

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

MAY 12 1976

Union Carbide Corporation
Attention: Mr. Dean B. Holzgraf
Business Manager Clinical
Diagnostics

License No. SNM-639
Inspection No. 76-01
Docket No. 70-687

P. O. Box 324
Tuxedo, New York 10987

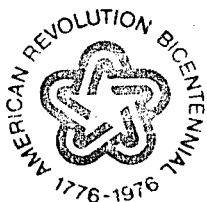
Gentlemen:

This refers to the inspection conducted by Mr. J. Roth of this office on April 19-21, 1976 of activities authorized by NRC License No. SNM-639 and to the discussions of our findings held by Mr. Roth with yourself and other members of your staff at the conclusion of the inspection, and to a subsequent telephone discussion between Mr. J. Roth and Mr. C. J. Konnerth on April 30, 1976.

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.

Based on the results of this inspection, it appears that certain of your activities were not conducted in full compliance with NRC requirements, as set forth in the Notice of Violation, enclosed herewith as Appendix A. These items of noncompliance have 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.

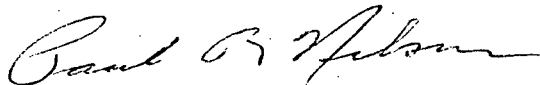
Another activity appears to be a deviation from generally accepted nuclear safety practices in the industry regarding the posting of nuclear criticality safety signs. With respect to this deviation which is discussed in the enclosed Inspection Report, please include in your response your comments concerning this item.



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 include a full statement of the reasons on the basis of which it is claimed that the information is proprietary, and should be prepared so that proprietary information identified in the application is contained in a separate part of the document. 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

Enclosure:
Appendix A, Notice of Violation
IE Inspection Report No. 70-687/76-01

APPENDIX A

NOTICE OF VIOLATION

Union Carbide Corporation
P. O. Box 324
Tuxedo, New York 10987
Docket No. 70-687
License No. SNM-639

Based on the results of an NRC inspection conducted on April 19-21, 1976, it appears that certain of your activities were not conducted in full compliance with NRC regulations and the conditions of your facility license as indicated below:

- A. Condition 9 of your license incorporates your license application dated April 28, 1969, which states that the Nuclear Safeguards Committee is composed of the following persons:
1. Chairman, a senior technically qualified person not in the line of organization of The Operations or Research Groups.
 2. A senior technically qualified person responsible for the operation of the laboratory.
 3. An engineer directly responsible for the operation of The Hot Lab.
 4. A responsible health physicist.
 5. A consultant in the field of reactor technology.
 6. A consultant in the field of hot laboratory operations.

Contrary to the above, examination of committee records by the inspector at the time of this inspection for the time period December 17, 1974 through March 11, 1976 and discussions with a licensee representative indicated that consultants in the fields of reactor technology and hot laboratory operations were not members of the Nuclear Safeguards Committee.

This item is an infraction.

APPENDIX A (CONT'D)

- B. Condition 9 of your license incorporates your license application dated April 28, 1969 which states that the consultant members of the Nuclear Safeguards Committee shall visit the laboratory at least once each twelve months to review the operating procedures and to assist the committee in the reviews of the experimental program.

Condition 9 of your license incorporates your license application dated June 13, 1973 which states under "Audits" that audits are performed at least once each 6 months by a person outside of the Nuclear Operations line organization. The auditor would be designated by the Nuclear Safeguards Committee and a report of his findings is made to that committee.

Contrary to the above requirements, at the time of this inspection, inspector examination of facility audits and reviews done from 1970 through the date of this inspection indicated that there was no record of 12 month reviews of operating procedures and experimental programs made by Nuclear Safeguards Committee consultants and the most recent 6 month audit by a person outside of the Nuclear Operations line organization was done on November 20, 1973.

This item is an infraction.

- C. Condition 9 of your license incorporates your license application dated June 13, 1973 which requires under "Drills" that drills of the Hot Laboratory evacuation procedure will be conducted semi-annually.

Contrary to the above, examination of licensee records by the inspector at the time of this inspection indicated that no evacuation drill was conducted between June 19, 1973 and April 29, 1974 nor between June 17, 1974 and an unscheduled drill which was conducted on January 27, 1976.

