



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

MAY 13 1977

Docket No. 70-687

Union Carbide Corporation  
ATTN: Mr. Dean B. Holzgraf  
Business Manager Clinical  
Diagnostics  
P. O. Box 324  
Tuxedo, New York 10987

Gentlemen:

Subject: Inspection 70-687/77-01

This refers to the inspection conducted by Mr. J. Roth of this office on April 13-15, 1977, of activities authorized by NRC License No. SNM-639 and to the discussions of our findings held by Mr. Roth with yourself, Mr. Stier, and other members of your staff 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, and observations by the inspector.

Our inspector also verified the steps you have taken to correct the items of noncompliance brought to your attention in a letter dated May 12, 1976. We have no further questions regarding your action at this time.

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.

As discussed with you in the exit interview, unscheduled (false alarm) evacuations can not be substituted for required scheduled evacuation drills. Unscheduled evacuations are not preplanned simulations of accidents testing the adequacy of timing, the adequacy of emergency procedures, and the adequacy and operability of emergency equipment and facilities.

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 the enclosures will be placed in the NRC's Public Document Room. If this report contains any information that you (or your contractor) believe to be proprietary, it is necessary that you make a written application within 20 days to this office to withhold such information from public disclosure. Any such application must be accompanied by an affidavit executed by the owner of the information, which identifies the document or part sought to be withheld, and which contains a statement of reasons which addresses with specificity the items which will be considered by the Commission as listed in subparagraph (b)(4) of Section 2.790. The information sought to be withheld shall be incorporated as far as possible into a separate part of the affidavit. If we do not hear from you in this regard within the specified period, the report will be placed in the Public Document Room.

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

Sincerely,



Paul R. Nelson, Chief  
Fuel Facility and Materials Safety  
Branch

Enclosures:

1. Appendix A, Notice of Violation
2. Office of Inspection and Enforcement Inspection Report No. 70-687/77-01

bcc w/encs:

IE Mail & Files (For Appropriate Distribution)

Central Files

Public Document Room (PDR)

Local Public Document Room (LPDR)

Nuclear Safety Information Center (NSIC)

REG:I Reading Room

State of New York

APPENDIX A

NOTICE OF VIOLATION

Union Carbide Corporation  
Tuxedo, New York 10987  
License No. SNM-639

Based on the results of an NRC inspection conducted on April 13-15, 1977, it appears that one of your activities was not conducted in full compliance with NRC regulations and the conditions of your facility license as indicated below. This item is a deficiency.

10 CFR 20.401(b) "Records of Surveys, Radiation Monitoring, and Disposal" requires in part that each licensee shall maintain records . . . showing the results of monitoring required by 10 CFR 20.205b.

Contrary to the above, records showing the results of monitoring had not been maintained for 16 of 28 receipts of radioactive material during the time period from April 14, 1976, through April 1, 1977.

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

Region I

NOTICE  
MAY 16 1977  
AS OF \_\_\_\_\_  
REGION I HAS NOT OBTAINED PROPRIETARY  
CLEARANCE IN ACCORDANCE WITH 10 CFR 2790

Report No. 70-687/77-01

Docket No. 70-687

License No. SNM-639 Priority 2 Category A

Licensee: Union Carbide Corporation  
P. O. Box 324  
Tuxedo, New York 10987

Facility Name: Sterling Forest Research Center  
(Hot Cells)

Inspection at:

Inspection conducted: April 13-15, 1977

Inspectors: J. Roth  
J. Roth, Fuel Facilities Inspector

5/10/77  
date signed

\_\_\_\_\_  
date signed

\_\_\_\_\_  
date signed

Approved by: H. W. Crocker  
H. W. Crocker, Chief, Fuel Facility  
Projects Section, FF&MS Branch

5/13/77  
date signed

Inspection Summary:

Inspection on April 13-15, 1977, (Report No. 70-687/77-01)

Areas Inspected: Routine, unannounced inspection of criticality safety and engineered systems; scope of operations; organization; examination of storage and operations including back shift operations; facility changes and modifications; internal review and audit; safety committees; training; procedure control; emergency planning tests and drills; shipping and receiving practices; examination of nonroutine event reports; and licensee action on previously identified enforcement items. The inspection involved 19 inspector hours on site by one NRC inspector.

Results: Of the 13 areas inspected, no apparent items of noncompliance were identified in 12 areas; one apparent item of noncompliance was identified in one area (deficiency - failure to record surveys of incoming shipping containers - Paragraph 13.a).

