-5 (-5(1) II (2)

UNITED STATES ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE

INSPECTION FINDINGS AND LICENSEE ACKNOWLEDGMENT

1. LICENSEE	2. REGIONAL OFFICE
INDIANA UNIVERSITY BLOOMINGTON, INDIANA	REGION III SUITE 405, 120 OAKBROOK CENTER MALL OAK BROOK, ILLINOIS
3. LICENSE NUMBER(S)	**4. DATE OF INSPECTION**
13-108-5; SNM-654	OCTOBER 23-24, 1967

5. INSPECTION FINDINGS

☒ A. No item of noncompliance was found.

☐ B. Rooms or areas were not properly posted to indicate the presence of a RADIATION AREA. 10 CFR 20.203(b) or 34.42

☐ C. Rooms or areas were not properly posted to indicate the presence of a HIGH RADIATION AREA. 10 CFR 20.203(c) (1) or 34.42

☐ D. Rooms or areas were not properly posted to indicate the presence of an AIRBORNE RADIOACTIVITY AREA. 10 CFR 20.203(d)

☐ E. Rooms or areas were not properly posted to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(e)

☐ F. Containers were not properly labeled to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(f) (1) or (f) (2)

☐ G. A current copy of 10 CFR 20, a copy of the license, or a copy of the operating procedures was not properly posted or made available. 10 CFR 20.206(b)

☐ H. Form AEC-3 was not properly posted. 10 CFR 20.206(c)

☐ I. Records of the radiation exposure of individuals were not properly maintained. 10 CFR 20.401(a) or 34.33(b)

☐ J. Records of surveys or disposals were not properly maintained. 10 CFR 20.401(b) or 34.43(d)

☐ K. Records of receipt, transfer, disposal, export or inventory of licensed material were not properly maintained. 10 CFR 30.51, 40.61 or 70.51

☐ L. Records of leak tests were not maintained as prescribed in your license, or 10 CFR 34.25(c)

☐ M. Records of inventories were not maintained. 10 CFR 34.26

☐ N. Utilization logs were not maintained. 10 CFR 34.27

Eugene T. Mapp
(AEC Compliance Inspector)

6. LICENSEE'S ACKNOWLEDGMENT

The AEC Compliance Inspector has explained and I understand the items of noncompliance listed above. The items of noncompliance will be corrected within the next 30 days.

(Date) _____ (Licensee Representative — Title or Position) _____

COPIES: ☐ LICENSEE ☐ COMPLIANCE REGION ☐ DIV. OF ST. & LIC. REL. ☐ DIV. OF COMPLIANCE

Mailed 11-3-67

REPORT COMPILED SHEET

Identifying Information

Type Report (circle) ~~(circle)~~ 591 592

1. Licensee Indiana University
2. Address Bloomington, Indiana
3. License No(s) 13-108-5
4. Date of Inspection October 23 & 24, 1967
5. Inspector E. T. Mapp
6. Status of Compliance Clear

Items of Noncompliance

7. Section of Regulation or License Condition	Details Paragraph
A.	A.
B.	B.
C.	C.
D.	D.
E.	E.
F.	F.
G.	G.

Classified Information

8. This report ~~contains~~ contains classified or business confidential information.
   Yes (No)

E T Mapp — Inspector — 1-16-68 — Date

Reviewer — Date

HEALTH PHYSICS ANALYSIS

The licensee's overall radiation health-safety program is satisfactory.

Use of licensed material is controlled by the Radiation Control Committee through the Radiation Safety Officer (R.S.O.). Six faculty members act as the Area R.S.O. for the separate departments or buildings in which licensed material is used.

Users are supplied the licensee's extensive "Guide for the Use of Radiations and Radioactive Materials."

The licensee's facilities and equipment, including instrumentation, are adequate for the use of licensed material and for the radiation safety program.

The licensee maintains satisfactory programs of personnel monitoring, radiation surveys, leak tests, and record keeping.

DETAILS

General Information

9. Type of inspection - announced. The licensee was notified by telephone on 10-17-67 of the proposed inspection.
10. The Indiana State Board of Health was notified by telephone on 10-9-67 of the scheduled inspection. H. C. Briggs accompanied the AEC inspector.
11. The following staff personnel were interviewed, and they furnished the information given herein: Robert W. Webb, Radiation Safety Officer; Dr. John M. Miller, Chairman, Radiation Control Committee; M. B. Sampson, Professor of Physics.

