STATE OF NEW YORK
RADIOACTIVE MATERIALS LICENSE

Pursuant to the Labor Law and Industrial Code Rule No. 38, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect of all appropriate regulatory agencies and to any conditions specified below.

Licensee	3. License number
1. **Name** Union Carbide Nuclear Co. Division	720-0352
2. **Address** Union Carbide Corporation Tonawanda, New York	4. Expiration date Until until terminated
	5. Reference number 1

6. Radioactive materials (element and mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
1. Any radioactive material with atomic number between n=3 and n=83 inclusive, except as follows	1. Any	1. No more than 100 curies of any radioisotope
2. Any radioactive material with atomic number between n=2 and n=83 inclusive, except as follows	2. Unsealed solids	2. No more than 1000 curies of any radioisotope

CONDITIONS

9. Authorized use. (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.) Research and development to include theoretical analysis, exploration or experimentation and the extension of investigative findings and theories of a scientific or technical nature into practical applications for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, material and processes.

10. The total amount of radioactivity authorized under Items 1 and 2 above is not to exceed 50,000 curies.

11. The licensee shall conduct operations involving the possession and use of sources of radiation in compliance with the requirements of New York State Industrial Code Rule No. 38, "Radiation Protection".

12. Any disposal of radioactive waste by the licensee by burial, through the sanitary sewer, or by other release to the environment shall be in accordance with the provisions of Part 16, New York State Sanitary Code. Records of such disposal shall be maintained by the licensee. Monitoring procedures shall be established by the licensee to verify that concentrations and quantities of radioactive materials so released do not exceed the maximum permissible levels specified in Part 16.

13. Plans and specifications for exhaust systems for hoods, storage areas and other locations where radioactive material is used or stored shall be submitted to the Division of Industrial Hygiene for approval prior to installation by the licensee. The installation of the exhaust

Date_____ FOR THE NEW YORK STATE DEPARTMENT OF LABOR

by_____

License Number _____ 729-0322

Reference Number: 1

6. Radioactive materials (element and mass number) (continued)	7. Chemical and/or physical form (continued)	8. Maximum quantity licensee may possess at any one time (continued)
3. Any by-product material	3. Irradiated metals and alloys	3. 25,000 curies
4. Any by-product material	4. Irradiated components	4. 25,000 curies
5. Cobalt 60	5. Sealed sources	5. 50,000 curies
6. Cobalt 60	6. Unsealed solids	6. 10,000 curies
7. Cesium 137	7. Sealed sources	7. 50,000 curies
8. Promethium 147	8. Sealed sources	8. 25,000 curies
9. Cerium 144	9. Sealed sources	9. 25,000 curies
10. Strontium 90	10. Sealed sources	10. 25,000 curies
11. Nickel 63	11. Sealed sources	11. 25,000 curies
12. Gold 198	12. Unsealed solids	12. 5000 curies
13. Uranium 238	13. Any	13. 100 pounds(15.5 millicuries)
14. Thorium 232	14. Any	14. 100 pounds(5.50 millicuries)
15. Hydrogen 3 (Tritium)	15. Any	15. 100 curies

CONDITIONS
(Continued)

system shall be made as per approved plans as determined by test by the Division of Industrial Hygiene.

14. The agreement material described in Items 6, 7 and 8 above:

A. Shall be used only by or under the supervision of persons authorized by the Nuclear Safeguards Committee, R. J. Klotzbach, Chairman.

B. Shall not be used in or on human beings, in products intended for uncontrolled distribution to the general public, nor in field applications where radioactivity is released.

