

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION I

Report No. 50-20/79-03, 70-89/79-02,
70-194/79-02, 70-938/79-02
Docket No. 50-20, 70-89, License No. R-37, SNM-81,
70-194, 70-938 SNM-986, SNM-171 Safeguards Group 2
Licensee: Massachusetts Institute of Technology
138 Albany Street
Cambridge, Massachusetts 02139

Facility Name: MIT Nuclear Reactor Laboratory

Inspection At: Cambridge, Massachusetts

Inspection Conducted: November 14-15, 1979

Date of Last Material Control and Accounting Inspection Visit: August 9-11, 1978

Type of Inspection: Material Control and Accounting

Inspectors: G. C. Smith, Auditor

1/8/80
date

H. Zibulsky, Chemist

1/9/80
date

Approved by: J. H. Joyner, Chief, Nuclear Material Control
Support Section, Safeguards Branch

date
1/9/80
date

Inspection Summary:

Area Inspected: Material Control and Accounting. The inspection involved 32 inspector-hours on site by two NRC inspectors and was begun during the regular hours.

Results: The licensee was found to be in compliance with NRC requirements in the area examined.

8002280152

DETAILS

1. Persons Contacted

- *L. Clark, Jr., Director, Reactor Operations
- *J. Bernard, Superintendent
- *W. Clancy, Assistant Superintendent
- *H. Bondar, Administrative Assistant

The inspectors interviewed other licensee employees during the course of the inspection.

*denotes those present at the exit interview.

2. Licensee Action on Previous Inspection Findings

There were no items of noncompliance noted on the previous Material Control and Accounting inspection (Report 50-20/78-04 et al).

3. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on November 15, 1979. The inspector summarized the scope and findings of the inspection.

4. Unresolved Items

There were no unresolved items noted on the inspection.

5. MC 92706B - Independent Inspection Effort

No items of noncompliance were noted. The inspection results were attained by direct observations, discussions with licensee personnel and review of records.

The inspectors, as part of the walk-through inspection, requested radiation readings be taken in several areas to insure posted radiological signs were in compliance with applicable regulations. No exceptions were noted.

Leak test records for sealed sources were reviewed for completeness and timeliness. No exceptions were noted.

6. MC 851025 - Material Control and Accounting

a. Facility Organization and Operation

No items of noncompliance noted. The inspection results were attained through review of various procedures and discussions with licensee personnel.

The inspectors review of the licensee's written procedures included "Manual of Procedures and Instructions Related to Accountability for Source, Special Nuclear and Certain Other Materials," Revision 9-78. During the previous material control and accounting inspection the licensee agreed to revise these procedures. The most current revision at that time was Revision 6-71. Specific changes that were to be included in these procedures were:

- (1) Revision of the organization chart to reflect organization changes made on July 1, 1976.
- (2) Removal of references to the "Atomic Energy Commission."
- (3) Separations of functions to provide a system of checks and balances.

The inspector's review of the procedure disclosed the above changes were included in Revision 9-78.

The licensee is authorized to possess and use special nuclear material (SNM) in the operation of the reactor and in teaching and research in campus laboratories, at the Lincoln Laboratory in Lexington, Massachusetts, and at the William H. Bates Linear Accelerator Laboratory at Middleton, Massachusetts.

b. Shipping and Receiving

No items of noncompliance were noted. Inspection results were attained through review of each of the prepared Forms NRC-741, Nuclear Material Transaction Reports, against criteria for completing the form, timeliness in issuance and completion, correctness of the coding information, and evidence of significant shipper-receiver differences. During the period April 1, 1978 through September 30, 1979, there were three receipts from Oak Ridge, Tennessee. No discrepancies were identified.

c. Physical Inventory

No items of noncompliance were noted. The inspection results were attained through review of procedures, discussions with licensee personnel and verification of physical inventory items not in the reactor.

