specified [20.1906(c)] (X) Y ( ) N
F. Transfer(s) between licensees performed per [30.41] (*) Y ( ) N
G. All sources surveyed before shipment and transfer [20.1501(a), 49 CFR 173.475(i), L/C] (X) Y ( ) N
H. Records of surveys and receipt/transfer maintained [20.2103(a), 30.51] (X) Y ( ) N
I. Transfers within licensee's authorized users or locations performed as required [L/C] ( ) N/A (X) Y ( ) N
J. Arrangements made for packages containing quantities of radioactive material in excess of Type A quantity [20.1906(a)] ( ) Y (x) N/I
K. Package receipt/distribution activities evaluated for compliance with 20.1301 [20.1302] ( ) N/A (X) Y ( ) N

Remarks: The inspector observed a technician perform a package receipt survey. The technician followed the procedures and the method was adequate. Please note, the exterior of the package was monitored with a ratemeter, a wipe of the exterior package was analyzed with the ratemeter and the packing slip was used to verify the contents. The

package was never opened and this is authorized by Part 20 procedures. If the package contains 2 mCi or more of tritium or labelled I-125 the wipe of the exterior of the package is analyzed in a liquid scintillation counter. Once the package is surveyed and all information is verified the technician places a neon orange label on the package specifying for the recipient procedures for opening packages containing RAM. These procedures include: (1) open only in a registered radiation lab. (2) assume inside materials are contaminated until proven free of contamination with a survey meter and/or wipe testing. (3) Notify RPO if a) contamination or leakage is detected, b)unexpected dose rates are measured or c) there is a discrepancy between material received or ordered. (4) remove or deface "CRAM" statement and radiation warning symbol from packages before disposal. and (5) recycle styrofoam in approved locations.

The inspector observed the licensee prepare and package a shipment of Dy-165. The dose rates are recorded in Section 12 of this report. The Dy-165 was packaged in a Type A container and had the appropriate labels, markings, shipping papers and communications. The Dy-165 was sent to Brigham and Women's Hospital in Boston, Massachusetts. A review of the licensee's verification process indicated that MIT did not have a current copy of Bringham and Women's Hospital's NRC license per 10 CFR 30.41 (d). The B&W Hospital license on file expired on 7/31/88. This was immediately corrected after the NRC inspector pointed it out to the Associate RPO. Another example of this problem was pointed out to the Associate RPO for isotope products license. The MIT file had a copy of Isotope Products license that expired on 6/8/83. The licensee received faxed copies of B&W's and Isotope Products license within an hour after the discovery.

The secretary for the RPO verifies, at the time of a request to order RAM, the licensed quantity the user may possess and the current possession.

10. TRANSPORTATION (10 CFR 71.5(a) and 49 CFR 170-189) ( ) N/A

A. Licensee shipments are:

( ) delivered to common carriers
( ) transported in licensee's own private vehicle
(X) both
( ) no shipments since last inspection

B. HAZMAT training [172.700-704] (X) Y ( ) N
C. Packages ( ) N/A

1. Authorized packages used [173.415, 416(b)] (X) Y ( ) N
2. Performance Test records on file (X) N/A

a. Special Form Sources [173.476(a)] ( ) Y (X) N
b. DOT-7A packages [173.415(a)] (X) Y ( ) N

3. COCs on file with NRC for Type B [71.12(c)(1)] NI
4. Two labels (White-I, Yellow-II, Yellow-III) with TI, Nuclide, Activity, and Hazard Class [172.403, 173.441] (X) Y ( ) N

5. Properly marked (Shipping Name, UN Number, Package Type, RQ, "This End Up" (liquids), Name and Address of consignee) [172.301,306,310,312,324] (X) Y ( ) N
6. Closed and sealed during transport [173.475(f)] (X) Y ( ) N

D. Shipping Papers ( ) N/A

1. Prepared and used [172.200(a)] (X) Y ( ) N
2. Proper {Shipping name, Hazard Class, UN Number, Quantity, Package Type, Nuclide, RQ, Radioactive Material, Physical and chemical form, Activity, Category of label, TI, Shipper's Name, Certification and Signature, Emergency Response Phone Number, "Limited Quantity" (if applicable), "Cargo Aircraft Only" (if applicable)} [172.200-204] ( ) Y (X) N
3. Readily accessible during transport [177.718(e)](X) Y ( ) N

E. Vehicles ( ) N/A

1. Placarded [172.504] NI
2. Cargo blocked and braced [177.842(d)] NI
3. Proper overpacks (shipping name, UN Number, labeled, statement indicating that inner package complies with specification packaging) [173.25] NI

F. Any incidents reported to DOT [171.15, 16] ( ) Y (X) N

Remarks: 49 CFR 172.604(a)[3] requires the emergency number immediately following the description of RAM on the shipping paper. The licensee included the emergency number as a supplement to the shipping paper and not on the shipping paper for the exclusive use shipment on 5/11/94. **VIOLATION**

On a LSV shipment dated 1/27/94, the second and third pages of the manifest indicated CM as the isotope when in fact, it should have been C-14. **VIOLATION**

Selected records of RAM shipments to other specific licensees were reviewed. A persistent problem encountered is that most of the RAM was shipped as Limited Quantity but the statement, "This package conforms to....." was not included on the shipping paper. The licensee corrected this at the time of inspection.

A Cf-252 sealed source was shipped as an instrument and article, but the wording on the package "This package conforms to" statement indicated it as limited quantity. The licensee corrected this problem.

11. PERSONNEL RADIATION PROTECTION

A. Licensee performed exposure evaluation [20.1501] (X) Y ( ) N
B. Licensee incorporated ALARA considerations in the Radiation Protection Program [20.1101(b)] (*) Y ( ) N

VIOLATION Remarks: A P-32 researchers ring badge readings were:
3.8 rem - 1st quarter 1993
0.38 rem - 2nd quarter 1993
12.8 rem - 3rd quarter 1993
8.04 rem - 4th quarter 1993
25 rem - 1993 total

The licensee investigated the exposure several times during the year and changed processes to try to reduce exposure. However, the licensee's ALARA program requires that if a quarterly review shows the exposure in excess of 1.875 rem, the RPO will review the exposure and present the results of the review at the first RPC meeting following the exposure. The ALARA program also requires that if the quarterly exposure exceeds 5.625 rem, a report of the investigation and a copy of the individuals NRC-5 form will be presented to the RPC at its first meeting following completion of the investigation. These exposures were never discussed at RPC meetings.

C. External Dosimetry ( ) N/A

1. Licensee monitors workers [20.1502(a), L/C] (X) Y ( ) N
2. External exposures account for contributions from airborne activity [20.1203] ( ) N/A (x) Y ( ) N
3. Supplier Landauer Frequency monthly
4. Supplier is NVLAP-approved [20.1501(c)] (X) Y ( ) N
5. Dosimeters exchanged at required frequency [L/C](X) Y ( ) N

D. Internal Dosimetry ( ) N/A

1. Licensee monitors workers [20.1502(b), L/C] (X) Y ( ) N
2. Briefly describe licensee's program for monitoring and controlling internal exposures [20.1701, 1702, L/C]:

The Radiation protection Office maintains an extensive bioassay program consisting of in-vivo and urinalysis measurements.

