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

REGION III

Report No. 030-02271/80-02

License No. 24-00167-11 Category G(1) Priority 3

Docket No. 030-02271

Licensee: Washington University
School of Medicine
Skinker and Lindell Blvd.
St. Louis, MO 63130

Inspection At: 4567 Scott Avenue
St. Louis, MO

Inspection Conducted: December 11, 1980

Inspector: S. R. Lasuk 3/3/81

Approved By: D. Wiedeman, Acting Chief 3/4/81
Materials Radiation Protection
Section 1

Inspection Summary

Inspection on December 11, 1980 (Report No. 030-02271/80-02)
Areas Insepcted: Special safety inspection of licensee's materials, facilities, and equipment; survey records; posting; independent measurements.
Results: No items of noncompliance were identified in the four inspected areas.

DETAILS

1. Persons Contacted

Washington University, St. Louis, MO

a. Program in Occupational Therapy - School of Medicine

Ruthan Kannegieter, Ph.D. - Faculty Member
Joseph Kempe - Faculty Member
Debbie Beauleu - Senior Student

b. Radiation Safety Group

John Eichling, Ph.D. - Radiation Safety Officer
Robert Wester - Assistant Deputy Radiation Safety Officer
Mary Feldhaus - Staff Member
Lise Goldworm - Staff Member

c. Administration - Medical Center

Robert Hickok - Assistant Vice Chancellor for Medical Affairs and member of Radiation Hazards Committee

2. Receipt of Information

Dr. Ruthan Kannegieter contacted Region III on November 26, 1980 to say that (1) the Washington University Radiation Safety Section occupies the basement of the building in which she works and has an office, (2) yellow waste drums are stored throughout her work area, and (3) she is concerned about possible radiation levels due to the waste handling and storage activities. She expressed her concerns to the Radiation Safety Officer but failed to receive, what she considers to be, an adequate response to these concerns.

3. Materials, Facilities, and Equipment

The Occupational Therapy Program, Department of Preventive Medicine, occupies the building at 4567 Scott Avenue in St. Louis, Missouri. This special safety inspection was conducted at this address on December 11, 1980. Upon arrival, the RIII inspector met with Dr. Ruthan Kannegieter, Joseph Kempe, Debbie Beauleu plus other O.T. staff members and students to discuss their concerns, action taken by Radiation Safety personnel, correspondence to and from the Radiation Safety Officer, and any assistance that could be provided by the inspector and the NRC.

Among their concerns was the fact that a room (No. 108) occupied by students, patients, faculty, housekeeping, and other O.T. personnel for various periods of time during the week is directly above the Radiation Safety Office and radioactive waste storage area. Also, yellow, 55-gallon drums are stacked on the outside adjacent to this

room and the faculty offices. Dr. Kannegieter said they are concerned about the effect that radiation, above background levels, might have on them and future generations.

It was pointed out that the Radiation Safety Group conducted surveys in Room 108, but the reported results were not considered as an adequate response to their concerns. They prefer to have the waste stored in a remote area, away from the Medical Center.

Copies of correspondence (attached) shows that Room 108 was surveyed, using a portable radiation survey meter, on March 30, 1979, at the request of Mr. Kempe. All readings were less than 0.05 mR/hr except for a 0.4 mR/hr reading in one corner of the room. This was followed by the placing of five badges in various locations of the room to measure the radiation levels over a period of 28.5 days (684 hours), from April 16, 1979 to May 14, 1979. The dose rates at four of the locations were evaluated to be less than 0.015 millirem per hour and approximately 0.044 millirem per hour at the fifth location, according to Dr. Eichling's letter of May 7, 1980.

Dr. Kannegieter stated that it was their desire to have someone other than the licensee's Radiation Safety Group make radiation level measurements in their work areas. The inspector then proceeded to survey rooms and areas specified by Dr. Kannegieter, Mr. Kempe, Ms. Beauleu, and any other individual who was present at this time. The results are given in paragraph 5.

The survey included the yellow, 55-gallon drums located outside the waste storage area and adjacent to the rooms and offices used by O.T. personnel. There were no signs, labels, or tags on these drums to indicate the presence of radioactive material. The lids on several drums were lifted for a visual inspection after surveys indicated no radiation above background levels. All inspected drums were either empty or filled with an absorbent material (later identified as material for liquid waste).

