

ENCLOSURES TRANSMITTED HEREWITH
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

SEP 19 1979

Docket Nos. 50-54
70-687✓

Union Carbide Corporation
ATTN: Mr. James J. McGovern
Production Manager, Radiochemicals
P. O. Box 324
Tuxedo, New York 10987

Gentlemen:

Subject: Combined Inspection 50-54/79-03; 70-687/79-01

This refers to the inspection conducted by Mr. D. Holody of this office on April 24-27, 1979, of activities authorized by NRC License Nos. R-81 and SNM-639, and to the discussions of our findings held by Mr. Holody with yourself at the conclusion of the inspection.

Areas examined during this inspection are described in the Office of Inspection and Enforcement Inspection Report which is enclosed with this letter. Within these areas, the inspection consisted of selective examinations of procedures and representative records; interviews with personnel; measurements made by the inspector, and observations by the inspector.

Our inspector also verified the steps you had taken to correct the two items of noncompliance brought to your attention in our letter dated July 13, 1978. With regard to Item 1, we found this to be a recurring item of noncompliance. With regard to Item 2, we found that it was not corrected by the date you committed to in your response of August 9, 1978. In that response, you indicated that an audit of the Nuclear Material Control and Accounting procedures and records would be completed by October 3, 1978. Our review indicated that you failed to complete this audit until after October 3, 1978, and the documentation of the audit findings was not performed until January, 1979. This constitutes a deviation from your commitment to correct the item of noncompliance in the specified time frame.

Based on the results of this inspection, it appears that one of your activities was not conducted in full compliance with NRC requirements, as set forth in the Notice of Violation, enclosed herewith as Appendix A. This item of noncompliance has been categorized into the levels as described in our correspondence to you dated December 31, 1974. This notice is sent to you pursuant to the provisions of Section 2.201 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations. Section 2.201 requires you to submit to this office, within twenty (20) days of your receipt of this notice, a written statement or explanation in reply including: (1) corrective steps which have been taken by you and the results achieved; (2) corrective steps which will be taken to avoid further items of noncompliance; and (3) the date when full compliance will be achieved.

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Union Carbide Corporation

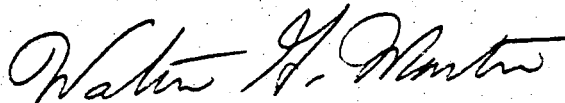
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In addition to your response to the item of noncompliance, please respond to the deviation by describing the actions you will take to insure that items of noncompliance are corrected in a timely manner. In your response to the item of noncompliance and the deviation, please give these matters your particular attention by (1) examining your management controls over such matters, (2) determining and correcting the fault which resulted in your failure to correct one item of noncompliance, and your failure to correct another item of noncompliance in the committed time frame, and (3) defining in your response to this letter, the specific corrective measures you have taken to prevent recurrence of such management inadequacies in the future.

In accordance with Section 2.790(d) of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, documentation of findings of your control and accounting procedures for safeguarding special nuclear materials and your facility security procedures are exempt from disclosure; therefore, the enclosures to this letter, and your response to this letter will not be placed in the Public Document Room and will receive limited distribution.

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,



Walter G. Martin, Chief
Safeguards Branch

Enclosures:

1. Appendix A, Notice of Violation (Contains 2.790 Information)
2. Office of Inspection and Enforcement Combined Inspection Report
Numbers 50-54/79-03 and 70-687/79-01 (Contains 2.790 Information)

cc w/report cover sheet only:

- D. B. Holzgraf, Nucleonics Manager
- J. W. Paradiso, Reactor Supervisor
- C. Konnerth, Health Physicist
- R. Bollinger, Vice President, Medical Products Division

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bcc:

IE Mail & Files (For Appropriate Distribution) (w cy of encls)

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State of New York (w report cover sheet only)

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APPENDIX A

NOTICE OF VIOLATION

Union Carbide Corporation

Docket No. 70-687

This refers to the inspection conducted by representatives of the Region I (Philadelphia) office at the Union Carbide facility, Tuxedo, New York, of activities authorized by NRC License Nos. R-81 and SNM-639.

During the inspection conducted on April 24-27, 1979, the following apparent item of noncompliance was identified. The following item is an infraction.

1. Section 1.3 of the Union Carbide Fundamental Nuclear Material Control Plan states, in part, that minimum annual training programs will be as follows:
 - a. Sixteen hours of instruction on the requirements of 10 CFR Part 70 and SNM license requirements will be given all management and supervisory personnel who have direct responsibility for control and accounting of special nuclear material (SNM).
 - b. Sixteen hours of instruction on 10 CFR Part 70, specific license requirements, and operational procedures will be given to all personnel working directly with SNM.
 - c. Records of personnel training will be maintained by the Health Physics Manager.

