

U. S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENSE

Supplementary Sheet

Page 1 of 2 Pages24-2261-3  
(D61)

License Number \_\_\_\_\_

## AMENDMENT NO. 2

McDonnell Aircraft Corporation  
St. Louis, MissouriAttention: William L. Kester, C. George Young, James G. Harris, H. A. Lamb,  
T. C. Linck, G. C. Longas, F. C. McCallister, Jr., H. E. Winn and  
H. K. WeberIn accordance with application dated August 31, 1959, License No. 24-2261-3 is  
amended to add the following:

- |                                                       |                                                                         |                                                                                        |
|-------------------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 6. Byproduct material<br>(element and mass<br>number) | 7. Chemical and/or<br>physical form                                     | 8. Maximum amount of<br>radioactivity which<br>licensee may possess<br>at any one time |
| I. Hydrogen 3                                         | J. Isotopic Source<br>(Radiation Re-<br>search Corp.<br>Model No. TT-1) | J. 400 millicuries                                                                     |

## 9. Authorized use

- J. To be used as an ionization source in HEC Equipment Corporation Model No.
- 
- 6714 gauge for measuring pressures.

## COMMENTS

- XI. Byproduct material licensed under Item J above may also be used at Wallops
- 
- Island, Virginia. Byproduct material licensed under J above may also be
- 
- used by, or under the direct supervision of, G. E. Stiller or R. G. Plummer.

- XII. Notwithstanding, and in line of, the requirements of paragraphs 39.203(a)(1)
- 
- and 39.203(a)(4), Title 10, Code of Federal Regulations, Part 39, marking here
- 
- and next adjacent safety pins referenced in Item XI shall be labeled with an
- 
- encompassed standard radiation symbol and the legend "Ionization Radiation
- 
- Material, AEC License 24-2261-3."

(See Page 2)

P.S. R. R.

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U. S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENSE  
Supplementary SheetPage 2 of 2 PagesLicense Number 24-2261-3  
(D61)

AMENDMENT NO. 2

CONTINUED:

The license is further amended to correct Item 8B to read 8 sources of 130 millieuries each, 16 sources of 20 millieuries each, total - 1520 millieuries.

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FOR DIV. OF INSP.

For the U. S. Atomic Energy Commission

Original Signed By  
James R. MasonDate September 22, 1959by CRAJohn J. Heston  
Division of Licensing and Regulation  
Washington 25, D. C.1. ~~RECEIVED~~ RECEIVED 9/24/59  
7209

## APPLICATION FOR BYPRODUCT MATERIAL LICENSE

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U. S. Atomic Energy Commission, P. O. Box E, Oak Ridge, Tenn. Attention: Isotopes Extension, Division of Civilian Application. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the licensee is subject to Title 10, Code of Federal Regulations, Part 20.

24-2261-3 Am. #3

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)  McDonnell Aircraft Corporation P. O. Box 516 St. Louis 66, Missouri		(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a);  Same	
2. DEPARTMENT TO USE BYPRODUCT MATERIAL  General Engineering, Manufacturing, Research		3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)  24-2261-3      Renewal	
4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)  W. L. Kester                      H. E. Winn N. A. Lamb                        H. K. Weber T. C. Linck F. C. McCallister		5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)  T. C. Linck	
6. (a) BYPRODUCT MATERIAL (Elements and mass number of each.)  See attachment 1		(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)  See attachment 1	

A1363

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

- A. For use in tagging of bucking bars and seat ejection safety pins to facilitate detection after manufacture.
- B. For use in aircraft in-flight refueling equipment.
- C. Machine-tool wear studies.
- D, E, F. and G. Calibration of instruments.
- H and I. To be used by "open-air" handling technique for industrial radiography.
- J. To be used as an ionization source in NRC Equipment Corporation Model No. 0714 gauge for measuring pressures.

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FOR DIV. OF COMPLIANCE

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## TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

6. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

## 9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience.)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

## 10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm <sup>2</sup> )	USE (Monitoring, surveying, measuring)

## 11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

## 12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)

## INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes No

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

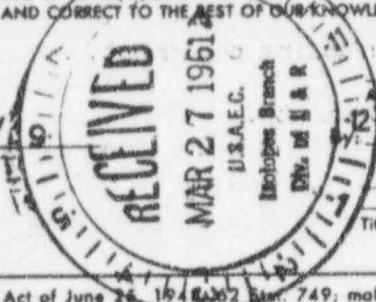
Nuclear Consultants Corporation, 9842 Manchester Rd., St. Louis 19, Missouri

## CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date

21 MARCH 1961



McDonnell Aircraft Corporation

Applicant named in Item 1

William L. Kester

Scientist, Research Department  
Chairman, Isotope Committee

Title of certifying official

WARNING.— 18 U. S. C., Section 1001; Act of June 25, 1948 (62 Stat. 749); makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.



6 (a) BYPRODUCT MATERIAL. (Elements and mass number of each)

✓ A. Cesium 137

*Tools*  
*Backing bars - 1000*

✓ B. Krypton 85

*light source in aircraft*

✓ C. Any byproduct material having atomic no. from 3 to 83, inclusive

✓ D. Thallium 204

✓ E. Cesium 137

✓ F. Cobalt 60

( ) G. Cobalt 60

( ) H. Iridium 192

✓ I. Cobalt 60

J. Hydrogen 3

*pressure gauge*

6 (b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)

A. Sealed Sources  
(Nuclear Consultants, Inc.; custom)

B. Sealed Sources  
(U. S. Radium light sources, model IAB-484-1A)

C. Irradiated metal samples

D. Any

E. Any

F. Any

G. Sealed Sources  
*Thallium RR-60*

H. Sealed Sources  
(Isotopes Specialties Co.; Type 30)

I. Sealed Sources  
(Nuclear-Chicago Model RR-60)

J. Sealed Source  
(Radiation Research Corp. Model No. TT-1)

A. 100 millicuries - maximum activity in a single source not to exceed 4 microcuries

B. 8 sources of 150 millicuries each  
16 sources of 20 millicuries each  
Total - 1520 mc  
C. 1 curie total

D. 20 millicuries

E. 20 millicuries

F. 20 millicuries

G. 200 millicuries

H. 5 sources not to exceed 2 curies each  
Total - 10 curies  
I. 2 sources not to exceed 1 curie each  
Total - 2 curies

J. 400 millicuries

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LAR:ED:WMM

April 4, 1961

McDonald Aircraft Corp  
St. Louis, Mo.

