FORM AEC-374A
(2-65)

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

License Number 11-00197-04

Amendment No. 11

University of Idaho
Engineering Experiment Station
Moscow, Idaho 83843

In accordance with letter dated August 8, 1967, License Number 11-00197-04 is amended as follows:

Condition 13. is amended to read:

13. Byproduct material shall be used by, or under the supervision of, J. J. Peebles or Vance E. Penton.

Date AUG 25 1967

For the U. S. Atomic Energy Commission
Original Signed by
John E. Bowyer
by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

8-22-67

RJD/eg

FORM AEC-374A
(2-65)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENS
Supplementary Sheet

License Number 11-00197-04

Amendment No. 10

University of Idaho
Engineering Experiment Station
Moscow, Idaho 83843

In accordance with application dated May 3, 1967, License Number 11-00197-04 is amended as follows:

The expiration date in Item 4 is changed to June 30, 1972.

Condition 13. is amended to read:

13. Byproduct material shall be used by, or under the supervision of, J. J. Peebles, Vance E. Penton, or George A. McKean.

For the U. S. Atomic Energy Commission

Original Signed By 6-21-67

by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

Date JUN 2 1 1967

JEB/

FORM AEC-374A
(10-61)

U. S. ATOMIC ENERGY COMMISSION

MATERIAL LICENSE

Supplementary Sheet

License Number 11-00197-04

Amendment No. 09

University of Idaho
Engineering Experiment Station
Moscow, Idaho 83843

Attention: J. J. Peeples
Vance E. Penton
George A. McKean
Harvey M. Waldron, III

In accordance with letter dated May 2, 1966, signed by G. A. McKean, License Number 11-00197-04 is amended as follows:

To add:

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
E. Americium 241	E. Sealed Source (Minnesota Mining and Manufacturing Company Custom Drawing No. A-1921-399)	E. 100 millicuries

9. Authorized use

E. For use in a shielded gage for measurement of density.

Condition 13 is amended to add:

Byproduct material, shown as Subitem E., may only be used by, or under the supervision of, G. L. Bloomsburg or G. A. McKean.

Condition 17 is amended to add:

17. C. Letters dated May 2, 1966, and 17 March 1966, both signed by G. A. McKean.

For the U. S. Atomic Energy Commission

Original Signed By
John E. Bowyer 5-20-66

by Isotopes Branch
Division of Materials
Licensing
Washington 25, D. C.

Date MAY 20 1966

JLH/ec

FORM AEC-374A
(2-65)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIA ICENSE
Supplementary Sheet

License Number 11-197-4
(G67)

Amendment No. 8

University of Idaho
Engineering Experiment Station
Moscow, Idaho 83843

Attention: J. J. Peebles
Vance E. Penton
George A. McKean
Harvey M. Waldron, III

In accordance with letter request dated November 18, 1965, signed by Dr. G. A. McKean, License No. 11-197-4 is amended as follows:

Condition 13 is amended to read:

13. Byproduct material shall be used by, or under the supervision of, J. J. Peebles, Vance E. Penton, George A. McKean or Harvey M. Waldron, III.

For the U. S. Atomic Energy Commission

1-6-66 [redacted]
Original Signed by
John E. Bowyer

by _____ Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

Date JAN 6 1966

1 Lap

FORM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION

BYPRODUCT MATERIAL LICENSE AMENDMENT NO. 7 11-197-4 (G67)

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, 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.

Licensee	
1. Name University of Idaho Engineering Experiment Station	3. License number In accordance with application dated May 18, 1965, 11-197-4 is amended in its entirety to read as follows:
2. Address Moscow, Idaho	4. Expiration date July 31, 1967
	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
(See Page 2)	(See Page 2)	(See Page 2)

9. Authorized use

(See Page 2)

CONDITIONS

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

11. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation."

12. Byproduct material may also be used at remote water and snow gauge stations on Moscow Mountain in Latah County, Idaho, at Township 40 North, Ranges 4 West and 5 West, and on Hemlock Butte, lying on the boundary between Clearwater and Idaho Counties, Idaho, at Township 36 North, Range 7 East.

13. Byproduct material shall be used by, or under the supervision of, J. J. Peebles, Vance E. Penton, or George A. McKean.

14. The licensee shall not use byproduct material in or on human beings or in field applications where activity is released except as provided otherwise by specific condition of this license.

15. Sealed sources containing byproduct material shall not be opened by the licensee.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivi which licensee may possess at any one time
A. Cobalt 60	A. Sealed Sources (Isotopes Specialties Type 38)	A. 2 sources of 40 millicuries each, total - 80 millicurie
B. Cobalt 60	B. Sealed Sources (U. S. Nuclear Corporation Type 338)	B. 4 sources up to 500 millicuri each, total not to exceed 1 curie
C. Cesium 137	C. Sealed Sources (U. S. Nuclear Corporation Type 376)	C. 4 sources up to 500 millicuri each, total not to exceed 1 curie
D. Europium 152	D. Sealed Sources (U. S. Nuclear Corporation Type 375)	D. 4 sources up to 500 millicuri each, total not to exceed 1 curie

9. Authorized Use

A. through D. To be used as radiation sources in water and snow gauges.

CONDITIONS

16. A. Each sealed source listed in Items 7A, 7B, 7C, and 7D shall be tested for leakage and/or contamination at intervals not to exceed six months while in storage. Each sealed source located at the remote test sites named in Item 12 above shall be tested for leakage and/or contamination each spring when the cap is placed over the collimator and each fall when the cap is removed from the collimating device or at intervals not to exceed twelve months if the source remains at the remote test site but is not used in the snow gauge during any twelve-month period. In the absence of a certificate from a transferor, 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 radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is mounted or stored on which one might expect contamination to accumulate. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

Continued From Page 2

16. 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 Materials Licensing, U. S. Atomic Energy Commission, Washington, D. C., 20545, describing the equipment involved, the test results, and the corrective action taken. A copy of such report shall also be sent to the Director, Region IV, Division of Compliance, USAEC, P. O. Box 15266, Denver, Colorado, 80215.

D. Tests for leakage and/or contamination shall be performed by George A. McKean, or by other persons specifically authorized by the Commission, or an Agreement State to perform such services.

17. 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 June 19, 1961, and May 18, 1965, and in related documents and amendments as follows:

A. Administrative instructions entitled "Regulations Governing the Safe Handling of Radioactive Isotopes at the University of Idaho."

B. Letters dated June 16, 1961, and February 12, 1962, signed by A. S. Janssen and J. W. Watts, and letters dated April 17, 1962, and June 10, 1963, signed by A. S. Janssen, Frederic D. Johnson, and Kenneth A. Dick.

For the U. S. Atomic Energy Commission

Original Signed by
John E. Bowyer

by Jno 7-30 Isotopes Branch

Division of Materials Licensing
Washington, D. C. 20545

Date JUL 30 1965

U. S. ATOMIC ENERGY COMMISSION

MATERIAL LICENSE

Supplementary Sheet

License Number 11-197-4 (G65)

Amendment No. 6

University of Idaho
Engineering Experimental Station
Moscow, Idaho

Attention: J. J. Peebles, Don L. Duncan, Vance E. Penton, George A. McKean

In accordance with application dated October 15, 1963, License No. 11-197-4 is amended as follows:

To add:

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
E. Cesium 137	E. Sealed sources (Nuclear-Chicago Corp. Model RR-137)	E. 1 source of 3.5 millicuries & 1 source of 20 microcuries
F. Cesium 137	F. Sealed source (Nuclear-Chicago Corp. Model RR-138)	F. 3.5 millicuries
G. Hydrogen 3	G. Any	G. 100 millicuries

9. Authorized use

E. To be used in Nuclear-Chicago Corporation Model P20 Subsurface Density Gauge to measure material density.
F. To be used in Nuclear-Chicago Corporation Model P22A Surface Density Gauge to measure material density.
G. Groundwater tracer studies.

Condition No. 11 is amended to read:

11. Byproduct material may also be used at remote water and snow gauge stations on Moscow Mountain, Latah County, Idaho, on Hemlock Butte on the boundary between Clearwater and Idaho Counties, Idaho, and on Mount Hood Experimental Pillow Site, Clackamas County, Oregon. Byproduct material listed in Subitems E, F, and G may be used at temporary experimental sites throughout the State of Idaho.

(see page 2)

For the U. S. Atomic Energy Commission

Date NOV 26 1963

by Original Signed by John E. Bowyer 11-22-63

Isotopes Branch

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

License Number 11-197-4
(G65)

AMENDMENT NO. 6

ondition No. 14 is amended to read:

4. Byproduct material as sealed sources shall not be opened. The licensee shall not remove sealed sources containing byproduct material from the Model P20 or P22A density gauges.

ondition No. 16.A. is amended to read:

5. A. (1.) Each sealed source listed in Items 7.A., 7.B., 7.C., and 7.D. shall be tested for leakage and/or contamination at intervals not to exceed six months while in storage. Each sealed source located at the remote test site named in Item 11 above shall be tested for leakage and/or contamination each spring when the cap is placed over the collimator and each fall when the cap is removed from the collimating device or at intervals not to exceed twelve months if the source remains at the remote test site but is not used in the snow gauge during any twelve-month period. In the absence of a certificate from a transferor indicating that a test has been made six months prior to the transfer, the sealed source shall not be put into use until tested.

(2.) Each sealed source listed in Items 7.E. and 7.F. shall be tested for leakage and/or contamination at intervals not to exceed one year. In the absence of a certificate from a transferor indicating that a test has been made six months prior to the transfer, the sealed source shall not be put into use until tested.

ondition No. 17 is amended to read:

7. 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 June 19, 1961, and October 15, 1963, and in related documents and amendments as follows

A. Administrative instructions entitled "Regulations Governing the Safe Handling of Radioactive Isotopes at the University of Idaho."

B. Letters dated June 16, 1961, and February 12, 1962, signed by A. S. Janssen and J. W. Watts, and letters dated April 17, 1962, and June 10, 1963, signed by A. S. Janssen, Frederic D. Johnson, and Kenneth A. Dick.

For the U. S. Atomic Energy Commission

Date NOV 26 1963

by Original Signed by John E. Bowyer 11-22-63

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

FORM AEC-374
(1-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

License No. 11-197-4
Amendment No. 5 (G65)

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, 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.

Licensee	
1. Name	University of Idaho
2. Address	Engineering Experimental Station Moscow, Idaho

In accordance with application received June 21, 1963
3. License number 11-197-4 is amended in its entirety to read as follows:
4. Expiration date July 31, 1965
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. Cobalt 60	A. Sealed Sources (Isotope Specialties Type 38)	A. 2 sources of 40 millicuries each Total 80 millicuries

(See page 2)

9. Authorized use

A. through D. Used as radiation sources in a water and snow gauge.

CONDITIONS

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

11. Byproduct material may also be used at remote water and snow gauge stations on Moscow Mountain, Latah County, Idaho, on Hemlock Butte on the boundary between Clearwater and Idaho Counties, Idaho and on Mount Hood Experimental Pillow Site, Clackamas County, Oregon.

12. Byproduct material shall be used by, or under the supervision of, J. J. Peebles, Don L. Duncan, Vance E. Penton and George A. McKean.

13. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation."

14. Byproduct material as sealed sources shall not be opened.

15. The licensee shall not use byproduct material in or on human beings or in field applications where such activity is released except as provided otherwise by specific condition of this license.

(Continued)

Continued From Page 1

License Number 11-197-4
(065)
Amendment No. 5

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
B. Cobalt 60	B. Sealed Sources (U. S. Nuclear Corporation Type 338)	B. 4 sources up to 500 millicuries each with Total not to exceed 1 curie
C. Cesium 137	C. Sealed Sources (U. S. Nuclear Corporation Type 376)	C. 4 sources up to 500 millicuries each with Total not to exceed 1 curie.
D. Europium 152	D. Sealed Sources (U. S. Nuclear Corporation Type 375)	D. 4 sources up to 500 millicuries each with Total not to exceed 1 curie

CONDITIONS

16.A. Each sealed source containing Cobalt 60, Cesium 137 or Europium 152 shall be tested for leakage and/or contamination at intervals not to exceed six (6) months while in storage. Each sealed source located at the remote test site named in Item 11 above shall be tested for leakage and/or contamination each spring when the cap is placed over the collimator and each fall when the cap is removed from the collimating device or at intervals not to exceed twelve (12) months if the source remains at the remote test site but is not used in the snow gauge during any twelve (12) month period. In the absence of a certificate from a transferor indicating that a test has been made six (6) 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 source. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. 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 (5) days of the test with the Director, Division of Licensing and Regulation, U. S. Atomic Energy Commission, Washington 25, D. C., describing

(Continued)

Continued from page 2

License Number 11-197-4 (G65)
Amendment No. 5

CONDITIONS

the equipment involved, the test results and the corrective action taken. A copy of such report shall also be sent to the Director, Region IV, Division of Compliance, USAEC, P. O. Box 15266, Denver 15, Colorado.

D. Tests for leakage and/or contamination shall be performed by Don L. Duncan, or George A. McKean.

17. 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 application dated June 19, 1961, and in related documents and amendments as follows:

A. Administrative instructions entitled "Regulations Governing the Safe Handling of Radioactive Isotopes at the University of Idaho."

B. Letters dated June 16, 1961 and February 12, 1962 signed by A. S. Janssen and J. W. Watts, and letters dated April 17, 1962 and June 10, 1963 signed by A. S. Janssen, Frederic D. Johnson and Kenneth A.Dick.

18. Written instructions referenced in Condition 17.A. covering radiological protection control and security of byproduct material shall be followed and a copy of instructions shall be supplied to each individual using or having responsibility for use of such material. Any changes in the instructions shall have the prior approval of the Isotopes Branch, Division of Licensing and Regulation.

19. Pursuant to Section 20.105(a) of Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation," the licensee is hereby authorized to produce radiation levels in unrestricted areas as necessary to the use of these sources, as described in his letter dated April 17, 1962.

For the U. S. Atomic Energy Commission

Date JUL 17 1963

DUPLICATED FOR DIV. OF COMPLIANCE

by Original Signed by John E. Bowyer 7-17-63

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

1 BWC/Harris BR

FORM AEC-374A
(12-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICE E
Supplementary Sheet

License Number 11-197-4
(063)

AMENDMENT NO. 4

University of Idaho
Engineering Experimental
Station
Moscow, Idaho

Attention: Lee M. Maxwell
Don L. Dumont
Vance E. Fenton
George A. McKean

In accordance with letter dated October 18, 1962, License No. 11-197-4 is amended as follows:

Condition 43. A. and 53 amended to read:

43. A. Administrative instructions entitled "Regulations Governing the Safe Handling of Radioisotopes at the University of Idaho," dated September 1962.

53. Written instructions referenced in Condition 43.A. covering radiological protection, control and security of byproduct material shall be followed and a copy of instructions shall be supplied to each individual using or having responsibility for use of such material. Any changes in the instructions shall have the prior approval of the Isotopes Branch, Division of Licensing and Regulation.

For the U. S. Atomic Energy Commission

Date NOV 15 1962

by Original signed by J. E. [illegible] 11-15-62
Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

DBH
1. DBH/Cases

FORM AEC-374A
(12-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENS
Supplementary Sheet

License Number 11-197-4
(G63)

AMENDMENT NO. 3

University of Idaho
Engineering Experimental
Station
Moscow, Idaho

Attention: Lee M. Maxwell
Don L. Duncan
Vance E. Penton
George A. McKean

In accordance with letter from George A. Mc Kean, dated July 30, 1962, License No. 11-197-4 is amended as follows:

Condition 51. D. is amended to read:

51. D. Tests for leakage and/or contamination shall be performed by Don L. Duncan, or George A. Mc Kean.

For the U. S. Atomic Energy Commission

Date AUG 21 1962

DUPLICATED
FOR DIV. OF COMPLIANCE

by Original Signed by John A. Hall 8-21-62
Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

GH #
DBH/Cary

FORM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION

BYPRODUCT MATERIAL LICENSE NO. 11-197-4 (G63) AMENDMENT NO. 2

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, 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.

Licensee			
1. Name	University of Idaho Engineering Experimental Station	3. License number	In accordance with application dated February 12, 1962 11-197-4 is amended in its entirety to read as follows:
2. Address	Moscow, Idaho	4. Expiration date	July 31, 1963
		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. Cobalt 60	A. Sealed Sources (Isotope Specialties Type 38)	A. 2 sources of 40 millicuries each Total - 80 millicuries
(See page 2)	(See page 2)	(See page 2)

9. Authorized use

A. through D. Used as radiation sources in a water and snow gauge.

CONDITIONS

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

11. Byproduct material may also be used at remote water and snow gauge stations on Moscow Mountain, Latah County, Idaho and on Hemlock Butte on the boundary between Clearwater and Idaho Counties, Idaho.

15. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards For Protection Against Radiation".

19. Byproduct material shall be used by, or under the supervision of, Lee M. Maxwell, Don L. Duncan, Vance E. Penton or George A. McKean.

24. Byproduct material as sealed sources shall not be opened.

(Continued)

Continued from Page 1

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
B. Cobalt 60	B. Sealed Sources(U.S. Nuclear Corporation Type 338)	B. 4 sources up to 500 millicuries each with Total not to exceed 1 curie.
C. Cesium 137	C. Sealed Sources(U.S. Nuclear Corporation Type 376)	C. 4 sources up to 500 millicuries each with Total not to exceed 1 curie.
D. Europium 152	D. Sealed Sources(U.S. Nuclear Corporation Type 375)	D. 4 sources up to 500 millicuries each with Total not to exceed 1 curie.

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Continued from page one

CONDITIONS

51. A. Each sealed source containing Cobalt 60, Cesium 137 or Europium 152 shall be tested for leakage and/or contamination at intervals not to exceed 6 months while in storage. Each sealed source located at the remote test sites named in Item 11 above shall be tested for leakage and/or contamination each spring when the cap is placed over the collimator and each fall when the cap is removed from the collimating device or at intervals not to exceed 12 months if the source remains at the remote test site but is not used in the snow gauge during any 12 month period. In the absence of a certificate from a transferor indicating that a test has been made 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 source. The test sample shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. 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 also be sent to the Director of the appropriate Regional Office, Division of Compliance, U. S. Atomic Energy Commission:

Region I, Division of Compliance, USAEC, 376 Hudson Street, New York, 14, New York

Region II, Division of Compliance, USAEC, 50 Seventh Street, Northeast, Atlanta 23, Georgia

Region III, Division of Compliance, USAEC, 9800 South Cass Avenue, Argonne, Illinois

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Continued

CONDITIONS

Region IV, Division of Compliance, USAEC, P. O. Box 15266, Denver 15, Colorado

Region V, Division of Compliance, USAEC, 2111 Bancroft Way, Berkeley 4, California

D. see amendment 3 Tests for leakage and/or contamination shall be performed by Don L. Duncan.

40. The licensee shall not use byproduct material in or on human beings or in field applications where such activity is released except as provided otherwise by specific condition of this license.