This item is an infraction.

- D. 10 CFR 71.62 (a)(10) "Records" requires that the licensee shall maintain for a period of 2 years after its generation, a record of each shipment of fissile material or of more than a type A Quantity of radioactive material as defined in 71.4(g) in a single package showing, the results of the determinations required by 10 CFR 71.53 and 71.54.

APPENDIX A (CONT'D)

Contrary to the above requirement at the time of this inspection no records were maintained to indicate that the inspections required by 10 CFR 71.54 "Routine Determinations" had been completed prior to each shipment.

This item is a deficiency.

- E. 10 CFR 71.53 (c) "Preliminary Determinations" requires that Packaging shall be conspicuously and durably marked with its model number.

Contrary to the above, at the time of this inspection the licensee had two Model B3-1 Shipping Casks (Serial Numbers P.P.1 Part No. D35136-1-02 and D35136-1-03) which were not conspicuously and durably marked with model numbers.

This item is a deficiency.

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

IE Inspection Report No: 70-687/76-01

Docket No: 70-687

Licensee: Union Carbide Corporation

License No: SNM-639

Sterling Forest Research Center

Priority: 11

Category: A

Safeguards
Group: _____

Location: Tuxedo, New York

Type of Licensee: Research and Test Center

Type of Inspection: Routine, Unannounced

Dates of Inspection: April 19-21, 1976

Dates of Previous Inspection: _____

Reporting Inspector: *J. Roth*
J. Roth, Fuel Facilities Inspector

5/12/76
DATE

Accompanying Inspectors: _____

DATE

DATE

DATE

Other Accompanying Personnel: _____

DATE

Reviewed By: *H. W. Crocker*

5/12/76
DATE

H. W. Crocker, Section Chief, Fuel Facility Projects Section,
Fuel Facility and Materials Safety Branch

SUMMARY OF FINDINGS

Enforcement Action

A. Infraction

Failure to have 2 consultants, one in the field of reactor technology and one in the field of hot laboratory operations as members of the Nuclear Safeguards committee. (Detail, Paragraph 7d(1)).

B. Infraction

Failure to have annual review of operating procedures and experimental programs by consultants and failure to audit the hot laboratory every 6 months by a person outside the Nuclear Operations line organization as designated by the Nuclear Safeguards committee. (Details, Paragraph 7e).

C. Infraction

Failure to conduct evacuation drills of the hot laboratory semi-annually. (Details, Paragraph 9).

D. Deficiency

Failure to document results of shipping container inspections required by 10CFR71.54. (Details, Paragraph 12b).

E. Deficiency

Failure to mark 2 model B3-1 shipping casks with model numbers as required by 10CFR71.53(c). (Details, Paragraph 12c).

Licensee Action on Previously Identified Enforcement Items

Not Applicable

Reportable Occurrences

None

Design Changes

Other Significant Findings

A. Current Findings

1. The inspector commented on the need to provide periodic, preferably quarterly, calibration of the gamma radiation and/or criticality monitors. In addition, it was commented by the inspector that all calibrations tests and checks on these systems should be documented. Corrective actions on this item had been started prior to the end of this inspection. (Details, Paragraph 7c).

B. Status of Unresolved Items

None

C. Deviations

1. Failure to post SNM storage and use locations with criticality safety signs as dictated by generally accepted Nuclear safety practices in the industry. It was noted by the inspector that temporary criticality safety signs had been posted by the licensee prior to the end of this inspection. (Details, Paragraph 7a).

Management Interview

At the conclusion of the inspection, an exit interview was held at 11:00 am on April 21, 1976. Those present were:

Union Carbide

- D. B. Holzgraf, Business Manager, Clinical Diagnostics
- K. D. George, Senior Development Scientist
- C. J. Konnerth, Manager, Health Physics

NRC

- J. Roth, Fuel Facilities Inspector

The scope of the inspection was described. The items of noncompliance previously documented relating to audits, shipping container inspections and evacuation drills were presented and discussed. In addition, the items previously documented relating to postings and calibration of gamma radiation monitors were presented as possible deviations and discussed. Also discussed, but not presented at the management meeting as items of noncompliance pending discussion with Region I management, were the items previously documented relating to consultant members of the Nuclear Safeguards committee and marking of the Model B3-1 shipping casks with a model number. The licensee was informed of the additional items of noncompliance and modifications in level of noncompliance through telephone discussions with Mr. C. J. Konnerth, Manager, Health Physics, on April 30, 1976.