Gentlemen:

This is to acknowledge receipt of your application for renewal of Hyproduct Material License No. 22632. Your application is deemed to be a timely application for renewal and, accordingly, the Hyproduct Material License will not expire until final action has been taken by this office upon the application for renewal.

Control No. 22632 has been assigned to your application and any correspondence regarding the application should reference this control number and be directed to the attention of Mr. W. F. Hilsman.

Very truly yours,

*James R. Mason*

James R. Mason  
Chief, Isotopes Branch  
Division of Licensing and Regulation

CC: Compliance Div

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JUL 24 1961

MLA:13:202 (23418)

McDonnell Aircraft Corporation  
Post Office Box 516  
St. Louis 66, Missouri

Attention: Mr. W. L. Hester

Gentlemen:

Reference is made to your application for renewal of Hypodermic Material License No. 24-2341-3. Since that application was filed with the Commission more than thirty days prior to the expiration date of License No. 24-2341-3, in accordance with the provisions of Section 20.23(b) of Title 10, Code of Federal Regulations, Part 20, that license shall not expire until a final determination has been made on the application for renewal.

Your attention is directed to Section 20.24(g) of 10 CFR Part 20, which establishes the information which must be included in an application for issuance or renewal of a license authorizing the use of sealed sources of hypodermic material for radiography. In view of these licensing requirements and the provisions of 10 CFR Parts 20 and 21, that portion of your application dealing with radiographic sources is deficient as follows:

1. You have not submitted a description of your program for the training of radiographic personnel as required by Subsection 20.24(g)(1) of Part 20. In those cases where the radiography program is limited in its operation to several persons, and personnel turnover is negligible, the Commission will consider continuing its present practice of issuing individual radiographers in a license condition. If your radiography program falls in this limited category, you should submit a description of the training of those persons who will act as radiographers, as defined by Subsection 20.2(a) of Part 21, in sufficient detail to demonstrate that their qualifications comply with the provisions of Subsection 21.201(a) of Part 21. This description should include the means by which those persons were made to demonstrate to McDonnell Aircraft Corporation their understanding of the subjects referenced in Subsections 21.201(a)(1) and (a)(2) of Part 21 and their competence in the use of the equipment.

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listed in Subsection 21.201(a)(3) of Part 21. If your radiography program does not fall in the limited category specified above, the required description of your training program should contain information on each of the phases listed in Subsection 20.24(g)(1) of Part 20 and be so sufficient detail to provide reasonable assurance that any person satisfactorily completing this program will satisfy the provisions of Section 21.201 of Part 21.

1. Your operating procedures controlling your radiographers' use of your radiographic sources, as submitted with your letter dated May 13, 1959, are not adequate to satisfy the licensing requirement of Subsection 20.24(g)(2) of Part 20, which refers to Section 21.202 of Part 21, for the following reasons:

- (a) You have not included adequate instructions on the subject listed as Subsection 21.202(b) of Part 21. You should refer to Section 21.203 of Part 21 for the physical radiation surveys required by that Part and to Section 20.251 of Part 20 for those required by that Regulation.

- (b) You have not included adequate instructions on the subject listed as Subsection 21.202(c) of Part 21. These instructions should specify the radiation levels which must be contained in restricted areas and any necessary exposure time limitations. Instructions should require continuous surveillance of radiographic areas to the extent provided by Section 21.201 of Part 21.

- (c) You have not included adequate instructions on the subject listed as Subsection 21.202(d) of Part 21. Section 21.203 of Part 21 refers to the wearing of film badges mandatory for radiographic personnel.

- (d) You have not included adequate instructions on those subjects listed as Subsections 21.202(g) and (h) of Part 21.

2. You have not described the internal inspection system by which McDonnell Aircraft Corporation is assured that its radiographic personnel are complying with AEC regulations and with the company's



operating procedures and other documents. This requirement, which is the subject of Subsection 19.14(b)(4) of Part 19, should result in the establishment of a minimum frequency for inspection by company management or its representative.

6. You have not supplied sufficient information on your leak testing procedures to satisfy the requirements of Subsection 19.14(b)(5) of Part 19. You will now state this information. You will state the method of conducting the test, and the pertinent experience of the person who will perform the test. You will further state that Section 21.143 of Part 21 requires that the test be sufficiently sensitive to detect .005 microcurie of contamination, as opposed to information contained in Section 11.1, "Safe Practice Procedures" of your operating procedures. It appears that the radiation exposure incurred from the direct testing of your sealed sources, as described in your "Safe Practice Procedures", could be reduced if your tests consisted of examining some area which, if the source were leaking or contaminated, would also contain radioactive material. Such an area might be an absorbent lining in the storage container or in the cover holder. You are requested to examine the feasibility of this alternate approach and to inform this office of your findings.

Very truly yours,

William G. Miller  
Senior Licensing Division  
Inspection Branch  
Division of Licensing & Regulation

Enclosures:  
12-000-10, 10 & 11

OFFICE	MLR:TB	MLR:TB			
SURNAME	W O Miller	W O Miller			
DATE	7/21/61	7/21/61			

3285-1 From

**McDONNELL** *Aircraft Corporation*  
*Lambert Saint Louis* MUNICIPAL AIRPORT • BOX 516, ST. LOUIS 66, MO.

24-2261-3  
Am. #3

8 September 1961

Ref: AEC-220-95

To: United States Atomic Energy Commission  
Washington 25, D. C.

Attention: Mr. William O. Miller  
Senior Licensing Reviewer  
Isotopes Branch  
Division of Licensing and Regulation

Subject: Byproduct License Renewal

Reference: (a) Your letter, DLR:IB:DRH(33418) dated 24 July 1961

Enclosures: (1) Certification Course for Radiographer (3 copies)  
(2) MAC Safe Practice Procedure No. 11.00 (3 copies)  
(3) Supplement to McDonnell Application for Byproduct  
Material License (3 copies)  
(4) Amendment to MAC Safe Practice Procedure No. 10.00 (3 copies)

In reply to your letter, Reference (a), the following information is presented.