43. see floor sheet 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 application dated June 19, 1961. (and in related documents and amendments as follows;

A. see Amend. 4 Administrative instructions entitled "Regulations Governing the Safe Handling of Radioactive Isotopes at the University of Idaho."

B. Letters dated June 16, 1961 and February 12, 1962 signed by A. S. Janssen and J. W. Watts, and letter dated April 17, 1962 signed by A. S. Janssen, Frederic D. Johnson and Kenneth A. Dick.

53. see amend. 4 Written instructions referenced in Condition 43 covering radiological protection, control and security of byproduct material shall be followed and a copy of instructions shall be supplied to each individual using or having responsibility for use of such material. Any changes in the instructions shall have the prior approval of the Isotopes Branch, Division of Licensing and Regulation.

54. Pursuant to Section 20.105(a) of Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation," the licensee is hereby authorized to produce radiation levels in unrestricted areas as necessary to the use of these sources, as described in his letter dated April 17, 1962.

For the U. S. Atomic Energy Commission

Date MAY 22 1962

Original Signed by John E. Bowyer 5-22-62

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

I. Gonyea/Carey

AEC-374A
(12-57)

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

License Number 11-197-4
(G63)

Amendment No. 1

University of Idaho
Engineering Experiment Station
Moscow, Idaho

Attention: L. M. Maxwell
D. L. Duncan
V. E. Fenton
G. A. McKean
H. Singh

In accordance with letter dated January 4, 1962 signed by Don L. Duncan, License No. 11-197-4 is amended as follows:

Condition 19.D. is amended to read:

19.D. Tests for leakage and/or contamination shall be performed by Don L. Duncan.

For the U. S. Atomic Energy Commission
Original Signed By
James R. Mason 1-17-62
by Chief, Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

Date January 17, 1962

RM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, 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.

Licensee

1. Name: University of Idaho
   Engineering Experiment Station
2. Address: Moscow, Idaho

3. License number: 11-197-4 (G63)
4. Expiration date: July 31, 1963
5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may posses at any one time
A. Cobalt 60	A. Sealed Source (Isotope Specialties Type 36)	A. 80 millicuries (2 sources of 40 millicuries each)

9. Authorized use

A. As a radiation source in a water and snow guage.

CONDITIONS

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

11. Byproduct material may also be used at remote water and snow guage station on Moscow Mountain in Latah County, Idaho.

12. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation".

13. Byproduct material shall be used by, or under the supervision of, L. M. Maxwell, D. L. Duncan, V. E. Fenton, G. A. McKean, or H. Singh.

14. Byproduct material as sealed sources shall not be opened.

15. Byproduct material shall not be used in or on human beings or in products distributed to the public.

(See page 2)

continued from page 1

16. Each sealed source of licensed material to be used outside of a shielded exposure device shall bear a durable, legible and visible tag permanently attached to the source. The tag shall be at least one (1) inch square, shall bear the conventional radiation symbol prescribed in Section 20.203(a) of Part 20 and a minimum of the following instructions: DANGER, RADIOACTIVE MATERIAL, DO NOT HANDLE, NOTIFY CIVIL AUTHORITIES IF FOUND.
Repair or replacement of tags shall be accomplished by persons specifically licensed by the Commission to perform this service.

17. 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 procednres contained in application dated June 19, 1961 and letter dated June 16, 1961 signed by A. S. Janssen and J. W. Watts, and in related documents and amendments as follows:

    A. Administrative instructions entitled "Regulations Governing the Safe Handling of Radioactive Isotopes at the University of Idaho".

18. Written administrative instructions referenced in Item 17 covering radiological protection, control, and security of byproduct material shall be followed and a copy of instructions shall be supplied to each individual using or having responsibility for use of such material. Any changes in the administrative instructions shall have the prior approval of the Isotopes Branch, Division of Licensing and Regulation.

19. A. Each sealed source containing Cobalt 60 shall be tested for leakage and/or contamination at intervals not to exceed 6 months. In the absence of a certificate from a transferor indicating that a test has been made within 6 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 test sample. 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.

(See page 3)

continued from page 2

19. 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 5 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 D of Title 10, Code of Federal Regulations, Part 20.

D. Tests for leakage and/or contamination shall be performed by persons specifically authorized by the Commission to perform such services.

For the U. S. Atomic Energy Commission

Original Signed By
James R. Mason

by Chief, Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

Date JUL 25 1961

/ Lapman /

7-25-61

UNIVERSITY OF IDAHO

MOSCOW, IDAHO 83843

Engineering Experiment Station

8 August 1967

U.S. Atomic Energy Commission
Division of Licensing
Washington, D.C.

RE: Byproduct Materials License 11-197-04

Gentlemen:

Effective on 25 August 1967, will you please remove the name of George A. McKean from the above-referenced Byproducts Materials License. This modification is requested to reflect termination of employment.

Sincerely yours,

George A. McKean
Research Supervisor

GAM/lc
cc: Dr. R.E. Warner

Form AEC-313
8-64
10 CFR 30

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved.
Budget Bureau No. 38-R027

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commisson with respect to Items 8 through 15 may be incorporated by reference provided references are clear and specific. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C., 20545, Attention: Isotopes Branch, Division of Materials Licensing. 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. Include ZIP Code.)*

Engineering Experiment Station
University of Idaho
Moscow, Idaho 83843

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a). Include ZIP Code.)*

University of Idaho campus, Remote site on Moscow Mountain in Latah County, Idaho at Township 40 North Ranges 4 West and 5 West. (See Attachment A

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Engineering Experiment Station

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Renewal of License No.
11-197-4(G67)

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.)*

G.A. McKean Associate Professor
V.E. Penton Assistant Professor
J.J. Peebles Associate Professor
G.L. Bloomsburg Associate Professor
(See Attachment B)

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.)*

G. A. McKean
(See Attachment C)

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

Cobalt 60
Cesium 137
Europium 152 (with trace of Europium 154)
Americium 241

(See Attachment D)

(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.)*

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.)*

All sources except the Americium source are for use in investigations concerning the development of nuclear radiation snow gages. Collimators similar to those described in the original application will be used except that appropriately increased shielding will be used for larger sources than described in the original application. The Americium 241 source is for use in a shielded gage for measurement of density as described in letters dated 5/2/66 and 3/17/66. Under no circumstances will any of the above sealed sources be opened.

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(Continued on reverse side)

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/cm²)*	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 IN DUPLICATE

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 5/3/67

G. A. McKean, Radiological Safety Officer
University of Idaho

University of Idaho
Engineering Experiment Station
Applicant named in item 1

By: Kenneth A. Klug

Financial Vice President
University of Idaho
Title of certifying official

RECEIVED MAY 3 1967

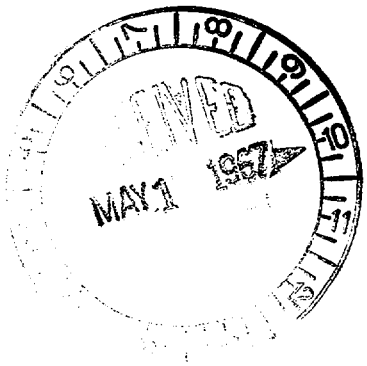
WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948, 62 Stat. 749, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

* U.S. GOVERNMENT PRINTING OFFICE : 1964 O—745-381

ATTACHMENT A

Item 1. (b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED (continued)

Remote site on Hemlock Butte, lying on the boundary between Clearwater and Idaho Counties, Idaho, at Township 36 North, Range 7 East.



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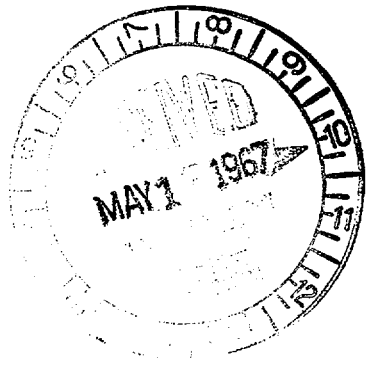
ATTACHMENT B

Item 4. INDIVIDUAL USER(S) (continued)

G. A. McKean, V. E. Penton, J. J. Peebles, and G. L. Bloomsburg are presently approved users of byproduct material under this license for which renewal is requested.

The name of H. M. Waldron III should be deleted from this license since he will terminate employment with the University of Idaho on 30 June 1967.



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ATTACHMENT C

ATTACHMENT TO FORM AEC-313

Radiation Protection Officer, University of Idaho

Name: G.A. McKean
Kirtley Laboratory No. 2
University of Idaho
Moscow, Idaho

Type of Training (as per item 8, Form AEC 313):

a. Principles and practices of radiation protection

Where Trained: University of Idaho, Moscow, Idaho
Atomic Energy Commission, Hanford, Washington

Training Duration: 6 years total

Training Mode: Formal indoctrination, AEC
On-job training, Univ. of Idaho
Formal course, Univ. of Idaho

b. Radioactivity measurement standardization and monitoring techniques and instruments

same as "a" above

c. Mathematics and calculations basic to the use and measurement of radioactivity

same as "a" above

d. Biological effects of radiation

Where Trained: University of Idaho, Moscow, Idaho
University of New Mexico, Albuquerque, N. M.

Training Duration: 6 years total

Training Mode: On-job training, Univ. of Idaho
Conference indoctrination, Univ. of New Mexico

Experience with Radiation (as per item 9, Form AEC 313):

a. Cobalt-60; 1 curie (max.); U.S.A.E.C., Hanford, Washington; 2 days handling; indoctrination

b. Cobalt-60, Cesium-137; 250 mc(max.); University of Idaho, Moscow, Idaho; 4 years handling (incl. leak testing); development of radioactive snow gage.

Additional Qualifications

a. Certified Radiological Monitoring Instructor (Civil Defense)

b. Certified Radiological Defense Officer (Civil Defense)

c. Registered Professional Engineer (EE), state of Idaho

ATTACHMENT D

Item 6. (b) FORM AND QUANTITY OF BYPRODUCT MATERIAL

Physical Form	Manufacturer	Model No.	Max. Activity Per Source	Max. Total Activity
Cobalt 60 Sealed Sources	U. S. Nuclear Corporation (or equivalent)	4 Type 338 capsules	500 millicuries	1,000 millicuries
Cesium 137 Sealed Sources	U. S. Nuclear Corporation (or equivalent)	4 Type 376 capsules	500 millicuries	1,000 millicuries
Europium 152 Sealed Sources	U. S. Nuclear Corporation (or equivalent)	4 Type 375 capsules	500 millicuries	1,000 millicuries
Cobalt 60 Sealed Sources	Isotope Specialties	2Type 38 capsules of equivalent	40 millicuries	80 millicuries
Americium 241 Sealed Source	Minnesota Mining Manufacturing	Drawing No. A-1921-399	100 millicuries	100 millicuries

UNIVERSITY OF IDAHO

MOSCOW, IDAHO 83843

Engineering Experiment Station

3 May 1967

Mr. Lyall Johnson, Chief
Licensing Branch
Division of Licensing and Regulation
U.S. Atomic Energy Commission
Washington 25, D.C.

Dear Mr. Johnson:

We wish to have our Byproduct Material License No. 11-197-4(G67) renewed and modified as stated in the attached AEC form 313 and explanatory statements. This license was first issued to the University of Idaho Engineering Experiment Station on July 31, 1961, and has since been amended and renewed as necessary.

Referring to the AEC Form 313, we wish to modify Item 4, INDIVIDUAL USER(S). This modification would reflect the departure of a University employee on 30 June 1967.

The renewal of our license will permit our continuing investigations in the areas of water and soil. For this reason, we will appreciate greatly any assistance you may extend in renewing and modifying this license.

Sincerely yours,

G. A. MCKEAN
Radiological Safety Officer
University of Idaho

ALLEN S. JANSSEN
Dean, College of Engineering
Director Engineering Experiment Station
University of Idaho

KENNETH A. DICK
Financial Vice President
University of Idaho

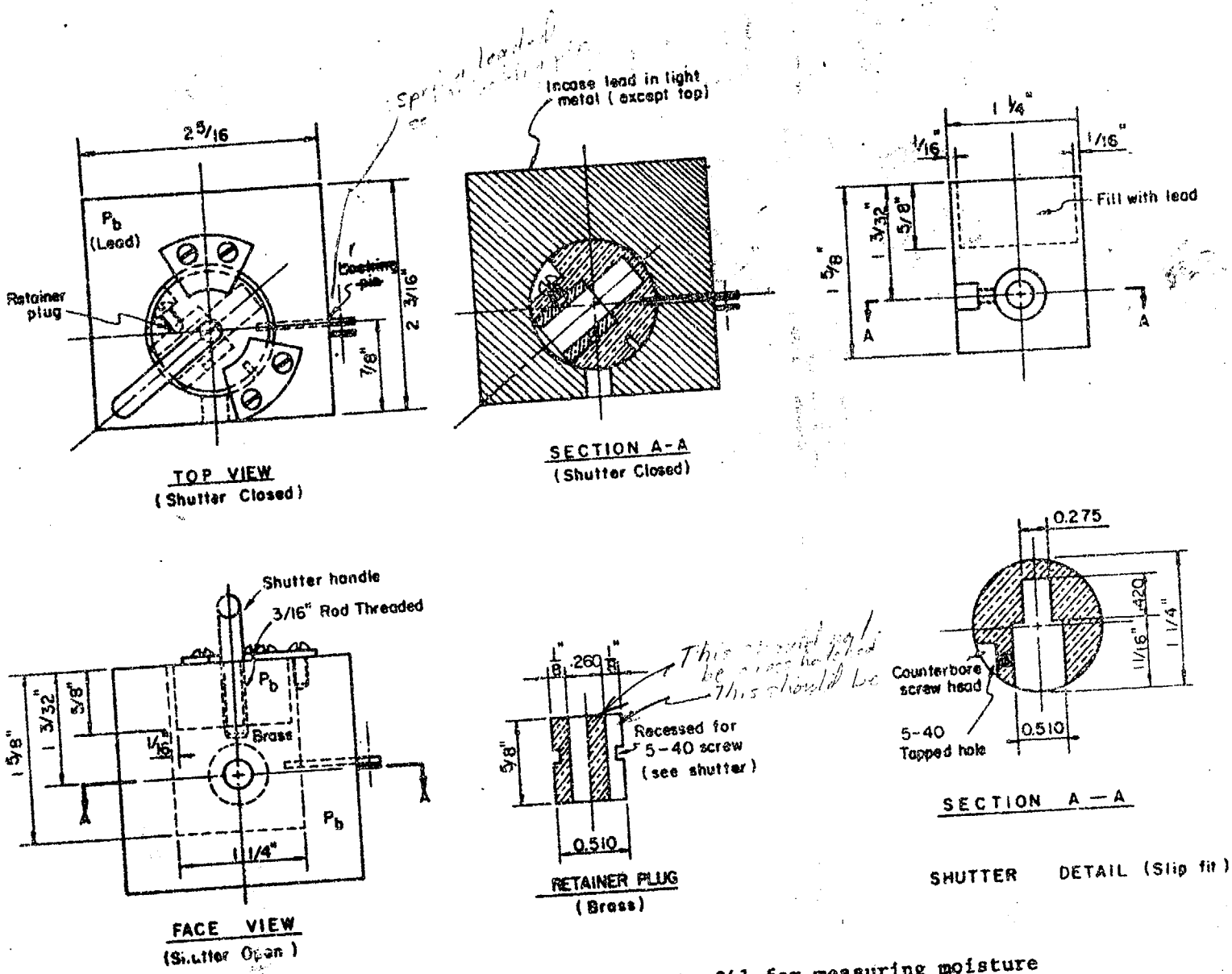

Figure 2. Shield-shutter device to hold 100 mc. Am-241 for measuring moisture content in thin soil columns by gamma rays.

/ey of all - EPR

UNIVERSITY OF IDAHO

MOSCOW, IDAHO

Engineering Experiment Station

OFFICE OF THE DIRECTOR

2 May 1966 1125

76531

Mr. Ernest Resner
Division of Licensing
U.S. Atomic Energy Commission
Washington, D.C. 20545

Dear Mr. Resner:

You telephoned me on 25 April 1965, stating that you needed additional information in order to approve a requested ammendment to our Byproduct Materials License No. 11-197-4. In particular, you requested that we supply the make and model of the Americium source, a description of the source mounting, the shielding arrangement and the anticipated dose rate.

The Americium -241 is a Type 304 sealed source, manufactured by the Minnesota Mining and Manufacturing Co. Enclosure A illustrates the capsule configuration.

Enclosure B illustrates the source mounting. The source, mounted in the shield-shutter device, will be mounted adjacent to a plastic encased soil column approximately 1-3/4 in. in diameter. A lead shield, approximately 1/4in. thick with a narrow slit, will be placed on each side of the soil column to give a collimated beam.

Americium -241, with a photopeak energy of 0.06 Mev, will yield a dose rate of 0.25 r/hr/curie at 1 foot. At one inch from an unshielded 100 mc source, 3.6 r/hr would be expected. However, the requested 100 mc source will be enclosed by at least 0.7 cm of lead and, at one inch away from the source, 3.6×10^{-12} r/hr dose rate is calculated.

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E/5/11

Should you need any additional information, please contact me. I feel that your telephone contacts have certainly aided the minimization of license processing time.