(1) Persons working with unsealed gamma emitters in excess of 10 mCi (100 mCi for ^{51}Cr) at any one time are scheduled for in-vivo measurements at frequencies that are appropriate for the half-life of the radionuclide and the nature of the operations involved. In addition, in-vivo measurements would be made as needed in the event of suspected accidental internal deposition.

For radioiodine, in-vivo thyroid measurements are scheduled monthly for persons routinely handling 1 to 20 mCi of sodium iodide, and for more than 20 mCi measurements are scheduled within 3 days following the handling operations. For persons occasionally handling in excess of 1 mCi, thyroid measurements are performed within 3 days of procedure.

VIOLATION

Bioassays for non-routine workers (i.e, greater than a few months from each use) are performed usually from 7 to 10 days (and sometimes a month) from the date of the iodination and not within 3 days as committed to by the license backup material.

(2) Individuals involved in the operations which utilize at any one time more than 10 mCi of ^{3}H in a non-contained form, other than metallic foil, are scheduled for urinalysis measurement to be performed within one week following a single operation, at monthly intervals for continuous operations in excess of 10 mCi, and at weekly intervals for continuous operations in excess of 100 mCi. Performance of the bioassays is increased to a daily frequency if the amount of ^{3}H is equal or greater than 10 curies.

3. Air sampling performed (X) Y ( ) N
4. Monitoring/controlling program implemented (X) Y ( ) N
5. Respiratory protection equipment [20.1703, L/C] N/A

E. Reports ( ) N/A

1. Reviewed by _Mitch Galanek____ Frequency__on receipt
2. Inspector reviewed personnel monitoring records for period __1/93_____to__1/95_____
3. Prior dose determined for individuals likely to receive doses [20.2104] (x) Y ( ) N
4. Maximum exposures TEDE _690 mrem/yr__ Other_____
5. Maximum CDEs _4 mrem/year____ Organs__thyroid_(all H-3 bioassays were at the MDA, i.e, 0.05 uCi/L)_____
6. Maximum CEDE __minimal_____
7. Licensee sums internal and external [20.1202] ( ) Y (x) N/I
8. TEDEs and TODEs within limits [20.1201] (x) Y ( ) N
9. NRC Forms or equivalent [20.2104(d), 2106(c)]

   a. NRC-4 (x) Y ( ) N Complete: (x) Y ( ) NA
   b. NRC-5 (X) Y ( ) N Complete: (X) Y ( ) N

10. Worker declared her pregnancy in writing during inspection period (review records) ( ) N/A (X) Y ( ) N
    If yes, licensee in compliance with [20.1208] (X) Y ( ) N
    and records maintained [20.2106(e)] (X) Y ( ) N

F. Who performed PSEs at this facility (number of people involved and doses received) [20.1206, 2104, 2105, 2204] (X) N/A

G. Records of exposures, surveys, monitoring, and evaluations maintained [20.2102, 2103, 2106, L/C] (X) Y ( ) N

Remarks: Individuals who generally handle millicurie quantities of energetic beta emitters such as P-32 will wear finger ring dosimeters. Some RAM users wear weekly dosimeters.

Two DPW records were reviewed. One person declared in 8/94 and conceived in 12/93. This person uses 10 μCi of P-32 per experiment. The person's dose for the period of gestation was M (<10mrem).

Another DPW declared on 11/22/94, conceived in 9/94, works with 200 μCi of S-35 and 500 μCi of P-32, and dose for the gestation period was M.

In 1993, a researcher, Dyer, was authorized to work with 15 mCi of p-32 per experiment.

12. NRC INDEPENDENT MEASUREMENTS

A. Survey instrument	Serial No.	Last calibration
Ludlum 14C	019613	6/10/95
Ludlum 16	019622	none
Eberline RO-2	006301	6/8/94

B. Inspector's measurements were compared to licensee's (X) Y ( ) N

C. Describe the type, location, and results of measurements:

Start with 1090 curies of Dy-165 and package 2 shipments of approximately 730 mCi to Brigham and Women's Hospital: 120 mR/hr top surface of 1090 curies of Dy-165 (Yellow III label; carried in Pb pig from reactor to processing laboratory). 90 mR/hr on side of hood for the Dy-165 experiment. 0.5 mR/hr on the other side of the wall. 20 mR/hr next to beta shield at elbow location. 180 mR/hr from centrifuge at Pb brick location. 10 mR/hr and 30 mR/hr at L-shaped beta shield. 10 mR/hr on top of transport container. 20 mR/hr from side of transport container. Compared with licensee. In agreement.

13. NOTIFICATION AND REPORTS ( ) N/A

A. Licensee in compliance with [19.13, 30.50] (reports to individuals,public and occupational, monitored to show compliance with Part 20) ( ) N/A (X) Y ( ) N

B. Licensee in compliance with [20.2201, 30.50] (theft or loss) (X) None ( ) Y ( ) N

C. Licensee in compliance with [20.2202, 30.50] (incidents) (X) None ( ) Y ( ) N

D. Licensee in compliance with [20.2203, 30.50] (overexposures and high radiation levels) (X) None ( ) Y ( ) N

E. Licensee aware of NRC Ops Center phone number (X) Y ( ) N

Licensee's incident log: Incidents/Special surveys include personnel contamination, equipment contamination, leaking sink surveys, floor contamination, and close-out survey for release for unrestricted use. There have been 18 incidents involving leaking sinks, drains, and pipes in 1993; 17 in 1994 and 1 so far in 1995. There has been 1 incident involving minor personnel contamination in 1993 and 3 incidents of minor personnel contamination in 1994 and none so far in 1995.

14. POSTING AND LABELING

A. NRC-3 "Notice to Workers" is posted [19.11] (X) Y ( ) N

B. Parts 19, 20, 21, Section 206 of Energy Reorganization Act, procedures adopted pursuant to Part 21, and license documents are posted or a notice indicating where documents can be examined is posted [19.11, 21.6] (X) Y ( ) N

C. Other posting and labeling per [20.1902, 1904] and the licensee is not exempted by [20.1903, 1905] (X) Y ( ) N

Remarks:

15. RECORDKEEPING FOR DECOMMISSIONING ( ) N/A

A. Records of information important to the safe and effective decommissioning of the facility maintained in an independent and identifiable location until license termination [30.35(g)] (X) Y ( ) N

B. Records include all information outlined in [30.35(g)] (X) Y ( ) N

Remarks: The inspector reviewed the Bldg. 6 Remediation Final Survey Report by SEG dated 3/4/94. Rooms 431, 432, and 434 were contaminated with Tc-99. The decommissioning project generated 16,000 pounds of radwaste (14 inner packs and 2 B25 boxes). Fume hoods and ductwork up to the roof were removed. prior to decontamination efforts, the maximum readings were 500,000 dpm/100 cm^2 direct surface contamination and 450,000 dpm/100 cm^2 removable contamination from a hood in Room 432. The walls in room 431 had 565,000 dpm/100 cm^2 of contamination. Post-decontamination efforts the maximum removable was 511 dpm/100cm, 4,300 dpm/100 cm^2 fixed beta and 21 μR/hr. A drain in Room 432 had 3,440 dpm/100 cm^2. A needle gun was used to remove the fixed contamination. A photo-essay was included. this material will need to be reviewed in more depth at a later time; preferable during a close-out inspection.