C. When in the form of sealed sources, shall be tested for leakage and/or contamination, as required by Code Rule 38-26.5, by the licensee or by other persons licensed or authorized to perform such services by the Industrial Commissioner, the United States Atomic Energy Commission or appropriate regulatory agency of another agreement state. Alpha-emitting sources shall be so tested at intervals of not to exceed three months. In the absence of a certificate from a transferor indicating that a leakage test has been made within six months prior to the transfer, the sealed source shall not be put into use until so tested. Each sealed source fabricated by the licensee shall be tested for contamination and/or leakage immediately after fabrication. Sources found to be contaminated or leaking in excess of the limits specified in Code Rule 38-26.5 shall be immediately decontaminated, repaired and retested. Sealed sources fabricated for distribution and containing radioactive material (with the exception of material having a half-life not exceeding 30 days, material in gaseous form, and Iridium 192) shall, in addition to an initial test upon fabrication, be stored for a period of seven days and retested prior to transfer to another person.

D. Shall be possessed and used by the licensee in accordance with statements representations and procedures contained in his application to the USAEC dated July 10, 1962 and letters to the USAEC dated August 13, 1962 and September 21, 1962 with attachments, signed by J. B. Holzgraf, and in his letter to the New York State Atomic Energy Co-

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

_____ Date _____

STATE OF NEW YORK
RADIOACTIVE MATERIALS LICENSE

License Number 729-0322

Referenced Number: 1

ordinating Council, dated November 11, 1963, signed by O. J. Kennerth.

15. An administrative procedures manual, containing instructions in safety precautions and safe working techniques for radioactive materials shall be prepared by the licensee. This manual shall be followed and a copy thereof furnished to each person working with or having responsibility for such materials, and to The Industrial Commissioner. Changes in the manual shall be submitted to the Commissioner for review prior to issuance.

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

Date February 14, 1964

by Nathan Solomon

Nathan Solomon, Ph.D., M. D.
Chief, Radiological Health Unit

AM:jb

Form COL-6bSL (8-63)

STATE OF NEW YORK
RADIOACTIVE MATERIALS LICENSE

Pursuant to the Labor Law and Industrial Code Rule No. 38, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect of all appropriate regulatory agencies and to any conditions specified below.

Licensee	3. License number
1. **Name** Union Carbide Nuclear Co. Division	729-0322
2. **Address** Union Carbide Corporation Tuxedo, New York	4. Expiration date Valid until terminated
	5. Reference number 1

6. Radioactive materials (element and mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
1. Any radioactive material with atomic number between z=3 and z=83 inclusive, except as follows	1. Any	1. No more than 100 curies of any radioisotope
2. Any radioactive material with atomic number between z=3 and z=83 inclusive, except as follows	2. Unsealed solids	2. No more than 1000 curies of any radioisotope

CONDITIONS

9. Authorized use. (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.) Research and development to include theoretical analysis, exploration or experimentation and the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, material and processes.

10. The total amount of radioactivity authorized under Items 1 and 2 above is not to exceed 50,000 curies.

11. The licensee shall conduct operations involving the possession and use of sources of radiation in compliance with the requirements of New York State Industrial Code Rule No. 38, "Radiation Protection".

12. Any disposal of radioactive waste by the licensee by burial, through the sanitary sewer, or by other release to the environment shall be in accordance with the provisions of Part 16, New York State Sanitary Code. Records of such disposal shall be maintained by the licensee. Monitoring procedures shall be established by the licensee to verify that concentrations and quantities of radioactive materials so released do not exceed the maximum permissible levels specified in Part 16.

13. Plans and specifications for exhaust systems for hoods, storage areas and other locations where radioactive material is used or stored shall be submitted to the Division of Industrial Hygiene for approval prior to installation by the licensee. The installation of the exhaust

Date_____ FOR THE NEW YORK STATE DEPARTMENT OF LABOR

by_____

729-0322

Reference Number: 1

6. Radioactive materials (element and mass number) (continued)	7. Chemical and/or physical form (continued)	8. Maximum quantity licensee may possess at any one time (continued)
3. Any by-product material	3. Irradiated metals and alloys	3. 25,000 curies
4. Any by-product material	4. Irradiated components	4. 25,000 curies
5. Cobalt 60	5. Sealed sources	5. 50,000 curies
6. Cobalt 60	6. Unsealed solids	6. 10,000 curies
7. Caesium 137	7. Sealed sources	7. 50,000 curies
8. Promethium 147	8. Sealed sources	8. 25,000 curies
9. Cerium 144	9. Sealed sources	9. 25,000 curies
10. Strontium 90	10. Sealed sources	10. 25,000 curies
11. Niobium 95	11. Sealed sources	11. 25,000 curies
12. Gold 198	12. Unsealed solids	12. 5000 curies
13. Uranium 238	13. Any	13. 100 pounds(15.5 millicuries)
14. Thorium 232	14. Any	14. 100 pounds(5.50 millicuries)
15. Hydrogen 3 (Tritium)	15. Any	15. 100 curies