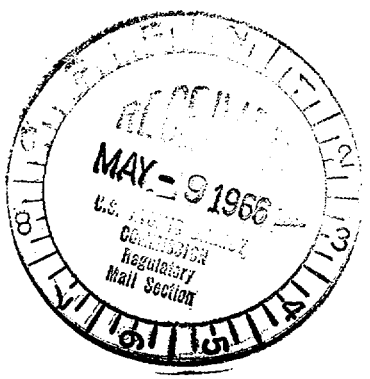
Sincerely yours,

G. A. McKean
Radiological Safety Officer

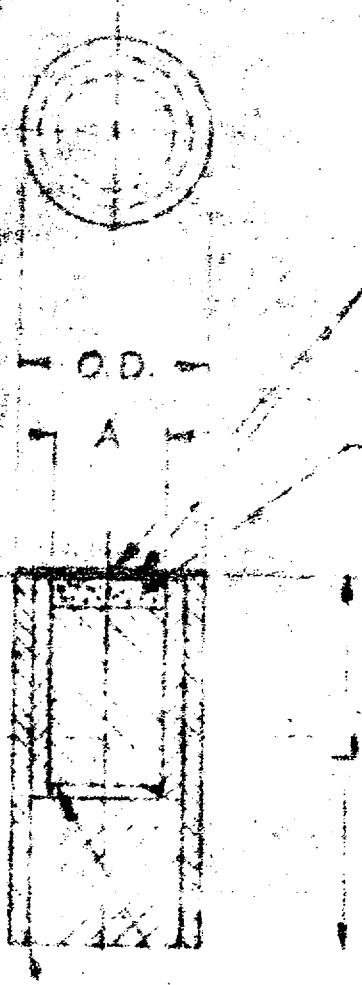
Attachments (2)

cc: G. L. Bloomsburg
AEC License File
AEC Correspondence File

GAM/rs



ENCLOSURE A



.005" thick each

2 STAINLESS STEEL [illegible]
WINDOWS - 1 EACH ON [illegible]
OUTER CAPSULE ROT[illegible]
SILVER BRAZED ALL AR[illegible]

~~3M BRAND RADIATION~~ Am-241
~~MICROSPHERES CONTAINING~~
~~ISOTOPE.~~

O.D. = .270
L = .420

SILVER BRAZE ALL AROUND

~~WELD~~ BRAZE ALL AROUND

MAT'L
STAINLESS STEEL
TYPE 304

USED ON

TOLERANCE EXCEPT AS NOTED	MACHINED DIMENSIONS	MATERIAL SURFACE FINISHES EXCEPT AS NOTED	63
		SCALE NONE	
		DR J.D. SWENSON	
		CK [illegible]	
		APP. [illegible]	

MINNESOTA MINING & MANUFACTURING CO.
ST. PAUL 6, MINNESOTA

REV	ISSUE DATE AND CHANGE NUMBER	DEC. 16, 1965
DIVISION	NUCLEAR	
TITLE	3M STANDARD SOURCE CYLINDRICAL TYPE BETA FLOW ENERGY (GAMMA)	
A	1921-399	

61203

UNIVERSITY OF IDAHO
No. 208 +U 30110
MOSCOW, IDAHO

6566 of 24

Engineering Experiment Station
OFFICE OF THE DIRECTOR

17 March 1966

Dr. John E. Bowyer
Isotopes Branch
Division of Materials Licensing
U.S. Atomic Energy Commission
Washington, D.C. 20545

Dear Dr. Boyer:

We wish to have our Byproduct Materials License No. 11-197-4 (G-67) modified to add the following:

1. One authorized individual user;
2. Possession and use of Americium-241 sealed sources.

These modifications will involve no changes in the work presently performed under this license but will allow us to use Americium-241 to determine the packing density and liquid saturation of porous materials in a plastic column several centimeters in diameter.

Since no additional license modifications will be needed, this request has been tabulated concisely on the attached pages instead of completing an entire Form AEC-313. All numerical references are correspondingly related to Form AEC-313 items. We hope you find this approach satisfactory.

We assume that any problems involved in granting the modifications requested herein will in no way interfere with our present operations under License No. 11-197-4 (G 67) as currently amended.

Very truly yours,

G. A. McKean
Radiological Safty Officer
University of Idaho

Allen S. Janssen, Director
Engineering Experiment Station
University of Idaho

Kenneth A. Dick
Financial Vice President
University of Idaho

MAR 2 8 1966

RECEIVED
APR 4 1966
U.S. ATOMIC ENERGY COMMISSION
Regulatory Mail Section

GAM/rs

REQUEST FOR MODIFICATION
OF U.S.A.E.C. BYPRODUCT MATERIAL
LICENSE NO. 11-197-4 (667)

LICENSEE: University of Idaho
Engineering Experiment Station
Moscow, Idaho

(All item numbers refer to identical numbers on Form AEC-313. Information given below refers to requested additions to this license. No deletions are requested.)

4. INDIVIDUAL USER(S):
G. L. Bloomsburg, Associate Professor

6(a). BYPRODUCT MATERIAL:
Americium-241

6(b). CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM FOR POSSESSION AT ANY ONE TIME:
One encapsulated source of 100 millicurie strength. Source manufactured by Minnesota Mining and Manufacturing Co.

7. DESCRIPTION OF PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED:
This source would be used only in the laboratory to determine the packing density and liquid saturation of porous materials packed into a column several centimeters in diameter. The source will be mounted in a shielded container on one side of the column with the detector mounted on the other side. The density and liquid saturation will be determined by gamma attenuation.

8. TYPE OF INDIVIDUAL TRAINING:
All of the training Dr. Bloomsburg has had has been in the form of on-the-job, self-study at the University of Idaho. This includes protection principles and

practices, monitoring and measuring techniques, biological effects, and radiation parameter calculation studies. Although he has had no actual experience in handling radioactivity, he will initially be supervised by the presently authorized users of this license and the University Radiological Safety Officer.

Applicant: University of Idaho
Engineering Experiment Station

Approved: 3/17/66
G. A. McKean
Radiological Safety Officer
University of Idaho

Kenneth A. Dick
Financial Vice President
University of Idaho
MAR 2 8 1966

61-03
Lic

UNIVERSITY OF IDAHO

MOSCOW, IDAHO

Engineering Experiment Station

OFFICE OF THE DIRECTOR

18 November 1965

Mr. John E. Bowyer
Isotopes Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Bowyer:

We wish to have our Byproduct Materials License No. 11-197-4 (G-67) modified to permit one authorized individual user in addition to those users presently listed on the license. The qualifications of Mr. Harvey M. Waldron III, the user for which this change is requested, are enclosed.

Since no additional license modifications will be needed and renewal will not be required for nearly 18 months, this request has been tabulated concisely on the attached pages instead of completing an entire Form AEC-313. We hope you find this approach satisfactory.

Very truly yours,

G. A. McKean
Radiological Safety Officer
University of Idaho

Allen S. Janssen, Director
Engineering Experiment Station
University of Idaho

Kenneth A. Dick
Financial Vice President
University of Idaho

GAM/cw

RECEIVED
DEC 3 - 1965

72118

REQUEST FOR MODIFICATION

OF U.S.A.E.C. BYPRODUCT MATERIAL

LICENSE NO. 11-197-4 (G67)

LICENSEE: University of Idaho
Engineering Experiment Station
Moscow, Idaho

It is hereby requested that Item 13 of the above-referenced license by modified to read:

> "Byproduct material shall be used by, or under the supervision of, J. J. Peebles, Vance E. Penton, George A. McKean, or Harvey M. Waldron III."

This requested modification would add, to the existing personnel, Mr. Harvey M. Waldron III as an authorized user of byproduct material under this license.

To justify this request, a resume of Mr. Waldron's qualifications appears on Attachment A and is tabulated in format consistent with that of Form AEC-313.

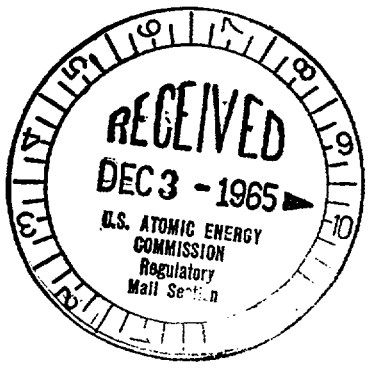
All other conditions of the above-referenced license are requested to remain unchanged.

Applicant: University of Idaho
Engineering Experiment Station

Approved: _____
G. A. McKean
Radiological Safety Officer
University of Idaho

_____
Kenneth A. Dick
Financial Vice President
University of Idaho

GAM/cw



ATTACHMENT A

RESUME OF HARVEY M. WALDRON: Training and Byproduct Material Handling

Experience	Location	Experience Duration	On the Job	Formal Course
Radiation Protection Training	University of Idaho	2 years (1962-1964)	yes	no
Measuring & Monitoring & Instruments Training	University of Idaho	3 years (1962-1964)	yes	no
Radioactivity Calculation Training	University of Idaho	1 year (1964-1965)	yes	no
Handling Cobalt-60 (200 mc. max.) for attenuation measurements	University of Idaho	3 years (1962-1965	yes	no
Handling Cesium-137 (100 mc. max.) for attenuation measurements	University of Idaho	3 years (1962-1965)	yes	no

DML:IB:GLB (11-197-4)

JUL 30 1965

University of Idaho
Engineering Experiment Station
Moscow, Idaho

Attention: Mr. George A. McKean

Gentlemen:

Enclosed is Amendment No. 7 to Byproduct Material License No. 11-197-4. Please note that we have not included in this license use of materials in Oregon which was previously authorized under Condition No. 11.

The Commission has entered into an agreement with the State of Oregon whereby the State assumed regulatory authority over byproduct material licensing effective July 1, 1965. When a state has entered into such an agreement with the AEC, the state is termed an Agreement State.

Your application to use byproduct material on Mount Hood in Clackamas County, Oregon, has been transmitted to the Radiological Health Section, Oregon State Board of Health, State Office Building, P. O. Box 231, Portland, Oregon, 97201, for appropriate action. Future communications concerning your use of byproduct material in Oregon should be directed to the attention of Dr. Oscar Schneider.

Under the Oregon regulations governing licensing of radioactive material, an AEC license in effect on July 1, 1965, is recognized by the State as a valid license which will expire ninety days after notification of expiration by the State regulatory authority or on the expiration date specified in the AEC license, whichever is earlier. Since your application was timely filed with the AEC pursuant to Section 30.35, 10 CFR 30, and we could not get the license issued before this late date, we called Dr. Schneider of Oregon to discuss the status of that part of your application pertaining to use in Oregon. He has agreed that they will consider your application as one having been timely filed for use of material in Oregon and that they will recognize extension of your previous AEC license coverage for Oregon until their review of your application can be finally determined.

OFFICE ▶	DML:IB	DML:IB	DML:IB			
SURNAME ▶	GLBattle	Buchanan/jls	JEBowyer			
DATE ▶	7/30/65	7/30/65	7/30/65			

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

Form AEC-313
(5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved.
Budget Bureau No. 38-R027.4.

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 three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. 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.)*

Engineering Experiment Station
University of Idaho
Moscow, Idaho

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

University of Idaho campus, Remote site on Moscow Mountain in Latah County, Idaho, at Township 40 North, Ranges 4 West and 5 West.
(See Attachment A)

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Engineering Experiment Station

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Renewal of license no.
11-197-4(G65)

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.)*

G. A. McKean Associate Professor
V. E. Penton Assistant Professor
J. J. Peebles Associate Professor
(see Attachment B)

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.)*

G. A. McKean
(see Attachment C)

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

Cobalt 60
Cesium 137
Europium 152 (with trace of Europium 154)

(see Attachment D)

(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.)*

Physical form	Manufacturer	Model No.	Maximum Activity Per Source	Maximum Total Activity At Any One Time
Cobalt 60 Sealed Sources	U.S. Nuclear Corporation (or equivalent)	4 Type 338 capsules	500 mc	1,000 millicurie
Cesium 137 Sealed	U.S. Nuclear Corporation (or equivalent)	4 Type 376 capsules	500 mc	1,000 millicurie
Europium 152 Sealed S.	U.S. Nuclear Corporation (or equivalent)	4 Type 375 capsules	500 mc	1,000 millicurie

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.)*

These sources will be used in making investigations concerning the development of radioisotope snow gages. The sealed sources will be used in the same manner as indicated in the original license application. Collimators similar to those described in the original application will be used except that appropriately increased shielding will be used for larger sources than described in the original application. Under no circumstances will any of the sealed sources be opened. These collimators are described in license applications dated June 9, 1961, and April 17, 1962, submitted by this applicant.

CC534

(Continued on reverse side)

Form AEC–313 (5-58)

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/cm²)*	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 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.

G. A. McKean, Radiation Protection Officer
University of Idaho

Date 5/18/65

RECEIVED JUN 1 1965 U.S. ATOMIC ENERGY COMMISSION Regulatory Mail Section

University of Idaho
Engineering Experiment Station
Applicant named in item 1

By: Kenneth A. Dunn

Financial Vice President
University of Idaho
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. GOVERNMENT PRINTING OFFICE : 1961 OF—615965

ATTACHMENT A

Item 1. (b) LOCATIONS AT WHICH BYPRODUCT MATERIAL WILL BE USED (continued)

Remote site on Hemlock Butte, lying on the boundary between Clearwater and Idaho Counties, Idaho, at Township 36 North, Range 7 East. Remote site on Mount Hood in Clackamas County, Oregon, Section 7 of Township 3 South, Range 9 East.

ATTACHMENT B

Item 4. INDIVIDUAL USER(S) (continued)

G. A. McKean, V. E. Penton, and J. J. Peebles are presently approved users of byproduct material under this license for which renewal is requested.

The name of D. L. Duncan should be delected from this license since he is no longer employed by the University of Idaho.

ATTACHMENT C

ATTACHMENT TO FORM AEC-313

Radiation Protection Officer, University of Idaho

Name: G. A. McKean
Kirtley Laboratory No. 2
University of Idaho
Moscow, Idaho

Type of Training (as per item 8, Form AEC 313):

a. Principles and practices of radiation protection

Where Trained: University of Idaho, Moscow, Idaho
Atomic Energy Commission, Hanford, Washington

Training Duration: 4 years total

Training Mode: Formal indoctrination, AEC
On-job training, Univ. of Idaho
Formal course, Univ. of Idaho

b. Radioactivity measurement standardization and monitoring techniques and instruments

Same as "a" above

c. Mathematics and calculations basic to the use and measurement of radioactivity

Same as "a" above

d. Biological effects of radiation

Where Trained: University of Idaho, Moscow, Idaho
University of New Mexico, Albuquerque, N. M.

Training Duration: 4 years total

Training Mode: On-job training, Univ. of Idaho
Conference indoctrination, Univ. of New Mexico

Experience with Radiation (as per item 9, Form AEC 313):

a. Cobalt-60; 1 curie (max.); U.S.A.E.C., Hanford, Washington; 2 days handling; indoctrination

b. Cobalt-60, Cesium-137; 250 mc(max.); University of Idaho, Moscow, Idaho; 4 years handling (incl. leak testing); development of radioactive snow gage.

ATTACHMENT D

Item 6. (b) FORM AND QUANTITY OF BYPRODUCT MATERIAL (continued)

Physical form	Manufacturer	Model No.	Max. Activity Per Source	Max. Total Activity at Any One Time
Cobalt 60 Sealed Sources	Isotope Specialties	2 Type 38 capsules or equivalent	40 mc	80 mc

UNIVERSITY OF IDAHO

MOSCOW, IDAHO

Engineering Experiment Station

OFFICE OF THE DIRECTOR

1 June 1965

Dr. Richard E. Cunningham
Chief, Isotopes Branch
Division of Materials Licensing
U.S. Atomic Energy Commission
Washington, D.C. 20545

Re: Byproduct Mat'l.
License 11-197-4

Dear Dr. Cunningham:

On this data I received a certificate of status for Byproduct Material License No. 11-197-4 which stated that this license will expire 31 July 1965. Your reference number for this certificate was ML:IB:36. Attached to that correspondence was a copy of Form AEC-313 (8-64).

Our License No. 11-197-4 was requested to be renewed by our submission of Form AEC-313 (5-58), mailed to your offices on 17 May 1965. However Form AEC-313 (5-58) only requires completion of Items 1 through 7, while Form AEC-313 (8-64) requires completion of all 16 items. Is it necessary to re-file a Form AEC-313 with all of these items completed?

As Radiation Protection Officer for the University of Idaho, I issue forms for the majority of University requests for radiation licensing. I was not informed of the issue of an updated Form AEC-313. It would be appreciated if you would send me 20 copies of Form AEC-313 (8-64) so we can avoid future use of the older forms.

Thank you for your notification of license expiration. Your advice on any further action necessary for renewal, as well as the receipt of new application forms, will be most helpful.

Very truly yours,

G. A. McKean
Radiological Safety Officer

GAM/cw

UNIVERSITY OF IDAHO

MOSCOW, IDAHO

Engineering Experiment Station

OFFICE OF THE DIRECTOR

May 17, 1965

Mr. Lyall Johnson, Chief
Licensing Branch
Division of Licensing and Regulation
U.S. Atomic Energy Commission
Washington 25, D.C.

Dear Mr. Johnson:

We wish to have our Byproduct Materials License No. 11-197-4(G65) renewed and modified as stated in the attached AEC Form 313 and explanatory statements. This license was first issued to the University of Idaho Engineering Experiment Station on July 31, 1961, and has since been amended and renewed as necessary.

Referring to the AEC Form 313, we wish to modify the following items:

4. INDIVIDUAL USER(S)
5. RADIATION PROTECTION OFFICER

The modification requested in item 4 is a deletion of an individual user who is no longer employed by the University of Idaho. The modification requested in item 5 reflects a change in the University Radiation Protection Officer which is to reflect a normal rotation of this duty within the University.

These modifications will enable our organization to continue with the work subsequent to Contract No. DA-45-164-CIVENG-62-172 with the Corps of Engineers concerning investigations of radioisotope snow gage systems. For this reason we will appreciate greatly any assistance you may extend in expediting the renewal and modification of this license.

Very truly yours,

G. A. McKean
Radiation Protection Officer
University of Idaho

Allen S. Janssen
Dean, College of Engineering
Director, Engineering Experiment Station
University of Idaho

Kenneth A. Dick
Financial Vice President
University of Idaho

UNIVERSITY OF IDAHO

MOSCOW, IDAHO

Engineering Experiment Station

OFFICE OF THE DIRECTOR

Kirtley Laboratory No. 2

October 20, 1964

Dr. Eber R. Price, Director
Division of State and Licensee Relations
U. S. Atomic Energy Commission
Washington 25, D. C.

Re: (1) AEC License No. 11-197-4(G65)
(2) U of I report of 10/6/64 to AEC

Dear Dr. Price:

Having received your 15 October reply to my letter of 6 October, I am enclosing an additional report in compliance with your request. This enclosed report is in two parts:

1) General Report containing all relevant information concerning high film badge exposures but with no mention of the names of the film badges' wearers.

2) Specific Report containing all relevant information concerning high film badge exposures, mentioning specific names of the film badge wearers.

It is hoped that this method of report submission will comply with 10 CFR 20.405(c) as stated in your letter of 15 October 1964.

Very truly yours,

G. A. McKean
Radiological Safety Officer

cc: (1) Director, Region IV
AEC Division of Compliance
Denver, Colorado
(3) File

GAM/drf

UNIVERSITY OF IDAHO

MOSCOW, IDAHO

Engineering Experiment Station

OFFICE OF THE DIRECTOR

General Report Concerning
Film Badge Overexposure at the
University of Idaho Engineering Experiment Station

Re: Byproducts Materials License
No. 11-197-4 (G65)

On 6 October 1964, the University of Idaho Engineering Experiment Station received an August 1964 film badge report from Nuclear-Chicago Corporation under Customer Order No. 20235. This reports a 30-day, August 1964 badge exposure of 3.000 rem each for Badge Nos. 20235-07 and 20235-08.

Contrary to the badge readings, the two film badge wearers were not subjected to overexposure. Their total occupational exposure was limited to 5 hours of operating Nuclear-Chicago P21 Surface Moisture Probe, Serial No. 97. This device has a 5-millicurie radium-beryllium source and is shielded such that an operator is normally exposed to less than 20 mr/hr. The erroneous film badge readings obtained were caused by a two-week period during which these badges were stored in very close vicinity with the above-mentioned radium-beryllium source. The University Radiological Safety Officer has calculated the probable film badge exposures for these conditions, based on actual survey meter readings. The results indicate that the film badge readings of 3.000 rem correlate well with actual conditions, but the personnel in question could not have received exposures in excess of 0.200 rem during the entire month of August 1964.