16. BULLETINS AND INFORMATION NOTICES

A. Bulletins, Information Notices, NMSS Newsletters, etc., received by the Licensee (X) Y ( ) N

B. Licensee took appropriate action in response to Bulletins, Generic Letters, etc. N/A

Remarks:

17. SPECIAL LICENSE CONDITIONS OR ISSUES (X) N/A

18. CONTINUATION OF REPORT ITEMS (x) N/A

19. VIOLATIONS, NCVs, AND OTHER ISSUES ( ) N/A

Note: Briefly state (1) the requirement and (2) how and when the licensee violated the requirement. For non-cited violations, indicate why the violation was not cited.

A. LC16 - Gammacell 40 irradiator moved prior to request and receipt of amendment to license.

B. 10 CFR 30.3 - Possession of RAM (sealed sources of Am-241) in excess of requested license limit. RETRACTED DUE TO LICENSEE CORRESPONDENCE ON MONDAY MARCH 13, 1995. LICENSEE DEMONSTRATED THAT THEIR RECORDS WERE WRONG AND THE ACCURATE ACTIVITY OF SEALED AMERICIUM-241 SOURCES IS 245 MILLICURIES.

C. LC21 - RPC failed to meet quarterly.

D. LC21 - No annual review of radiation safety program for 1993.

E. LC21 - Thyroid scans not performed within 3 days of using greater than 1 mCi of I-125.

F. LC21 - ALARA program procedures not followed when investigational levels exceeded.

G. LC21 - Expired authorizations not renewed in a timely manner (every 2 years).

H. LC21 - Retraining not conducted a time of license renewal.

I. LC21 - Retraining of housekeeping not performed.

J. 49 CFR 172.604 (a)(3) - failure to include emergency number on shipping paper.

K. 49 CFR 72.203 (d) - Inappropriate isotope identification on waste manifest.

CONCERNS:

1. Reviewing their license after any change (i.e., Troxler gauge)
2. License verification prior to transport of RAM (i.e., Bringham and Women's, Isotope Products).
3. 12 PIs with >20 users but <36
4. A comparison between NRC license limit versus Radionuclide total for all authorized users (RPO stated approximately 25%, however tritium and C-14 total possession limit for all users combine is closer to 75%).
5. Needles in old DIS (i.e., S-35)
6. 1994 year end review of doses do not appear to include Dy-165 users
7. Medium Half-life DIS stickers indicate between disposal of nuclides with a half-life between 20-120 days; however NRC license only allows DIS for nuclides with a half-life of up to 100 days.
8. Door in waste room is severely damaged due to improper fork lift operations.
9. 0.05mCi of H-3 and C-14 written on LSV waste drums and shipping papers. Actual waste generation records indicate a lower activity for each nuclide.
10. use of inappropriate units (<MDA).

20. DEBRIEF WITH LICENSING STAFF

Inspection findings discussed with licensing staff ( ) N/A (X) Y ( ) N

Items discussed: Information identified in Section 19 of this report.

21. EPA REFERRAL FORM

EPA referral form for air effluents sent to appropriate EPA regional office per IP 87102 Not Needed

22. PERFORMANCE EVALUATION FACTORS

Licensee (name & location)
MIT
Cambridge, MA

Inspectors _Lanzisera and Dolce

Inspection Date ___3/8-10/95

A. Lack of senior management involvement with the radiation safety program and/or Radiation Protection Officer (RPO) oversight (X) Y ( ) N
B. RPO too busy with other assignments (X) Y ( ) N
C. Insufficient staffing ( ) Y (X) N
D. Radiation Protection Committee fails to meet or functions inadequately ( ) N/A (X) Y ( ) N - see violation
E. Inadequate consulting services or inadequate audits ( ) N/A (X) Y ( ) N

Remarks (consider above assessment and/or other pertinent PEFs):

The RPO spends only 1/3 of the time working on MIT's NRC licensed material program. Weaknesses of the program include: lack of oversight of the program and lack of attention to detail. Many violations and concerns indicate inadequate audits of the staff and the radiation safety program. All of the violations were identified by the NRC. Discrepancies noted during staff interviews (i.e., action levels, review of authorizations, review of surveys) lead to this potential breakdown. In addition there were errors in records include missing information and calculational errors.

Regional follow-up on above PEFs citations:
Continue on normal inspection frequency, but with added attention to management oversight and auditing of this program.

END

93-001

MAY 17 1993

Docket Nos. 030-00763
030-09177
030-21272

License Nos. 20-01537-02
20-01537-10
20-01537-12

Massachusetts Institute of Technology
ATTN: Charles Billings, Acting Director
Medical Safety
77 Massachusetts Avenue, 20B-238
Cambridge, Massachusetts 02139

Dear Mr. Billings:

Subject: Routine Inspection No. 030-00763/93-001

This refers to your letter dated March 4, 1993, in response to our letter dated February 9, 1993.

Based on our review of the information submitted in support of your request that the violation be retracted, we have determined that the Troxler gauge in question was transported in accordance with the applicable requirements of the regulations of the Department of Transportation (DOT) in 49 CFR Parts 170-189, and 10 CFR 71.5. This violation is hereby withdrawn. Our records have been adjusted to reflect these results. No violations were identified during inspection 30-763/93-001.

We apologize for any inconvenience this error may have caused. Thank you for your cooperation in this matter.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Research, Development and
Decommissioning Section
Division of Radiation Safety
and Safeguards

S:\PENDING\MASSINST.LTR OFFICIAL RECORD COPY May 10, 1993

RETURN ORIGINAL TO REGION I IE:07

cc:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
Commonwealth of Massachusetts
Francis X. Masse, Radiation Safety Officer

bcc:
Region I Docket Room (w/concurrences)

RI:DRSS	RI:DRSS	RI:DRSS
Dimitriadis/GMP	Ulrich	Kinneman
4/10/93	4/27/93	4/17/93

Environmental
Medical
Service

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
MEDICAL DEPARTMENT
77 MASSACHUSETTS AVENUE, 208-238
CAMBRIDGE, MASSACHUSETTS 02139-4307

Docket Nos. 030-00763
030-09177
030-21272

License Nos. 20-01537-02
20-01537-10
20-01537-12

March 4, 1993

United States
Nuclear regulatory Commission
Region 1
475 Allendale Road
King of Prussia, A 19406-1415

Attention: Mr. John D. Kinneman, Chief

Subject: Response to Notice of Violation for Routine Inspection No.93-001

In response to your letter dated February 9, 1993, and the Notice of Violation contained in Appendix A, the Massachusetts Institute of Technology requests that the Notice of Violation be retracted and a correction letter stating the routine inspection resulted in no items of noncompliance be issued to the Institute.

The following data supports the fact that no violation has ever occurred:

1. The Troxler Gauge, Model 3321, S/N 226, is routinely transported by trained radiation workers to field sites in Massachusetts. The gauge is housed in a transportation case that has a metal plaque attached to one side which contains the following wording:

EXCEPTED RADIOACTIVE MATERIAL
INSTRUMENTS AND ARTICLES
UN 2911
EXEMPTION FROM REGULATORY PACKAGING
SPECIFICATION PACKAGING PERFORMANCE TEST
AND MARKING AND LABELING REQUIREMENTS
BY VIRTUE OF CONFORMANCE WITH U.S.
D.O.T. 49 CFR 173.422.