## DETAILS

### 1. Persons Contacted

#### Principal Licensee Employees

- \* Mr. C. J. Konnerth, Manager, Health, Safety, and Environmental Affairs
- \* Mr. P. M. Stier, Operations Manager, Sterling Forest Laboratory
- \* Mr. D. B. Holzgraf, Manager, Nucleonics
- \* Mr. L. Thelin, Health Physicist

\* denotes those present at the exit interview

The inspector also interviewed 7 other licensee employees during the course of the inspection. They included MBA custodians, HP technicians, hot cell operators, and general office personnel.

### 2. Scope of Operations

The licensee operates a pool type reactor with MTR fuel elements at a maximum thermal power output of five megawatts. The reactor is used to produce radioactive isotopes mainly for use by pharmaceutical houses. The isotopes are produced by irradiation of U-235, separated by chemical techniques in a hot cell network located on site and loaded onto columns for shipment. The spent uranium is packaged for shipment to a licensed burial ground.

### 3. Organization

The organization of the UCC Sterling Forest Laboratory Reactor and Hot Laboratory operations remains essentially the same as that reported during Inspection 70-687/76-01 with the exception that Mr. C. J. Konnerth now reports to the Site Manager, P. M. Steir, rather than to the Manager, Nucleonics, D. B. Holzgraf.

### 4. Licensee Action on Previous Inspection Findings

- a. (Closed) Noncompliance (70-687/76-01): Failure to have two consultants as members of the Nuclear Safeguards Committee. The current organization of the Nuclear Safeguards Committee as described in license amendment application dated August 12, 1976, was authorized by Amendment #1 dated November 8, 1976. The inspector verified that the current organization of this committee was as required.

- b. (Closed) Noncompliance (70-687/76-01): Failure to audit hot laboratory operations at the required frequency. The inspector verified that audits of the hot laboratory by persons outside the Nuclear Operations line organization have been conducted as required and that Amendment #1 dated November 8, 1976, has increased the required audit interval to 12 months.
- c. (Closed) Noncompliance (70-687/76-01): Failure to document results of routine determinations required by 10 CFR 71.54. The inspector verified that the licensee has developed and is using a checklist which contains entries to indicate that the routine determinations required by 10 CFR 71.54 have been completed on outgoing shipping containers.

#### 5. Operations Review

The inspector examined all areas of the hot laboratory facility to observe operations and activities in progress, to inspect the general state of cleanliness, housekeeping, and adherence to five protection rules, and to assure that all areas in which SNM was handled or stored were properly posted with proper radiation safety or criticality safety signs as required by federal regulations or license conditions. The inspector also reviewed the safety implications of various procedures used with hot laboratory operators and found that these operators had a good knowledge of the procedures, process safety requirements, and the facility with which they worked. It was also noted that no significant changes or modifications to the facility had occurred since the last inspection (70-687/76-01). No items of noncompliance or deviations were identified.

#### 6. Off-Shift Operations Review

The inspector conducted an unannounced off-shift examination of the facility on the night of April 14, 1977. During this examination, the inspector observed operations in the hot laboratory and reactor facility areas. It was determined that during off-shift hours, stripping of the product isotopes from the irradiated capsule was being conducted. In addition, it was found on this occasion that the reactor had been shut down and the inspector observed two capsules being unloaded from the reactor and being transported to the cooling channel for the cooldown period prior to being taken into the hot cell for the stripping operation.

It was determined that there was no health physics coverage on site during off-shift hours. This was discussed at the exit interview. No items of noncompliance or deviations were identified.

## 7. Nuclear Criticality Safety

### a. Gamma Radiation Monitors

Fifteen gamma radiation monitors are located throughout the hot laboratory facility. Five are located in-cell (one in each cell), three in the charging area, two in the second level makeup area, and one each at the (1) south loading dock, (2) canal gamma facility, (3) in the ion exchange column room, (4) in the exhaust air filter room and (5) in the operating area. Only the two gamma radiation monitors located in the second level makeup and storage area are criticality monitors interlocked with an evacuation horn and the facility evacuation annunciator system. All units observed by the inspector appeared to be working. It was not possible for the inspector to determine alarm set points on these monitors at each monitor location, however, each monitor was provided with a remote readout meter located on a control panel which was in the hot laboratory operating area. All monitors except those located in the hot cells, one located in shielded filter room, and the unit located in the shielded ion exchange column room were set to alarm at 10 mr/hr.

### b. Calibration of Gamma Radiation Monitors

The inspector verified that all facility area radiation and criticality monitors had been calibrated during the month of April, 1976. The licensee has established an annual recalibration schedule for these monitors, however, it was noted that the recalibration had not been completed for April, 1977, as of the date of this inspection, April 15, 1977. It was also noted by the inspector that the licensee documented daily operability tests and weekly alarm checks on each monitor.