The presence of SNM in the form of unirradiated fuel elements, loose plates, fuel rods, pins, foils, buttons, and scrap was verified by the inspectors. The PuBe neutron sources on campus and not in the core were also verified. The presence of neutron sources at laboratories in Middleton and Lexington, Massachusetts, were not verified.

Review of the licensee's last physical inventory, dated October 31, 1978, disclosed that some items on the inventory were not actually physically inventoried until November and December, 1978. Discussions disclosed that the licensee was uncertain about the required time frame for inventories and reconciliation, and these times were not addressed in internal procedures. The situation was clarified by the inspectors and the licensee committed to revise internal inventory procedures by January 15, 1980, to include beginning and ending times for the inventories and the 30-day completion time for the reconciliation. This item will be reviewed in a subsequent inspection (79-03-01).

d. Records and Reports

No items of noncompliance were noted. The inspection results were attained through a complete audit of the Material Status Reports (Form NRC-742), covering the period April 1, 1978 through September 30, 1979. The review covered proper signature, time of submission, and accuracy of data. During the period covered, the licensee had a normal operational loss of 21 grams U-235 which was incurred in decladding and recladding UO₂ pellets for reactor physics experiments. An inventory difference gain of 4 grams U-235 was attributed to remeasurement of material in process and to rounding. The attached Exhibits I-IV present the audited material balance statements for enriched uranium and plutonium.

EXHIBIT I

Material Balance Summary
 4/1/78 - 9/30/79
 Enriched Uranium

	U	Grams	U-235
Beginning Inventory (4/1/78)	7,911,800		106,290
Receipts			
FZB-CCP #1 (6/30/78)	1909		1779
FZB-CCP #3 (11/8/78)	1910		1780
FZB-CCP #4 (1/11/79)	1911		1781
Material to Account for	<u>7,917,530</u>		<u>111,630</u>
Removals			
Shipments	--		--
Burnup	1374		1616
*Normal Operational Losses	1882		21
**Inventory Difference and Rounding	(314)		(4)
Ending Inventory (9/30/79)	7,914,588		109,997
Material Accounted for	<u>7,917,530</u>		<u>116,630</u>

*Incurred in decladding and recladding UO₂ pellets for reactor physics experiments.

**Inventory difference due to remeasurement of material in process and in rounding.

EXHIBIT II

MIT - Material Balance Summary
RIS:CCP SNM R-37 4/1/78 - 9/30/79
(Reactor Fuel) Enriched Uranium

	U	Grams	U-235
Beginning Inventory (4/1/78)	14568		13176
Receipts:			
FZB-CCP #1 (6/30/78)	1909		1779
FZB-CCP #3 (11/8/78)	1910		1780
FZB-CCP #4 (1/18/79)	1911		1781
Material to Account for	<u>20298</u>		<u>18516</u>
Removals:			
Shipments	--		--
Burnup	1374		1615
Rounding	1		--
Ending Inventory (9/30/79)	18923		16901
Material Accounted for:	<u>20298</u>		<u>18516</u>

EXHIBIT III

MIT - Material Balance Summary
 RIS:CCP 4/1/78 - 9/30/79
 Plutonium

	Pu	Grams	Pu 239 & 241
Beginning Inventory (4/1/78)	366		342
Receipts			
CCP-CCP #1 (8/16/78)	178		166
Material to Account for	<u>544</u>		<u>508</u>
Removals			
Shipments			
CCP-CCP #1 (8/16/78)	178		166
Ending Inventory (9/30/79)	366		342
Material Accounted for	<u>544</u>		<u>508</u>

EXHIBIT IV

MIT - Material Balance Summary (By Licerse)
 RIS:CCP 4/1/78 - 9/30/79
 Plutonium

	<u>Authorized Limits (grams)</u>		<u>Possession (grams)</u>	
	<u>Pu</u>	<u>Pu 239 & 241</u>	<u>Pu</u>	<u>Pu 239 & 241</u>
SNM-81	180	--	178	166
SNM-171	19		18	17
SNM-986	324		<u>170</u>	<u>159</u>
			<u>366</u>	<u>342</u>