DETAILS

1. Persons Contacted

C. J. Konnerth, Manager, Health Physics Department
J. J. McGovern, Superintendent, Nuclear Operations
L. C. Thelin, Health Physicist
K. D. George, Senior Development Scientist
D. E. Wilson, Lead Technician, Feed Stock Area
P. G. Nault, Lead Technician, Plating Operation
A. B. Inness, Chief Operator, Reactor Area
J. E. Lucas, Alternate Technician, Hot Cell Processing
D. Collins, Health Physics Technician

2. Scope of Inspection

This inspection was of the criticality control and engineered safety systems. Within these areas, the inspection consisted of selective examination of procedures and records, interviews with personnel, and examination of the facility by the inspector.

3. Scope of Operation

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 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.

4. Organization

a. The following is the current organization of the UCC-Sterling Forest Laboratory Reactor and Hot Laboratory operation:

P. M. Stier, Operating Manager, Sterling Forest Laboratory
R. I. Gray, General Manager, Clinical Diagnostics
J. J. Agresta, Chairman, Nuclear Safeguards Committee
D. B. Holzgrap, Manager, Nucleonics
J. J. McGovern, Manager, Radiochemicals Production
C. J. Konnerth, Manager, Health Physics
K. D. George, Senior Research Scientist
W. Fecych, Superintendent Nuclear Operations

J. C. Perhauch, Superintendent Radiochemical Production
H. C. Hart, Assistant Reactor Supervisor
A. B. Innis, Chief Reactor Operator
L. C. Thelin, Health Physicist

- b. The inspector reviewed the qualifications of Mr. L. C. Thelin for his position as health physicist.
- c. Mr. Thelin was employed by UCC during April 1975 as a health physicist. He received his M.S. in Health Physics from Rutgers University in 1973. After receiving his M.S. degree Mr. Thelin worked for the summer in the health physics department at Brookhaven National Laboratory. From late 1973 until 1974 he worked as a health physicist for the Cambridge Nuclear Radiopharmaceutical Division and from 1974 through March 1975 he was the Radiation Safety officer for the Industrial Reactor Laboratories. Prior to attending Rutgers University to obtain his MS degree Mr. Thelin received his BA degree from Mullenberg College in 1968 and taught high school science and mathematics for two years.

5. SNM Material at the Sterling Forest Research Center

The inspector examined licensee records and found that the quantity of SNM located at the site was within the license limits for license SNM-639.

6. Examination of the Hot Laboratory Operation

The inspector examined those areas of the site that contained or had the potential to contain SNM.

- a. The Feed stock storage area consisted of two storage cabinets which are separated by approximately four feet. Each cabinet is mechanically attached to the wall in order to maintain this separation. One cabinet is a locked, safe type of drawer file cabinet which has a maximum fissile content limit of 650 grams U-235 for the entire cabinet. The other storage location is a 2 ft. deep by about 4 ft. high by about 4 ft. wide cabinet which is locked by means of a padlock. There are only two storage locations within this cabinet located at diametrically opposite corners, separated by a solid sheet metal separator. The fissile material limit for each compartment within this cabinet is 650 gms U-235. There were no posted criticality limits on either of these cabinets or located any where in the vicinity of these storage areas.

- b. The chemistry laboratories used for solution make-up, quality control, assay, the plating operation and the target tube welding laboratory were examined by the inspector. Inventory sheets located in each of the three laboratories indicated that the fissile material content of each area was below the 300 gram U-235 license limit. Once again none of these laboratories were posted with fissile material criticality limits.
- c. Welded target tubes ready for insertion into the reactor were stored in a locked cabinet located in the reactor building. This cabinet also had a 650 gram U-235 storage limit, however, no criticality limit signs were in evidence. SNM quantities being irradiated in-reactor were not maintained as part of this 650 grams limit.
- d. Irradiated uranium is used and/or stored in 5 hot cells each of which had an unposted 650 gram U-235 criticality limit as stated in the approved license application dated June 13, 1973. This uranium is handled in batches limited to less than 15 grams U-235.