### c. Nuclear Criticality Safety Evaluations

During examination of the facility the inspector noted that two additional SNM storage cabinets had been installed in the second level makeup area. These are in addition to the two original storage cabinets previously installed. Following are the posted limits on each of these cabinets:

<u>Cabinet No.</u>	<u>Posted Limit</u>
1	650 gms U-235 (1 zone)
2	1300 gms U-235 (650 gms in each of 2 zones)
3	1300 gms U-235 (650 gms in each of 2 zones)
4	1300 gms U-235 (650 gms in each of 2 zones)

Cabinets 1 and 2 are separated from each other by about 3 feet and are separated from cabinets 3 and 4 by about 30 feet. Cabinets 3 and 4 are separated from each other by about 3 - 4 feet. Each cabinet except cabinet 1 is posted to allow storage of 1,300 grams U-235 per cabinet. However, the internals of the cabinets, except cabinet 2, have been constructed so that only 1 location containing a maximum of 650 gms U-235 is available for storage in each. Cabinet 2 has two storage locations available separated by about 3 feet.

The approved license application limits storage of 650 gram U-235 in a single compartment as a "single parameter limit" (as defined by ANSI N16.1-1969) either as a solid (UO<sub>2</sub>) or a liquid (300 gms U-235/liter as nitrate solution).

It was noted that the licensee was conservative in application of U-235 storage criteria with respect to solid SNM, however, the inspector expressed concern about the storage of SNM solutions in that the failure of one administrative control could contribute to cause a potential hazard since the posted limits do not take into account possible double batching of solutions.

Because of this concern, the inspector requested to review licensee documentation relating to the nuclear safety evaluations accomplished to justify storage of U-235 bearing materials. The licensee representative stated that as far as he was aware, no formal evaluations had been done, however, these evaluations would be done and forwarded to the IE:I office. This was discussed at the exit interview.

d. Nuclear Safety Audits

The inspector examined records of a semi-annual nuclear safety audit of the Hot Laboratory which was performed on August 17, 1976, by a person outside of the Nuclear Operations line organization. This auditor was designated by the Nuclear Safeguards committee and a report of findings was made to that committee. Amendment #1 to license SNM-639 was issued on November 8, 1976, and now requires that these audits should be accomplished annually, thus the next audit is not due until August, 1977.

This audit covered review of: Quantities of SNM in MBA's; Radiation monitoring, personnel dosimetry, security, in-cell safety aspects, evacuation tests and drills, and SNM Purchasing Control. No problem areas were noted during this audit.

8. Nuclear Safeguards Committee

All equipment and procedures involving the use of licensed materials are required to be reviewed and approved by the Nuclear Safeguards Committee. This committee is charged with the responsibility for insuring that the administrative controls, operating procedures, and experimental programs of the reactor and hot laboratory are reviewed and approved to minimize the hazards to the facility, the staff, and the general public. The committee also insures that all operations and experiments are conducted in accordance with existing regulations and license requirements, and that the procedures and experiments not approved in the license are not conducted until approval is received from the NRC. The committee meets on an as needed basis but at least once each year. Current members of the Nuclear Safeguards Committee as authorized by Amendment #1 to license SNM-639 are:

J. J. Agresta, Chairman, Manager of Management Services (New York Office)  
 C. J. Konnerth, Secretary, Manager, Health Physics  
 K. D. George, Senior Development Scientist  
 D. B. Holzgraf, Business Manager, Clinical Diagnostics  
 F. B. Morse, Development Manager, Pilot Plant Operations  
 J. A. Ward, Supervisor, Radiation Chemistry Department  
 J. J. McGovern, Manager, Radio Chemical Production

The inspector examined the records of 2 meetings of the Nuclear Safeguards Committee held between March 11, 1976, and April 14, 1977. In each case, review actions and recommendations made by the committee were adequately documented. Included in these records were supporting documents used by the committee to develop the recommendations made. In addition, the implementation of these recommendations was adequately documented in the committee minutes.

## 9. Training

- a. All personnel working with radioactive material in the hot laboratory receive basic radiation safety training. The inspector examined training records for the period April 21, 1976, through April 15, 1977. During this time period approximately 30 new hires were given a lecture in radiation safety and received a copy of a Health Physics Safety Guide which was assembled by members of the Health Physics Department. The guide covered basic areas of radiation protection including, health physics criteria, criticality control, effects of radiation on man, handling of SNM, and industrial safety.
- b. Retraining or continued formal training was administered to approximately 15 persons during this same time period. The licensee has developed a series of 4 health physics experiments to train persons in various aspects of health physics. These experiments cover the following subjects:

<u>Experiment</u>	<u>Subject</u>
No. 1	Inverse Square Law
No. 2	Neutron Surveys
No. 3	Shielding and Half Value Layers
No. 4	Isotopes in Reactor Air and Water

These experiments consist of an informational section which describes the subject; a Procedures section; a data gathering section which is an actual experiment; and an analysis section which details the correct route to be used to analyze the data obtained. These experiments are completed as required by the health physics staff, graded, and maintained in the individual's training file. The licensee is currently in a program to retrain all of the hot laboratory operators using these formalized experiments.

