

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report Nos: 50-5/83-01  
70-113/83-01  
50-5  
Docket Nos: 70-113                      Licenses No.                      R-2  
SNM-95                      Safeguards Group                      5  
Licensee: Pennsylvania State University  
University Park, Pennsylvania 16802


Facility Name: The Pennsylvania State University

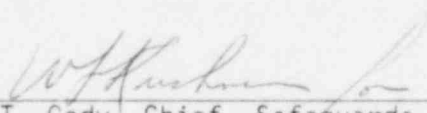
Inspection At: University Park Campus

Inspection Conducted: January 10-14, 1983

Date of Last Material Control and Accounting Inspection: July 28-31, 1981

Type of Inspection: Unannounced Material Control and Accounting

Inspector:                       2-4-83  
H. Zibulsky, Chemist                      date

Approved by:                       2/4/83  
A. T. Gody, Chief, Safeguards and                      date  
Fuel Facilities Section

Inspection Summary: Inspection on January 10-14, 1983 (Combined Report  
Nos. 50-5/83-01, 70-113/83-01)

Areas Inspected: Routine, unannounced inspection of Nuclear Material Control and Accounting including: Procedures and Implementation; Physical Inventory and Verification; Records and Reports; and Authorized Possession Limits. The inspection involved 32 inspector-hours onsite by one NRC regional based inspector.

Results: No items of noncompliance were identified.

## DETAILS

### 1. Persons Contacted

- \*R. G. Cunningham, Vice President for Research and Graduate Studies
- \*S. H. Levine, Director, Breazeale Nuclear Reactor
- \*I. E. McMaster, Deputy Director, Breazeale Nuclear Reactor
- \*R. W. Granlund, University Health Physicist
- \*E. Augustine, Health Physics Assistant
- \*R. E. Totenbier, SNM Controller

\*present at exit interview.

### 2. 30703 - Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on January 14, 1983. The inspector summarized the scope and the findings of the inspection.

### 3. Material Control Procedures and Implementation

No violations were identified.

Nuclear material control procedures required by 10 CFR 70.51(c) were documented in a manual entitled, "Rules and Procedures for the Use of Radioactive Material at the Pennsylvania State University." The manual, dated July 1980, had been approved by the University Isotopes Committee and distributed to all persons authorized to use radioactive material. The procedures provided for an annual audit of the nuclear material control activities. The procedures provided details of the program, including organization, material balance areas, personnel responsibilities, receipts and shipments, records and reports, internal transfers, tamper-safing practices, physical inventories, and reactor fuel burn-up calculations. The inspector reviewed documents and interviewed licensee employees to determine whether activities within each of these areas were performed in accordance with the procedures. No discrepancies were noted. Revised procedures were written and were to be sent to the University Isotopes Committee for approval.

Annual audits of nuclear material control practices were performed by the Manager of Safety during 1981 and 1982. Written reports were issued to the Vice President for Research and Graduate Studies on November 20, 1981 and December 20, 1982, respectively. There were no deficient practices disclosed in the audit reports.

### 4. Physical Inventory and Verification

No violations were identified.

The licensee conducted a physical inventory of all nuclear material in his possession at intervals not exceeding twelve months. This was

substantiated by the inspector upon review of the physical inventory results for 1981 and 1982.

The inventories consisted of (1) enriched uranium in the form of fuel elements, element sections, fission counters, samples and standards, (2) plutonium in the form of standards and sources, and (3) uranium-233 in the form of foil scrap. All inventory items were identified by a unique number assigned by the licensee. Each inventory item was located in a locked area or the nuclear reactor. Pu-Be source #317 was on the Altoona campus.

The inspector verified the presence of each of the items in the licensee's inventory by piece count and compared the results to the licensee's inventory listing and reconciled to the control records. No discrepancies were noted.

The licensee determined burn-up of enriched uranium fuel used in the nuclear reactor. The burn-up determination was performed quarterly and the fuel inventory was decreased accordingly. The inspector determined the decrease of enriched uranium from reactor log records for the period July 1, 1981 through September 30, 1982. There were no differences between the licensee's values and those determined by the inspector.

#### 5. Records and Reports

No violations were identified.

The licensee's records and reports were audited for the period July 1, 1981 through September 30, 1982. This included a review of all Nuclear Material Transaction Reports (DOE/NRC Form-741), Material Balance Reports (DOE/NRC Form-742), and underlying data issued during the audit period.

Records and reports were maintained in accordance with the licensee's procedures and applicable regulatory requirements.

Exhibits I through IV of this report summarizes the nuclear material activity for the audit period.

#### 6. Authorized Possession Limits

No violations were identified.

The licensee's authorized possession limits were compared with the actual holdings and were in accordance with license conditions.