Contrary to the above, on April 26, 1979, the inspector determined that the licensee had not completed the required hours of annual training for the period January 1 - December 31, 1978. This item was previously cited in Inspection Report 70-687/78-01 for the year 1977.

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1 Pages

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

Region I

Report No. 50-54/79-03
70-687/79-01
50-54
Docket No. 70-687
R-81
License No. SNM-639 Priority 1 Safeguards Group 2
Category F
Licensee: Union Carbide Corporation
P. O. Box 324
Tuxedo, New York

Facility Name: Sterling Forest Research Reactor

Inspection at: Tuxedo, New York

Inspection conducted: April 24-27, 1979

Inspectors: D. J. Holody
D. J. Holody, Mathematical Statistician
H. Zibulsky
H. Zibulsky, Chemist

8/3/79
date signed

8/3/79
date signed

date signed

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

8/20/79
date signed

Inspection Summary:

Inspection on April 24-27, 1979 (Combined Report Nos. 50-54/79-03 and 70-687/79-01)

Areas Inspected: Routine, unannounced inspection by regional based inspectors of nuclear material control and accounting including: licensee action on previous inspection findings; organization; operations; measurement and statistical controls; shipping and receiving; storage and internal controls; physical inventory; inventory difference and its associated limit of error (under License SNM-639 only); records and reports; and management of materials control. The inspection involved 52 inspector-hours onsite by two NRC regional based inspectors.

Results: Of the ten areas inspected, no items of noncompliance were identified in eight areas, one apparent item of noncompliance was identified in one area and one deviation was identified in one area (Infraction - failure to perform required training of personnel, Paragraph 3; Deviation - failure to perform a management review and audit of material control and accounting procedures and records within the required time frame, Paragraph 11).

Region I Form 12
(Rev. April 77)

THE INFORMATION ON THIS PAGE IS DEEMED TO BE APPROPRIATE
FOR PUBLIC DISCLOSURE PURSUANT TO 10 CFR 2.790.

THE REPORT DETAILS CONTAIN 10 CFR 2.790 INFORMATION

S-F1-79-109

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DETAILS

1. Persons Contacted

- *J. McGovern, Manager, Radiochemical Production
- *C. Konnerth, Manager, Health, Safety and Environmental Affairs
- *L. Thelin, Radiation Health Physicist
- W. Leinheiser, Quality Control Supervisor
- P. O'Callaghan, Chemist

The inspectors also interviewed other licensee employees associated with measurements, plant operations, and nuclear material control.

*denotes those present at the exit interview.

2. Licensee Action on Previous Inspection Findings

(Closed) Noncompliance Item (Item No. 70-687/78-01-01): Failure to provide and document annual training of personnel in material control requirements as required by Section 1.3 of the licensee's Fundamental Nuclear Material Control Plan (FNMCP). The licensee's August 9, 1978 response to this item of noncompliance stated: "Training of all personnel shall be completed by December 31, 1978 and a standing record of all training shall be maintained." All personnel were not trained by December 31, 1978, and the licensee's record of training, as of April 27, 1979, indicated that some personnel had still not completed training. See Paragraph 3.

(Closed) Noncompliance Item (Item No. 70-687/78-01-02): Failure to perform the annual management review and audit of material control and accounting procedures and records as required by Section 8.2.1 of the licensee's FNMCP. The licensee's response to this item, dated August 9, 1978 stated: "An auditor will be designated by the Nuclear Safeguards Committee and an audit shall be completed by October 3, 1978." This audit was not performed until after October 3, 1978. See Paragraph 11.

3. Facility Organization

The licensee's current organizational structure was in accordance with SNM-639 requirements contained in the FNMCP. However, the licensee has not provided and documented the required training of personnel in material control requirements and activities as required by Section 1.3 of the FNMCP. The licensee was cited for noncompliance with this requirement during Inspection 70-687/78-01 (June 6-9, 1978) for not having provided such training in 1977. During this current inspection, review of training records indicated that training was not completed for 1978, and records as of April 27, 1979 indicated that training was still not complete. This is a recurring item of noncompliance, of the infraction level, under Section 1.3 of the FNMCP. (79-01-01)

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The licensee's training program consists of an employee signing out a training manual and then signing it back in when completed. This manual contains the FNMCP, license conditions, 10 CFR Part 70 requirements, and material control procedures. This approach does not guarantee that the "16 hours of required instruction" is actually given. For this reason, this item will be referred to NMSS for resolution regarding the acceptability of the licensee's approach to training, and is considered unresolved. (79-01-03)

4. Facility Operation

The licensee's operations consist of (a) dissolving received uranium oxide in nitric acid to create uranyl nitrate which is used to plate uranium on target tubes; (b) irradiation of these uranium target tubes in the reactor; (c) operation of the reactor; and (d) separation of selected radioisotopes from the irradiated targets for pharmaceutical purposes. The inspectors toured the facility operational areas and observed the licensee's operations, activities and measurements. There were no instances observed by the inspectors for which the possession, use and location of SNM were contrary to the licenses.