It is the opinion of the University Radiological Safety Officer that there is absolutely no cause for alarm as the possibility of personnel overexposure was not even remotely possible.

Submitted this Twentieth day of October in the year 1964.

G. A. McKean
Radiological Safety Officer

Form AEC-313 (5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027.4.

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 three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. 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.)*

Engineering Experiment Station
University of Idaho
Moscow, Idaho

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

1. University of Idaho Campus
2. Remote sites on Moscow Mountain in Latah County, Idaho, in Township 40 North, Ranges 4 and 5 West.

(Continued on Supplemental Sheet A)

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Engineering Experiment Station

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

This is an application for an amendment to License No. 11-197-4

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.)*

D. L. Duncan, Research Technologist
G. A. McKean, Assistant Professor
J. J. Peebles, Research Associate Professor
V. E. Penton, Instructor

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. P. K. Freeman

(Continued on Supplemental Sheet B)

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.)*

Physical form	Manufacturer	Model No.	Maximum Activity Per Source	Maximum Total Activity At Any One Time
1. Cobalt 60 sealed sources	U. S. Nuclear Corporation (or equivalent)	4 Type 338 capsules	500 mc	1,000 mc
2. Cesium 137 sealed sources	Ditto	4 Type 376 capsules	500 mc	1,000 mc
3. Europium 152 sealed sources	Ditto	4 Type 375 capsules	500 mc	1,000 mc

(Continued on Supplemental Sheet C)

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.)*

The use of byproduct materials 6. (a) 1. through 6. (a) 4. to continue as stated in previous license applications. Item 6.(a)5. to be used to measure the density of the medium into which the probe is inserted. Sources are installed in Nuclear-Chicago Corporation's Model P20 Depth Density Gage.

Item 6.(a)6. to be used to measure the density of the medium on which the gage is placed. Source is installed in Nuclear-Chicago Corporation's Model P22A Surface Density Gage.

(Continued on Supplemental Sheet D)

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(Continued on reverse side)

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/cm²)*	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 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.

Engineering Experiment Station
University of Idaho
Applicant named in item 1

Date October 15, 1963

By: Kenneth A. Dick
Financial Vice President
Title of certifying official

Frederic D. Johnson, Chairman
Isotopes Committee, University of Idaho

University of Idaho

RECEIVED OCT 28 1963 U.S. Atomic Energy Commission Division of Licensing & Regulation

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. GOVERNMENT PRINTING OFFICE : 1961 O—615963

MODIFICATION REQUESTS

1. (b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED

No change in the sites for conducting research on Contract No. DA-45-164-CIVENG-62-172 with the Corps of Engineers is requested. The use of the Nuclear-Chicago density gages in the fields of highway construction, landslides, canal seepage studies, hydrologic studies, and in the general study of soils requires a degree of flexibility as to locations. These instruments are properly shielded when not actually being used and they are designed to be easily transported from one location to another as construction or research requirements may dictate. It would be impossible to predict all of the sites at which these instruments might be used. Obviously, it would be highly impractical to apply for an amendment to our AEC license each time we anticipate using the instruments at a new site. Therefore, we are applying for an amendment to permit us to use the instruments at random locations throughout the State of Idaho.

The same general philosophy applies to locations at which we may use tritium for studying groundwater movements in connection with landslides and seepage and drainage problems. As will be illustrated below under Item 6. (b), we plan to use tritium in water at concentrations far below that considered to be the maximum permissible concentration for the general population. The use of tritium is similar to the use of the density gages in that it would be impossible to predict all of the sites at which this tracer might be used. This is particularly true in the case of landslides which, in general, are quite unpredictable. Therefore, we are also applying for a modification to permit us to use tritium at random locations throughout the State of Idaho. It would, of course, be necessary to obtain permission of any landowners involved before any research investigations could be undertaken. Idaho is a sparsely populated state and the chances of a location at which tritium would be used being near a domestic or stockwater supply is somewhat remote. However, if necessary, we could limit our use of tritium to areas at least 1,500 feet from any known source of domestic or stockwater supply. Although it would be a burden to all concerned, we could request an AEC representative to inspect and give approval for each site at which we propose to use tritium.

6. (a) BYPRODUCT MATERIAL

In addition to the radioisotopes we are presently licensed to use, we desire that our license be amended to permit our use of Cesium 137 as sealed sources in the Nuclear-Chicago Corporation's depth and surface density gages and to permit our use of free tritium in concentrations below the maximum permissible concentration for the general population. At present we have the Nuclear-Chicago Corporation's depth density gage and accessories, including a scaler. We do not have the Nuclear-Chicago surface density gage, but it is anticipated that we will procure one in the near future.

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

No change is requested in the form or quantities of the radioisotopes that we are presently licensed to use. The form and quantity of byproduct material in the density gages are manufactured standards as shown on the form.

The quantities listed for the free tritium were estimated as follows:

1. The maximum permissible concentration of tritium in water for the general population is 0.003 μc/cc as shown in the U. S. Department of Commerce, National Bureau of Standards, Handbook 69. This corresponds to a dose rate of approximately 300 mrads/year and a concentration in water of a little over 1,000,000 tritium units.

2. According to waste disposal studies being made at the AEC National Reactor Testing Station, Idaho Falls, Idaho, tritium can be monitored relatively easily in concentrations above about 1,200 TU. Below that concentration, monitoring becomes progressively more difficult and requires more expensive equipment and procedures.

3. These studies also show an average attenuation of tritium activity in a distance of 1,400 feet of approximately 95 per cent.

4. Although we may plan to eventually equip ourselves to monitor tritium samples with concentrations above 1,200 TU, in the meantime it is possible that we may be able to have samples of this type monitored for us by AEC laboratories at Idaho Falls, Idaho, and Hanford, Washington. We, therefore, plan to inject tritium into the groundwater at concentrations not to exceed 50,000 TU. This concentration is only 5 per cent of the maximum permissible concentration and, assuming a 95 per cent attenuation in a typical landslide area, would still result in a concentration of 2,500 TU at the most distant monitoring well.

5. Since 50,000 TU is equivalent to approximately 4 μc per cubic foot of water, it is estimated that the maximum injection at any one point would certainly not exceed 200 μc, depending on the rate of water flow. With 4 or 5 injection points in a typical study area the maximum activity on hand at any one time in the field should never exceed one mc. For long range studies at several different areas the maximum total activity on hand at any time in storage and in the field should not exceed 100 mc.

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED

No change is requested with repect to the byproduct material that we are presently licensed to use. The depth and surface density gages are to be used in the fields of highway construction, landslides, canal

seepage studies, hydrologic studies, and in the general study of soils. The density of the medium into which the depth probe is inserted or upon which the surface gage is placed is measured by a gamma ray scattering technique. The density in pounds per cubic foot is obtained by entering a calibration chart with the counts per minute as read on the scaler. Each density gage acts as its own radiation monitor. The count-rate in the standardizing position is a sensitive indicator as to the presence and strength of the source. Standardizing is done each day before the gage is used and a continuous check on the source is made. These instruments are properly shielded so that the general public is not endangered when the instruments are not in operation, and when simple operating instructions are followed, the operator is not endangered when the instruments are being used. The containers for the instruments are properly labeled with radioactivity symbols. The vehicle transporting these instruments would also be properly marked with these symbols.

The tritium is to be used as a tracer for studying groundwater movements in connection with landslides and seepage and drainage problems. Many engineering problems are caused or aggravated by the presence of groundwater in the soil. Because this water is rarely visible, it is difficult to trace its movements and to ascertain its sources. In the case of landslides, many of them can be corrected or prevented if a means can be found to prevent groundwater saturation of the soil. The problem many times is to determine the source of water causing saturation and the pattern of flow by which the groundwater reaches and permeates the slide area. The answer to this problem is necessary before intelligent corrective measures can be undertaken. Several types of tracers, including radioisotopes, are available for use in studying groundwater movements. The technique consists of locating possible sources of the groundwater flow in the field and then introducing the tracers either into surface water that later joins the groundwater or by means of injection wells. The time of arrival is then determined and concentration of the tracer is measured at specified time intervals at various points between the probable sources and the landslide area and at various points in the landslide area by means of test wells. With tritium, the determination of concentrations is strictly a matter of continuous sampling. Our plans at present are to send these samples to outside agencies for monitoring. Because we plan to work with concentrations greater than 1,200 TU, it is possible that some arrangements could be made to have AEC laboratories at Idaho Falls, Idaho, and at Hanford, Washington, do this monitoring for us by means of gas or liquid scintillation counting. Eventually, we may obtain the necessary equipment to do this monitoring at the University of Idaho.

In our field work we would be governed by the following criteria:

1. At no time after injection would the tritium concentration be permitted to attain the maximum permissible concentration, particularly if the water is a potential source of drinking water.

2. The concentration of tritium would be kept to a minimum and this would be accomplished, naturally, by utilizing measuring equipment of maximum sensitivity.

3. Some attempt would be made in each field experiment to make a material balance study to insure that all tritium injected could be accounted for and that none would be lost to an unknown area.

4. Some predictions as to the extent of dilution which might occur after injection would be made to insure that concentrations would not decrease below the limits of detection of the measuring equipment.

In addition to the above, we would solicit the advice of U. S. Geological Survey and AEC personnel at the National Reactor Testing Station in setting up our initial research projects involving the use of tritium as a tracer.

Because of the extremely low-energy beta particle given off (maximum of 0.018 Mev) only a minimum of shielding is necessary to reduce the irradiation of the body from external tritium to almost negligible quantities. Aluminum containers of nominal thickness would be used to transport and handle the material in the field and to store it in the Engineering Experiment Station facilities described in previous license applications. These containers as well as the vehicle transporting the material would be properly labeled with radioactivity symbols. Rubber gloves would be used in handling the containers to assure that none of the tritium came in contact with the skin.

SUPPLEMENTAL SHEET A

Item 1. (b) LOCATIONS AT WHICH BYPRODUCT MATERIAL WILL BE USED (Continued)

3. Remote site on Hemlock Butte, lying on the boundary between Clearwater and Idaho Counties, Idaho, in Township 36 North, Range 7 East.

4. Remote site on Mount Hood in Clackamas County, Oregon, in Section 7, Township 3 South, Range 9 East.

5. Depth and Surface Density Gages and free tritium to be used at locations throughout the State of Idaho. Depth and Surface Density Gages to be used on highway construction projects, in the study of landslides, in canal seepage studies, in hydrologic studies, and in the general study of soils. The free tritium to be used as a tracer for studying groundwater movements in connection with landslides and seepage and drainage problems.

SUPPLEMENTAL SHEET B

Item 5. RADIATION PROTECTION OFFICER (Continued)

The University of Idaho Radiation Protection Officer is Dr. P. K. Freeman, whose resume of training and experience is listed below:

Training and Experience of P. K. Freeman, Radiation Protection Officer

Type of Training	Where Trained	Duration of Training	On the Job	Formal Course
a.	University of California, Institute in Basic Nuclear Science and Radiation and Radioisotope Technology.	7 weeks	No	Yes
b.	Ditto	7 weeks	No	Yes
c.	Ditto	7 weeks	No	Yes
d.	University of Colorado	1 semester	No	Yes
	University of California	7 weeks	No	Yes

Experience with Radiation

P. K. Freeman's formal experience with radiation was gained at the Institute in Basic Nuclear Science and Radiation and Radioisotope Technology at the University of California, July 11 to August 26, 1960.

SUPPLEMENTAL SHEET C

Item 6. BYPRODUCT MATERIAL (Continued)

Physical Form	Manufacturer	Model No.	Maximum Activity Per Source	Max. Total Activity at Any One Time
4. Cobalt 60 Sealed Sources	Isotope Specialties	2 Type 38 capsules or equivalent	40 mc	80 mc
5. Cesium 137 Sealed Sources in Surface Density Gage	Nuclear-Chicago Corporation	P20	3±0.05 mc in probe 15±5 mc in calibration shield	3±0.5 mc 15±5 mc
6. Cesium 137 Sealed Source in Surface Density Gage	Nuclear-Chicago Corporation	P22A	3±0.5 mc	3±0.5 mc
7. Tritium	Union Carbide Corporation	Free Sources	1 mc	100 mc

SUPPLEMENTAL SHEET D

Item 7. PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED (Continued)

Item 6. (a) 7. to be used as a tracer for studying groundwater movements in connection with landslides and seepage and drainage problems.

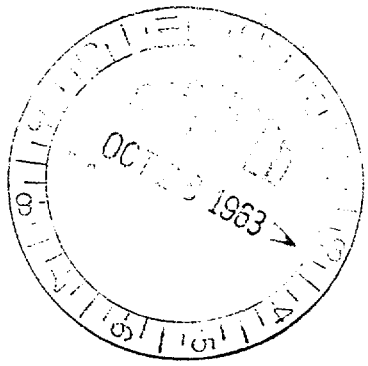
55042

UNIVERSITY OF IDAHO

MOSCOW, IDAHO

Engineering Experiment Station

October 15, 1963



Mr. Lyall Johnson, Chief
Licensing Branch
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Johnson:

We wish to have our Byproduct Materials License No. 11-197-4 amended as stated in the attached AEC Form 313 and explanatory statements. This license was first issued to the Engineering Experiment Station at the University of Idaho on July 31, 1961, and has since been amended and annually renewed.

Referring to the AEC Form 313, we wish to modify the following items for reasons stated on the attached sheet entitled "MODIFICATION REQUESTS".

1. (b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED.
6. (a) BYPRODUCT MATERIAL
   (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
7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED

These modifications will involve no change in connection with our work on Contract No. DA-45-164-CIVENG-62-172 with the Corps of Engineers concerning investigations of radioisotope snow gage systems. The modifications will permit us to use our Nuclear-Chicago density gage in the fields of highway construction, landslides, canal seepage studies, hydrologic studies, and in the general study of soils. In addition, the modifications will permit us to use our existing facilities to handle tritium which will be used for studying groundwater movements in connection with landslides and seepage and drainage problems. We are assuming that any problems involved in granting the modifications requested herein will in no way interfere with our operations under License No. 11-197-4 as currently amended.

Very truly yours,

Frederic D. Johnson
Frederic D. Johnson, Chairman
University Isotopes Committee
University of Idaho

Allen S. Janssen
Allen S. Janssen
Dean, College of Engineering
Director, Engineering
Experiment Station
University of Idaho

Kenneth A. Dick
Financial Vice President
University of Idaho

55042

Form AEC-313 (5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027.4.

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 three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. 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.)*

Engineering Experiment Station
University of Idaho
Moscow, Idaho

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

University of Idaho campus. Remote sites on Moscow Mountain in Latah County, Idaho, at Township 40 North, Ranges 4 West and 5 West.
(See Attachment A)

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Engineering Experiment Station

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Renewal of license no.
11-197-4(G63)

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.)*

D. L. Duncan — Research Technologist
G. A. McKean — Assistant Professor
V. E. Penton — Instructor
J. J. Peebles — Research Associate Professor (See Attachment B)

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. P. K. Freeman
(See Attachment C)

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

Cobalt 60
Cesium 137
Europium 152 (with trace of Europium 154)
(See Attachment D)

(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.)*

Physical form	Manufacturer	Model No.	Maximum Activity Per Source	Maximum Total Activity at Any One Time
Cobalt 60 Sealed Sources	U. S. Nuclear Corporation (or equivalent)	4 Type 338 capsules	500 mc	1,000 millicuries
Cesium 137 Sealed Sources	U. S. Nuclear Corporation (or equivalent)	4 Type 376 capsules	500 mc	1,000 millicuries
Europium 152 Sealed S.	U. S. Nuclear Corporation (or equivalent)	4 Type 375 capsules	500 mc	1,000 millicuries

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.)*

These sources will be used in making investigations concerning the development of radioisotope snow gages. The sealed sources will be used in the same manner as indicated in the original application. Collimators similar to those described in the original application will be used except that appropriately increased shielding will be used for larger sources than described in the original license application. Under no circumstances will any of the sealed sources be opened. These collimators are completely described in license applications dated June 19, 1961, and April 17, 1962, submitted by this applicant.

DUPLICATED
FOR DIV. OF COMPLIANCE

ACKNOWLEDGED 50271

(Continued on reverse side)

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	See Attachment B		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 Attachment B		

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/cm²)*	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) See Attachment E

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 MY KNOWLEDGE AND BELIEF.

Frederic D. Johnson

Frederic D. Johnson, Chairman
Isotopes Committee, Univ. of Idaho

Date

Date

University of Idaho
Engineering Experiment Station
Applicant named in item 1

By Kenneth A. Dick

Kenneth A. Dick
Financial Vice President
Title of certifying official

University of Idaho

RECEIVED
JUN 21 1963
U.S.A.E.C.
Isotopes Branch
Div. of L & R

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. GOVERNMENT PRINTING OFFICE : 1961 O—615963

ATTACHMENT A

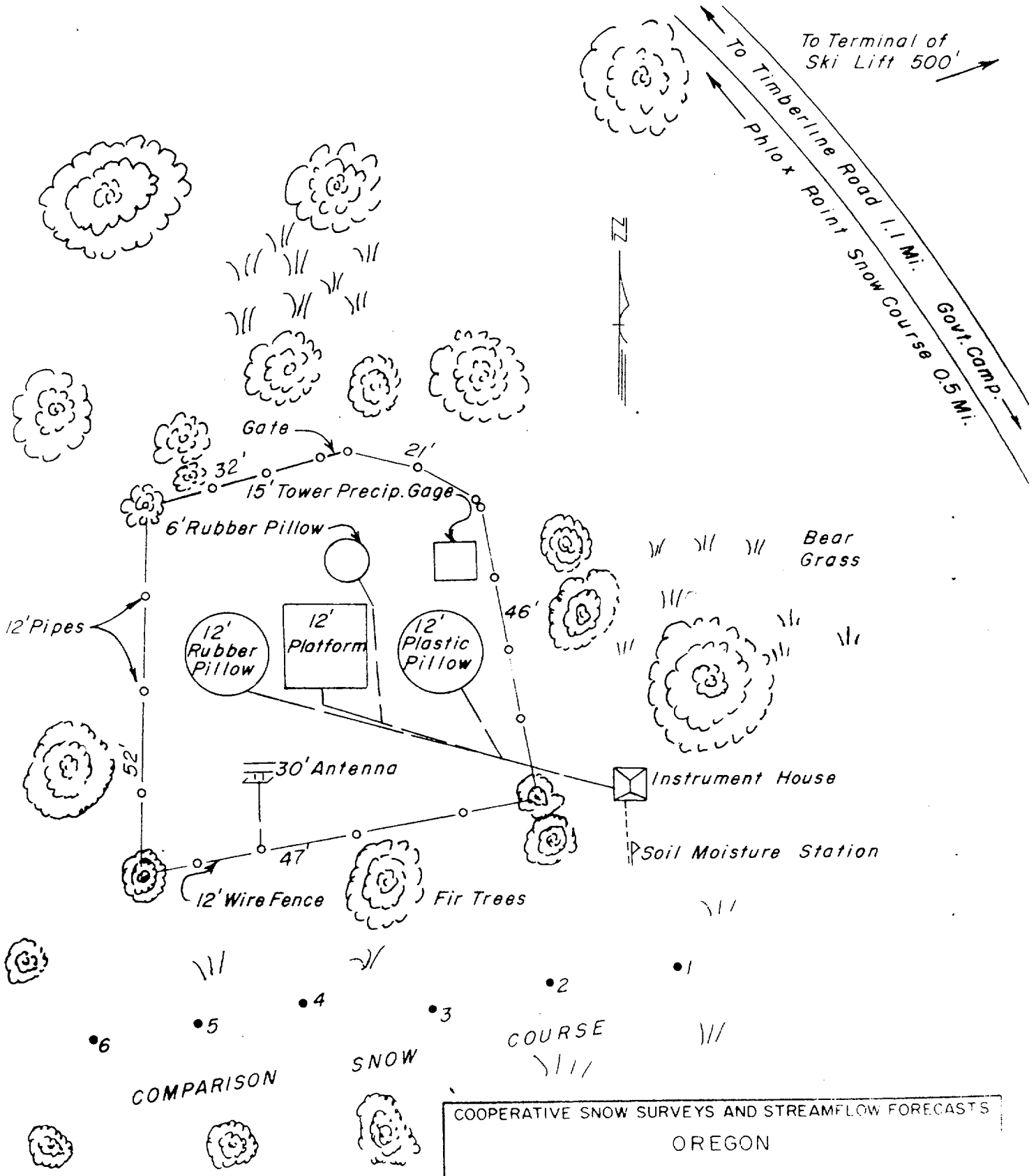
Item 1.(b) LOCATIONS AT WHICH BYPRODUCT MATERIAL WILL BE USED (continued)

Remote site on Hemlock Butte, lying on the boundary between Clearwater and Idaho Counties, Idaho, at Township 36 North, Range 7 East. Remote site on Mount Hood in Clackamas County, Oregon, Section 7 of Township 3 South, Range 9 East.