During the drum inspection, Lise Goldworm emerged from the Radiation Safety Office and asked if she could be of assistance. The RIII inspector identified himself and told her of the radiation survey requested by O.T. personnel.

The inspector and Ms. Goldworm then went to the Radiation Safety Office where, at the request of the inspector, she tried to contact Dr. Eichling. After several unsuccessful attempts to reach him, the inspector asked Ms. Goldworm to contact Robert Hickok. The inspector informed Mr. Hickok of the reason for the inspector's visit, the meeting with O.T. personnel that morning and the items that were discussed, results of the radiation survey made by the inspector, and that the inspector will be meeting with Dr. Eichling when he is available later this day.

Mr. Hickok briefly discussed the University's efforts to maintain a safe program involving licensed material. He also stated that he is aware of the concerns of the O.T. personnel and that Dr. Eichling has been involved in activities in response to these concerns. In a subsequent short visit with the inspector, Mr. Hickok said he will pursue this matter further with Dr. Eichling.

Ms. Goldworm produced records showing the results of surveys in the waste storage area and then conducted a tour of this facility where the inspector made additional radiation level measurements (see paragraphs 4 and 5).

Before leaving this location, the inspector informed Dr. Kannegieter that he will be meeting with Dr. Eichling that afternoon. She requested a call from the inspector, after his meeting with Dr. Eichling, to discuss any followup action that may be forthcoming as a result of the inspector's visit.

No items of noncompliance were identified.

4. Survey Records

A selective review of records showing the results of radiation surveys (direct and smears) in the waste storage facility from June 20, 1980 to December 1, 1980 was included in this inspection. Direct radiation levels ranged from background to 15 mR/hr. Smeared areas showing removable contamination levels of 163 to a maximum of 633 dpm $B\beta^-/100\ cm^2$ were cleaned and resmeared until results were less than 100 dpm $B\beta^-/100\ cm^2$.

No items of noncompliance were identified.

5. Independent Measurements

Direct radiation level measurements were made by the RIII inspector using RIII's Eberline E-120 end-window meter, Model 7564, NRC No. 007931, calibrated on November 4, 1980.

The results of radiation surveys in areas specified by Dr. Kannegieter and others are as follows.

Location	Results (mR/hr)
NW corner of Room 108 (which is above the waste storage area).	0.44 through floor
All other floor areas in Room 108	*Bkgd. to 0.1
Housekeeping supplies room (adjacent to Room 108).	Bkgd. to 0.04

Graduate room (Room 107).	Bkgd.
Ellen T. Tyson's office.	Bkgd.
Dr. Elsie S. Roush's office.	Bkgd.
Dr. Ruthan Kannegieter's office.	Bkgd.
Copy room (Room 105).	Bkgd.
Basement area used by O.T. personnel	Bkgd.
Doorway to waste storage area.	Bkgd. to 0.02, through door
Yellow drums located outside of the O.T. faculty and student offices and rooms.	Bkgd.

*Background radiation level was 0.06 mR/hr.

Radiation surveys were also conducted in the waste storage area. A portion of this area is used for the temporary storage of incoming shipments of licensed material. Survey results ranged from background to 10 mR/hr (over open drum containing liquid waste in vermiculite). In the shipment storage area, a maximum reading of 18 mR/hr was obtained through the surface of a package that arrived earlier that day.

No items of noncompliance were identified.

6. Posting

Posted on the outside surface of the door to the waste storage area were "Caution - Radiation Area" and "Caution - Radioactive Material" signs.

No items of noncompliance were identified.

7. Meeting with the Radiation Safety Officer

The inspector met with Dr. Eichling during the afternoon to discuss the reason for his visit plus the earlier meetings and inspection findings. Robert Wester was in attendance during a portion of this meeting.

Dr. Eichling stated that they have three waste storage areas. The waste area which was visited by the inspector handles approximately 75% of all waste; also, the waste is almost entirely from their broad medical licensed program. The yellow drums are temporarily stored outside until needed in the waste storage area.

In addition to their direct and smear surveys, Dr. Eichling produced records to show they conduct an air sampling program in the waste area to evaluate and control their waste handling operations.

Prior to this meeting with the inspector, Dr. Eichling said he was informed by Mr. Hickok that a meeting will be arranged involving himself (Mr. Hickok), Dr. Robert Shank, head of the Department of Preventive Medicine, Dr. Kannegieter, and Dr. Eichling in order to further pursue the concerns of the O.T. personnel.