McDonnell Aircraft Corporation's radiography program is rather limited. At present only one radioisotope is in use, Iridium-192 in quantities of 2 curies or less. All radiography is performed by Mr. Fred McCallister who is in charge of the industrial X-ray equipment at MAC. His formal training in the use of radioisotopes consists of a course given by personnel from the Nuclear Consultants Corporation of St. Louis, Missouri. In addition he has been given a refresher course at MAC. An outline of the course is given in Enclosure (1).

Persons who are required to use radioactive sources are given a series of lectures covering the subject matter listed in the enclosed outline. In addition they are required to demonstrate their understanding in the concepts presented. This includes a demonstration of their ability to use radiation monitoring equipment, their ability to locate and designate radiation areas. There is a demonstration of their technique of operating all of the cameras and irradiators with which they may be concerned and finally, they are required to show their knowledge of procedures to be followed in case of emergencies such as those that might arise should an irradiator become jammed in the open position or a source dropped inadvertently from its container.

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Wipe tests on containers and sources are performed by Health Physics personnel and not by the radiographers or their assistants.

Radiographers and radiographer's assistants will be given training in the use of any new devices that may be procured at MAC. This training will be performed by persons familiar with the equipment and its operation; or, preferably, by qualified representatives of the manufacturer.

The information requested in paragraph 2 of your letter is covered in Enclosure (2), titled MAC Radiation Safe Practice Procedure 11.00.

Concerning paragraph 3 of your letter, the company Health Physicist and/or the Chairman of the Isotope Committee will make personal surveys of areas used for radiography. These inspections will be made during actual irradiations in order to determine the degree of compliance with established operating procedures and regulations. A written report will be filed with Health Physics. This report will note any instances of failure to comply with these regulations. It will also note any unsafe practices and will contain recommendations for their correction.

Inspections will be made at least once each three months and/or whenever

1. a new source is used,
2. a new irradiator or camera is used, or
3. whenever a new and unusual use is to be made of existing equipment.

Information requested in paragraph 4 of your letter is presented in Enclosures (2) and (4).

It should be pointed out that all radiation monitoring equipment with the exception of film badges is routinely calibrated against a 0.1 curie Co-60 standard. Film badges are checked once each six months by exposing one badge to a known radiation dose from Co-60. This serves as a check upon the Film Badge Service.

In the event that any leak test shows excess activity, both the encapsulated source and its holder will be washed with water containing a detergent, then with acetone. The washings from each will be assayed by pulse height analysis and if necessary, by radiochemical assay.

Once it has been determined that a sample is leaking, it will be returned to the vendor for repair or disposal.

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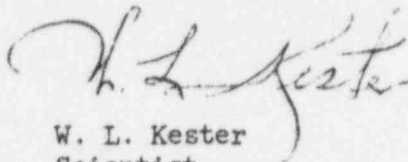
Ref: AEC-220-95

Page 3

Enclosure (3) contains information to be added to previous MAC application. It is a resume of radiation experience of additional personnel assigned to work in the Research Division of MAC.

Should you wish any further information, please do not hesitate to contact me.

Yours very truly,

A handwritten signature in cursive script, appearing to read "W. L. Kester".

W. L. Kester  
Scientist  
Research Division

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FOR DIV. OF COMPLIANCE, :



24-2261-3 Am. #8

CERTIFICATION COURSE FOR RADIOGRAPHER

I Fundamentals of radiation safety.

- A. Characteristics of gamma radiation.
- B. Units of radiation dose (mrem) and quantity of radioactivity (curie).
- C. Hazard of excessive exposure to radiation.
- D. Methods of controlling radiation dose.
  - 1. Working time.
  - 2. Working distance.
  - 3. Shielding.
- E. Levels of radiation from licensed material.
  - 1. When in storage container.
  - 2. When in exposure position.
  - 3. Distance from source to unrestricted area.
  - 4. Distance from source to high radiation area.

II Radiation detection instruments to be used

- A. Types of instruments to be used.
  - 1. Ion chambers
  - 2. Geiger counter.
- B. Use of instruments.
  - 1. Operation.
  - 2. Maintenance.
  - 3. Calibration.
  - 4. Limitations.
- C. Survey techniques.
- D. Use of personnel monitoring equipment.
  - 1. Film badges.
  - 2. Pocket dosimeters.

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This is Enclosure ( / )
to _____
Re: No. <u>AEC-220-95</u>
Dated <u>8 Sept 1961</u>

If enclosure No. .... is withdrawn (or not attached), the classification of this correspondence will be down- graded to .... in accordance with FAR, 38 AR380-5 and FAR 4-28 O'NAV 32-P-1100
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III Radiographic equipment to be used.

- A. Storage container.
- B. Use of remote handling equipment.
- C. Use of radiographic exposure devices.

IV Review of pertinent Federal Regulations.

V Review of MAC Radiation Safe Practice Procedures.

VI Written or oral test for comprehension.

CERTIFICATION COURSE FOR ASSISTANT RADIOGRAPHERS

This course will be the same as for Radiographers except that Sect. I will not be stressed as heavily and Sect. III will include sufficient "dry-runs" to assure competency.

Courses are to be given under the supervision of:

N. Lamb

F. McCallister

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FOR DIV. OF COMPLIANCE

24-2261-3

CERTIFICATION COURSE FOR RADIOGRAPHER

II

I Fundamentals of radiation safety.

IV

V

VI

- A. Characteristics of gamma radiation.
- B. Units of radiation dose (mrem) and quantity of radioactivity (curie).
- C. Hazard of excessive exposure to radiation.
- D. Methods of controlling radiation dose.

- 1. Working time.
- 2. Working distance.
- 3. Shielding.

E. Levels of radiation from licensed material.

- 1. When in storage container.
- 2. When in exposure position.
- 3. Distance from source to unrestricted area.
- 4. Distance from source to high radiation area.

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II Radiation detection instruments to be used

A. Types of instruments to be used.

- 1. Ion chambers
- 2. Geiger counter.

B. Use of instruments.

- 1. Operation.
- 2. Maintenance.
- 3. Calibration.
- 4. Limitations.

C. Survey techniques.

D. Use of personnel monitoring equipment.

- 1. Film badges.
- 2. Pocket dosimeters.