- c. Other training administered during 1976 included, first aid and fire response training to approximately 20 employees and a film on transportation of Radioactive Materials was shown to approximately 40 persons.

No items of noncompliance or deviations were identified.

## 10. Procedure Control

Procedures are written by members of the staff and submitted to the Nuclear Safeguards Committee for review and approval. The Committee controls the maintenance storage and issuance of all procedures.

The inspector examined the available procedures relative to the hot laboratory operation and determined that all facets of the hot laboratory operation were covered by procedures except for:

- a. Procedures associated with final disposition of the product isotope from the point in the process in which the product has been separated and purified until preparation for shipment has been started.
- b. Procedures associated with maintenance and storage of waste solutions containing SNM from the point that the product has been separated until preparation for shipment has been started.

It was noted that most of the procedures associated with b. above are contained in the facility license applications; however, these instructions were not found to be readily available to operators on the floor. It was also noted by the inspector that the operators were cognizant of the operations required but did not have the written procedures readily available for reference if required. This was discussed at the exit interview.

## 11. Evacuation Drills

Records of unscheduled evacuations which occurred at the facility during the time period from April 21, 1976, to April 15, 1977, on May 18, 1976, August 9, 1976, August 11, 1976, and September 28, 1976, were examined by the inspector. The licensee conducted the first scheduled drill for the period on April 1, 1977. Documentation concerning this scheduled drill was not readily available and was not given to the inspector until after the inspector reiterated the NRC position on the use of unscheduled evacuations as drills as presented in Inspection 70-687/76-02 during the exit interview. It was again pointed out to the licensee that in spite of the number of unscheduled evacuations occurring, the conduct of scheduled drills must be maintained in that the scheduled drills are preplanned simulations of accidents conducted for the primary purpose of testing the adequacy of timing and content of implementing emergency procedures and the adequacy and operability of emergency equipment and facilities under such conditions. These drills are observed, critiqued, and the results used as a basis for initiating any improvements to increase the effectiveness of the emergency response. False alarms, which are not preplanned accident simulations, inadequately replace scheduled drills since they provide insufficient sensory data upon which to base required evaluations. False alarms should, therefore, be supplemental to the conduct of preplanned drills.

## 12. Review of Nonroutine Event Reports

The inspector reviewed licensee actions with respect to the following listed nonroutine event reports to verify that the events were reviewed and evaluated by the licensee as required by license conditions and federal regulations, that corrective action was taken by the licensee, and that safety limits were not exceeded. The inspector examined selected Nuclear Safeguards Committee Minutes, licensee investigation reports and records, inspected equipment, and interviewed selected personnel.

- a. Leakage of raw fission liquor from a Mo-99 capsule in Hot Cell #2 on February 9, 1977.
- b. Shipping cask transportation accident of April 10, 1976.

No items of noncompliance or deviations were identified.

## 13. Shipping and Receiving

- a. The inspector examined records of receipts of SNM for the period April 14, 1976, through April 1, 1977, and determined that contrary to 10 CFR 20.401(b), records of monitoring upon receipt of a package of radioactive material required by 10 CFR 20.205.b(1) had not been maintained for 16 of 28 receipts received during the above time period. The licensee's representative stated that all incoming packages had been surveyed; however, records were maintained only on those which indicated contaminated surfaces. All other receipt practices were accomplished as required.
- b. The inspector examined records of waste and/or SNM shipments made during the period April 12, 1976, through April 13, 1977, and determined that radiation surveys were taken and recorded, and all shipments were labeled, marked, placarded, and recorded as required. Shipping containers used by the licensee include Model B3-1 (DOT 605B) casks and DOT 7A boxes. No items of non-compliance or deviations were identified.

## 14. Exit Interview

The inspector met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on April 15, 1977. The inspector summarized the scope and findings of the inspection. Licensee representatives made the following remarks in response to certain of the items discussed by the inspector:

- Provided the inspector with additional information on evacuation drills and stated that unscheduled drills should be adequate. The inspector reiterated the NRC position that preplanned scheduled drills are required as discussed in Paragraph 11.
- Acknowledged the statement by the inspector with respect to the item of noncompliance. (paragraph 13.a)
- Stated that a review of procedures for completeness would be undertaken. (paragraph 10)
- Stated that nuclear criticality safety evaluations of SNM in storage would be conducted and recorded. (paragraph 7.c)
- Stated that the training experience and limited work level hot cell operators and the availability of Health Physics Technicians on short notice during off-shift hours precluded the assignment of health physics coverage on a full time (24 hour per day) basis.