CONDITIONS

(Continued)

system shall be made as per approved plans as determined by test by the Division of Industrial Hygiene.

14. The agreement material described in Items 6, 7 and 8 above:

A. Shall be used only by or under the supervision of persons authorized by the Nuclear Safeguards Committee, E. J. Kletzbach, Chairman.

B. Shall not be used in or on human beings, in products intended for uncontrolled distribution to the general public, nor in field applications where radioactivity is released.

C. When in the form of sealed sources, shall be tested for leakage and/or contamination, as required by Code Rule 38-26.5, by the licensee or by other persons licensed or authorized to perform such services by the Industrial Commissioner, the United States Atomic Energy Commission or appropriate regulatory agency of another agreement state. Alpha-emitting sources shall be so tested at intervals of not to exceed three months. In the absence of a certificate from a transferor indicating that a leakage test has been made within six months prior to the transfer, the sealed source shall not be put into use until so tested. Each sealed source fabricated by the licensee shall be tested for contamination and/or leakage immediately after fabrication. Sources found to be contaminated or leaking in excess of the limits specified in Code Rule 38-26.5 shall be immediately decontaminated, repaired and retested. Sealed sources fabricated for distribution and containing radioactive material (with the exception of material having a half-life not exceeding 30 days, material in gaseous form, and Iridium 192) shall, in addition to an initial test upon fabrication, be stored for a period of seven days and retested prior to transfer to another person.

D. Shall be possessed and used by the licensee in accordance with statements representations and procedures contained in his application to the USAEC dated July 10, 1962 and letters to the USAEC dated August 13, 1962 and September 21, 1962 with attachments, signed by D. B. Holzgraf, and in his letter to the New York State Atomic Energy Co-

STATE OF NEW YORK
RADIOACTIVE MATERIALS LICENSE

License Number_____

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

Date_____ **by**_____

STATE OF NEW YORK
RADIOACTIVE MATERIALS LICENSE

License Number 729-0322

Reference Number: 1

ordinating Council, dated November 11, 1963, signed by C. J. Konnerth.

15. An administrative procedures manual, containing instructions in safety precautions and safe working techniques for radioactive materials shall be prepared by the licensee. This manual shall be followed and a copy thereof furnished to each person working with or having responsibility for such materials, and to The Industrial Commissioner. Changes in the manual shall be submitted to the Commissioner for review prior to issuance.

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

Date February 14, 1964

by Nathan Solomon

Nathan Solomon, Ph.D., M. D.
Chief, Radiological Health Unit
For: Morris Kleinfeld, Director, OSH

APA:jb

Form COL-6bSL (8-63)

STATE OF NEW YORK
RADIOACTIVE MATERIALS LICENSE

Pursuant to the Labor Law and Industrial Code Rule No. 38, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect of all appropriate regulatory agencies and to any conditions specified below.

Licensee	
1. Name	Union Carbide Nuclear Company Div.
2. Address	Union Carbide Corporation Tuxedo, New York

3. License number	729-0322
4. Expiration date	Valid until terminated
5. Reference number	2

6. Radioactive materials (element and mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
1. Any radioactive material with atomic number between z=3 and z=83 inclusive, except as follows	1. Any	1. No more than 100 curies of any radioisotope
2. Any radioactive material with atomic number between z=3 and z=83 inclusive, except as follows	2. Unsealed solids	2. No more than 1000 curies of any radioisotope

CONDITIONS

9. Authorized use. (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.) Research and development, to include theoretical analysis, exploration or experimentation and the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, material and processes.