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MCDONNELL AIRCRAFT CORPORATION

RADIATION SAFE PRACTICE PROCEDURE

DATE ISSUED 1 August 1961

DATE REVISED \_\_\_\_\_

SAFETY AND MEDICAL DEPARTMENT

PROCEDURE NUMBER 11.00

PAGE 1 OF 5

A. TITLE

RADIOGRAPHIC PROCEDURES (IRIDIUM 192)

B. PURPOSE

To detail procedures for safe handling and use of Iridium-192 used as radiographic source.

C. SCOPE

1. This procedure shall govern the handling and use of Iridium-192 sealed sources containing 2 curies or less of radioisotope and used for radiographic purposes.
2. The permissible levels of radiation and contamination as contained in Safe Practice Procedure (SPP) No. 10.00 shall be the controlling factor in any interpretation of this procedure.

D. DEFINITIONS

Radiographer - Any individual who performs or who, in attendance at the site where the sealed source or sources are being used, personally supervises radiographic operations and who is responsible for assuring compliance with the requirements of these procedures.

Radiographer's Assistant - Any individual who, under the personal supervision of a radiographer, uses radiographic exposure devices, sealed sources or related handling tools, or survey instruments in radiography.

Radiography - The examination of the structure of materials by nondestructive methods utilizing sealed sources of by-product material.

Sealed Source - Any by-product material that is encased in a capsule designed to prevent leakage or escape of the by-product material.

E. RESPONSIBILITIES AND PROCEDURES

1. All personnel performing radiographic operations must be currently certified in accordance with Sect. F.1. of SPP 10.01.
2. Records
  - 2.1 The Safety and Medical Department shall maintain a quarterly inventory of all sealed sources not stored in the Isotope Lab.

This is Enclosure (2)  
to \_\_\_\_\_  
File No. AEC-22a-  
Dated 8 Sept 1961



MCDONNELL AIRCRAFT CORPORATION

RADIATION SAFE PRACTICE PROCEDURE

SAFETY AND MEDICAL DEPARTMENT

DATE ISSUED 1 August 1961

PROCEDURE NUMBER 11.00

DATE REVISED \_\_\_\_\_

PAGE 3 OF 5

- 4.3 Each radiographic set-up shall be monitored or surveyed at points and times as established by the Safety and Medical Department. This shall include:
  - 4.3.1 Readings of the outside of the storage container prior to opening.
  - 4.3.2 Readings of the area when the source is being transferred from the storage container to the exposure device.
  - 4.3.3 Readings of the area during exposure.
  - 4.3.4 Reading of the outside of the storage container after the source has been returned.
  - 4.3.5 Readings of the area where the source was used to determine if any leakage had occurred.
  - 4.3.6 Length of time that the source was out of the storage container.
- 4.4 Initial surveys to establish radiation levels and survey points shall be performed by the Safety and Medical Department.
- 4.5 The radiographer is responsible for all additional surveys and for reporting same to the Safety and Medical Department as required in Sect. E.2.2 of this procedure.

5. Operating Procedures

- 5.1 The source and storage container shall not be left unattended at any time when not in storage.
- 5.2 Transportation of the source to the place of exposure shall be in accordance with Sect. F.5. of SPP 10.01.
- 5.3 The storage container shall be placed as close to the exposure site as possible to minimize personnel exposure while transferring the source from the storage container.
- 5.4 The exposure site shall have been prepared and the film in place prior to removal of the source from the storage container. This shall include:
  - 5.4.1 (a) Roping off of the restricted area, (b) posting of radiation signs and (c) clearing the area of non-certified personnel for a distance of 70 feet around the exposure site (the approximate distance of 2 mr/hr line for 2 curies of Iridium-192).
  - 5.4.2 Post high radiation warning signs 15 feet from the exposure site (the 50 mr/hr line).

MCDONNELL AIRCRAFT CORPORATION

RADIATION SAFE PRACTICE PROCEDURE

SAFETY AND MEDICAL DEPARTMENT

DATE ISSUED 1 August 1961

PROCEDURE NUMBER 11.00

DATE REVISED \_\_\_\_\_

PAGE 4 OF 5

- 5.5 Conduct at least one "dry run" on a dummy source of approximately the same size and shape as the active source.
- 5.6 Unlock the storage container.
- 5.7 Remove the Iridium plug from the storage container with the aid of a six-foot long handling tool.
- 5.8 Transfer the source to the exposure position by use of the handling tool.
- 5.9 After the exposure return the source to the safe and reseal.
- 5.10 Lock the storage container.
- 5.11 Check all pocket dosimeters for indications of over-exposure.
- 5.12 Remove the radiation warning signs after the area has been checked and is free of contamination.
- 5.13 Return storage container to the storage area.

6. Emergency Procedures

- 6.1 It shall be the radiographer's responsibility to see that Sect. F.3. SPP 10.01 is followed.
- 6.2 Any person who receives a total radiation dose in excess of that permitted in Sect. E.3. of this procedure shall not re-enter the restricted area until authorized by the Safety and Medical Department.
- 6.3 If the pocket dosimeter reading of any person within the restricted area exceeds 200 mr, their film badge shall immediately be processed and he shall not be allowed to return to a restricted area until authorized by the Safety and Medical Department.

7. Leak Testing and Tagging of Sealed Sources

- 7.1 Sealed sources not fastened to or contained in a radiographic exposure device shall not be used unless it has permanently attached to it a durable tag at least one inch square in accordance with the Atomic Energy Commission regulations.
- 7.2 No repair or modification of the tag, leader, or sealed source shall be performed unless by or under the direction of the Chairman of the Isotope Committee.

MCDONNELL AIRCRAFT CORPORATION

RADIATION SAFE PRACTICE PROCEDURE

SAFETY AND MEDICAL DEPARTMENT

DATE ISSUED 1 August 1961

PROCEDURE NUMBER 11.00

DATE REVISED \_\_\_\_\_

PAGE 5 OF 5

- 7.3 Leak testing of each sealed source shall be performed by the Safety and Medical Department at least every six months according to the following procedure.
- 7.3.1 The source shall be removed from the storage container with six-foot long handling tools.
- 7.3.2 The inside of the storage container shall be wiped with ashless filter paper previously dampened with water or acetone.
- 7.3.3 The filter paper will be ashed and counted using a lead shielded scintillation counter.
- 7.3.4 If there is no activity then the sample is so labeled.
- 7.3.5 If there is an indication of contamination then a careful assay shall be made in order to determine the type and quantity of activity.
- 7.3.6 Should the test reveal the presence of 0.005 microcuries or more of contamination then the source is considered to be leaking and is to be shipped to supplier for inspection and repair or disposal.