Due to the above exemption, no violation of D.O.T. regulations has ever occurred with respect to the transportation of this device by MIT personnel.

Director
208-238
(617) 253-5360
Fax: (617) 253-4879

Biohazard Assessment
20C-214
(617) 253-1740
Fax: (617) 258-6107

Industrial Hygiene
20C-204
(617) 253-2596
Fax: (617) 253-4879

Radiation Protection
Campus RPO 20C-207
(617) 253-2180
Fax: (617) 253-4879

Reactor RPO
NW12-108
(617) 253-4203

Bates LINAC RPO
P.O. Box 95 21 Manning Road
Middleton, MA
(617) 245-6600 Fax: (617) 245-0901

2. The exemption plaque on the carrying case was not observed by the inspectors during the inspection. RPO review of the authorized project, the Troxler Gauge, and its transportation case after the close of the inspection determined that the above notice was permanently installed on the case and hence there was no violation. Mitchell Galanek, MIT Associate Radiation Protection Officer, communicated this information to Mr. Anthony Dimitriadis on January 15, 1993, at which point they agreed that the conclusion of the inspection should be no finding of noncompliance. Mr. Galanek understood that Mr. Dimitriadis would further communicate these findings to Ms. Elizabeth Ulrich, the lead inspector of the NRC team. I believe it was the failure of Mr. Galanek and/or Mr. Dimitriadis to communicate this finding directly to Ms. Ulrich that led to the erroneous Notice of Violation.

As stated above, MIT requests the Notice of Violation be retracted and a correction letter stating the routine inspection resulted in no items of noncompliance be issued to the Institute.

Please feel free to contact me if you have any questions concerning this matter. Thank you in advance for your cooperation.

Sincerely,

F P Masse' CHP, CMP

Francis X. Masse, Director
MIT Radiation Protection Programs
MIT Radiation Protection Officer

FEB 09 1993

Docket Nos. 030-00763
030-09177
030-21272

License Nos. 20-01537-02
20-01537-10
20-01537-12

Massachusetts Institute of Technology
ATTN: Charles Billings, Acting Director
Medical Safety
77 Massachusetts Avenue, 20B-238
Cambridge, Massachusetts 02139

Dear Mr. Billings:

Subject: Routine Inspection No. 93-001

On January 12 - 14, 1993, Betsy Ullrich, Steven Courtemanche and Tony Dimitriadis of this office conducted a routine safety inspection at the Massachusetts Institute of Technology, Cambridge and Lincoln campuses, of activities authorized by the above listed NRC licenses. The inspection was an examination of your licensed activities as they relate to radiation safety and to compliance with the Commission's regulations and the license conditions. The inspection consisted of observations by the inspector, interviews with personnel, and a selective examination of representative records. The findings of the inspection were discussed with you at the conclusion of the inspection.

Based on the results of this inspection, it appears that your activities were not conducted in full compliance with NRC requirements. A Notice of Violation is enclosed as Appendix A and categorizes each violation by severity level in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C (Enforcement Policy). You are required to respond to this letter and in preparing your response, you should follow the instructions in Appendix A.

Please use the enclosed self-addressed green envelope when you respond to this letter to assist us in the timely processing of your response.

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RETURN ORIGINAL TO
REGION I

IE:07

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and your reply will be placed in the Public Document Room.

The responses directed by this letter and the accompanying Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

Your cooperation with us is appreciated.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Research, Development &
Decommissioning Section
Division of Radiation Safety
and Safeguards

Enclosure: Appendix A, Notice of Violation

cc:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
Commonwealth of Massachusetts
Francis X. Masse, Radiation Safety Officer

bcc:
Region I Docket Room (w/concurrences)
D. Holody, RI

RI:DRSS	RI:DRSS
Ullrich/smh	Kinneman
02/4/93	02/6/93

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APPENDIX A

NOTICE OF VIOLATION

Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Docket No. 030-00763
License No. 20-01537-02

As a result of the inspection conducted on January 12-14, 1993, and in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C (Enforcement Policy) (1993), the following violation was identified:

10 CFR 71.5(a) requires that licensees who transport licensed material outside the confines of their plants or deliver licensed material to a carrier for transport comply with the applicable requirements of the regulations appropriate to the mode of transport of the Department of Transportation (DOT) in 49 CFR Parts 170-189.

49 CFR 172.200(a) requires that each person who offers a hazardous material for transport shall describe the hazardous material on the shipping paper in the manner required.

49 CFR 173.422 excepts instruments and articles from the shipping paper requirements if they meet specific criteria.

49 CFR 173.421-1 requires that excepted radioactive material must be certified as being acceptable for transportation by having a notice enclosed in or on the package.

Contrary to the above, during the period of July 1, 1992 through January 12, 1993, a Troxler gauge containing a 10 millicurie Americium-241 sealed source was transported 10 times to a field site without shipping papers or without an "excepted radioactive material" notice.

This is a Severity Level IV Violation (Supplement V).

Pursuant to the provisions of 10 CFR 2.201, Massachusetts Institute of Technology is hereby required to submit to this office within thirty days of the date of the letter which transmitted this Notice, a written statement or explanation in reply, including: (1) the corrective steps which have been taken and the results achieved; (2) corrective steps which will be taken to avoid further violations; and (3) the date when full compliance will be achieved. Where good cause is shown, consideration will be given to extending this response time.

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RETURN ORIGINAL TO
REGION I

91-001

NRC Form 591
(12-81)
10 CFR 2.201

U.S. NUCLEAR REGULATORY COMMISSION

SAFETY INSPECTION

1. LICENSEE	2. REGIONAL OFFICE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY 77 Massachusetts Avenue Cambridge MA 02139	US NRC Region I Office 475 Allendale Road King of Prussia 19406

3. DOCKET NUMBER(S)	4. LICENSE NUMBER(S)	5. DATE OF INSPECTION
030-00763 030-09177	20-01537-02 20-01537-10	February 11 & 12, 1991

Licensee: 030-21272 20-01537-12

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's (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 findings as a result of this inspection are as follows:

☒ 1. Within the scope of this inspection, no violations were observed.

☒ 2. The inspector also verified the steps you have taken to correct the violations identified during the last inspection. We have no further questions on those actions at this time.

☐ 3. During this inspection certain of your activities, as checked below, were in violation of NRC requirements. **THIS IS A NOTICE OF VIOLATION** which is required to be posted in accordance with 10 CFR 19.11.

☐ A. _____ was not properly posted to indicate the presence of a _____. 10 CFR 20.203(b), (c), (d), (e) or 34.42.

☐ B. Containers located in _____ were not properly labeled to indicate the presence of radioactive material. 10 CFR 20.203(f)(1), or (f)(2).

☐ C. _____ of sealed sources were not performed at the proper frequencies. 10 CFR _____ License Condition Number _____

☐ D. Records of _____ were not properly maintained. 10 CFR _____ or License Condition Number _____

☐ E. Documents were not properly posted or otherwise made available. 10 CFR 19.11.

☐ F. Reports or notifications of _____ were not made in accordance with 10 CFR _____ or License Condition Number _____

☐ H. _____

☐ I. _____

☐ J. ~~9103050235~~ 910212
REG1 LIC30
20-01537-02 PDR

☐ K. DESIGNATED ORIGINAL

Certified By: Joshua M. Thrusham

Return Original to Region I IE-07

I hereby state that within 30 days the actions described by me to the inspector will be taken to correct the violations identified in the items checked above. This statement of corrective actions is made in accordance with the requirements of 10 CFR 2.201. No further response will be submitted unless required by the NRC.