The use of the sites at the University of Idaho campus, Moscow Mountain, and Hemlock Butte, will continue as stated in previous license applications. The description of the Mount Hood site, officially designated as the Mount Hood Experimental Pillow Site, is given below.

A diagram of the Mount Hood site is attached to this application. The area is enclosed by a woven wire fence, twelve feet in height. The fenced area will be posted on all sides with radiation warning signs which will be placed well above the limits of maximum possible snow depth. High radiation area signs will be placed on the tower supporting the radioisotope collimator. Installation and operation of the radioisotope snow gage would be under the supervision of the users listed in this license, and equipment configuration would be similar to that presently used at the Moscow Mountain site. Leak tests will be performed at least every twelve months by D. L. Duncan or G. A. McKean, as required by this license.

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE



COOPERATIVE SNOW SURVEYS AND STREAMFLOW FORECASTS

OREGON

MT. HOOD EXPERIMENTAL PILLOW SITE

ATTACHMENT B

Item 4. INDIVIDUAL USER(S) (continued)

D. L. Duncan, G. A. McKean, and V. E. Penton are presently approved users of byproduct material under this license for which renewal is requested. Approval is requested for J. J. Peebles to be added to this list.

The name of L. M. Maxwell should be deleted from this license since he is no longer employed by the University of Idaho.

Items 8 and 9. TYPE OF TRAINING AND EXPERIENCE WITH RADIATION

J. J. Peebles has received training in the handling of sealed and unsealed sources at the Oak Ridge Institute of Nuclear Studies, Oak Ridge, Tennessee, during a three week course entitled "Radioisotope Applications for Highway Engineers." The purpose of this course was to familiarize highway engineers with the basic concepts of nuclear physics, methods of producing and characterizing radioisotopes, and the uses of such isotopes in the solution of engineering problems.

Basically, the course consisted of laboratory work, lectures on laboratory experiments, general background lectures, tours, and special-topic seminars, with the largest portion of time devoted to the laboratory. Although the course was intended to serve the specific needs of highway engineers, nearly all of the training stressed fundamental concepts.

The course subject matter included, but was not limited to, the following:

1. Radiation interactions and gas detection
2. Statistics of radioactive decay
3. Laboratory techniques and assay of beta emitters
4. Gamma interactions and spectra
5. Identification and assay of gamma emitters
6. Rates of decay
7. Standardization of a radioactive solution
8. Phase and component tracing
9. Radiotracer determination of flow rates in pipes and open streams
10. Neutron interactions with matter
11. Density and moisture gages
12. Radiography
13. Atomic Energy Commission licensing and regulations
14. Radiation safety
15. Radiation survey participation
16. Survey instruments and radiation dosage monitoring
17. Radiation shielding

In addition to the above-mentioned course, J. J. Peebles is familiar with the contents of Title 10, Code of Federal Regulations, Parts 20 and 30, with ammendments through December 12, 1962.

ATTACHMENT C

Item 5. RADIATION PROTECTION OFFICER

The University of Idaho Radiation Protection Officer is Dr. P. K. Freeman, whose resume of training and experience is listed below.

Training and Experience of P. K. Freeman, Radiation Protection Officer

Type of Training	Where Trained	Duration of Training	On the Job	Formal Course
a.	Univ. of California, Institute in Basic Nuclear Science and Radiation and Radio-isotope Technology	7 weeks	No	Yes
b.	Univ. of California, Institute in Basic Nuclear Science and Radiation and Radio-isotope Technology	7 weeks	No	Yes
c.	Univ. of California, Institute in Basic Nuclear Science and Radiation and Radio-isotope Technology	7 weeks	No	Yes
	Univ. of Colorado	1 semester	No	Yes
d.	Univ. of California	7 weeks	No	Yes

Experience with Radiation

P. K. Freeman's formal experience with radiation was gained at the Institute in Basic Nuclear Science and Radiation and Radioisotope Technology at the University of California, July 11 to August 26, 1960.

ATTACHMENT D

Item 6.(b) FORM AND QUANTITY OF BYPRODUCT MATERIAL (continued)

Physical form	Manufacturer	Model No.	Max. Activity Per Source	Max. Total Activity at Any one Time
Cobalt 60 Sealed Sources	Isotope Specialties	2 Type 38 capsules or equivalent	40 mc	80 mc

ATTACHMENT E

Item 13. FACILITIES AND EQUIPMENT

In addition to the presently used facilities of the Kirtley Engineering Laboratory and the Engineering Experiment Station on the University of Idaho campus, a new research laboratory is being planned and constructed. This new building, presently designated as the Engineering Isotopes Laboratory, is also located on the University of Idaho campus and should be completed during the fall of the year 1963.

While specific plans for this new laboratory are not available at this time, the building will be constructed especially for radioisotope work of the type for which approval is requested in this license application. Adequately shielded storage and working areas will be included. The equipment, experimental set-up, and type of work will be closely similar to that stated in previous license applications and as presently used in the Kirtley Engineering Laboratory.

UNIVERSITY OF IDAHO

MOSCOW, IDAHO

Engineering Experiment Station

June 10, 1963

Mr. Lyall Johnson, Chief
Licensing Branch
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Johnson:

We wish to have our Byproduct Materials License No. 11-197-4(G63) renewed and modified as stated in the attached AEC Form 313 and explanatory statements. This license was first issued to the University of Idaho Engineering Experiment Station on July 31, 1961, and has since been amended and annually renewed.

Referring to the AEC Form 313, we wish to modify the following items for reasons stated on the attached sheet entitled "MODIFICATION REQUESTS".

1.(b) STREET ADDRESS(ES) AT WHICH BYRPDDUCT MATERIAL WILL BE USED
4. INDIVIDUAL USER(S)
8. TYPE OF TRAINING
9. EXPERIENCE WITH RADIATION
13. FACILITIES AND EQUIPMENT

These modifications will enable our organization to continue with the work on Contract No. DA-45-164-CIVENG-62-172 with the Corps of Engineers concerning further investigations of radioisotope snow gage systems. The time schedule for the work on this contract requires that a major portion of the work be completed during the spring and summer of this year. For this reason we will greatly appreciate any assistance you may extend in expediting the renewal and modification of our license.

Very truly yours,

Frederic D. Johnson, Chairman
University Isotope Committee
University of Idaho

Allen S. Janssen
Dean, College of Engineering
Director, Engineering Experiment Station
University of Idaho

RECEIVED
JUN 21 1963
U.S.A.E.C.
Isotopes Branch
Div. of L & R

Kenneth A. Dick
Financial Vice President
University of Idaho

JUN 24 1963

ds

MODIFICATION REQUESTS

1.(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED

In addition to the sites included on the present license, permission is requested to use a site on Mount Hood, Oregon. The description and precise location of this site is stated on AEC Form 313, Attachment A. Officially, this site is called the Mount Hood Experimental Pillow Site and is cooperatively operated by the Soil Conservation Service and the U. S. Forest Service. It is desired to install and operate a snow gage at this site to gain increased knowledge of such radioisotope snow gages under different environmental conditions than those present at existing sites. Should this permission be granted, the test results will greatly aid in the final evaluation of both the accuracy and resolution of the radioisotope snow gage.

4. INDIVIDUAL USER(S)

Those persons presently handling byproduct material are D. L. Duncan, G. A. McKean, and V. E. Penton. In addition to these persons, it is requested that J. J. Peebles be granted this permission since he recently joined the University of Idaho staff and will be engaged in work on the snow gage system. J. J. Peebles has the qualifications as stated on AEC Form 313, Attachment B. The advice and assistance of Professor Peebles will be a valuable aid to the present individual users.

The name of L. M. Maxwell should be deleted from the license since he is no longer employed by the University of Idaho.

8. TYPE OF TRAINING

The type of training acquired by J. J. Peebles is cited on AEC Form 313, Attachment B.

9. EXPERIENCE WITH RADIATION

The experience with radiation obtained by J. J. Peebles is cited on AEC Form 313, Attachment B.

13. FACILITIES AND EQUIPMENT

A new laboratory is being planned and constructed on the University of Idaho campus. This building will be designed especially for the research work performed under the contract for which this license was granted. No definite building plans are available at this time. Permission is requested for this new laboratory building to be used in the same manner as is the Kirtley Engineering Laboratory at present (as cited in the letter of February 12, 1962, from the University of Idaho to the Atomic Energy Commission). The use of the Kirtley Engineering Laboratory and the Engineering Experiment Station will be continued.

NOV 15 1962

DLR:IB:DBH (11-197-4)

University of Idaho
Engineering Experimental
Station
Moscow, Idaho

Attention: Mr. Don L. Duncan

Gentlemen:

Enclosed is Amendment No. 4 to Byproduct Material License No. 11-197-4 issued in response to your October 18, 1962 letter.

You are advised that Condition 15 of your license requires that your byproduct material programs conform to the present standards of 10 CFR 20, and all future amendments of 10 CFR 20 as they become effective. Therefore, to prevent your "Regulations Governing the Safe Handling of Radioisotopes at the University of Idaho," from becoming out-dated at each new amendment of 10 CFR 20 they should only include your administrative procedures, educational programs, experimental techniques and other controls for implementing adherence to the standards set forth in 10 CFR 20, rather than specifying that your program will conform to a dated issue of 10 CFR 20. You will always be required to comply with 10 CFR 20 unless otherwise authorized by specific conditions of your byproduct material license.

Enclosed is an up-dated copy of 10 CFR 20. Future amendments to 10 CFR 20 will be routinely supplied to you as your license is renewed.

Very truly yours,

John E. Bowyer
Isotopes Branch
Division of Licensing
and Regulation

Enclosures:
As stated

bcc: Co. Region IV

OFFICE ▶	DLR:IB	DLR:IB				
SURNAME ▶	Howell:ytc	Bowyer				
DATE ▶	11-15-62	11- -62				

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

5622

UNIVERSITY OF IDAHO

MOSCOW, IDAHO

Engineering Experiment Station

OFFICE OF THE DIRECTOR

Amend. 4
11-197-4

October 18, 1962

Mr. John E. Bowyer
Senior Licensing Reviewer
Isotopes Branch
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Bowyer:

Enclosed are two copies of the latest revision of the University of Idaho regulations regarding the handling of radioisotopes. These regulations supercede the regulations which were submitted with our original application for our Byproduct Material License No. 11-197-4(G63).

These revised regulations were drawn up to conform to Part 30 of Title 10, Code of Federal Regulations (with amendments through August 17, 1960) and Part 20 of Title 10, Code of Federal Regulations (with amendments through November 25, 1961).

In order to keep our university regulations in conformance with the latest amendments to 10-CFR-20 and 30, we would like to know what arrangements can be made to receive the latest amendments as they become available.

Thank you.

Yours truly,

Don L Duncan

Don L. Duncan
Research Technologist

DLD:ds

Enclosures 2

47164

UNIVERSITY OF IDAHO

MOSCOW, IDAHO

College of Engineering

ELECTRICAL ENGINEERING

Amends
11-197-4

30 July 1962

Mr. John E. Bowyer
Senior Licensing Reviewer
Isotopes Branch
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D.C.

Dear Mr. Bowyer:

I request to be authorized to perform leak tests on a 40 millicurie Cobalt-60 sealed source (Isotope Specialties Type 38), a 200 millicurie Cobalt-60 sealed source (U.S. Nuclear Corporation Type 338), and a 100 millicurie Cesium-137 sealed source (U.S. Nuclear Corporation Type 376). These sources are owned by the University of Idaho Engineering Experiment Station, as authorized by AEC Byproducts Material License No. 11-197-4(G63).

I propose to make these leak tests on each of the above-mentioned sources in the following manner. A source will be wiped thoroughly on a filter paper using a 48-inch remote handling tool. The filter paper will be saturated with an organic solvent to increase the efficiency of the operation. The filter paper will be given a preliminary check with one of the following instruments: Atomic Accessories Model SM-131 survey meter, Baird-Atomic Model 414 logarithmic survey meter, Nucor Model D-1A survey meter. The filter paper will then be counted using a Baird-Atomic Model 810 well type scintillation detector coupled to either a Baird-Atomic Model A-2-17B single channel scintillation spectrometer and a Baird-Atomic Model 2010 scaler, or to a Tracerlab Model SC-80M single channel scintillation spectrometer and a Tracerlab Model SC-83 scaler.

If no leakage is apparent in the above test, the sealed source will be wrapped in cotton and left for at least a day in a small sealed container. The cotton will then be counted in the same manner as described above for the filter paper.

If leakage is detected in either procedure, the source will be placed in a sealed container and returned to the manufacturer of said source for repair or disposal; your division will be notified of this action as specified in Condition 19C of our license. Containers and carriers, as well as any other equipment that has had contact with the leaking source, will be decontaminated with the advice of our radiation safety officer. Appropriate records of the tests will be made and retained in accordance with Condition 19B of our license.

I received training in the use and handling of sealed sources at the United States Atomic Energy Commission, Hanford Operations, Richland, Washington, as outlined in the University of Idaho Engineering Experiment Station's byproduct

materials license application of June 16, 1961. I have gained further experience in the handling of sealed sources from the time of license issuance until the present time.

Very truly yours,

George A. McKean

George A. McKean
Research Technologist

GAM:jm

11-19-74

Form AEC-313 (5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved Budget Bureau No. 38-R027.4

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 three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. 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).)* University of Idaho campus and at remote location on Moscow Mountain in Latah County at Section 14, Township 40 North, Range 5 West. Remote site on Hemlock Butte lying on the boundary between Clearwater and Idaho counties in Township 36 North, Range 7 East.

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.)*

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.)*

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

Cobalt 60
Cesium 137
Europium 152 (with trace of Europium 154)

(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.)*

Physical Form	Manufacturer	Model No.	Maximum Activity Per Source	Maximum Total Activity at Any One Time
Cobalt 60 Sealed Source	U.S. Nuclear Corporation	Capsule Type 338 or equiv.	up to 500 mc	1,000 millicuries
Cesium 137 Sealed Source	U.S. Nuclear Corporation	Capsule Type 376 or equiv.	up to 500 mc	1,000 millicuries
Europium 152 Sealed Source	U.S. Nuclear Corporation	Capsule Type 375 or equiv.	up to 500 mc	1,000 millicuries

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.)* These sources will be used in making investigations concerning a radioisotope snow gage in fulfillment of a contract with the Walla Walla District Corps of Engineers. The sealed sources will be used in the same manner as indicated in the original license application. Collimators similar to those described in the original application will be used except that more shielding will be used with the stronger sources. Under no circumstances will any of the sealed sources be opened.

(See attached sheet for list of containers)

(Continued on reverse side)

Form AEC–313 (5-58) Page Two

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/cm²)*	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 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.

Frederic D. Johnson, Chairman, University Isotope Committee, University of Idaho

Date April 17, 1962

Frederic D. Johnson

University of Idaho Engineering Experiment Station

Applicant named in item 1

By: Kenneth A. Dick

Kenneth A. Dick

Financial Vice President

Title of certifying official

University of Idaho

APR 23 1962

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.

GPO - 87 407 3

UNIVERSITY OF IDAHO
ENGINEERING EXPERIMENT STATION
MOSCOW, IDAHO

OFFICE OF THE DIRECTOR

Amend 2
11-19-74

April 17, 1962

Mr. John E. Bowyer
Senior Licensing Reviewer
Isotopes Branch
Division of Licensing and Regulation
U.S. Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Bowyer:

We are submitting the additional material requested in your letter of March 30, 1962, reference number DLR:LB:GWK: (41156). The following sections provide the information requested under the correspondingly numbered sections of your letter.

1. The policy of the University Isotope Committee in the past has been to have certain members of the committee evaluate the application and then to have the chairman of the committee sign the application. The application for license modification as originally made, along with the material in this letter, has been evaluated according to this policy and approved. A new copy of the original application for license modification (AEC Form 313) is enclosed which has been signed by the chairman of the isotope committee.

2. The Regulations Governing the Safe Handling of Radioactive Isotopes at the University of Idaho will be revised to reflect the latest revisions of Parts 20 and 30 of Title 10, Code of Federal Regulations as follows:

   (a) Section 1.1 to indicate 10-CFR-30 with amendments through August 17, 1960.

   (b) Sections 1.2, 4.1, 8.2, 9.1, and 11.5 (b) (1) to indicate 10-CFR-20 with amendments through November 25, 1961.

   A copy of the revised regulations will be submitted to the AEC as soon as copies are available.

3. The following persons will be handling the byproduct material:

Don. L. Duncan	George A. McKean
Vance E. Penton	Lee M. Maxwell

The name of H. Singh should be removed from the license application as he is no longer employed by the University of Idaho.

The persons listed above received training in handling of sealed sources at the United States Atomic Energy Commission, Hanford Operation, Richland, Washington. This training covered the following material:

1. Review of the different types of radation - α, β, γ and neutron; the particular hazards of each and common methods of shielding against each.