No items of noncompliance were identified.

5. Measurement and Statistical Controls

a. License SNM-639

The measurement systems used for accountability at the Tuxedo, N. Y. facility consists of (1) the Jones Reduction method for uranium analysis of oxide feed dissolved in nitric acid, (2) volumetric measurement of the uranyl nitrate, (3) radiometric analysis of the uranyl nitrate and target tubes for uranium-235 content and (4) a barrel scanner for U-235 analysis of unirradiated solid scrap destined for burial.

The licensee's statistical program is limited. Standards are run for calibration and control, but the licensee is excepted (by License Condition 4.3) from maintaining a replicate program. The licensee is also excepted (by License Condition 4.2) from calculating the limit of error for ID (LEID) provided that the plant ID is less than 150 grams uranium or uranium-235. Limits of error on shipments and receipts are very small.

The volumetric method, Jones reduction and KMnO_4 titrant, determination of uranium in uranyl nitrate was independently tested by the inspectors. The method was tested by having the laboratory perform the uranium analyses on uranyl nitrate standard solutions made up and certified by the New Brunswick Laboratory.

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The analytical results showed a mean relative bias of +0.34% and a limit of error of 0.28% on one standard solution. Another concentration standard solution showed a mean relative bias of +1.33% and a limit of error of 0.74%. The accuracy of the procedure, using potassium permanganate as a titrant, is about $-0.3\% \pm 0.4\%$.

If the licensee had larger receipts than they do have, significant shipper/receiver differences could be seen. This method of analysis for the determination of uranium is not as accurate as the present state of the art.

No items of noncompliance were identified.

b. License No. R-81

The licensee utilizes a power meter, which integrates the power levels, to determine the total power output for the reactor. This information is then input into a computer program, UBURN, which updates the element and isotopic composition of each fuel element.

The inspectors reviewed the thermal power integration records and determined that the licensee has correctly used this information in the UBURN program. The inspectors also independently calculated the uranium and uranium-235 depletion and transmutation for the period April 1, 1978 to March 31, 1979. These values were in agreement with the licensee's values.

No items of noncompliance were identified.

6. Shipping and Receiving

The licensee has established and is maintaining a program to assure that all special nuclear material (SNM) received and shipped is accurately accounted for.

All receipts of SNM are confirmed promptly through a system of item checks and/or measurements. The reactor fuel is verified by item checks, and the uranium oxide is verified by item check and measurement of the uranium content after it is dissolved in nitric acid. The licensee has not experienced any significant shipper/receiver differences (S/R's) on this material since the receipts typically involve only small quantities of uranium (average of 360 grams per receipt).

All SNM shipments from the facility consist of small quantities of either nonirradiated waste or irradiated waste containing essentially all of the uranium in the targets (resulting from the separation of the desired radioisotopes from the irradiated targets). The licensee is in the process of revising their separation process so that the irradiated waste will be shipped for recovery instead of burial.

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The incoming material transaction reports (Forms NRC-741) were acknowledged and returned within 10 days. Material transaction reports covering shipments were prepared by the licensee on the day of the shipment, as required by the instructions for preparing the forms.

No items of noncompliance were identified.

7. Storage and Internal Control

The licensee has established a system of storage and internal control which provides for current knowledge of the quantity, identity and location of all SNM within the facility, in accordance with the licensee's FNMCP and applicable license conditions. The controls include the master log, subsidiary logs for each MBA, and supporting internal transfer documents for transfers between MBA's. The licensee has the following MBA's:

<u>MBA's</u>	<u>Description</u>
1	Feed Area
2	Plating Operation
3	Reactor
4	Radiochemistry Area (Hot Cells)

The inspectors selected a representative number of postings in the master log and subsidiary logs and verified that they were supported by either material transaction reports (Forms NRC-741), or internal transfer documents, as applicable.

No items of noncompliance were identified.