In the hot cells, irradiated uranium is dissolved, fission products molybdenum-99 is separated as a product from the remaining fission product waste which contains about 99% of the starting uranium content. The scrap uranium from operations in a hot cell is stored in hot cell No. 5 as an aqueous solution containing up to 0.1 gram U-235/ml in plastic coated Borosilicate glass bottles.

7. Nuclear Criticality Safety

- a. Generally accepted nuclear safety practices in the industry dictate that appropriate area postings shall be maintained specifying special nuclear material identification and all limits on parameters that are subject to procedural control. Contrary to the above, as indicated in paragraph 6 of this inspection report, none of the SNM storage and use locations observed by the inspector were posted with criticality safety signs. Prior to the end of this inspection the licensee had prepared temporary labels which identified the SNM mass limits for each area. The licensee also indicated that permanent signs would be prepared and permanently mounted in each area.

b. 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 make-up 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 make up 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.

c. Calibration of Gamma Radiation Monitors

The licensee was unable to determine if the gamma radiation and/or criticality monitors had been calibrated in the last several years. However, it was noted by the inspector that although these units had not been calibrated, documented daily operability tests were run on each unit. Also, a licensee representative indicated that weekly alarm checks were run but not documented. The inspector commented on the need to provide periodic, preferably quarterly, calibration and that all calibrations, tests and checks should be documented. The inspector observed, that prior to the end of this inspection calibration of these units had been started.

d. 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 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

- (1) The license application dated April 28, 1969 states that the committee is composed of the following persons:
 - (a) Chairman, a senior technically qualified person not in the line of organization of the operations or research groups.
 - (b) A senior technically qualified person responsible for the operation of the laboratory.
 - (c) An engineer directly responsible for the operation of the hot lab.
 - (d) A responsible health physicist.
 - (e) A consultant in the field of hot laboratory operations.

Contrary to the above, examination of committee records by the inspector for the time period December 17, 1974 through March 11, 1976 and discussions with a licensee representative indicated that consultants in the fields of reactor technology and hot laboratory operations were not members of the Nuclear Safeguards Committee.

- (2) The inspector examined the records of four meetings of the Nuclear Safeguards Committee held between December 17, 1974 and March 11, 1976. 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.

e. Audits

- (1) The license application dated April 28, 1969 states that the consultant members of the Nuclear Safeguards Committee shall visit the laboratory at least once each twelve months to review the operating procedures and to assist the committee in the review of the experimental program.
- (2) The license application dated June 13, 1973 under "Audits" states that audits are performed at least once each 6 months by a person outside of the Nuclear Operations line organization. The auditor would be designated by the Nuclear Safeguards Committee and a report of his findings is made to that committee.
- (3) Contrary to the above requirements inspector examination of facility audits done from 1970 through the date of this inspection indicated that there was no record of annual reviews made by Nuclear Safeguards committee consultants and the most recent internal semi-annual audit of the hot laboratory was done on November 20, 1973.

8. Training

- a. All personnel working with radioactive material in the hot laboratory receive basic radiation safety training. The inspector examined training records for the year 1975. During 1975 approximately 20 new hires were given a lecture in radiation safety and received a personal copy of a Health Physics Safety Guide which was written by members of the Union Carbide Corporation Health Physics Department.
- b. This guide was examined by the inspector and was found to adequately cover the basic areas of radiation protection including, Health Physics criteria, criticality control, effects of radiation on man, handling of SNM and industrial safety.
- c. Approximately 45 laboratory personnel were given a 100 question quiz to assess the adequacy of the radiation protection program. Results of this quiz are being used by the Health Physics Department to maintain and/or improve the facility educational program.

- d. Members of the Health Physics staff maintain constant surveillance of SNM handling techniques, and, according to licensee representatives, give on the job training in this area as required.