Mr. John E. Bowyer

2. Discussion of the different dosage units and the dosage limits per day, week, quarter and year, and the dosage limits for the different parts of the body.

3. Discussion of types of dosimeters

4. Dose rates acceptable for restricted and unrestricted areas

5. Discussion of sealed sources such as Colbalt-60 and Cesium-137 and the hazards that would result if such a source was broken open including the procedure to be used in decontaminating such an area.

6. Special consideration of Colbalt-60 with regard to internal consumption; the biological half-life and principle organs affected.

7. Estimating the dose rates from Colbalt-60 and Cesium-137

8. Types of monitoring equipment and calibration procedures.

9. Appropriate Material from NBS Handbook No's 42,48,51,63,69,72 and 73

10. Handling techniques using remote handling tools were demonstrated using an actual 1 curie Colbalt-60 sealed source. Measurements of the gamma flux were made using an ionization chamber survey meter. The method of calculating permissible exposure times based on the survey meter reading was discussed.

In addition, the persons listed above are familiar with the contents of Title 10, Code of Federal Regulations, Parts 20 and 30 with amendments through January 18, 1961. Other books and pamphlets readily available include:

NBS Handbook No's 42, 48, 51, 63, 69, 72 and 73
"Radiological Health Handbook", Revised September 1960
Handloser, J. S., "Health Physics Instrumentation",
Pergamon Press, New York, 1959

The above listed persons have gained considerable experience in handling the sealed gamma sources during the performance of work under a contract with the Corps of Engineers during the summer of 1961 and in using the sources in other tests during the past winter.

4. We have initiated correspondence with Nuclear-Chicago Corporation with regard to supplying the required film badge service. We have used their film badge service in the past in connection with the use of their depth and surface moisture equipment.

The sources will be out of the shields only while being transferred from a shipping container to a collimator or when being used to calibrate survey instruments or make shielding measurements. We estimate a maximum monthly dosage of 200 to 300 mr. For most of the testing program the dosages should be less than 50 mr. per month.

Amend 2
11-19-74

Mr. John E. Bowyer

5. The new collimating devices will be constructed to provide at least as much lead in the sides and bottom as the shipping containers listed under Section 7 of the license modification application. This is being done so that the collimators may serve as shipping containers. If the collimators are used for shipping or storage they will have plugs providing shielding equivalent to the containers listed under Section 7. A step type plug construction will be used so that there will not be any direct leakage paths from the source to the outside of the container. Collimators will be marked as per 10-CFR-20.203.

   When the collimators are being used for actual tests a 1/8-inch thick stainless steel disk with a neophrene gasket will be bolted over the collimator hole. In addition, a special steel cap will be fabricated which will fit over the bolts holding the stainless steel disk so that they cannotbe removed. This steel cap will be secured to the collimator by a pinned hinge and a padlock so that the cap cannot be removed except by authorized personnel. See the attached sketch. A 3-inch lead shield will be placed over the collimator when it is not in actual use during testing periods.

   The radiation level at 3-feet from the collimators in any direction when the plug or the 3-inch shield is being used should be less than 10 mr/hr in all cases, and less than 5 mr/hr for most cases.

6. The Moscow Mountain test site has a fenced area approximately 50 feet by 70 feet. The sources would be located at approximately the center of this area and would be at least 20 feet from the nearest point on the fence.

   The Hemlock Butte test site is being used by the Corps of Engineers as one of their radioisotope snow gage sites covered under License No. 46-2805-2 (L61). The Corps of Engineers has agreed to share this site with the Engineering Experiment station to facilitate tests of improved radioisotope snow gage systems. This test site has a fenced area approximately 200 feet by 200 feet. The sources would be located approximately in the center of this area.

   It is unlikely that we would want to use more than two different sources at either one of the locations at any one time.

   We did not intend to infer in our application that we would need eight sources for two snow gages. Due to the developmental nature of the program in which these sources will be used, it is difficult to specify exactly how many sources might be needed to accomplish the objectives of the program. A copy of the project proposal, on which the contract with the Corps of Engineers is based, is enclosed. In this proposal the objectives of the project are outlined and the need for testing various isotopes is stated.

   We would estimate that we may wish to obtain four different source strengths of each type of isotope so that a total of 12 sources might be required to perform all the tests required to determine what type isotope and what source strength will give certain results for a particular snow gagingsite. Asspecified in the application, the total activity in our possession of any one type of isotope would be limited to 1000 millicuries and the maximum strength of any individual source would be limited to 500 millicuries.

Attach
11-19-74

Mr. John E. Bowyer

The total number of separate radioisotope snow gages that will be constructed and tested before the desired results are obtained is difficult to predict but might be as high as 10.

7. The maximum snow depths at the Moscow Mountain and Hemlock Butte sites are 4 feet and 10 feet, respectively.

At the remote test sites the collimators will be supported above the snowpack and the detectors will be located below the snowpack. This procedure provides better shielding against background radiation and gives temperature stability for the detector units.

A typical collimator support structure is shown in the enclosed sketch. The collimators will be supported approximately 8 feet and 15 feet above the ground at the Moscow Mountain and Hemlock Butte sites, respectively. Radiation warning signs will be posted near the top of the support towers so as to be visible from all directions. There would be virtually no chance of getting snow conditions which would cover these signs. Warning signs will be posted near the top of the fence on all sides of the enclosures. In addition, at the Hemlock Butte site warning signs will be placed on 17 foot posts which will be spaced around the perimeter of the test area.

At the Moscow Mountain site there is some traffic along a road adjacent to the fenced area during the summer. The locked gate on the enclosure plus the warning signs should provide sufficient warning to these persons. During the fall, a few hunters pass through this area until the snow gets deep enough to stop 4-wheel drive vehicles. During the winter and spring the only means of access is by oversnow vehicle and the only persons who would be in the area are those connected with the snow gage project and occasionally some personnel from Clearwater Power Company who maintain a radio repeater station on a peak about $\frac{1}{2}$ mile from the test site. This area is not used for skiing.

The Hemlock Butte site is in a rugged mountainous area about 20 miles from the nearest settlement and is frequented by a very few persons even in the summer. During the fall, winter and spring the only means of access is by oversnow vehicle and it is very unlikely that any persons would be in this area other than those concerned with the radioisotope snow gages.

The measures taken to prevent unauthorized persons from removing the sources from the collimator were covered under item 5. The collimators themselves will be securely bolted to the support structures.

We hope the above information and material will provide you with the additional

Amend 2
11-19-74

Mr. John E. Bowyer

information needed to complete the processing our license modification application.

Very truly yours,

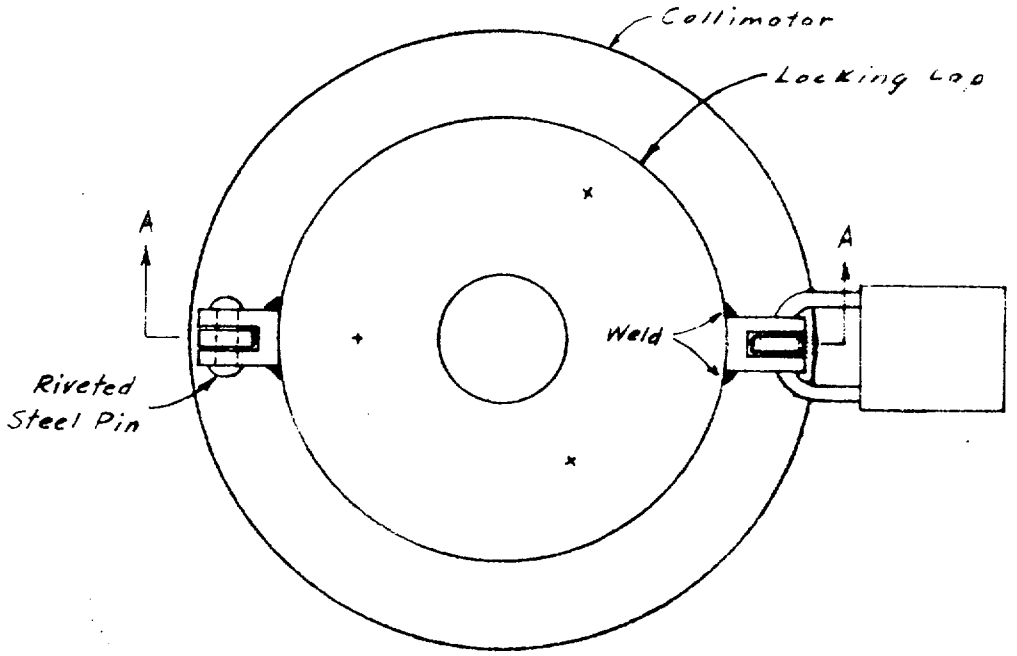
A.S. Janssen, Dean
College of Engineering and
Director of the Engineering
Experiment Station

Frederic D. Johnson, Chairman
University Isotope Committee

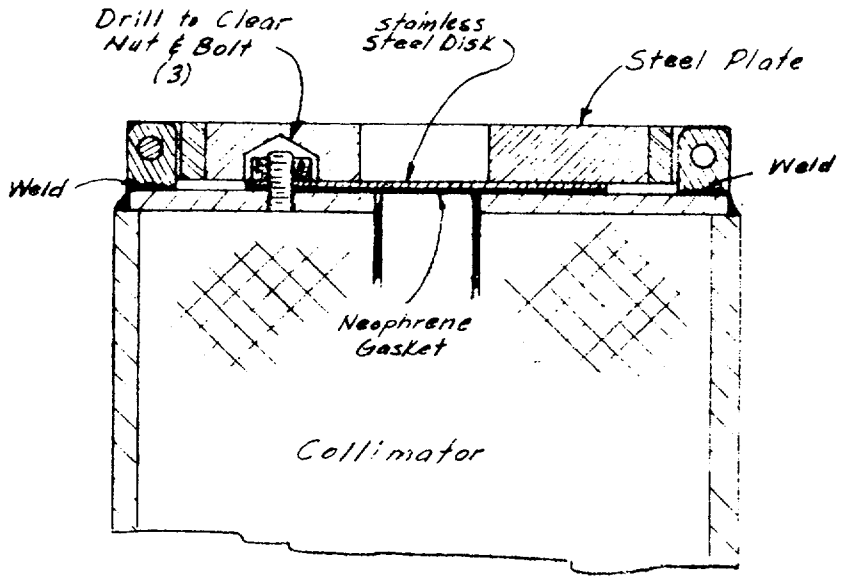
Kenneth A. Dick
Financial Vice President
University of Idaho

Enclosures: 4

Addend 2
Amend. 2
11-1974

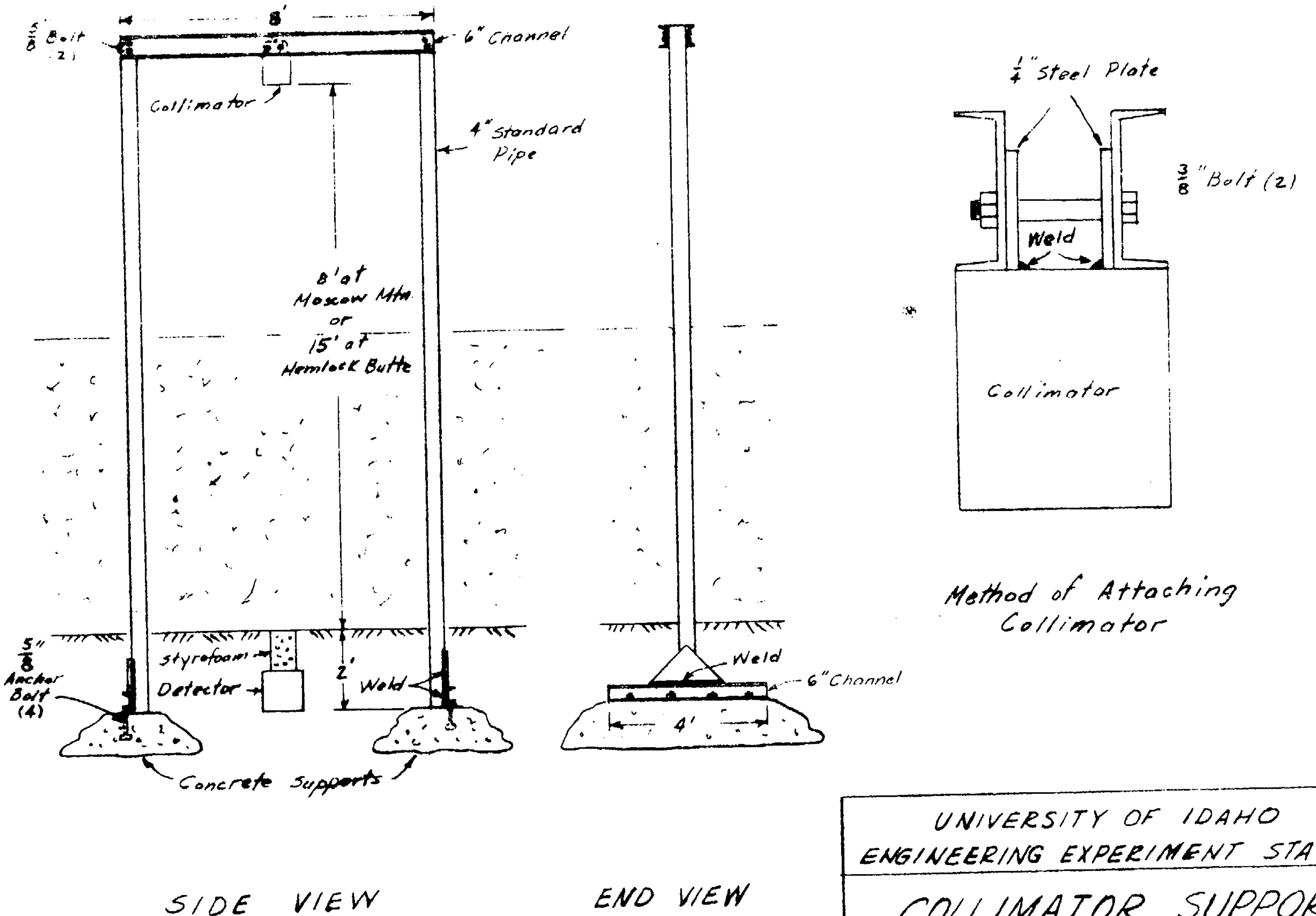


TOP VIEW



SECTION AA

UNIVERSITY OF IDAHO ENGINEERING EXPERIMENT STATION		
COLLIMATOR LOCKING CAP		
DLD	4-2-62	



UNIVERSITY OF IDAHO ENGINEERING EXPERIMENT STATION		
COLLIMATOR SUPPORT STRUCTURE		
DLD	4-12-62	

Amend 2
11-1974

PROJECT PROPOSAL

Research on
Radioisotope Snow Gage Components and Techniques

Submitted by the
Engineering Experiment Station
University of Idaho

to
Walla Walla District
U. S. Army Engineer District
Corps of Engineers

Moscow, Idaho
15 October 1961

Amend 2
11-197-4

1. PROJECT NUMBER

2. TITLE

Investigation of Radioisotope Snow Gage Components and Techniques

3. PROPOSED DURATION

To cover period until 30 June 1963

4. PERSONNEL

Professor C. C. Warnick	General Supervision
Mr. D. L. Duncan	Project Leader
Mr. K. E. Waltz	Technical Advisor
Mr. G. A. McKean	Technical Advisor
Mr. E. Clerkin	Technical Assistant
*Professor L. M. Maxwell	Technical Supervision
Mr. J. E. Thomas	Research Assistant
Mr. V. H. Estrick	Student Assistant
Mr. S. M. Griffiths	Student Assistant

*On leave until September 1962

5. ESTIMATED COST OF PROJECT

Salaries	$ 8,400
Irregular Help	2,200
Travel	400
Other Expense	1,300
Capital Outlay	9,000
Overhead	3,300
Total	$24,600

6. OBJECTIVES

The study will have as primary objective the development of a suitable detector unit for a radioisotope snow gage telemetering system and study of certain other aspects of the snow gage system with the aim of improving the reliability and accuracy of the equipment. Specific problems to be studied are as follows:

1. Design of a pulse height discriminator which would work in a scintillation type detector unit under conditions of a remote snow environment. The aim would be to build a unit in which the output pulse rate would not vary with temperature, voltage and other parameters of the detecor circuitry.

2. Development of necessary divider circuits for reducing counts to a range of counts suitable for telemetering.

3. Investigation of GM counters for radioisotope snow gage monitoring. This to be done in parallel with testing the above scintillation counting system.

4. Investigation of window setting techniques such that the detector output can be limited to a specific region or band width of the isotopes energy spectrum. The possibility of using energy levels below the given radioisotopes photopeaks would be studied to consider elimination of an upper window now used in certain systems.

Proposal 2
11-197-4

5. Investigation to establish an optimum gamma emitting radioisotope source from the standpoint of source strength, half-life, and energy spectrum. This may entail and merit a separate study supported by the Atomic Energy Commission. The problems of licensing for higher intensity sources would be approached with that commission.

6. Investigation of relative positioning of source and detector to give best operating condition. The possibility of using two sources and two detectors supported to read snow water equivalent in steps would be considered. The effect of position of detectors on background count, temperature, stability, backscatter radiation, source shielding and heat transfer from the ground would be studied.

7. Further investigation of calibration techniques would be studied using both a scintillation detector system and GM tube system. The influence of water or snow of an infinite extent would be investigated as well as the use of metal shims for simulating attenuation by water.

8. Study in the literature, variation of background count with time and place. Actual field checks would be made at Moscow Mountain or Hemlock Butte to establish extent of variation of background count in given cases.

9. Field tests with actual snow pack either at Moscow Mountain or Hemlock Butte to test under actual condition performance of the detection system that would be recommended from these studies.

10. Collaboration with Corps of Engineers personnel in preparing an instruction manual for such a unit.

7. ANTICIPATED EQUIPMENT NEEDS

A. Available Equipment

1. The three detector units from the Clearwater River System for summer 1962
2. Extra scintillation crystal and photomultiplier tube
3. Power supplies
   medium voltage
   high voltage
4. Vacuum tube voltmeters
5. 40 mc Cobalt 60 radioisotope source and collimator
6. Radiation survey meter
7. Nicad batteries
8. Cold room and deep freeze
9. Temperature measuring equipment
10. Electrometer for measuring high voltages
11. Oscilloscopes of certain types
12. Oversnow vehicle
13. Snow test site on Moscow Mountain with various devices and measuring equipment

B. New Equipment

1. Pulse height analyser system consisting of the following components
   (a) Baird Atomic 250 M. D. Linear Amplifier and Pulse Height Discriminator
   (b) Baird Atomic Model 131A Timer and Scaler

Amend 2
11-1974

(c) Baird Atomic Model 412 Ratemeter
(d) Atomic Accessories Panel Mount Recorder

Estimated cost--$4000

2. Hamner Model N102 Pulse Generator

Estimated cost--$300

3. Tektronix Model 545A Oscilloscope with Type B preamplifier

Estimated cost--$1700

4. Collimator, sources and small electronic components for the equipment testing program

Estimated cost--$1000

5. Prototype detection systems of the scintillation and GM types

Estimated cost--$2000

These items will be valuable in further expected research at the University of Idaho and therefore it would be desirable for the University to retain these at the termination of the contract. Most of the items are so specialized their value would be very limited to the Corps of Engineers.