Prepared by: T. C. Linck

Approved by: \_\_\_\_\_

E. V. Sisul

Approved by: \_\_\_\_\_

W. L. Kester

# Supplement to APPLICATION FOR BYPRODUCT MATERIAL LICENSE

## Training and Experience of Clarence J. Wolf

8. <u>Type of Training</u>	<u>Where Trained</u>	<u>Duration of Training</u>	<u>On the Job</u>	<u>Formal Course</u>
a. Principles and practices of radiation protection	Purdue University	4 years	Yes	Yes
b. Radioactivity measurement standardization and monitoring techniques and instruments	Purdue University	4 years	Yes	Yes
c. Mathematics and calculations basic to the use and measurement of radioactivity	Purdue University	4 years	Yes	Yes
d. Biological effects of radiation	Purdue University	4 years	Yes	Yes

## 9. Experience with Radiation

<u>Isotope</u>	<u>Max. Amount</u>	<u>Where Experience was Gained</u>	<u>Duration of Experience</u>	<u>Type of Use</u>
Co <sup>60</sup>	3500 curies	Union Carbide Research Center Parma, Ohio	4 years	Radiation Chemistry
Re <sup>187</sup>	25 grams	Purdue University	3 years	Determination of natural radioactivity
I <sup>131</sup>	50 mc	Purdue University	6 months	Kinetic studies
C <sup>14</sup>	5 mc	Purdue University	6 months	" "
H <sup>3</sup>	10 mc	Purdue University	1 year	Beta spectra studies
A <sup>37</sup>	50 mc	Purdue University	1 year	Spectra studies
As <sup>76</sup>	50 mc	Union Carbide Research Center	3 months	Kinetic studies
Ag <sup>111</sup>	50 mc	Union Carbide Research Center	2 months	" "
P <sup>32</sup>	25 mc	Union Carbide Research Center	6 months	" "

This is Enclosure (3)

to

*Att.*  
~~Memorandum~~ No. AEC-220-95

Dated 8 Sept 1961



# Supplement to APPLICATION FOR BYPRODUCT MATERIAL LICENSE

## Training and Experience of Donald P. Ames

8. <u>Type of Training</u>	<u>Where Trained</u>	<u>Duration of Training</u>	<u>On the Job</u>	<u>Formal Course</u>
a. Principles and practices of radiation protection	Metallurgical Laboratories	3 years	Yes	Yes
b. Radioactivity measurement standardization and monitoring techniques and instruments	Metallurgical Laboratories	3 years	Yes	Yes
c. Mathematics and calculations basic to the use and measurement of radioactivity	1. Metallurgical Laboratories	3 years	Yes	Yes
	2. Univ. of Wisconsin	1 year	Yes	Yes
d. Biological effects of radiation	Metallurgical Laboratories	3 years	Yes	No

## 9. Experience with Radiation

<u>Isotope</u>	<u>Max. Amount</u>	<u>Where Experience was Gained</u>	<u>Duration of Experience</u>	<u>Type of Use</u>
Pu <sup>239</sup>	1 g	Metallurgical Labs. (Argonne)	2 years	Chemistry BiPO <sub>4</sub> - LaF <sub>3</sub> Process
Pu <sup>239</sup>	50 g	Savannah River Lab.	2 years	Purex process
Ra <sup>226</sup>	10 mg	Argonne National Lab.	1 year	Half-life measurements
S <sup>35</sup>	50 mc	University of Wisconsin	3 years	Tracer chemistry

Fission Products from Nuclear Bombs and U<sup>235</sup> or Pu<sup>239</sup> pile irradiations and 14 Mev neutron irradiations.

Ce <sup>144</sup>	Los Alamos Scientific Lab.	4 years	Bomb yields and efficiencies
Ce <sup>143</sup>			
Ce <sup>141</sup>	Savannah River Lab.	4 years	Purex and Thorex process chemistry
Mo <sup>99</sup>			
Sr <sup>90</sup>			
Sr <sup>91</sup>			
Y <sup>91m</sup>			
Y <sup>92</sup>			Decay scheme investigations
Cd <sup>115</sup>			
Ru <sup>106</sup>			
Ru <sup>103</sup>			
Pr <sup>144</sup>			
Ba <sup>140</sup>			
La <sup>140</sup>			
Zr <sup>95</sup>			
-121			

This is Enclosure (3)

to

File No. AEC-220-95

Dated 8 Sept 1961

INTER-OFFICE MEMO

Date: 22 August 1961

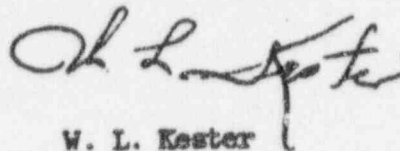
TO: All Holders of Copies of Radiation Safe Practice Procedure  
No. 10.00

CC: Attach to all existing copies of Radiation Safe Practice  
Procedure No. 10.00

FROM: W. L. Kester

SUBJECT: Amendment to Radiation Safe Practice Procedure No. 10.00

1. Effective upon issue of this memo, Sect. E.5.1 of the subject procedure is changed to read "... exceeds 0.005 microcuries".
2. Please attach this memo to your copy of the subject procedure. The next revision of the procedure will reflect this change.