9. Evacuation Drills

- a. The approved license application dated June 13, 1973 requires that drills of the hot laboratory evacuation procedure will be conducted semi-annually.
- b. Contrary to the above, examination of licensee records indicated that no evacuation drill was conducted between June 19, 1973 and April 29, 1974. Licensee documentation also indicated that a drill was then conducted on June 17, 1974, however, no additional drills were conducted until an unscheduled drill, caused by an electrical short circuit, was held on January 27, 1976.
- c. Documentation examined by the inspector indicated that when drills were conducted, training in the use of emergency equipment was given as part of the drill. Drill critiques examined by the inspector suggested corrective actions, all of which were acted upon and resolved by laboratory management.

10. Health Physics Log Book

The inspector examined a sampling of the health physics log book for the time period January 1, 1975 through March 22, 1975 and determined that this log contained adequate records pertaining to samples collected and counted, rad waste shipments including radiation readings and survey results, leak test results for sealed sources and target tubes, air system filter replacement, receipt of uranium shipments including survey results, descriptions of hot laboratory incident reports and instrument checks.

11. Waste Disposal

- a. Spent uranium solutions are stored in cells 4 and 5 in borosilicate glass bottles for about 60 days. These solutions are prepared for disposal by pouring solutions containing up to a maximum of 350 grams U-235 into a 2100 ml welded aluminum container which is filled with about 1600 ml of "Speedy-Dri". Dry plaster of paris powder is poured into the aluminum container in order to form a self solidified internal seal in the container. The aluminum container is permanently sealed with a

pipe plug and transferred to cell 1 for preparation for shipment. In cell 1 the aluminum container is placed into a 55 gallon barrel, surrounded with concrete, the barrel is sealed and loaded into a Model B3-1 shipping cask for transfer to the burial grounds.

- b. Solid waste such as contaminated paper, bags, gloves, glassware, etc, is placed into a 55 gallon barrel, sealed and loaded into a Model B3-1 shipping cask for transfer to the burial grounds.

12. Shipping

- a. The inspector examined records of shipments made using the Model B3-1 (Dot 60581B) shipping casks starting with the first shipment made with Union Carbide owned casks. The first use of the casks was for shipment #174 on March 30, 1976. Between March 30, 1976 and April 9, 1976, inclusive, these casks were involved in a total of 3 shipments prior to this inspection. Other shipping containers used by the licensee include DOT 7A boxes and DOT 20 wc type B containers. Records of waste and/or SNM shipments indicated that radiation surveys were taken and recorded, and all shipments were labeled, marked, placarded and recorded as required.
- b. The inspector examined operating procedure SP-01 "B3-1 Cask Loading and Shipping -" dated March 17, 1976 which specifies the requirements for loading and preparing the B3-1 cask for shipping with radioactive materials. Included in this procedure are the inspection requirements of 10CFR71.54(a), (b), (c) and (d) "Routine determinations". However, not included in this procedure is the means to maintain records that these inspections were completed or the requirement that these records be kept. This is contrary to 10CFR71.62(a), (10) "Records" which requires that the licensee shall maintain for a period of 2 years after its generation a record of each shipment of fissile material or of more than a type A quantity of radioactive material as defined in 71.4(g) in a single package, showing, the results of the determinations required by 71.53 and 71.54.
- c. During examination of the 2 Model B3-1 shipping casks by the inspector, it was observed that both casks (Serial Numbers PP1 Part No. D 35136-1-02 and D 35136-1-03) were conspicuously and durably marked with labels identifying the DOT Identification Number, the tare weight, the moderator and/or shielding material the cavity size, the serial number, identification of the

designer/manufacture and the owners name. However, contrary to 10CFR71.53(c) the packages were not conspicuously and durably marked with Model numbers (Model No. B3-1).

The application of the model number indicates that the licensee has determined that the packaging has been fabricated in accordance with the design approved by the Commission. In a letter to the USNRC dated February 9, 1976, the licensee certified that they have in their files the documentation as necessary to verify that the packages were constructed and tested in accordance with the requirements of the reference package. However, the licensee neglected to apply the Model numbers to the packages as required.