8. PROPOSED PROCEDURE

Anticipating that the contract for this work can be in effect by 1 January 1962 the following approach is proposed:

1. Ordering and obtaining all specialized new equipment to be available in April for actual use.
2. During the winter and spring of 1962 design and study the pulse height discriminator through a literature survey and laboratory work. This is to terminate in a construction period and laboratory testing program in the summer of 1962.
3. Study of other isotopes and acquisition of necessary licenses to be pursued from the start with actual testing to be done during the summer of 1962.
4. Mockup testing of detector units in a laboratory program during the summer of 1962.
5. Work during the summer on determining optimum type and arrangement of radioisotope source. This is to be done in cooperation with Atomic Energy Commission.
6. Study window setting techniques as soon as a developed detector is available.
7. Assist in field installation and develop at Moscow Mountain or Hemlock Butte or at both places a winter field testing program for study of calibration and monitoring techniques.
8. It is hoped that several personal conferences either at Walla Walla or Moscow with Corps of Engineers personnel will be held to provide maximum liaison and interchange of ideas.
9. A final report is to be prepared and submitted in June 1963 covering the work described in this proposal. It is hoped all this will contribute to existing telemetering developments in progress at the University of Idaho and also in the Walla Walla District of the Corps of Engineers.

Amend 2
11-197-4

MAR 30 1962

DLR:IB:GWK (41156)

A. S. Janssen, Dean
College of Engineering and
Director of the Engineering
Experiment Station
University of Idaho
Moscow, Idaho

Dear Dean Janssen:

We wish to acknowledge receipt of your letter dated February 12, 1962, requesting amendment to Byproduct Material License Number 11-197-4. In view of the proposed expansion of your radioisotope program, we shall need the following additional information in regard to this request:

1. Please indicate that this application has been evaluated and approved by the University Isotope Committee. Section 2.2 of your Radiation Safety Regulations indicates that all applications must be signed by the Chairman of the Isotope Committee.

2. We note that your Radiation Safety Regulations are out of date and suggest that they be revised to reflect the latest revisions of Parts 20 and 30 of Title 10, Code of Federal Regulations as follows:

   (a) Section 1.1 to indicate 10-CFR-30 with amendments through August 17, 1960.

   (b) Sections 1.2, 4.1, 8.2, 9.1 and 11.5(b)(1) to indicate 10-CFR-20 with amendments through November 25, 1961.

3. Please furnish an up-to-date statement of the training and experience of each individual who will be handling the byproduct material. We received such a statement from Don L. Duncan on January 9, 1962.

4. Due to the high radiation levels associated with the magnitude of the sources you have requested, it is recommended that both film badges and pocket chambers be used while working with the sources. Please indicate the name of the supplier of this film badge service.

5. Please indicate how much lead will be used in the new collimating device. This should include the thickness of lead on the sides and bottom as well as the lid. State the anticipated radiation levels at the surface and/or at 3 feet from the collimating device.

6. How large are the fenced areas at the remote test sites? Indicate the location of the radiation sources in relation to the fenced area. How many sources will be used at each location at any one time? Please clarify the need for 8 sources for two snow gauges.

7. To what depth is snow likely to accumulate during the winter at each of the two sites? Is it possible for snow to accumulate to a depth of 7 feet, resulting in an unrestricted area with all warning signs being no longer visible? What is the probability of skiers, hunters, or other transient personnel being in the area adjacent to the fenced test site? Describe in detail how security against unauthorized removal of the material will be ensured.

Upon receipt of the above information, we shall continue the review of your request.

Very truly yours,

John E. Bowyer
Senior Licensing Reviewer
Isotopes Branch
Division of Licensing and Regulation

Enclosures:
10-CFR-20 & 30

cc: Dr. Waldo Curtis
Chairman
Isotopes Committee

bcc: Compliance Region IV

DLR:IB
Kerr:ytd
3-29-62

DLR:IB
Bowyer

1 copy - S.H.
Amend. 2
11-197-4

UNIVERSITY OF IDAHO
ENGINEERING EXPERIMENT STATION
MOSCOW, IDAHO

OFFICE OF THE DIRECTOR

February 12, 1962

Mr. Lyall Johnson
Chief, Licensing Branch
Division of Licensing and Regulation
U.S. Atomic Energy Commission
Washington 25, D.C.

Dear Mr. Johnson:

We wish to have our Byproduct Materials License No. 11-197-4(G63) modified as indicated below. This license was issued to the University of Idaho Engineering Experiment Station on July 31, 1961. We are making the license modification application so that we can go forward with work on Contract No. DA-45-164-CIVENG-62-172 with the Corps of Engineers concerning further investigations on a radioisotope snow gage system. One part of the contract calls for us to investigate the feasibility of using isotopes with a longer half-life and different types of energy spectra and to use greater source strengths.

Referring to AEC Form 313, we wish to modify the sections indicated below and shown in detail on the appropriate form:

1.(b) STREET ADDRESS (ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED.

6.(a) BYPRODUCT MATERIAL

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.

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED.

13. FACILITIES AND EQUIPMENT

14. RADIATION PROTECTION PROGRAM

15. WASTE DISPOSAL

The time schedule for the work on the Corps of Engineers contract requires that a major portion of the experimental work be completed during the spring and summer of this year. For this reason, we would appreciate any assistance you may extend to us in expediting the processing of this license modification.

41156

Very truly yours,

A.S. Janssen, Dean
College of Engineering and
Director of the Engineering
Experiment Station

J.W. Watts
Business Manager
University of Idaho

djs

Enclosures

41156

Amend 2

Form AEC-313 (5-58)	ATOMIC ENERGY COMMISSION **APPLICATION FOR BYPRODUCT MATERIAL LICENSE**	6-1-1974 Form approved Budget Bureau No. 38-R027.4

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 three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. 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).)* University of Idaho campus and at remote location on Moscow Mountain in Latah County at Section 14, Township 40 North, Range 5 West. Remote site on Hemlock Butte lying on the boundary between Clearwater and Idaho counties in Township 36 North, Range 7 East.
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.)*
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.)*

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

Cobalt 60
Cesium 137
Europium 152 (with trace of Europium 154)

(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.)*

Physical Form	Manufacturer	Model No.	Maximum Activity Per Source	Maximum Total Activity at Any One Time
Cobalt 60 Sealed Source	U.S. Nuclear Corporation or equivalent	Capsule Type 338	up to 500 mc	1,000 millicuries
Cesium 137 Sealed Source	U.S. Nuclear Corporation or equivalent	Capsule Type 376	up to 500 mc	1,000 millicuries
Europium 152 Sealed S.	U.S. Nuclear Corporation or equivalent	Capsule Type 375	up to 500 mc	1,000 millicuries

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.)* These sources will be used in making investigations concerning a radioisotope snow gage in fulfillment of a contract with the Walla Walla District Corps of Engineers. The sealed sources will be used in the same manner as indicated in the original license application. Collimators similar to those described in the original application will be used except that more shielding will be used with the stronger sources. Under no circumstances will any of the sealed sources be opened.

DUPLICATED
FOR DIV. OF COMPLIANCE

(See attached sheet for list of containers)

41156

(Continued on reverse side)

Amend 2
11-19-71

7. COMMERCIAL STORAGE CONTAINERS

Isotope	Activity	Manufacturer	Model No.
Cobalt 60	up to 40 mc	Isotope Specialties	SC-3
Cobalt 60	up to 200 mc	U.S. Nuclear Corp.	SL-8-1.5
Cobalt 60	up to 500 mc	U.S. Nuclear Corp.	SL-10-1.5
Cesium 137	up to 15 mc	U.S. Nuclear Corp.	CL-4-1.5
Cesium 137	up to 100 mc	U.S. Nuclear Corp.	SL-5-1.5
Cesium 137	up to 500 mc	U.S. Nuclear Corp.	SL-6-1.5
Europium 152	up to 10 mc	U.S. Nuclear Corp.	SL-6-1.5
Europium 152	up to 500 mc	U.S. Nuclear Corp.	SL-10-1.5

The above listed storage containers or equivalents are to be used.

13. FACILITIES AND EQUIPMENT

Laboratory facilities on the University of Idaho campus at Kirtley Engineering Laboratory, the Engineering Experiment Station and a physical plant building will be used in this research program. A sketch of the physical layout of the equipment is shown in the original application. The sources to be used at the remote test sites on Moscow Mountain or Hemlock Butte will be sealed in heavily shielded collimators which will be firmly fixed in place. The remote facilities are further discussed in Item 14. Remote handling tools include the following: two 4-foot grip tong remote handlers, one 4-foot grip tong remote handlers, one 4-foot remote handler for magnetic sources and one 4-foot remote handler for non-magnetic sources. Twenty-five lead bricks 2" x 4" x 8" are available. Lead filled iron pipes as shown in the drawing with the original application will be used as collimators and with tops in place as storage containers. Commercial storage containers or their equivalents which will be used are listed under Item 7.

14. RADIATION PROTECTION PROGRAM

The Rules and Regulations as prescribed in "Title 10 - Atomic Energy, Chapter 1, Atomic Energy Commission, Part 20 - Standards for Protection Against Radiation" shall be followed.

Only qualified personnel familiar with the hazards of radiation are permitted in the radiation area. Direct radiation is emitted only through the top of the collimators. The remote testing site on Moscow Mountain has a heavy, woven wire fence seven feet high. The fence will be posted on all sides with AEC radiation warning signs and University of Idaho radioisotope snow gaging signs. Isotopes shall be installed by one of the five persons mentioned in Item 4. The remote site at Hemlock Butte will similarly be fenced and posted with radiation warning signs. The remote snow gage sites will be surveyed at least once a year to determine the radiation levels.

Leakage tests will be made by an AEC authorized person or by one of the personnel mentioned in Item 4 using a commercial leak test kit. Leakage tests of the sealed sources on the University of Idaho campus will be made at least once every six months. At the remote sites leakage tests will be made at least once a year since these sites may may be accessible only during the summer.

Amend 2
11-1974

During the period of the research program when the sources are not in use, they will be stored in their collimators or in their original shielded shipping containers. These containers will be kept in a locked room with radiation warning signs posted on the door.

15. WASTE DISPOSAL

The radioisotope sources will be used until they have lost most of their activity and then they will be disposed of in accordance with paragraphs 20.301 through 20.305 of AEC 10-CFR-20.

UNIVERSITY OF IDAHO
ENGINEERING EXPERIMENT STATION
MOSCOW, IDAHO

THE DIRECTOR

103-2

JEB

January 4, 1962

11-197-4
Gen 1

Mr. John E. Bowyer
Senior Licensing Reviewer
Isotopes Branch
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D.C.

Dear Mr. Bowyer:

I would like to be authorized to perform leak tests on a 40 millicurie Cobalt 60 sealed source (Isotope Specialties Type 38) owned by the University of Idaho Engineering Experiment Station, as authorized by AEC Byproducts Material License No. 11-197-4(G63).

I propose to make the leak tests in the following manner. The 40 mc. Cobalt 60 sealed source will be wiped thoroughly on a filter paper using a 48-inch remote handling tool. The filter paper will be saturated with an organic solvent to increase the efficiency of the operation. The filter paper will be given a preliminary check with one of the following instruments: Atomic Accessories Model SM-131 survey meter, Baird-Atomic Model 414 logarithmic survey meter, Nucor Model D-1A survey meter. The filter paper will then be counted using either a Baird-Atomic Model 2010 scalar or Baird-Atomic Model 810 well type scintillation detector and Baird-Atomic Model A-2-17B single channel scintillation spectrometer.

If no leakage is apparent in the above test, the sealed source will be wrapped in cotton and left for at least a day in a small sealed container. The cotton will then be counted in the same manner as described above for the filter paper.

If leakage is detected in either procedure, the source will be placed in a sealed container and returned to Isotopes Specialties Company for repair or disposal and your division will be notified of this action as specified in Condition 19C of our license. Containers and carriers, as well as any other equipment that have had contact with the leaking source, will be decontaminated with the advice of our radiation protection officer. Appropriate records of the tests will be kept as required by Condition 19B of our license.

I received training in the use and handling of sealed sources at the United States Atomic Energy Commission, Hanford Operations, Richland, Washington, as outlined in the University of Idaho Engineering Experiment Station's byproduct materials license application of June 16, 1961. I gained considerable experience in handling sealed sources during the performance of work under a contract with the Walla Walla District of the Corps of Engineers during the summer of 1961.

Yours truly,

Don L. Duncan

Don L. Duncan
Research Technologist

DLD:djs

2-357-1

U.S. ARMY ENGINEER DISTRICT, WALLA WALLA
CORPS OF ENGINEERS
BLDG. 602, CITY-COUNTY AIRPORT
WALLA WALLA, WASHINGTON

ADDRESS REPLY TO
THE DISTRICT ENGINEER
NOT TO INDIVIDUALS

NPWGW

18 July 1961

Mr. Lyall Johnson
Chief, License Branch
U. S. Atomic Energy Commission
Washington 25, D. C.

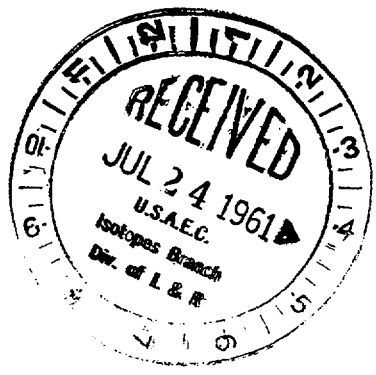
Dear Mr. Johnson:

Reference is made to application for Byproduct Material License dated 16 June 1961 from the University of Idaho.

This University is presently engaged in some very important research on radioactive snow gaging equipment for the Corps of Engineers. The work involves the use of Cobalt 60 and has a deadline for completion of 1 September 1961. Any effort to expedite the issuance of above license will be greatly appreciated.

Sincerely yours,

J. H. BEDDOW
Colonel, CE
District Engineer



11-197-4

2243-1

UNIVERSITY OF IDAHO
ENGINEERING EXPERIMENT STATION
MOSCOW, IDAHO

OFFICE OF THE DIRECTOR

July 6, 1961

35393

Lyall Johnson, Chief
Licensing Branch
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Sir:

Could you please advise how soon we may expect action on application for Byproduct Materials License submitted in the letter of 16 June 1961 signed by A. S. Janssen? The need is urgent to proceed with the investigational program.

Very truly yours,

C. C. Warnick
Associate Director

CCW:ar
Air Mail

Form AEC-313
(5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved.
Budget Bureau No. 38-R027.3.

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 three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. 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.

11-197-4

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

University of Idaho
Moscow, Idaho

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

University of Idaho campus and at remote location on Moscow Mountain in Latah County at Section 14, T 40 N, R 5 West.

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Engineering Experiment Station

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

None

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.)*

L. M. Maxwell	Assistant Professor
D. L. Duncan	Research Technologist
V. E. Penton	Instructor
G. A. McKean	Instructor
H. Singh	Research Technologist

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. Duane J. LeTourneau
Associate Professor of Agricultural Chemistry.

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

$Cobalt_{60}$

(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.)*

1. $Cobalt_{60}$ 40 mc source in type 38 capsule with model SC-3 cylindrical shipping-storage shield.
(Isotope Specialties, Burbank, California)

During the course of the research we may wish to acquire an additional $Cobalt_{60}$ 40 mc sealed source of the same type. This would make a maximum of 80 millicuries in our possession at any one time.

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.)*

This unit will be used to study problems with a radioisotope gage now being used by the Walla Walla District Corps of Engineers. Research will be conducted on calibration of a unit with water and snow with scintillation and G.M. counter equipment. This will be a sealed unit used in collimator as shown on attached sketch. Storage unit will be as indicated above. The unit will be eventually moved to a remote site on Moscow Mountain noted on sketch. This will be inspected before final disposition is made.

DUPLICATED
FOR DIV. OF COMPLIANCE

35383

(Continued on reverse side)

Form AEC–313 (5-58)

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	Training to be given by		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	Hanford Operations of A.E.C. as necessary for this work.		Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity	This is to be given during ~~week of 19-23 June.~~ See attached explanation.		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
The persons mentioned in Item 4 have had no appreciable experience with sources of this magnitude other than described in Item 8 above. An attached sheet describes the experience of our radiation officer.				

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^2)	USE (Monitoring, surveying, measuring)
Attached list gives equipment available in the Radioisotopes Laboratory at the University of Idaho.					

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

See above. (These are calibrated by our Radioisotopes Laboratory.)

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

10 Model L65 Pocket Chambers — Nuclear Chicago Company
1 Model L60 Charger-Reader — Nuclear Chicago Company

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.

University of Idaho
Applicant named in Item 1

Date 19 June 1961

By: J. W. Watts

Deputy Bursar
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. GOVERNMENT PRINTING OFFICE: 1960 O - 568569

8. TYPE OF TRAINING

Arrangements have been made to send the persons named in Item No. 4 to the United States Atomic Energy Commission, Hanford Operations, at Richland, Washington to receive training as deemed sufficient for the purposes of this research project. The training will be completed by June 24, 1961. A copy of a letter from Mr. J. E. Travis is attached describing the period of this training. All of those mentioned are University engineering graduates.

9. EXPERIENCE WITH RADIATION (Radiation Protection Officer)

Dr. Duane J. LeTourneau
Associate Professor of Agricultural Chemistry

(8) Type of Training

Trained in all items.
a. Principles and practices of radiation protection.
b. Radioactivity measurement.
c. Mathematics and calculations.
d. Biological effects.

Trained at Oak Ridge Institute of Nuclear Studies. Duration of training was four weeks in a formal course.

He has served over one year of supervision of radiation hazard problems on the campus and worked under A.E.C. License No. 111-197-3.

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

The Atomic Accessories Model SM-131 portable radiation detector will be used as the survey meter. A reference source is attached to this instrument and a calibration will be made prior to each time it is used. Further calibration and maintenance of this instrument will be made by the University of Idaho Radiation Laboratory on an annual basis.

13. FACILITIES AND EQUIPMENT

During the course of this research program laboratory facilities will be maintained on the University of Idaho campus, either in the Kirtley Engineering Laboratories or in the Engineering Experiment Station. A sketch of the proposed physical layout of the equipment is shown in the covering letter. Later when the radioactive source is moved atop Moscow Mountain a stationary mounting shall be provided as described in Item 14.

Remote handling equipment consists of two magnetic source extension handlers about 3 feet long and 6 lead bricks 2" x 4" x 8". A storage container (Model SC-3 Isotopes Specialty Company) and a lead filled iron pipe (used as a collimator; see attached drawing) will be used as storage devices.