Exhibit V of this report presents a comparison of license authorizations with actual possessions as of September 30, 1982.

EXHIBIT I

PENNSYLVANIA STATE UNIVERSITY

Period: July 1, 1981 through September 30, 1982

MATERIAL BALANCE SUMMARY  
Enriched Uranium-235

RIS:CDW

	<u>Element</u>	<u>Grams</u> <u>Isotope</u>
Beginning Inventory @ July 1, 1981	933,123	69,131
Receipts	<u>- 0 -</u>	<u>- 0 -</u>
Material to Account For	<u>933,123</u>	<u>69,131</u>
Removals:		
Shipments CDW-AUA-1 (5/25/82)	144	134
Burn-up	16	18
Inventory Difference (Rounding)	<u>(1)</u>	<u>(1)</u>
Total Removals	<u>159</u>	<u>151</u>
Ending Inventory @ September 30, 1982	<u>932,964</u>	<u>68,980</u>
Material Accounted For:	<u>933,123</u>	<u>69,131</u>

EXHIBIT II

PENNSYLVANIA STATE UNIVERSITY

Period: July 1, 1981 through September 30, 1982

MATERIAL BALANCE SUMMARY

Enriched Uranium-235

RIS:ZRV

	<u>Element</u>	<u>Grams</u> <u>Isotope</u>
Beginning Inventory @ July 1, 1981	35	32
Receipts	<u>- 0 -</u>	<u>- 0 -</u>
Material to Account For	<u>35</u>	<u>32</u>
Removals:		
Shipments	<u>- 0 -</u>	<u>- 0 -</u>
Total Removals	<u>- 0 -</u>	<u>- 0 -</u>
Ending Inventory @ September 30, 1982	<u>35</u>	<u>32</u>
Material Accounted For:	<u>35</u>	<u>32</u>

EXHIBIT III

PENNSYLVANIA STATE UNIVERSITY  
Period: July 1, 1981 through September 30, 1982

MATERIAL BALANCE SUMMARY  
Plutonium

RIS:ZRV	<u>Element</u>	<u>Grams</u> <u>Isotope</u>
Beginning Inventory @ July 1, 1981	205	197
Receipts	- 0 -	- 0 -
Production	- 0 -	- 0 -
Material to Account For	<u>205</u>	<u>197</u>
Removals:		
Shipments	- 0 -	- 0 -
Decay	- 0 -	- 0 -
Total Removals	- 0 -	- 0 -
Ending Inventory @ September 30, 1982	<u>205</u>	<u>197</u>
Material Accounted For:	<u>205</u>	<u>197</u>

EXHIBIT IV

PENNSYLVANIA STATE UNIVERSITY

Period: July 1, 1981 through September 30, 1982

MATERIAL BALANCE SUMMARY

Enriched Uranium-233

RIS:ZRV

	<u>Element</u>	<u>Grams</u> <u>Isotope</u>
Beginning Inventory @ July 1, 1981	2	2
Receipts	<u>- 0 -</u>	<u>- 0 -</u>
Material to Account For	<u>2</u>	<u>2</u>
Removals:		
Shipments	<u>- 0 -</u>	<u>- 0 -</u>
Total Removals	<u>- 0 -</u>	<u>- 0 -</u>
Ending Inventory @ September 30, 1982	<u>2</u>	<u>2</u>
Material Accounted For:	<u>2</u>	<u>2</u>

EXHIBIT V  
PENNSYLVANIA STATE UNIVERSITY

License Authorizations versus Actual Holdings  
as of September 30, 1982

License	Authorized Quantity and Use	September 30, 1982 Inventory
R-2, Amendment 20 issued September 10, 1980	9 Kgs. U-235 in connection with reactor operation	5,787 gms. U-235
	0.9 Kgs. U-235 in MTR type fuel elements	668 gms. U-235
SNM-95, as renewed June 18, 1981	60 gms. U-235 in any form	52 gms. U-235
	40 gms. U-235 in foils	38 gms. U-235
	1100 Kgs. $UO_2$ in 415 fuel elements (6.95 w/o U-235) and 2 fuel elements (7.5 w/o U-235)	62,465 gms. U-235
	3 gms. U-233 in any form	2 gms. U-233
	205 gms. Pu-239 in encapsulated Pu-Be sources	205 gms Pu-239
	1 microcurie Pu-239 in plated alpha sources	Negl. gms. Pu
	2500 Kgs. Natural U in cylindrical metal slugs canned in aluminum	2500 Kgs. Natural U
37-00185-04, Amendment 56 issued June 18, 1979	150 millicuries of byproduct material (Atomic Nos. 89 through 98, inclusive) for use in studies of contaminated soil from nuclear weapons test sites	Negl. gms. Pu