SIGNATURE – LICENSEE	DATE	SIGNATURE – NRC INSPECTOR	DATE
	2/11/91	Elizabeth B. Ullrich	2/12/91

A0105

100-88

JUL 26 1988

Docket No. 030-00763 License No. 20-01537-02
EA No. 88-146

Massachusetts Institute of Technology
ATTN: Mr. Paul C. Powell, Assistant Director
Office of Sponsored Programs
Room E19-721
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

Gentlemen:

Subject: Enforcement Conference No. 030-00763/88-002

This letter refers to the Enforcement Conference held at the NRC Regional Office in King of Prussia, Pennsylvania, on June 22, 1988 relating to activities authorized by NRC license. The meeting was attended by yourself and members of your staff, and by myself and other members of the NRC Region I staff. The subjects discussed at this meeting are included in the enclosed Enforcement Conference Report. This letter also refers to Mr. Frank Massè's letter to me dated June 28, 1988 that provided additional proposed corrective actions for the exposure incident discussed during the Enforcement Conference. A copy of the June 28 letter is attached to the enclosed Enforcement Conference Report.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure will be placed in the NRC Public Document Room.

No reply to this letter is required. Your cooperation with us in this matter is appreciated.

Sincerely,

Glen L. Sjoblom, Acting Director
Division of Radiation Safety
and Safeguards

Enclosure: Enforcement Conference Report No. 030-00763/88-002

cc w/encl:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
State of New Jersey
Francis X. Massé, Radiation Safety Officer

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07/22/88

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REG1 LIC30 PNU
01537-02

JUL 26 1988

Massachusetts Institute of Technology 2

bcc w/enclosures:
Region I Docket Room (w/concurrences)
F. Costello, RI
C. T. Oberg, RI
J. Joyner, RI
J. Kinneman, RI
E. Ullrich, RI

RI:DRSS	RI:DRSS	RI:DRSS	RI:DRSS
Ullrich/bc	Kinneman	Joyner	Sjoblom
07/21/88	07/21/88	07/25/88	07/25 /88

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07/22/88

EA No. 88-146

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 030-00763/88-002

Docket No. 030-00763

License No. 20-01537-02 Priority 2 Category F1A

Licensee: Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

Facility Name: Massachusetts Institute of Technology

Enforcement Conference At: Region I, King of Prussia, PA

Enforcement Conference Conducted: June 22, 1988

Prepared by: Francis M. Costello 7-25-88
Elizabeth Ullrich, Health Physicist date signed

Francis M. Costello 7-25-88
C. T. Oberg, Health Physicist date signed

Francis M. Costello 7-25-88
Francis M. Costello, Senior Health Physicist date signed

Approved by: John D. Kinneman 7/25/88
John D. Kinneman, Chief date signed
Nuclear Materials Safety Section B

Enforcement Summary: Enforcement Conference held in King of Prussia, Pennsylvania on June 22, 1988. Licensee representatives discussed corrective and preventive actions taken and planned as a result of an extremity exposure reported by the licensee to be in excess of regulatory limits and the results of the NRC inspection conducted on January 28, 1988 and April 20-22, 1988. NRC representatives discussed their concerns regarding factors leading to the exposure. Enforcement options available to the Commission were reviewed. Licensee representatives provided comments on Report No. 030-00763/88-001.

DETAILS

1. Attendance

Massachusetts Institute of Technology

Paul C. Powell, Assistant Director, Office of Sponsored Programs
Francis X. Masse, Radiation Protection Officer
Mitchell S. Galanek, Associate Radiation Protection Officer

Nuclear Regulatory Commission

Glen L. Sjoblom, Acting Director, Division of Radiation Safety and Safeguards
Jay M. Gutierrez, Regional Counsel
John D. Kinneman, Acting Chief, Nuclear Materials Safety Branch
Francis M. Costello, Senior Health Physicist
C. T. Oberg, Health Physicist
Elizabeth Ullrich, Health Physicist

2. Conference Summary

On June 22, 1988, representatives of Massachusetts Institute of Technology (MIT) and NRC Region I met at the Region I office in King of Prussia to discuss the apparent violations identified during the NRC inspection conducted on January 28, 1988 and April 20-22, 1988. This inspection reviewed an apparent extremity exposure which was reported by the licensee to be in excess of regulatory limits resulting from the use of holmium-166 and dysprosium-165 in the licensee's Nuclear Research Laboratory.

The NRC representatives expressed concern regarding the lack of specific procedures and safety limits in the written authorization for this project, which was approved by the Radiation Protection Committee (RPC), and the lack of surveys by representatives of the Radiation Protection Office (RPO) when the isotope in use changed from dysposium-165 to holmium-166. NRC representatives stated that no violations or weaknesses were identified in other areas of the MIT radiation safety program; however, the dysprosium/holmium project presented unusual safety considerations due to the large quantities of radioactive material used and, in the judgement of NRC representatives, should have received more attention than it did.

The MIT representatives stated that the evaluation of the dysprosium/holmium project was thorough and that initial surveys of work with dysprosium indicated good control of the material and the resulting radiation exposure. They described their evaluations in detail. Furthermore, they explained that the doses to the researcher during this short-term project were reviewed and considered to be acceptable; more stringent controls were planned in the event that the project became permanent. They agreed that they underestimated the potential hazard of the change to holmium-166 because significantly smaller quantities were used, as compared to dysprosium-165, and that more thorough surveys and measurements should have been performed at the time of the isotope change. They also agreed that the documentation of RPO actions was not as complete as they would have liked.

The MIT representatives also stated that the decision to allow the individual to work with holmium-166 in November prior to receiving the results of the October dosimeter was based on a thorough review of the facts and circumstances. The individual's workload for September and October were compared, and they concluded that the dose limits would not be exceeded if certain shielding was altered. Since omission of the November studies would have required that the individual repeat a great deal of work with radioactive material, the licensee concluded that unnecessary dose due to repetition of the study should be avoided. Therefore, the shielding was modified and the work was authorized. In addition, a RPO representative monitored all work with holmium-166 in November.

Licensee representatives described the corrective actions taken and planned. These included the revision of processing and handling procedures during December 1987 and January 1988; the addition of a second individual to share the workload; and, the use of weekly dosimeters for both individuals. Preventive actions included development of procedures for additional, pre-authorization review of significant projects by the Radiation Protection Committee, with a copy of these procedures to be sent to the NRC Region I Office, and step-by-step analysis of all new procedures and changes to existing procedures.

The MIT representatives provided comments regarding NRC Inspection Report No. 030-00763/88-001. These comments are described in Attachment 1.

Enforcement options available to the NRC were reviewed.

Subsequent to the Enforcement Conference, Mr. Massé provided, by letter dated June 28, 1988, additional proposed prevention actions that, if approved by the RPC and implemented, would raise the level of protection applied to users of large quantities of radioactive material. A copy of the June 28 letter is Attachment 2.

Report No. 030-00763/88-002

Attachment 1

Licensee Comments On Report No. 030-00763/88-01

Report Section 4.