10. The total amount of radioactivity authorized under Items 1 and 2 above is not to exceed 50,000 curies.

11. The licensee shall conduct operations involving the possession and use of sources of radiation in compliance with the requirements of New York State Industrial Code Rule No. 38, "Radiation Protection".

12. Any disposal of radioactive waste by the licensee by burial, through the sanitary sewer, or by other release to the environment shall be in accordance with the provisions of Part 16, New York State Sanitary Code. Records of all such disposal shall be maintained by the licensee. Monitoring procedures shall be established by the licensee to verify that concentrations and quantities of radioactive materials so released do not exceed the maximum permissible levels specified in Part 16.

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

Date_____ by_____

STATE OF NEW YORK
RADIOACTIVE MATERIALS LICENSE

License Number 729-0322

Reference Number: 2

6. Radioactive materials (element and mass number) (continued)	7. Chemical and/or physical form (continued)	8. Maximum quantity licensee may possess at any one time (continued)
3. Any by-product material	3. Irradiated metals and alloys	3. 25,000 curies
4. Any by-product material	4. Irradiated components	4. 25,000 curies
5. Cobalt 60	5. Sealed sources	5. 50,000 curies
6. Cobalt 60	6. Unsealed solids	6. 10,000 curies
7. Cesium 137	7. Sealed sources	7. 50,000 curies
8. Promethium 147	8. Sealed sources	8. 25,000 curies
9. Cerium 144	9. Sealed sources	9. 25,000 curies
10. Strontium 90	10. Sealed sources	10. 25,000 curies
11. Niobium 95	11. Sealed sources	11. 25,000 curies
12. Gold 198	12. Unsealed solids	12. 5000 curies
13. Uranium 238	13. Any	13. 100 pounds (15.50 millicuries)
14. Thorium 232	14. Any	14. 100 pounds (5.50 millicuries)
15. Hydrogen 3 (Tritium)	15. Any	15. 100 curies

C O N D I T I O N S
Continued

13. Plans and specifications for exhaust systems for hoods, storage areas and other locations where radioactive material is used or stored shall be submitted to the Division of Industrial Hygiene for approval prior to installation by the licensee. The installation of the exhaust system shall be made as per approved plans as determined by test by the Division of Industrial Hygiene.

14. The agreement material described in Items 6, 7 and 8 above:

A. Shall be used only by or under the supervision of persons authorized by the Nuclear Safeguards Committee, R. J. Klotzbach, Chairman

B. Shall not be used in or on human beings, in products intended for uncontrolled distribution to the general public, nor in field applications where radioactivity is released.

C. When in the form of sealed sources, shall be tested for leakage and/or contamination as required by Code Rule 38-26.5, by the licensee or by other persons licensed or authorized to perform such services by the Industrial Commissioner, the United States Atomic Energy Commission, or appropriate regulatory agency of another agreement state. Alpha-emitting sources shall

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

Date_____ by_____

STATE OF NEW YORK
RADIOACTIVE MATERIALS LICENSE

License Number 729-0332
Reference Number: 2

be so tested at intervals of not to exceed three months. In the absence of a certificate from a transferor indicating that a leakage test has been made within six months prior to the transfer, the sealed source shall not be put into use until so tested. Each sealed source fabricated by the licensee shall be tested for contamination and/or leakage immediately after fabrication. Sources found to be contaminated or leaking in excess of the limits specified in Code Rule 38-26.5 shall be immediately decontaminated, repaired and retested. Sealed sources fabricated for distribution and containing radioactive material (with the exception of material having a half-life not exceeding 30 days, material in gaseous form, and Iridium 192) shall, in addition to an initial test upon fabrication, be stored for a period of seven days and retested prior to transfer to another person.