Inspection History

12. The last previous inspection under License No. 13-108-5 (Rc #5) was made on 10-7-65; no item of noncompliance was found.
The initial inspection under License No. SNM-654 was made on 11-30 and 12-1+2-64; no item of noncompliance was found.

Program

13. Type of program - the licensed material is used for the purposes authorized in the licenses, as detailed therein.
14. Radioisotopes presently in use -
a. Inventory of isotopes, quantities, forms
13-108-5 provides for A, 500 mc each of 3 to 83, B, 1 curie C-14, 10 curies total A+B; C, 10 curies H-3; D, 20 mc Po-210; E, 0.1 μc Am-241 internal calibration source; F, 0.22 μc Cf-252 neutron check source. Table 19B "Radiological Health, 1966-67, Use of Licensed Material" shows that a total of

(14a) 670.035 millicuries of all isotopes used by all departments and lists the isotopes purchased. See EXHIBIT A.
SNM-654 provides for 32 grams plutonium encapsulated as a Pu-Be neutron source; the source on hand contained 31.790 grams Pu.

14.b. The licensee was in compliance with the terms of his licenses regarding possession limits, forms, and specific radioisotopes.

Organization and Administrative Control

15. The licensed programs function in the separate departments of the University. E.J. Stahr is the President of Indiana University. The radiation control program is part of the Environmental health program of the Environmental Health Division (R.W. Webb, Director) of the Student Health Service (J.M. Miller, Director). Dr. Miller reports to the Vice-President and Dean for Undergraduate Development, J.W. Snyder.

16. Radiation Control Committee

a. The membership comprises:
Chairman, Dr. J.M. Miller, Director, Student Health Service
Dr. R.T. Wilkinson, Professor of Physics
Dr. T.B. Guthrie, Professor of Chemistry
Dr. C.W. Beck, Professor of Zoology
Dr. D.W. Fraser, Professor of Microbiology
Mr. K.M. Briscoe, Director, Purchases and Stores
The membership is to be expanded to include a member from every dept. where licensed material is used.

b. The Committee meets quarterly. Minutes of the meetings are prepared by R.W. Webb, who is a non-voting member, ex officio.

17. Radiation Safety Officer (R.S.O.)
a. The R.S.O. is L.W. Wolfe, Assistant Director for Administration, Student Health Service.
b. He is assisted by Isaac Reese, R.S.O. at Indiana University Medical Center, Indianapolis, who comes to Bloomington one day a week.
18. Area Radiation Safety Officers
a. Six faculty members act as R.S.O. for the various buildings or depts. in which licensed material is used. They function in the depts. of Zoology, Chemistry, Physics, and Psychology and in Jordan and Myers buildings.
19. The individual user's competency to act as a Responsible Investigator is determined on the basis of the information he is required to submit on the application form. See EXHIBIT B. Approval as a Responsible Investigator is granted by the Radiation Control Committee on the form shown as EXHIBIT C.
20. Procurement of licensed material is controlled by the Director of Purchases and Stores, who will honor only those requisitions from Responsible Investigators approved by the Radiation Control Committee.

Radiological Safety Procedures

21. Written instructions and emergency procedures are supplied to users in the form of the licensee's extensive "Guide for the Use of Radiations and Radioactive Materials," as specified in License Condition No. 20. The R.S.O. stated that this guide is being revised.

Facilities and Equipment

22. The facilities and equipment are as described in the reports of previous inspections and in the license applications.
23. The instrumentation presently used is comparable to that listed on the license applications.

Personnel Monitoring

24. Film badges
   a. Employees exposed to licensed material are issued a film badge.
   b. Badges are supplied by R. S. Landauer Jr. & Co.
   c. Badges are worn for a period of one week in the Physics Dept.
   d. Badges are worn for a period of one month in the Depts. of Geology, Chemistry, Psychology, Zoology, Microbiology, Botany, Pharmacology, and Anatomy - Physiology.
   e. Film badge reports are reviewed by the Assistant to the R. S. O.
   f. Any exposures over 100 mr/week are reported by telephone by Landauer and are relayed to the University Dept. involved for their investigation.
25. Pocket dosimeters
   a. Dosimeters are used in the various depts. and records are kept there.

