

UNITED STATES  
ATOMIC ENERGY COMMISSION  
DIVISION OF NUCLEAR MATERIALS SAFEGUARDS  
DISTRICT III SAFEGUARDS OFFICE  
2111 BANCROFT WAY  
BERKELEY, CALIFORNIA 94704

TELEPHONE: 841-5121

REPORT OF THE INSPECTION OF  
SAFEGUARDS CONTROL OF  
NUCLEAR MATERIALS  
OF  
UNIVERSITY OF CALIFORNIA  
AT LOS ANGELES, CALIFORNIA

RIS: YEU

License Nos.: SNM-974  
R-71

Docket Nos.: 70-223  
50-142

Inspection No.: SO-III-16


Inspection Date: January 14, 1971

Report Date: January 25, 1971

For the Period: July 1, 1966 To: January 14, 1971

Exhibit:

I - Material Balance Statement, 7/1/66-1/14/71

  
\_\_\_\_\_  
Vincent N. Rizzolo, Director  
District III Safeguards Office

# INSPECTION OF SPECIAL NUCLEAR MATERIALS SAFEGUARDS

UNIVERSITY OF CALIFORNIA  
AT LOS ANGELES, CALIFORNIA

INSPECTION NO. SO-III-16

## A. INTRODUCTION

1. The inspection was made on January 14, 1971, at the University of California Campus, Los Angeles (UCLA).
2. UCLA has limited quantities of special nuclear materials for use in training and research. These quantities include, primarily, fuel for a research reactor, Pu/Be neutron sources, and alpha sources for instrument calibrations.

The University has an argonaut-type research reactor with an authorized power level up to 500 kilowatts thermal. The reactor itself is a heterogeneous, light water, graphite reflected type. The core, when fully loaded, consists of 24 fuel bundles contained in six water-filled aluminum boxes surrounded by graphite. Each fuel bundle is composed of 11 flat, aluminum clad, approximately 13.4% U/Al alloy fuel plates. The reactor operates at atmospheric pressure.

3. UCLA has two licenses, SNM-974 and R-71, for special nuclear material.
4. In addition to these two licenses, UCLA has a State of California license, No. 1335-70, authorizing possession and use of source materials for research and educational activities.

## B. SCOPE OF THE INSPECTION

1. The University of California at Los Angeles is a Group V licensee exempt from the requirements in Section 70.22(b), Part 70, 10 CFR. This inspection, therefore, covered only the applicable requirements of Part 70 and the AEC licenses.
2. The inspection included the following:
  - a. Audit of the records, reports and source documents.
  - b. Review of the written material controls and accounting procedures.

- c. Physical inventory of SNM which consisted of locating, identifying and recording all items on inventory.
- d. Review of compliance with license requirements in regard to possession limits, use in authorized locations and for authorized uses.

### C. CATEGORIZATION

1. The SNM inventory, consisting of both leased and privately owned materials, is grouped by license as follows:

<u>R-71</u>	Grams		
	<u>U-235</u>	<u>Pu</u>	<u>U-233</u>
Reactor fuel elements (U/Al, Al clad plates) - approximately 93% U-235	3,500		
Pieces of U/Al fuel plates (cold)	19		
UO <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub> ·6H <sub>2</sub> O in solution	250		
Pu/Be neutron source, #MRC-730		32	
<u>SNM-974</u>			
Pu/Be neutron source, #MRC-395		32	
Pu/Be neutron source, #MRC-908		32	
Four Pu plated alpha sources - as a set		<1	
One Pu plated alpha source		<1	
Five Pu-239/Pu-238 alpha sources, #54-58		<1	
U-233 as U <sub>3</sub> O <sub>8</sub> - in solution			<1
U-233 as five plated alpha sources, #49-53			<1
U-235, 99.85% U, as standard solutions, 0.2 g net	<1		

2. The reactor fuel elements, including the three in the floor storage holes, were all located in the reactor facility in Boelter Hall. The breakdown by fuel plates is as follows:

	<u>No. of Elements</u>	<u>U-235 Grams</u>
	261	3,461
(irradiated)	3	39
Fuel plate samples	-	19
		<u>3,519</u>

3. The remaining inventory was located in the following locations:

	<u>Grams</u>		
	<u>U-235</u>	<u>U-233</u>	<u>Pu</u>
Reactor facility, Boelter Hall	250		64
Physics Dept., Knudsen Hall			32
Geophysics Dept., Geology Building	<1	<1	
Chemistry Department		<1	<1
Environmental Health & Safety Office			<1
	<u>250</u>	<u>&lt;1</u>	<u>96</u>

D. SAMPLING PROCEDURES

1. No samples of the inventory were taken.
2. The inventory was verified by locating and accounting for all items comprising the SNM inventory. The quantities of the SNM items were accepted as described on available documentation. No weighings of inventory items were made since it was not meaningful for identification.