Text:

"Further, finger ring dosimetry were missing for January and May of 1987 and the licensee had not evaluated the doses received during the time covered by this missing dosimetry."

Licensee Comment:

Licensee representatives stated that they had not assigned doses for the two months when ring dosimetry was missing because the ring doses were less than the wrist doses and all wrist dosimeters were evaluated, and due to the unreliability of any method of assessing the ring doses after the fact.

Report Section 5.

Text:

"The licensee did not request emergency processing of the October wrist dosimeter, and did not make an estimate of the October wrist dose prior to authorizing this work ..." [done in November, after notification of the apparent overexposure in third quarter 1987].

Licensee Comment:

Licensee representatives stated that, while emergency processing of the October wrist dosimeter was not requested, they did compare the use of radioactive material during September and October and concluded that the October dose would be less than the dose in September, and that the total annual dose would be less than 75 rem.

Report Section 6.

Text:

"Changes included: (1) substantial additions of lucite shielding in the area; (2) design and production of remote handling equipment; (3) use of lucite-shielded containers; and, (4) use of syringe shields. Equipment is currently being designed to restrain the rabbit and shield the investigator during animal studies."

Licensee Comment:

Licensee representatives stated that this statement incorrectly appears to indicate that no shielding was used prior to this time. However, shielding and remote-handling equipment were used by the researcher prior to the exposure. After notification of the exposure in excess of regulatory limits, additions to shielding and changes to improve handling procedures were made.

Report Section 6.

Text:

"However, several weekly dosimeters were lost during the first quarter of 1988. Licensee representatives stated that an evaluation of these dosimeters would be included in the first quarter's dosimetry total".

License Comment:

Licensee representatives stated that their records do not indicate missing dosimetry during the first quarter of 1988.

Report Section 7.

Text:

"...he [the researcher] indicated that, for much of the time, his wrist dosimeter was several inches from the rabbit knee as he was working on the rabbit".

Licensee Comment:

Licensee representatives stated that the researcher said that his wrist was much closer than several inches from the rabbit knee during most of the autopsy of the rabbit, even touching the knee at times.

License Comment on Entire Report:

Licensee representatives stated that, throughout the report, all references to "left ring" and "right ring" should be reversed. These designations came from the vendor dosimetry records. In fact, the individual used the rings on the opposite hands than those designated by the vendor code.

NRC Comment on the Report

Report Section 7.

Text:

On page 8 of the report, two subsections were incorrectly numbered "3" and "4". They should have been identified as "c" and "d".

Report No. 030-00763/88-002

Attachment 2

Letter Dated June 28, 1988 from Frank Massé
to Glen L. Sjoblom

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
MEDICAL DEPARTMENT
ENVIRONMENTAL MEDICAL SERVICE

77 MASSACHUSETTS AVENUE, 208-238
CAMBRIDGE, MASSACHUSETTS 02139

June 28, 1988

Glen L. Sjoblom, Acting Director
Division of Radiation Safety
and Safeguards
US Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia PA 19406

Dear Mr. Sjoblom:

Enclosed for your information is a copy of my memo to the Chairman of the MIT Radiation Protection Committee proposing amendments to our review and approval processes that, when implemented, will constitute corrective action for our recent overexposure incident. Please don't hesitate to contact me if you have questions.

Regards,

Frank Massé

Frank Massé, CHP

FXM/nlj

enclosure

cc: Paul Powell
Mitch Galanek

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
MEDICAL DEPARTMENT
ENVIRONMENTAL MEDICAL SERVICE

77 MASSACHUSETTS AVENUE, 20B-236
CAMBRIDGE, MASSACHUSETTS 02139

TO: Alan Davison, Chairman, RPC

FROM: Frank Massé, RPO

SUBJECT: Response to recent overexposure incident

DATE: June 28, 1988

The recent apparent extremity overexposure to the radiochemist working on multicurie quantities of dyprosium and holmium leads me to conclude that some modification in the program is advisable. While this was clearly an isolated incident, we must take steps to assure there are no such incidents in the future. Following our own in-house investigation plus discussion with NRC representatives it is clear that the review and approval processes generally applied to applications for smaller quantities of material routinely used at MIT plus the monitoring programs generally applied to these smaller quantities may not be adequate to provide the necessary level of protection warranted for projects such as the one in question. I therefore propose that we place on the agenda for the July meeting a proposal to add the following requirements to our programs as they apply to such uses.

1. I propose that large quantities be defined as possession of quantities in excess of 100,000 times the quantity listed in Appendix C of 10 CFR 20, with combinations being treated as in the note at the end of Appendix C.

2. The review process for such large quantities shall involve a rigorous, step-by-step RPO review of the proposed procedures, with full documentation of this review and all details of the operation. Whenever practical, a mock or low-activity run will be performed as part of this review to check on the suitability of the proposed procedures. Following completion of RPO review, the full detailed procedure description with review data will be submitted to the Radiation Protection Committee for intensive review and approval in a full meeting before the project may proceed.

3. In addition to the required monitoring of all aspects of the operation by the project, initial runs will also be monitored by RPO to determine full compliance with all committee requirements and adequacy of all procedures. This monitoring will be fully documented and will continue until RPO has confidence that all conditions are well controlled. Results of this monitoring will be reported back to Committee.

4. Any amendments or additions to such approvals will undergo the same rigorous RPO and RPC review before they are authorized and each will be subject to the same initial monitoring outlined above.

5. Personnel monitoring for all such procedures will be provided at an increased frequency from the normal monthly processing to provide a rapid database of all personnel monitoring data. This will automatically provide for a special report on each such project that will receive the special attention necessary on an increased frequency basis.

We have undertaken the RPO portion of the above escalated review process for the ongoing portions of the current project that led to these concerns and propose to place that review on the agenda of the upcoming meeting for Committee review. The suspended holmium work is scheduled to be reviewed by RPO in time for Committee review at the September meeting.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
MEDICAL DEPARTMENT
ENVIRONMENTAL MEDICAL SERVICE

77 MASSACHUSETTS AVENUE, 208-238
CAMBRIDGE, MASSACHUSETTS 02139

July 22, 1988

US Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Docket # 30-00763
License # 20-01537-02
EA 88-146

Gentlemen:

This is in response to your notice of violation referenced above and dated July 7, 1988. Following are the detailed items called for in the response:

1. Reason for violations: As reported in our earlier letters describing this incident to the Commission, the primary reason for both violations (both the overexposure and the failure to make adequate surveys) was the assumption by all involved that the successful handling of Dysprosium was sufficient evidence that there would be no difficulty with the followup studies with Holmium, since the Dysprosium operations typically involved at least 10 times as much activity as Holmium. Unfortunately, we failed to adequately account for the increased time of exposure, the prolonged proximity of the workers hands to the source, and the strength of the longer-lived Holmium source at a fixed time after injection.

2. and 3. The corrective steps that have been taken to prevent recurrence of an incident such as this are outlined in the attached memo from F.X. Masse, RPO, to Professor Alan Davison, RPC Chairman. The Committee formally adopted those recommendations for escalated committee review and RPO monitoring activities whenever large amounts of radionuclides such as were handled in this case are involved. All procedures and requirements outlined in that memo are therefore incorporated as part of our operating program and should be considered a part of this response. The results achieved by this procedure are the immediate escalated control process over all such work.