  
W. L. Kester

TCL:mf

This is Enclosure (4)  
to  
~~Attn.~~ ~~Memorandum~~ No. AEC-220-95  
Dated 8 Sept 1961

INTER-OFFICE MEMO

Date: 22 August 1961

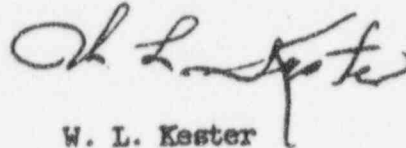
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W. L. Kester

TCL:mf

DUPLICATED  
FOR DIV. OF COMPLIANCE

This is Enclosure (4)
to _____
<del>Mem.</del> Memo. No. <u>AEC-220-95</u>
Dated <u>8 Sept 1961</u>

## CERTIFICATION COURSE FOR RADIOGRAPHER

### I Fundamentals of radiation safety.

- A. Characteristics of gamma radiation.
- B. Units of radiation dose (mrem) and quantity of radioactivity (curie).
- C. Hazard of excessive exposure to radiation.
- D. Methods of controlling radiation dose.
  - 1. Working time.
  - 2. Working distance.
  - 3. Shielding.
- E. Levels of radiation from licensed material.
  - 1. When in storage container.
  - 2. When in exposure position.
  - 3. Distance from source to unrestricted area.
  - 4. Distance from source to high radiation area.

### II Radiation detection instruments to be used.

- A. Types of instruments to be used.
  - 1. Ion chambers
  - 2. Geiger counter.
- B. Use of instruments.
  - 1. Operation.
  - 2. Maintenance.
  - 3. Calibration.
  - 4. Limitations.
- C. Survey techniques.
- D. Use of personnel monitoring equipment.
  - 1. Film badges.
  - 2. Pocket dosimeters.

This is Enclosure ( / )

to

*Lth.*  
Memo. No. *AEC-220-95*

Dated *8 Sept 1961*

If enclosure No. ... is returned  
(or not attached), the classification  
of this correspondence will be down-  
graded to ...  
in accordance with PAR. 9c AR38C-5  
and Par. 4-28 O'NAV 32-P-1100



III Radiographic equipment to be used.

- A. Storage container.
- B. Use of remote handling equipment.
- C. Use of radiographic exposure devices.

IV Review of pertinent Federal Regulations.

V Review of MAC Radiation Safety Practice Procedures.

VI Written or oral test for comprehension.

CERTIFICATION COURSE FOR ASSISTANT RADIOGRAPHERS

This course will be the same as for Radiographers except that Sect. I will not be stressed as heavily and Sect. III will include sufficient "dry-runs" to assure competency.

Courses are to be given under the supervision of:

N. Lamb

F. McCallister

DLR:ID:301 (14-0001-3)

SEP 21 1961

McDonnell Aircraft Corporation  
St. Louis, Missouri

Attention: Mr. William A. Easter

Continued:

Enclosed is Amendment No. 3 to Hypodermic Material License  
No. 14-0001-3, issued in response to your application for  
renewal and your letter dated September 8, 1961.

It should be noted that your operating procedures entitled  
"Radiographic Procedures (Iridium 192)", dated August 1,  
1961, must be followed in the use of your Gebelt 60 radio-  
graphic sources as well as those containing Iridium 192.

Very truly yours,

William O. Miller  
Senior Licensing Reviewer  
Inspection Branch  
Division of Licensing and  
Regulation

Enclosures:  
Amend. No. 3  
to GCR 10, 10 & 11  
Form AHS-113

A/367

OFFICE	DLR:ID	DLR:ID					
IRNAME	D A Hopkins:m	W O Miller					
DATE	9/19/61	9/20/61					

BYPRODUCT MATERIAL LICEN NO. 24-2261-3 AMENDMENT NO.  
(162)

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 20, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954 and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

<b>Licensee</b>		<b>In accordance with application dated March 21, 1961</b>	
1. Name <b>McDonnell Aircraft Corporation</b>		3. License number <b>24-2261-3</b> is amended in its entirety to read as follows:	
2. Address <b>St. Louis, Missouri</b>		4. Expiration date <b>September 30, 1962</b>	
		5. Reference No.	
6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time	
A. <b>Cesium 137</b>  (See Page 2)	A. <b>Sealed Sources (Nuclear Consultants, Inc.; custom)</b>	A. <b>100 millicuries - maximum activity in a single source not to exceed 4 microcuries</b>	
9. Authorized use			
A. <b>For use in tagging of bucking bars and seat ejection safety pins to facilitate detection after manufacture.</b>  (See Page 2)			

## CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.
11. Byproduct material licensed under Item J may also be used at Wallops Island, Virginia. Byproduct material licensed under J may also be used by, or under the supervision of, C. E. Sitler or R. G. Plummer.
12. Byproduct material shall not be used in products distributed to the public.
13. Except as hereinafter provided, the licensee shall comply with the provisions of Title 10, Code of Federal Regulations, Part 20, Chapter 1, "Standards For Protection Against Radiation", and Part 31, "Radiation Safety Requirements For Radiographic Operations".
- Notwithstanding, and in lieu of, the requirements of paragraphs 20.203(f)(1) and 20.203(f)(4), Title 10, Code of Federal Regulations, Part 20, bucking bars and seat ejection safety pins referenced in Item 9A shall be labeled with an uncolored standard radiation symbol and the legend "Contains Radioactive Material, AEC License 24-2261-3".
- (See Page 2)

9701170276 4A

U. S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENSE  
Supplementary SheetPage 2 of 4 PagesLicense Number 24-2261-2  
(162)

Continued From Page 1

Amendment Number 3

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radio- activity which licensee may possess at any one time
B. Krypton 85	B. Sealed Sources (U. S. Radium light sources, model LAB-484-1A)	B. 8 sources of 150 milli- curies each. 16 sources of 20 millicuries each. Total - 2 curies
C. Any byproduct material having atomic no. from 3 to 83, inclusive	C. Irradiated metal samples	C. 1 curie - total
D. Thallium 204	D. Any	D. 20 millicuries
E. Cesium 137	E. Any	E. 20 millicuries
F. Cobalt 60	F. Any	F. 20 millicuries
G. Cobalt 60	G. Sealed Sources	G. 200 millicuries
H. Iridium 192	H. Sealed Sources (Isotopes Specialties Co.; Type 30)	H. 5 sources not to exceed 2 curies each. Total - 10 curies
I. Cobalt 60	I. Sealed Sources (Nuclear- Chicago Model RR-60)	I. 2 sources not to exceed 1 curie each. Total - 2 curies
J. Hydrogen 3	J. Sealed Source (Radiation Research Corp. Model No. TT-1)	J. 400 millicuries
9. Authorized use		
B. For use in aircraft in-flight refueling equipment.		
C. Machine-tool wear studies.		
D., E., F. and G. Calibration of instruments.		
H. and I. To be used by "open-air" handling technique for industrial radiography.		
J. To be used as an ionization source in RMC Equipment Corporation Model No. 0714 gauge for measuring pressures.		