## E. SUMMARY OF FINDINGS

1. The licensee was in conformance with all safeguards requirements of 10 CFR 70.
2. The licensee's SNM inventories were within the authorized possession limits of its licenses, SNM-974 and R-71.
3. During the inspection period, the licensee reported materials unaccounted for (MUF) of approximately 187 grams uranium and 21 grams U-235 related to the disposition of inventories and termination of license SNM-693 about June, 1968. SNM-693 covered the operation of a subcritical assembly utilizing uranyl sulfate dissolved in D<sub>2</sub>O at an enrichment of 9.97% as its fuel. The licensee advised that the fuel solution was contained in aluminum tubes which corroded and reacted with the uranyl sulfate causing some precipitation and tube leakage. The shipper-receiver difference following recovery processing of the fuel was reported as MUF. No further investigation was possible or considered necessary during the inspection.
4. Program weaknesses.
  - a. Records maintained by the Radiation Safety Officer (SS Representative), Office of Environmental Health and Safety (EH&S), were considered minimally adequate in view of the limited inventory. However, data in support of burn-up reported in past material status reports was not available in the EH&S Office. The health and safety monitor assigned to the reactor facility working with data provided by reactor personnel calculates burn-up and provides EH&S with a draft of the material status report (Form AEC-742) to be issued to the AEC. Except as noted on each material status report, no record of periodic or cumulative burn-up was maintained by either the EH&S Office, the monitor, or reactor facility. However, an operating log was maintained in the reactor facility detailing the reactor operating time in terms of kilowatt/hours.

Although burn-up quantities were minimal, the licensee agreed to establish a permanent record within the EH&S Office to correlate the conversion of reactor operating times to burn-up reported and to record the cumulative burn-up.

- b. Labeling of some of the individual inventory items was minimal. The licensee agreed to label those items as appropriate with adequate identification.

EXHIBIT I

UNIVERSITY OF CALIFORNIA  
LOS ANGELES, CALIFORNIA

INSPECTION NO. SO-III-16

RIS: YEU

SPECIAL NUCLEAR MATERIAL  
MATERIAL BALANCE STATEMENT  
JULY 1, 1966 - JANUARY 14, 1971

UNIT: GRAMS

	Enriched Uranium		Plutonium		U-233		Pu-238	
	<u>U</u>	<u>U-235</u>	<u>Pu</u>	<u>Pu-239 &amp; 241</u>	<u>U</u>	<u>U-233</u>	<u>Pu</u>	<u>Pu-238</u>
Begin. Inventory, 7/1/66	4,377	3,809	64	60	<1	<1	-	-
* Receipts	-	-	32	29	<1	<1	5.0	4.0
Total to Account For	<u>4,377</u>	<u>3,809</u>	<u>96</u>	<u>89</u>	<u>&lt;1</u>	<u>&lt;1</u>	<u>5.0</u>	<u>4.0</u>
Shipments	133	11	-	-			5.0	4.0
MUF (1)	187	21	-	-				
Burn-up (2)	9	8	-	-				
Ending Inventory, 1/14/71	<u>4,048</u>	<u>3,769</u>	<u>96</u>	<u>89</u>	<u>&lt;1</u>	<u>&lt;1</u>	<u>-</u>	<u>-</u>
Total Accounted For	<u>4,377</u>	<u>3,809</u>	<u>96</u>	<u>89</u>	<u>&lt;1</u>	<u>&lt;1</u>	<u>5.0</u>	<u>4.0</u>

(1) Material unaccounted for upon AEC recovery of subcritical assembly fuel (9.97% enriched uranyl sulfate dissolved in D<sub>2</sub>O).

(2) Burn-up in the uranium element includes correction for reporting error for periods prior to July 1, 1966.