4. Full compliance with the regulations was actually achieved immediately after we were notified of the overexposure last fall. Increased monitoring was immediately implemented and no further overexposure occurred. The escalated monitoring and review procedures referenced above will assure continuing compliance.

We wish to make one important clarification of a statement in the Notice of Violation for the record. Violation A implies that the exposure occurred in the Nuclear Reactor Laboratory at MIT. While the research project involved in this incident is an integral part of the Nuclear Reactor Laboratory, the exposure actually occurred elsewhere on the MIT campus.

We wish to express our appreciation to NRC personnel for a thorough and cooperative review of this entire incident which truly represented a joint effort to improve the MIT radiation protection program. Please don't hesitate to contact the undersigned if further information is required.

Yours truly,

F.X. Masse, CHP
MIT Radiation Protection Officer

Paul Powell
Assistant Director
Office of Sponsored Programs

FXM/nlj
enclosure

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
MEDICAL DEPARTMENT
ENVIRONMENTAL MEDICAL SERVICE

77 MASSACHUSETTS AVENUE 208-238
CAMBRIDGE, MASSACHUSETTS 02139

TO: Alan Davison, Chairman, RPC

FROM: Frank Massè, RPO

SUBJECT: Response to recent overexposure incident

DATE: June 28, 1988

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3. In addition to the required monitoring of all aspects of the operation by the project, initial runs will also be monitored by RPO to determine full compliance with all committee requirements and adequacy of all procedures. This monitoring will be fully documented and will continue until RPO has confidence that all conditions are well controlled. Results of this monitoring will be reported back to Committee.

4. Any amendments or additions to such approvals will undergo the same rigorous RPO and RPC review before they are authorized and each will be subject to the same initial monitoring outlined above.

5. Personnel monitoring for all such procedures will be provided at an increased frequency from the normal monthly processing to provide a rapid database of all personnel monitoring data. This will automatically provide for a special report on each such project that will receive the special attention necessary on an increased frequency basis.

We have undertaken the RPO portion of the above escalated review process for the ongoing portions of the current project that led to these concerns and propose to place that review on the agenda of the upcoming meeting for Committee review. The suspended holmium work is scheduled to be reviewed by RPO in time for Committee review at the September meeting.

JUL. 07 1988

Docket No. 30-00763
License No. 20-01537-02
EA 88-146

Massachusetts Institute of Technology
ATTN: Mr. Paul C. Powell
Assistant Director, Office of Sponsored Programs
Room E19-721
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

Gentlemen:

SUBJECT: NOTICE OF VIOLATION
(NRC Inspection Report No. 30-00763/88-001)

This letter refers to the NRC inspection conducted on January 28 and April 20-22, 1988, at your facility in Cambridge, Massachusetts, to review the circumstances associated with a violation identified by your staff and reported to the NRC. The violation involved a radiation exposure of 22.91 rem to the right wrist of an authorized user at your facility during the third calendar quarter of 1987. This exposure is in excess of the regulatory limit of 18.75 rem. During the inspection, another violation of NRC requirements was identified. The report of the inspection was forwarded to you on June 8, 1988. On June 22, 1988, we held an enforcement conference with you and members of your staff to discuss the violations, their causes, and your corrective actions.

This cumulative exposure in excess of the regulatory limit occurred when the individual researcher was performing certain animal experiments involving the use of curie and millicurie quantities, respectively, of dysprosium-165 and holmium-166. Apparently, the procedures for conducting the experiments were changed in September 1987, to use the holmium-166 instead of the previously used dysprosium-165. Although the use of holmium-166 created a potential for much higher dose rates because of a longer half-life, an evaluation of the effects of this procedure change was not performed by the authorized user or the Radiation Safety Officer prior to its approval and implementation. As a result, when the individual began using the holmium-166 in September 1987, he received a 15.04 rem exposure for that month which resulted in the 22.91 rem exposure for the third calendar quarter of 1987.

The NRC recognizes, based on this inspection and your prior good enforcement history, that management of your facility has normally exercised adequate control and supervision of licensed activities. Nonetheless, the NRC is concerned that an adequate evaluation of the effects of the use of both these two isotopes was not performed by authorized user, the Radiation Safety Officer, or the Radiation Safety Committee prior to the Radiation Safety Committee's approval in October 1986 to use the holmium-166. This event demonstrates the importance of (1) adequate evaluations whenever changes are made at the facility,

(2) prompt assessment of the causes of any unusually high exposure, even if the specific exposure is not in excess of the regulatory limit, and (3) prompt actions to prevent recurrence of any unusually high exposure.

The violation involving the exposure in excess of the regulatory limit is described in the enclosed Notice of Violation and is classified at Severity Level IV in accordance with Supplement IV of the "General Statement of Policy and Procedures for Enforcement Actions" (Enforcement Policy), 10 CFR 2, Appendix C (1988) since the violation involves a cumulative exposure that reflects an isolated weakness in your radiation protection program, rather than a programmatic breakdown. Nonetheless, we emphasize that any similar violations in the future may result in additional enforcement action. The other violation set forth in the enclosed Notice is also classified at Severity Level IV.

The inspection report forwarded to you on June 8, 1988, identified two instances of failure to perform required evaluations. These included an apparent failure to evaluate missing ring dosimetry in January and May 1987 and an apparent failure to evaluate an October 1987 extremity dose prior to permitting the individual to continue working with radioactive materials in November. Based on the information provided during the enforcement conference, we have concluded that these evaluations were, in fact, performed in accordance with regulatory requirements and, thus, these items are not being cited.

You are required to respond to this letter and the enclosed Notice, and you should follow the instructions specified in the enclosed Notice when preparing your response. In your response, you should document the specific actions taken and any additional actions you plan to prevent recurrence. In particular, your response should address long term actions designed to identify and correct unanticipated problems associated with new uses or applications of licensed material. After reviewing your response to this Notice, including your proposed corrective actions and the results of future inspections, the NRC will determine whether further NRC enforcement action is necessary to ensure compliance with NRC regulatory requirements.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

The responses directed by this letter and the enclosed Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL Number 96-511.

Sincerely,

Original signed by:

Glen L. Sjoblom, Acting Director
Division of Radiation Safety and
Safeguards

Enclosure: Notice of Violation

cc w/encl:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
Commonwealth of Massachusetts

NOTICE OF VIOLATION

Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Docket No. 30-00763
License No. 20-01537-02
EA 88-146

On January 28 and April 20-22, 1988, an NRC inspection was conducted at the licensee's facility in Cambridge, Massachusetts to review the circumstances associated with a violation identified by the licensee and reported to the NRC. During the inspection, another violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C (1987), the violations are set forth below:

A. 10 CFR 20.101(a) requires, in part, that no licensee possess, use, or transfer licensed material in such a manner as to cause any individual in a restricted area to receive in any period of one calendar quarter, a total exposure to the hands of 18.75 rems.

Contrary to the above, during the third quarter of 1987, an authorized user working with curie and millicurie quantities of dysprosium-165 and holmium-166, respectively, in the Nuclear Reactor Laboratory, a restricted area, received a radiation exposure to the right wrist of 22.91 rems.

This is a Severity Level IV violation (Supplement IV)

B. 10 CFR 20.201(b) requires that each licensee make such surveys as may be necessary for the licensee to comply with the regulations in Part 20. As defined in 10 CFR 20.201(a), "survey" means an evaluation of the radiation hazards incident to the production, use, disposal, or presence of radioactive materials or other sources of radiation.