## CONDITIONS

14. Byproduct material shall be used by, or under the supervision of, William L. Kaster, H. A. Lamb, T. C. Linck, F. C. McCallister, Jr., H. E. Wiss or H. K. Weber. The only person authorized to act as radiographer under this license is F. C. McCallister, Jr. "Radiographer" is defined in Title 10, Code of Federal Regulations, Part 31, "Radiation Safety Requirements For Radiographic Operations", Section 31.3(a).

(See Page 3)



U. S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENS

## Supplementary Sheet

License Number 24-2261-2  
(162)

Continued From Page 2

Amendment Number 3

## CONDITIONS

15. A curie of Iridium 192 is defined as that quantity of activity which presents a radiation intensity of 0.55 roentgen per hour at a distance of one meter.
16. Byproduct material as sealed sources shall not be opened.
17. Sealed sources of byproduct material shall not be combined for use in open air techniques to produce a radiation level in excess of the level produced by the largest single source authorized by this license for open air use.
18. A. In addition to the leak testing provisions of Section 31.105 of 10 CFR Part 31, the sealed sources described by Items 6G, 7G and 8G of this license shall be tested for leakage and/or contamination at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.  
  
B. The test shall be capable of detecting the presence of 0.005 microcurie of removable contamination on the sealed source. The test sample shall be taken from the sealed source or from appropriate accessible surfaces of the device in which the sealed source is permanently or semipermanently mounted or stored. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.  
  
C. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within five days of the test with the Director, Division of Licensing and Regulation, U. S. Atomic Energy Commission, Washington 25, D. C., describing the equipment involved, the test results and the corrective action taken. A copy of such report shall be sent to the manager of the nearest AEC operations office listed in Appendix B of Title 10, Code of Federal Regulations, Part 20.  
  
D. Tests for leakage and/or contamination may be performed in accordance with procedures contained in Item 7 of document entitled "Radiographic Procedures (Iridium 192)" and dated August 1, 1961.

(See Page 4)

U. S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENSEPage 4 of 4 Pages

Supplementary Sheet

License Number 24-2261-3  
(162)

Continued From Page 3

Amendment Number 3

## CONDITIONS

19. Except as specifically provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7 and 8 of this license in accordance with statements, representations and procedures contained in applications dated October 6, 1958 and March 21, 1961, and in related documents and amendments as follows:
- A. Administrative instructions entitled "Safe Practice Procedures" submitted May 22, 1959.
  - B. Letter dated May 13, 1959 from W. L. Kester.
  - C. Operating and emergency procedures entitled "Radiographic Procedures (Iridium 192)" and dated August 1, 1961.
  - D. Letter dated September 8, 1961 from W. L. Kester.
20. The licensee is authorized to receive, possess and use sealed sources of Iridium 192 and Cobalt 60 where the radioactivity exceeds the maximum amount of radioactivity specified in Item 8 of this license provided:
- A. Such possession does not exceed the quantity per source specified in Item 8 by more than 20% for Iridium 192 or 10% for Cobalt 60; and
  - B. Records of the licensee show that no more than the maximum amount of radioactivity per source specified in Item 8 of the license was ordered from the supplier or transferor of the byproduct material.

Date

SEP 21 1961

DUPLICATED  
FOR DIV. OF COMPLIANCE  
9/20/61

For the U. S. Atomic Energy Commission

Original by  
James R. [unclear]by Chief, Isotopes BranchDivision of Licensing and Regulation  
Washington 25, D. C.

DRH/Kaufman

SR/ 9-19-61

## APPLICATION FOR BYPRODUCT MATERIAL LICENSE

INSTRUCTIONS.—Complete items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only items 1 through 7 and indicate new information or changes in the program as requested in items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U. S. Atomic Energy Commission, P. O. Box E, Oak Ridge, Tenn. Attention: Isotopes Extension, Division of Civilian Application. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)		(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).)	
McDonnell Aircraft Corporation P. O. Box 516 St. Louis 66, Missouri		McDonnell Aircraft Corporation P. O. Box 516 St. Louis 66, Missouri	
2. DEPARTMENT TO USE BYPRODUCT MATERIAL		3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)	
Research		24-2261-3	
4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in items 8 and 9.)		5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in items 8 and 9.)	
Dr. C. J. Wolf		T. C. Linck and C. J. Wolf	
6. (a) BYPRODUCT MATERIAL. (Elements and mass number of each.)		(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)	
Sulfur - 35 Iron - 59 Calcium - 64 Zinc - 65 Gallium - 72 Arsenic - 76 Silver - 111 Cadmium - 115 Gold - 197		20 millicuries in any chemical form	

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

Research in solid state physics. Studies in crystal lattice defects and crystal diffusion mechanisms.

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FOR DIV. OF COMPLIANCE

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## TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

B. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	SEE PREVIOUS APPLICATION		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

## 9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience.)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		SEE PREVIOUS APPLICATION		

## 10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm <sup>2</sup> )	USE (Monitoring, surveying, measuring)
		SEE PREVIOUS APPLICATION			

## 11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

SEE PREVIOUS APPLICATION

## 12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)

SEE PREVIOUS APPLICATION

## INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes No
14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.
15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

## CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date 7 June 1962

McDonnell Aircraft Corporation

Applicant named in item 1

By: Dr. W. L. Kester

Scientist, Research Division

Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

**MCDONNELL** *Aircraft Corporation*  
Lambert Saint Louis MUNICIPAL AIRPORT • BOX 518, ST. LOUIS 66, MO.

8 JUN 1962

Ref: USAEC-220-687

To: United States Atomic Energy Commission  
Isotopes Branch  
Division of Licensing and Regulation  
Washington 25, D. C.