14. RADIATION PROTECTION PROGRAM

The Rules and Regulations as prescribed in "Title 10 - Atomic Energy, Chapter 1, Atomic Energy Commission, Part 20 - Standards for Protection Against Radiation" shall be followed.

14. (continued)

Only qualified personnel familiar with the hazards of radiation are permitted in the radiation area. Rays are emitted only through the top of the collimator which has a 1-1/4 inch opening. The experimental snow gaging station at which the Co_{60} is to be used will be fenced with barbed wire and posted on all four sides with conventional A.E.C. radiation warning signs and University of Idaho radioactive snow gaging signs. Isotopes shall be installed by one of the five personnel mentioned in item 4.

The remote snow gage site (on Moscow Mountain) shall be surveyed annually by the user. Maintenance and repair, if needed, will be made by the above personnel. With the protective collimator cup in place, exposure rates, as measured by the Corps of Engineers, were 2 milliroentgens per hour or less at the cap.

During the period of the research program the Co_{60} source, when not in use, shall be stored in either the collimator or the original shipping case in a small concrete surrounded room guarded by two doors, both of which shall be locked. Warning signs shall be posted on both doors. This room is located in the basement of Kirtley Engineering Laboratory No. 2.

15. WASTE DISPOSAL

Co_{60} isotopes will be used until decayed (5.3 years half life) and then disposed of in accordance with paragraph 20.301 or 20.305 of A.E.C. 10-CFR-20.

UNIVERSITY OF IDAHO
COLLEGE OF ENGINEERING
MOSCOW, IDAHO

OFFICE OF THE DEAN

16 June 1961

Mr. Lyall Johnson, Chief
Licensing Branch
Division of Licensing and Regulation
U.S. Atomic Energy Commission
Washington 25, D.C.

Dear Mr. Johnson:

Enclosed is our application for Byproduct Material License along with the required attachments. In addition the following information is supplied:

1. Applicant: University of Idaho, Moscow, Idaho
   Administrative Officers:
   D. R. Theophilus, President of the University
   H. W. Steffens, Vice President
   K. A. Dick, Vice President

2. This license for Byproduct Material handling is requested so that a research project carried on by the Engineering Experiment Station under contract of the Corps of Engineers may get underway. This research program consists primarily of calibrating a radio isotope snow gaging system. A simple sketch of the physical layout of the equipment used in this project is attached to this letter.

3. The license is requested for an indefinite period of time.

4. A maximum of 2-40 millicurie sources of Co_{60} will be used on this project at any one time. We shall initially have only 1-40 mc source.

5. (a) The estimated date on which the University desires to receive the shipment of 1-40 millicurie source of Co_{60} is July 15, 1961.
   (b) Only sealed sources shall be employed.
   (c) The material will be located on the University of Idaho campus or on Moscow Mountain.

6. The training and experience of the proposed individual users are explained in the attachments to the license application.

7. All other details of the proposed research project are illustrated in the attachments to the application.

8. Proposed procedures to protect health and minimize danger to life or property are described in "Regulations Governing the Safe Handling of Radioactive Isotopes at the University of Idaho". These are attached to the application.

A major portion of this program must be completed during this summer so that the reports are available to the Corps of Engineers for use in the forthcoming winter's activities. It is for this reason that we should appreciate any assistance you may extend to us in expediting the processing of the application.

Very truly yours,

Allen S. Janssen

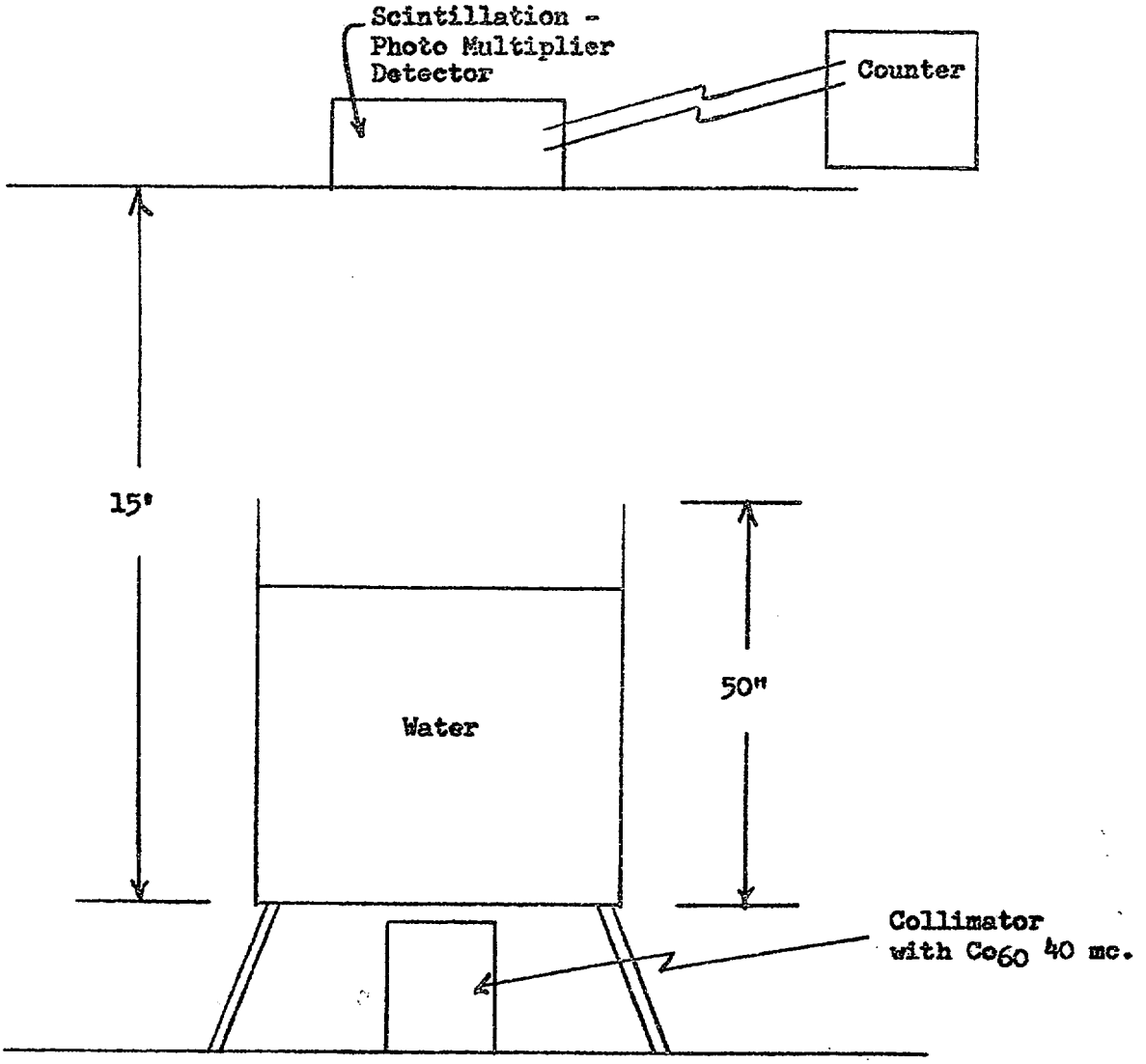
A. S. Janssen
Dean of the College of Engineering
and Director of the Engineering
Experiment Station.

J. W. Watts

~~xx Xxx Xxxx~~ J. W. Watts
~~Xxxx Xxxxxxxxxx~~ Deputy Bursar
University of Idaho

pd
Encl.

SKETCH OF SYSTEM LAYOUT



35383

UNITED STATES
ATOMIC ENERGY COMMISSION
HANFORD OPERATIONS OFFICE
P. O. BOX 550
RICHLAND, WASHINGTON

IN REPLY REFER TO:
RS:HGH

JUN 13 1961

Mr. C. C. Warnick, Associate Director
Engineering Experiment Station
University of Idaho
Moscow, Idaho

Dear Mr. Warnick:

We will be glad to furnish the instruction you requested in your letter of May 26. Since you will be using a sealed cobalt-60 source, we feel that one day should be adequate to give all instruction and demonstration needed for its handling and to discuss our telemetering system.

A day during the latter part of the week of June 19 through 23 would be satisfactory for your trip to Hanford; some of the Hanford health physicists will not be here during the first two days of the week. Five to ten persons attending the session will create no additional problems and there will be no charge for this training.

Please inform us as to which day we may expect the group.

Very truly yours,

J. E. Travis
Manager

35383

RADIOISOTOPES EQUIPMENT, UNIVERSITY OF IDAHO

1	Survey meters-El-Tronics, sm-3
2	Tracerlab, Su-14
2	Atomic Accessories, Model SM-131
1	Baird-Atomic Model 414, Logarithmic
1	Auto Scaler, Tracerlab SC-1B
1	RCL Scaler, Radiation Counter Laboratories, Mark 13 Model 1
5	Baird-Atomic Model 123 G-M Scaler
1	Baird-Atomic Model 2010 Scaler
1	Windowless flow counter, Radiation Counter Laboratories
1	Scintillation detector, Nuclear, Chicago
1	Baird-Atomic Model, 810A well type scintillation detector
1	Pulse Height Analyzer, Tracerlab, RL1-6SR
1	Baird-Atomic Model, A-2-17B single channel scintillation spectrometer
1	Rate meter, Tracerlab, Sc34Bd
1	Carbon counter, Tracerlab, SC 55
1	Windowless flow counter, Tracerlab Sc, 166
5	Baird-Atomic Model 822B stand and end window GM tubes
1	Baird-Atomic Model 821B micro-thin end window flow counter
1	Baird-Atomic Model 410 count rate meter
1	Atomic Accessories Model RSC-5A chromatogram scanner with recorder
1	Remote pipettor
2	Atomic Accessories Model RHT 60-3 remote handling tools
25	Atomic Accessories Model LB-24 lead bricks
3	Atomic Accessories Model AB-23 absorber sets
1	Atomic Accessories Model L-75 Isotope Analysis Kit (electroscope)
10	" " " IP-1 indium foils
2	" " " PC-14 planchet storage cabinets
1000	" " " NP-11 nickel plated cupped planchets
1000	" " " LT-16 lusteroid well counter tubes
5	" " " PF-44 planchet forceps
5	" " " RD-43 Ring and disc sets
1	" " " SPP-69 sample spinner
20	" " " TMP-74 micropipette transfer(2 ea. 1λ, 2λ, 5λ, 10λ, 25λ, 50λ, 100λ, 250λ, 500λ, and 1 ml .)
1	" " " RP-65 remote pipetter
2	" " " 370/271 BF_3 neutron counters
1	" " " F-200-1 lead container for Co^{60} } to be supplied
1	" " " F-200-5 lead container for Co^{60} } with Co^{60}
1	" " " LS-62 lead shield and collimator
10	" " " ESS-35 shielded syringe (0.10cc)
1	" " " SL-71 education source kit
1	Baird-Atomic Model 255 non-overloading proportional amplifiers
5	" " " 960 dual purpose precision timers
5	" " " 800D low background iron shields
2	Atomic Accessories Model 2009 cosmic ray tubes
1	" " " RRMA-X-X51 single channel recorder
1	Baird-Atomic Model 812 scintillation probe
1	Atomic Accessories Model L-24K-58 landsverk charger
2	" " " AGR-28 pressure regulators

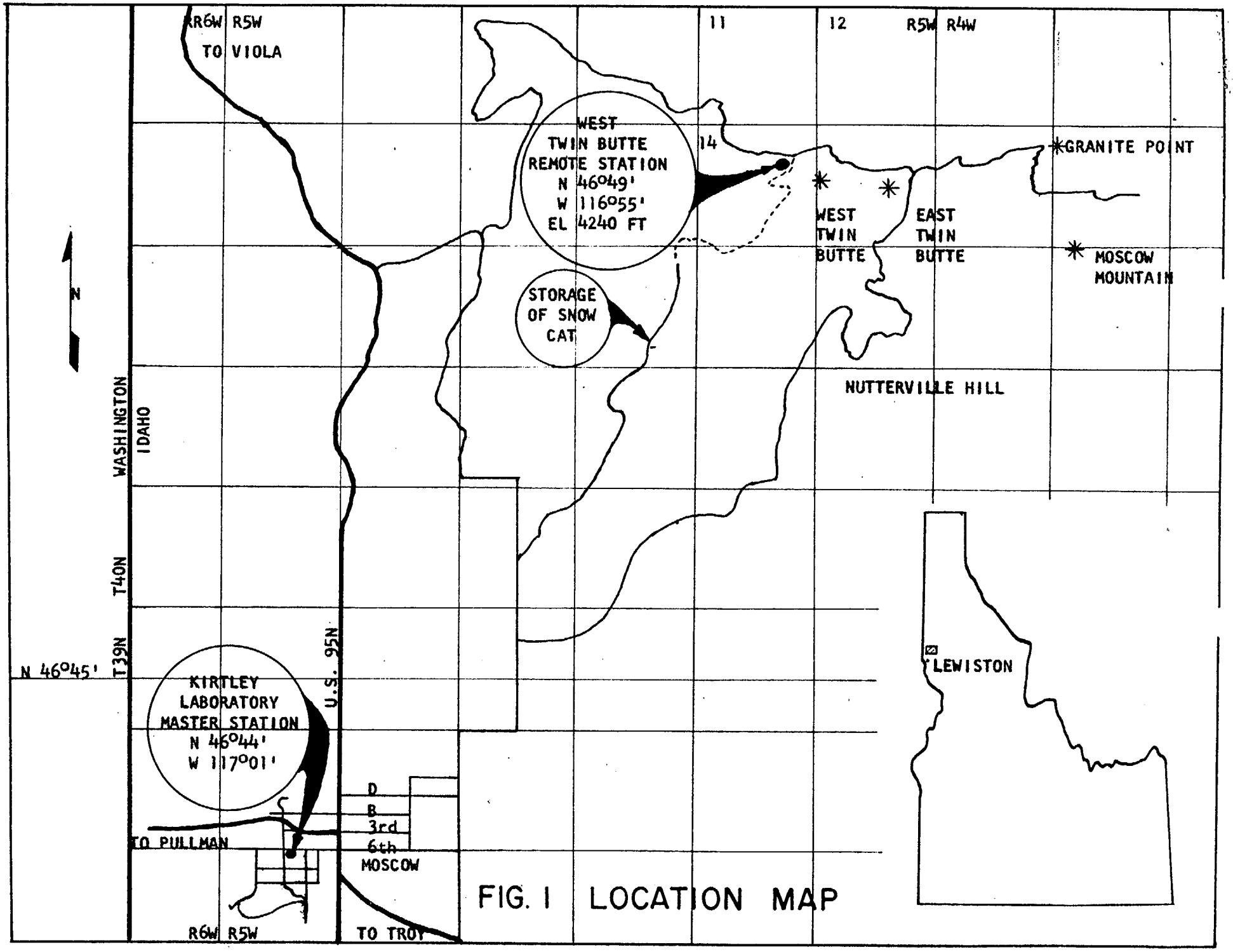
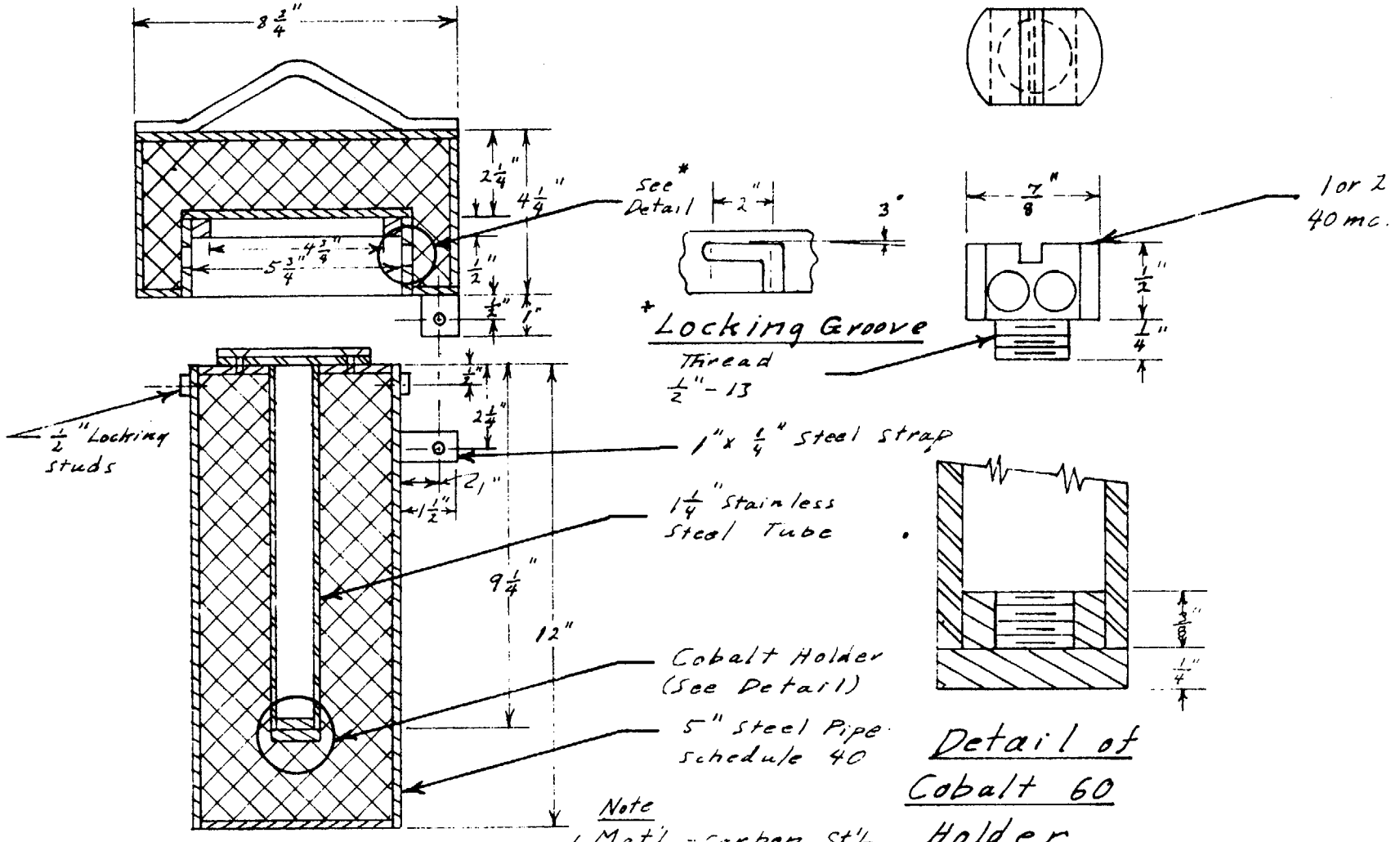


FIG. 1 LOCATION MAP



Section of Lid and Collimator on Centerline

Detail of Cobalt 60 Holder

Note

1. Mat'l. - Carbon St'L 1/4" Th. unless otherwise specified
2. All welded or brazed construction
3. Lead filled as shown

COBALT 60 COLLIMATOR AND STORAGE

3333