D. Shall be possessed and used by the licensee in accordance with statements, representations, and procedures contained in his application to the USAEC dated July 10, 1962 and letters to the USAEC dated August 13, 1962 and September 21, 1962, with attachments, signed by D. D. Reisgraf, in his letters to the New York State Atomic Energy Coordinating Council dated November 11, 1963 and July 14, 1964 signed by G. J. Zonnerth, and in related documents as follows:

1. Drawing entitled "Diagram of Research Center".
2. Drawing entitled "Floor Plan, Building 4, First Floor".
3. Drawing entitled "Floor Plan, Building 4, Second Floor".
4. Radiation survey of Co-60 Facility dated 7/6/64
5. Schematic of safety interlock system.
6. Diagram of Co-60 irradiator
7. Sketch of Cobalt 60 source dated 9/10/63 showing isodose curves-end view dated 9/10/63.
8. Sketch of Cobalt 60 source dated 9/10/63 showing isodose curves-30° elevation dated 9/10/63.
9. Sketch of Cobalt 60 source dated 9/10/63 showing isodose curves-front view.

15. An administrative procedures manual, containing instruction in safety precautions and safe working techniques for radioactive materials shall be prepared by the licensee. This manual shall be followed and a copy thereof furnished to each person working with or having responsibility for such materials, and to the Industrial Commissioner. Changes in the manual shall be submitted to the Commissioner for review prior to issuance.

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

by Nathan Soloman
Nathan Soloman, Ph.D., M. D.
Chief, Radiological Health Unit

Date August 19, 1964

For: Dr. Morris Kleinfeld, M. D., Director

AFA:jb

Form COL-6bSL (8-63)

STATE OF NEW YORK
RADIOACTIVE MATERIALS LICENSE

AMENDMENT No. 1

729-0322
Reference Number: 2

Pursuant to the Labor Law and Industrial Code Rule No. 38, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect of all appropriate regulatory agencies and to any conditions specified below.

Licensee	3. License number
1. Name Union Carbide Nuclear Company Division	729-0322
2. Address Union Carbide Corporation Tuxedo, New York	4. Expiration date Valid until terminated
	5. Reference number 2

6. Radioactive materials (element and mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
16. Promethium 147	16. Any	16. 2000 curies
17. Promethium 148	17. Any	17. 2000 curies

CONDITIONS

9. Authorized use. (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.)

1-15. Research and development, to include theoretical analysis, exploration or experimentation, and the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, material, and processes.

16-17. Preparation of radioactive sources for Knolls Atomic Power Laboratory.

14D. Shall be possessed and used by the licensee in accordance with statements, representations and procedures contained in his application to the USAEC dated July 10, 1962 and in the following related documents:

1. His letters to the USAEC dated August 13, 1962 and September 21, 1962 with attachments, signed by D. B. Holzgraf.

2. His letters to the New York State Atomic Energy Coordinating Council dated November 11, 1963 and July 14, 1964, signed by C. J. Konnorth.

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

Date _____ by _____

COL-6SL.8 (12-64)

STATE OF NEW YORK
RADIOACTIVE MATERIALS LICENSE

License Number 729-0322

Reference Number: 2
Amendment Number: 1

3. His letter dated May 21, 1965, signed by C. J. Konnerth.
4. Drawing entitled "Diagram of Research Center".
5. Drawing entitled "Floor Plan, Building 4, First Floor"
6. Drawing entitled "Floor Plan, Building 4, Second Floor".
7. Radiation survey of Cobalt 60 facility dated July 6, 1964.
8. Schematic of safety interlock system.
9. Diagram of Cobalt 60 Irradiator.
10. Sketch of Cobalt 60 source dated September 10, 1963 showing isodose curves-end view.
11. Sketch of Cobalt 60 source dated September 10, 1963 showing isodose curves-30° elevation.
12. Sketch of Cobalt 60 source dated September 10, 1963 showing isodose curves-front view.

FOR THE NEW YORK STATE DEPARTMENT OF LABOR

Date ~~May 28, 1965~~

by Robert E. Swencicki M.D.
Robert E. Swencicki, M. D.
Chief, Radiological Health Unit
For: Morris Kleinfeld, M. D., Director, BIH

APA:jb
Form COL-6bSL (8-63)