Subject: Byproduct Material License

1. The Research Division of the McDonnell Aircraft Corporation is initiating a program involving an investigation into various phenomena associated with lattice defects in crystal-line materials. In this program, use will be made of a cobalt - 60 gamma irradiator for which license application was made earlier. In addition to gamma radiation, it is planned that several short half-life beta emitting materials will be used in the study, accordingly, application is made for those byproduct materials for which we anticipate an immediate need.
2. The present request is for isotopes of fairly short half-life. Their use will minimize the hazard associated with accidental contamination during the initial phases of the program when additional personnel are being trained in the use and handling of such materials.
3. Projected planning indicates that an even greater variety of radiosotopes will be required in the near future. This fact coupled with a planned use of the reactor facilities at the Missouri School of Mines, Rolla, Missouri, leads to the conclusion that soon we will require a Broad License for research and development. In light of this fact we would appreciate any suggestions you may have concerning application for such a license.

MCDONNELL AIRCRAFT CORPORATION

*W. L. Kester*  
W. L. Kester  
Scientist  
Research Division

WLK:sv

**DUPLICATED**  
FOR DIV. OF COMPLIANCE

*Discussed by telephone 6/20/62 RER*

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ATOMIC ENERGY COMMISSION  
APPLICATION FOR BYPRODUCT MATERIAL LICENSE

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U. S. Atomic Energy Commission, P. O. Box E, Oak Ridge, Tenn. Attention: Isotopes Extension, Division of Civilian Application. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the licensee is subject to Title 10, Code of Federal Regulations, Part 20.

<p>1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)</p> <p>McDonnell Aircraft Corporation P. O. Box 516 St. Louis 66, Missouri</p>	<p>(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).)</p> <p>See 1 (a)</p>
<p>2. DEPARTMENT TO USE BYPRODUCT MATERIAL</p> <p>Project Gemini</p>	<p>3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)</p> <p>24-2261-3 24-2261-4</p>
<p>4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)</p> <p>Ghlee T. Cozad - Under direction of W. L. Kester</p>	<p>5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)</p> <p>T. C. Linck</p>
<p>6. (a) BYPRODUCT MATERIAL (Elements and mass number of each.)</p> <p>Tritium - 40 sealed sources of 6 curies each - total 240 curies.</p>	<p>(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)</p> <p>Tritium in Titanium foil Sealed into an ionization chamber Lion Research Corporation Model #52-88715-1</p>
<p>7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)</p> <p>A sealed source as part of an Ion Gage for measuring Carbon Dioxide partial pressure. Gage manufactured by Lion Research Corporation 12 Norfolk St. Cambridge 39, Mass. Lion part No. 52-88715-1</p>	

ACKNOWLEDGED

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## TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection .....			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments .....			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity .....			Yes No	Yes No
d. Biological effects of radiation .....			Yes No	Yes No

## 9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience.)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

## 10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm <sup>2</sup> )	USE (Monitoring, surveying, measuring)

## 11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

## 12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)

## INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes No

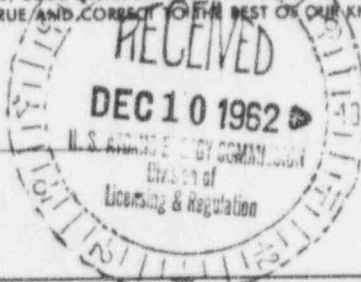
14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

## CERTIFICATE (This form must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date 5 December 1962



McDonnell Aircraft Corporation

Applicant named in item 1

By: Ch. L. FosterCHAIRMAN, Isotope Committee  
Title of certifying official

**WARNING.**—18 U. S. C., Section 1001; Act of June 25, 1948, 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.



U. S. ATOMIC ENERGY COMMISSION  
BYPRODUCT MATERIAL LICENSE

Page 1 of 2 Pages

Supplementary Sheet

License Number 24-2261-3  
(064)

Amendment No. 4

McDonnell Aircraft Corporation  
St. Louis, Missouri

Attention: William L. Kester  
M. A. Lamb  
F. C. Link  
F. C. McCallister, Jr.

H. E. Winn  
H. K. Weber  
C. J. Wolf

In response to application dated June 7, 1962, License No. 24-2261-3 is amended as follows:

Item 4 is amended to extend the expiration date from September 30, 1962 to July 31, 1964.

The symbol below the license number is changed from (I62) to (064).

Items 6, 7, 8, and 9 are amended to add:

6. Byproduct material (element & mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
K. Sulfur 35	K. Any	K. 20 millicuries
L. Iron 59	L. Any	L. 20 millicuries
M. Copper 64	M. Any	M. 20 millicuries
N. Calcium 45	N. Any	N. 20 millicuries
O. Zinc 65	O. Any	O. 20 millicuries
P. Gallium 72	P. Any	P. 20 millicuries
Q. Arsenic 76	Q. Any	Q. 20 millicuries
R. Silver 111	R. Any	R. 20 millicuries
S. Cadmium 115	S. Any	S. 20 millicuries
T. Gold 198	T. Any	T. 20 millicuries

9. Authorized use

K. - R. Research in solid state physics. Studies in crystal lattice defects and crystal diffusion mechanisms.

Conditions 12 and 14 are amended to read:

12. The licensee shall not transfer possession and/or control of materials or products containing byproduct material as a contaminant except:

(See page 2)

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U. S. ATOMIC ENERGY COMMISSION  
HYPRODUCT MATERIAL LICENSE  
Supplementary Sheet

Page 2 of 2 Pages

License Number 24-2261-3  
(664)

Amendment No. 4

12. (cont'd.)

- (a) by transfer of waste to an authorized recipient,
- (b) by transfer to a specifically licensed recipient, or
- (c) as provided otherwise by specific condition of this license pursuant to the requirements of Section 30.24(h), 10 CFR 30.

14. Hyproduct material shall be used by, or under the supervision of William L. Kester, H. A. Lamb, T. C. Link, F. C. McCallister, Jr., H. E. Winn, H. K. Weber, or G. J. Wolf. The only person authorized to act as radiographer under this license is F. C. McCallister, Jr. "Radiographer" is defined in Title 10, Code of Federal Regulations, Part 31, "Radiation Safety Requirements For Radiographic Operations", Section 31.3(a).

For the U. S. Atomic Energy Commission

Original Signed by  
Robert E. Brinkman

Isotopes Branch

Division of Licensing and Regulation  
Washington 25, D. C.

DUPLICATED  
FOR DIV. OF COMPLIANCE

Date JUN 28 1962

1. WSC/De

REB 6/28/62