Contrary to the above, adequate surveys were not made to assure compliance with 10 CFR 20.101(a), a regulation which limits the radiation dose to individuals in restricted areas. Specifically, adequate radiation surveys were not performed prior to September 1987 to determine the dose rates associated with animal studies involving the use of millicurie quantities of holmium-166.

This is a Severity Level IV violation (Supplement IV).

Pursuant to the provisions of 10 CFR 2.201, Massachusetts Institute of Technology is hereby required to submit a written statement or explanation to the Director of Enforcement, U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555, with a copy to the Regional Administrator, Region I, 475 Allendale Road, King of Prussia, Pennsylvania 19406, within 30 days of the date of the letter transmitting this Notice. This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation if admitted, (2) the corrective steps that have been taken and the results achieved, (3) the

corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Consideration may be given to extending the response time for good cause shown.

FOR THE NUCLEAR REGULATORY COMMISSION

Glen L. Sjoblom, Acting Director
Division of Radiation Safety and
Safeguards

Dated at King of Prussia, Pennsylvania
this 7th day of July 1988

MATERIALS LICENSE

Amendment No. 50

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Massachusetts Institute of Technology Room E19-721 2. 77 Massachusetts Avenue Cambridge, Massachusetts 02139	In accordance with letter dated March 23, 1995, 3. License Number 20-01537-02 is amended in its entirety to read as follows: 4. Expiration Date January 31, 1995 (extended) 5. Docket or Reference No. 030-00763

6. Byproduct, Source, and/or Special Nuclear Material	7. Chemical and/or Physical Form	8. Maximum Amount that Licensee May Possess at Any One Time Under This License
A. Any byproduct material between Atomic Nos. 3 and 83 with half-lives less than or equal to 120 days	A. Any	A. Not to exceed 3 curies per radionuclide and 100 curies total
B. Any byproduct material between Atomic Nos. 3 and 83, except as specified in Subitem 6.E.	B. Sealed sources, foils, plated or deposited sources	B. Not to exceed 20 curies per radionuclide and 100 curies total
C. Any byproduct material with Atomic Nos. 84 through 96 with half-lives less than or equal to 120 days	C. Any	C. Not to exceed 26 millicuries per radionuclide and 200 millicuries total
D. Hydrogen 3	D. Any	D. 30 curies
E. Carbon 14	E. Any	E. 750 millicuries
F. Chlorine 36	F. Any	F. 20 millicuries
G. Calcium 45	G. Any	G. 50 millicuries
H. Iron 55	H. Any	H. 50 millicuries
I. Cobalt 60	I. Any	I. 5 millicuries
J. Nickel 63	J. Any	J. 10 millicuries
K. Zinc 65	K. Any	K. 10 millicuries
L. Strontium 90	L. Any	L. 2.5 millicuries
M. Technetium 99	M. Any	M. 150 millicuries
N. Cadmium 109	N. Any	N. 20 millicuries
O. Iodine 129	O. Any	O. 100 microcuries
P. Cesium 137	P. Any	P. 10 millicuries
Q. Gadolinium 153	Q. Any	Q. 10 millicuries
R. Dysprosium 165	R. Any	R. 50 curies
S. Thallium 204	S. Any	S. 10 millicuries
T. Polonium 210	T. Sealed sources	T. 200 millicuries
U. Americium 241	U. Any	U. 10 microcuries
V. Americium 241	V. Sealed sources	V. 300 millicuries

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
W. Californium 252	W. Sealed sources (Savannah River Model SR-CF-100)	W. Not to exceed 102 micrograms (55 millicuries) per source and 408 micrograms (220 millicuries) total

9. Authorized use

A. through W. Research and development as defined by 10 CFR 30.4, animal studies, educational purposes; and calibration of survey meters for Draper Laboratories and Whitehead Institute.

CONDITIONS

10. A. Licensed material may be used only at any location comprising the Cambridge, Massachusetts Campus; at Lincoln Laboratories, Lexington, Massachusetts; and the Bates Linear Accelerator, Middleton, Massachusetts.

B. Notwithstanding the provision of Condition 10.A., licensed material listed as Item 6.B. and 6.V. may be used at temporary job sites anywhere in the United States where the U. S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material in accordance with application dated November 29, 1989.

11. A. Licensed material shall be used by, or under the supervision of, individuals designated by the MIT Radiation Protection Committee. The licensee shall maintain records of individuals designated as users.

B. The Radiation Safety Officer for this license is F. X. Masse, C.H.P.

12. A. Sealed sources and detector cells shall be tested for leakage and/or contamination at intervals not to exceed 6 months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed 3 years.

B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months.

C. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.

D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.

E. Sealed sources and detector cells need not be leak tested if:

(i) they contain only hydrogen 3; or

(ii) they contain only a gas; or

(iii) the half-life of the isotope is 30 days or less; or

(iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or

(v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transfer to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

F. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the Commission. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission and the source shall be removed from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region I, ATTN: Chief, Nuclear Materials Safety Branch, 475 Allendale Road, King of Prussia, Pennsylvania 19406. The report shall specify the source involved, the test results, and corrective action taken.

G. The licensee is authorized to collect leak test samples for analysis by the licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Commission or an Agreement State to perform such services.

13. Experimental animals administered licensed materials or their products shall not be used for human consumption.

14. In lieu of using the conventional radiation caution colors (magenta or purple on yellow background) as provided in Section 20.203(a)(1), of 10 CFR Part 20, the licensee is hereby authorized to label detector cells and cell baths, containing licensed material and used in gas chromatography devices, with conspicuously etched or stamped radiation caution symbols without a color requirement.

15. Detector cells containing a titanium tritide foil or a scandium tritide foil shall only be used in conjunction with a properly operating temperature control mechanism which prevents foil temperatures from exceeding that specified by the manufacturer.

16. The licensee shall conduct a physical inventory every 6 months to account for all sources and/or devices received and possessed under the license. Records of inventories shall be maintained for 5 years from the date of each inventory.

17. The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material".

18. The licensee is authorized to hold radioactive material with a physical half-life of less than 100 days for decay-in-storage before disposal in ordinary trash provided:

    A. Radioactive waste to be disposed of in this manner shall be held for decay a minimum of 10 half-lives.

    B. Before disposal as normal waste, radioactive waste shall be surveyed to determine that its radioactivity cannot be distinguished from background. All radiation labels shall be removed or obliterated.

19. In addition to the possession limits in Item 8, the licensee shall further restrict the possession of licensed material so that at no time is a quantity of material in excess of the limits of 10 CFR 30.72 possessed.

20. The licensee shall not acquire licensed material in a sealed source on a device that contains a sealed source unless the source or device has been registered with the Nuclear Regulatory Commission under 10 CFR 32.210 or with an Agreement State. The licensee may possess and use sealed sources which were in the licensee's possession as of December 31, 1989.

21. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee s application and correspondence are more restrictive than the regulations.

    A. Application dated November 29, 1989
    B. Letter dated June 21, 1990

Date JUN 20 1995

For the U.S. Nuclear Regulatory Commission
Original Signed By:
By John R. McGrath
Nuclear Materials Safety Branch
Region I
King of Prussia, Pennsylvania 19406