Radiation Surveys and Evaluations

26. Direct reading and smear surveys are made by the Assistant R.S.O. periodically of labs where licensed material is used. He utilizes a Nuclear-Chicago Model 2588 Cutie Pie with Model 2526 Dual Chamber (range 0-25 mr/hr x1, x10, x100) and a Wm. B. Johnson & Associates, Inc., Mountain Lakes, N.J., survey meter (range 0-2 mr/hr x1, x10, x100).

27. At the University's request, complete survey, inspection, and evaluation of all areas involved had been done recently by the Indiana State Board of Health and the University R.S.O.

Posting and Labeling

28. Areas or rooms in which licensed material is used or stored are posted according to 20.203(f)(1).

29. Containers of licensed material were labeled as required by 20.203(f)(1) and (2).

30. Copies of the operating procedures and the AEC licenses and regulations were kept available for employee's examination upon request.

31. Form AEC-3 was posted in suitable locations, including the bulletin board in the Physics Dept.

Leak Tests

32. 13-108-5: the only source on hand under this license is the 0.22 μg Cf-252 source, which has not been used; it will be leak tested before use.

SNM-654: the 2-curie Am-Be neutron source was leak tested as prescribed in License Condition No. 11.

Waste Disposal

33. Byproduct material is disposed by incineration as provided by Condition 19 of 13-108-5, by the specified procedures. Records are kept by the Area R.S.O. of the isotopes incineration in that building.

34. Five burials had been made since the last inspection: 12-10-65, 6-10-66, 7-29-66, 4-19-67, and 6-2-67. The records show the microcuries of each isotope disposed and the burial limit x 1000. The records are kept by the Assistant R.S.O. in a log-book.

Records

35. Receipt and transfer of licensed material.
   a. On the logbooks kept by the Assistant R.S.O., the Isotope Requisitions show the Date, Isotope, Activity (mc), Building, Purchase Order No.
   b. The Area R.S.O. keeps records of the receipt and disposal of licensed materials by the Responsible Investigators in his area.

36. Radiation survey records
   a. The results of the periodic surveys by the Assistant R.S.O. are recorded in his memo to the Area R.S.O. (a faculty member) with copies to the R.S.O., the local member of the isotope committee, and the area administrator. The memo includes a diagram of the area surveyed and the comments on the amounts of contamination found, if any. The smear samples are counted in a windowless gas-flow proportional counter.
   b. The results of the surveys by the State Board of Health are recorded in detailed memos in their files showing building, room, no. of smear samples, location in lab; & cpm, B cpm: done on 9-22-67, 9-29-67, 10-6-67, 10-20-67.
   c. When the Pu-Be neutron source was transferred to the neutron irradiation facility on 4-23-63, a survey showed 1.5-2 mr/hr at the surface. On 4-30-63, a slow-neutron count at the surface showed 1500 counts/minute.

37. Leak test results
   a. Leak tests on the Pu-Be neutron source had been done within the required 6-month intervals, according to the licensee records. A Nuclear-Chicago Model 2112 meter with an AP-4 alpha detector was used.

(37a) for counting the swabs. Results showed no counts indicating 0.005 μc. or more of removable alpha contamination.

38. Submission of Material Status Reports

a. The licensee's copies showed that Forms AEC-578 had been submitted to the AEC on a timely basis from 12-31-64 through 6-30-67 listing possession of 31.790 grams of plutonium.

39. Film badge records

a. The licensee's records show that there have been no overexposures to users of licensed material.

b. Entries on the Form AEC-5 kept for each film badge user show exposures of less than 10% of 1¼ rems per calendar quarter.

License Conditions

40. Conditions 10 thru 20 of License No. 13-108-5 and Conditions 8, 10, and 11 of License No. SNM-654 were discussed with licensee personnel during the inspection; no item of noncompliance was found.

Management Discussion

41. The results of the inspection were discussed with Dr. J. M. Miller, Chairman of the Radiation Control Committee, and Mr. R. M. Webb, Radiation Safety Officer; and a Form AEC-591 was issued for License 13-108-5 and SNM-654 showing that no item of noncompliance was found. H. C. Briggs of the Indiana State Board of Health was present during the discussion.