8. Inventory and Inventory Verification

a. License No. SNM-639

The inspectors reviewed records of the licensee's last six inventories, dating back to April 26, 1978. These inventories were conducted in accordance with approved physical inventory plans. The inspector also determined that, for each inventory, the master log and the MBA logs were reconciled and adjusted to the inventory results within 30 days. The inspectors also verified the presence of the licensee's PuBe neutron source authorized under this license.

No items of noncompliance were identified.

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b. License R-81

The inspectors performed a piece count of all the fuel elements in the reactor and spent fuel pool. Fuel elements in the vault were verified by serial number. The inspectors' inventory results were then crosschecked to the licensee's records. The location and presence of the licensee's four fission chambers were also confirmed.

No items of noncompliance were identified.

9. Inventory Difference (ID) and Its Associated Limit of Error (LEID)

The licensee's inventory difference calculation was reviewed by the inspectors for each of the five inventory periods covering April 26, 1978 to February 26, 1979. The ID's were accurately determined. No additional loss mechanisms that could contribute to ID were identified.

For each of the five periods reviewed, the ID was less than 150 grams uranium and uranium-235. Thus, the licensee was excepted from determining the LEID, as stated in Paragraph 5 of this report.

No items of noncompliance were identified.

10. Records and Reports

In addition to the inspectors' review of the master log, subsidiary accounts, internal transfer documents, and inventory records, the inspectors also reviewed all material transaction reports (Form NRC-741), and material status reports (Form NRC-742) for the two six-month reporting periods ending September 30, 1978 and March 31, 1979. These were reviewed for appropriate signatures, accuracy, and timely dispatch. No discrepancies were noted. The licensee's activity during this period is summarized in Exhibits 1 and 2.

No items of noncompliance were identified.

11. Management of Material Control System

The licensee is required by Section 8.2.1 of the FNMCP to audit the material control and accounting procedures and records at least every 12 months. The licensee was cited for this during Inspection 70-687/78-01, conducted June 6-9, 1978, for not having conducted this review within 12 months of the previous audit. In the licensee's response (August 9, 1978) to that item, it was agreed that an audit would be completed by October 3, 1978. The inspector's review of the licensee's records indicated that an auditor was not designated until October 3, 1978 and an audit was not performed until after that date. The results of the audit were not documented until January, 1979. The licensee's failure to complete the audit by October 3, 1978 is a deviation. (79-01-02)

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12. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. An unresolved item disclosed during the inspection is discussed in Paragraph 3.

13. Exit Interview

The inspectors met with the licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on April 27, 1979. The inspectors summarized the scope and findings of the inspection.

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EXHIBIT 1

Union Carbide Corporation
 Period: April 1, 1978 - March 31, 1979
 License: SNM-639

MATERIAL BALANCE SUMMARY

Enriched Uranium
 Plutonium
 RIS:ZWN

	GRAMS			
	<u>U</u>	<u>U-235</u>	<u>Pu</u>	<u>Pu 239 + 241</u>
Beginning Inventory (April 1, 1978)	4,520	4,079	80	74
Receipts (ZWT-ZWN 105-158)	<u>19,097</u>	<u>17,573</u>	<u>0</u>	<u>0</u>
Material to Account For	<u>23,617</u>	<u>21,652</u>	<u>80</u>	<u>74</u>
Removals				
Shipments	0	0	0	0
Measured Discards				
ZWN-VAQ 25-83	18,130	16,611	0	0
ZWN-VAT 1-5	363	322	0	0
Inventory Difference	(26)	(5)	0	0
Ending Inventory (March 31, 1979)	<u>5,150</u>	<u>4,724</u>	<u>80</u>	<u>74</u>
Material to Account For	<u>23,617</u>	<u>21,652</u>	<u>80</u>	<u>74</u>

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EXHIBIT 2

Union Carbide Corporation
 Period: April 1, 1978 - March 31, 1979
 License: R-81

MATERIAL BALANCE

Enriched Uranium
 RIS:ZWN

GRAMS

	<u>U</u>	<u>U-235</u>
Beginning Inventory (April 1, 1978)	10,848	9,460
Receipts		
CAK-ZWN 1	2,385	2,222
ZYN-ZWN 1	2	2
RFR-ZWN 1-5	<u>6,685</u>	<u>6,222</u>
Material to Account For	<u>19,920</u>	<u>17,906</u>
Removals		
Shipments		
ZWN-DZA 9-1, 10-1, 11-1	169	256
Inventory Difference (rounding)	(1)	1
Fission and Transmutation (includes correction for ZWN-DZA 9, 10, 11)	1,613	1,862
Ending Inventory (March 31, 1979)	<u>18,139</u>	<u>15,787</u>
Material Accounted For	<u>19,920</u>	<u>17,906</u>