TABLE 19B

EXHIBIT A

RADIOLOGICAL HEALTH

1966-67
Use of Licensed Materials

Building or Department	Millicuries Used	Isotopes purchased
Chemistry	196.37	H-3, Tl-204, Ag-110m, Zn^{65}, Ni^{63}, C-14
Jordan	332.515	P-32, H-3, I^{131}, C-14, S-35, Ca^{45}
Myers	30.35	H-3, C-14, I-131, S-35, I^{125}
Psychology	15.5	H-3, C-14
Physics	95.3	Ag-110m, Y-91, Pr-144, Ca-47, Co-57, Yb 169, Y-88, Gd 153, Sc-46, Sb^{124}, Sb-122, Tb^{160}
Total All Departments	670.035	

Burials 3 decrease in burials is a result of greater used of incinerators and disposal of decayed waste via normal garbage routes.

Inspections 14

Occupational Exposure Record kept for 102 individuals working with radiation

Indiana University

Information Required for Approval
as a Responsible Investigator
In the Use of Radioactive Materials
and Radiation Sources

1. Name: _____ Department: _____

2. Type of Training:

Type	Where Trained	Duration of Training	Formal Course	On the Job
(a) Principles and Practices of Radiation Protection.			(circle one) yes no	(circle one) yes no
(b) Radioactivity measurement, 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

3. Formal Courses: (List all courses pertaining to isotopes, atomic and nuclear structure, radiochemistry, radiobiology, etc.)

Title of Course	Where Trained	Duration	Course Content
(a)			
(b)			

4. Experience: (Actual use of isotopes)

Isotope	Maximum Amount (mc)	Where Experience Gained	Duration	Type of Use

5. Statement of intended applications of radiations or radioactive materials (include an estimate of maximum activities of each isotope per requisition):

6. Statement of Agreement: The below-named individual signifies that he has read and is willing to abide by the Indiana University regulations governing the use of radioisotopes and other sources of ionizing radiation. The undersigned agrees to comply strictly with all such rules and regulations and hereby waives any right or recourse against Indiana University for any damage whatsoever resulting from any failure to conform with said regulations. He further assumes responsibility for ascertaining that employees, students and associates working under his direction shall comply with the regulations of Indiana University governing the use of radioactive materials and radiation sources.

Date: _____ Signed: _____

EXHIBIT B.

Indiana University

APPROVAL FOR RADIOISOTOPE USAGE

_____ is hereby granted approval as a Responsible Investigator in the use of radioactive isotopes and/or radiation sources for research purposes. This material shall be stored or used only in the following approved area.

_____.

Approved Isotopes or Radiation Sources	Maximum Quantities	Conditions

It is understood that the Responsible Investigator shall be fully responsible for the use of isotopes or radiation sources in accordance with all University regulations and that the use must be confined to the stated proposed use and to the area for which permission is granted. This area will be subjected to monitoring for contamination at unannounced times and in cases of carelessness or lack of cooperation, this approval may be withdrawn. Complete cooperation in preventing health hazards and contamination of University buildings is expected. A film badge (MUST) (NEED NOT) be worn during periods of usage under the approved conditions.

(signed)_____
for the Committee

Date_____

EXHIBIT C

MEMO ROUTE SLIP

Form AEC-93 (Rev. May 14, 1947) AECM 0240

☐ See me about this. ☐ Note and return. ☐ For concurrence. ☐ For signature. ☐ For action. ☐ For information.

TO (Name and unit)	INITIALS	REMARKS
J. R. Roeder Div. of Compliance Headquarters	DATE	SUBJECT: INDIANA UNIVERSITY BLOOMINGTON, INDIANA LICENSE NO. 12-108-5
TO (Name and unit)	INITIALS	REMARKS
	DATE	
TO (Name and unit)	INITIALS	REMARKS
	DATE	
FROM (Name and unit) J. M. Allan CO:III		REMARKS Attached are two copies of licensee's adequate reply to our 592 letter of October 6, 1969.
PHONE NO.	DATE 11/31/69	

	BHG		HDT
	JMA		
	GPC		PTS
	GF		VAG
	GAP		File

USE OTHER SIDE FOR ADDITIONAL REMARKS

GPO : 1968 O—294-619

[redacted]

9/146