8. Concluding Discussion with Dr. Kannegieter

The inspector called Dr. Kannegieter from the RSO's office to inform her of the meeting to be arranged by Mr. Hickok. She asked if Joseph Kempe could attend the meeting and was told that she should discuss that point with Mr. Hickok.

RADIATION SAFETY DIVISION

WASHINGTON UNIVERSITY

Copies of letters/memos received 12-11-80 from Mr. Joseph Kempe.
SRL

APPLIED HEALTH PHYSICS — BOX 8053, 4567 SCOTT AVE. ST. LOUIS, MO. 63110 314-454-2282

MEMO

To: John Eichling, Ph. D.
Radiation Safety Officer

From: Mary Feldhaus, R.T., BSRT
Health Physics MF

Re: Survey of Room in Occupational Therapy above RSO

As requested by Mr. Kempe, Occupational Therapy, a survey was conducted in a room on the first floor of the Occupational Therapy Building that is located directly above the Radiation Safety Office and radioactive waste storage area.

With the exception of a .4 mR/hr (on contact with the floor) reading in the Northeast corner of the room, all readings were less than < .05 mR/hr.

Meter used: Victoreen 440

Date: March 30, 1979

cc: Mr. Joseph Kempe
Lecturer in Audio-Visual Technology
Occupational Therapy

WASHINGTON UNIVERSITY IN ST LOUIS
School of Medicine

Program in Occupational Therapy
4567 Scott Avenue
St. Louis, Missouri 63110
(314) 454-2564

March 31, 1980

Mr. John O. Eichling, M.D.
Association Professor of Radiation
Science in Radiology
Washington University Medical School
Box 8131

Dear Dr. Eichling:

The undersigned faculty, staff, and students of the Occupational Therapy Program, Department of Preventive Medicine, Washington University School of Medicine, are deeply troubled and greatly concerned about the proximity of the University's radiation disposal facility to our classrooms, treatment room, and offices. The disposal facility, as you know, is located within our building and metal barrels containing radioactive waste are stored outside the facility against adjacent walls and under windows of heavily used classrooms, study rooms, and a treatment room in which an ongoing program for blind patients is conducted. These barrels cause additional concern about contamination from leaking and handling procedures that could cause particulate matter to enter the air.

During the period of April 16 and May 14, 1979, monitoring by film dosimeter was conducted in the room occupied by occupational therpay above the radiation disposal facility with the following results: The average exposure over a period of 28.5 days was 1.2mR/hr. which is 24 times the normal background level of .06 mR/hr. Realizing that episodic exposure is difficult to monitor, we feel, nevertheless, that peak exposures are not reflected in this average reading. The monitoring conducted renders no useful data for determining these peak exposures nor the presence of any airborne particulate matter. It is not only the possibility of these higher transient exposures but the constant low-level exposure to personnel using the bulding that disturbs us. You must be aware of the fact that a youthful population, with reproductive years ahead of them constitute the majority of people working under the radiation levels described.

While there are a number of remedies to the situation, the best one seems to be the isolation of the radiation disposal facility from the University community. We urge your prompt consideration of this proposal to eliminate a hazardous situation affecting human lives. We look forward to hearing from you.

Sincerely yours,

Ruthan B. Kannegieter, Ph.D

Joseph C. Kempe

RK:JK/sk
cc: William H. Danforth, M.D., Chancellor, Washington University-St. Louis
Kenton King, M.D., Dean of the School of Medicine
Samuel B. Guze, M.D., Vice Chancellor of Medical Affairs
Robert J. Hickok, Assistant Vice Chancellor of Medical Affairs
Robert E. Shank, M.D., Head of Department of Preventive Medicine and Public Health

WASHINGTON UNIVERSITY IN ST. LOUIS
School of Medicine

Program in Occupational Therapy
4567 Scott Avenue
St. Louis, Missouri 63110
(314) 454-2564

April 8, 1980

John O. Eichling, Ph.D.,
Associate Professor of Radiation
Science in Radiology
Washington University School of Medicine
Box 8131

Dear Dr. Eichling:

The attached petition was submitted to me and is being presented to you at the request of the faculty, staff, and students of the Program in Occupational Therapy, Washington University School of Medicine. We are deeply troubled and greatly concerned about the proximity of the University's radiation disposal facility to our classrooms and offices. The disposal facility is located within our building, but metal barrels containing radioactive waste are also stored outside the facility against adjacent walls and under windows of heavily used classrooms, study rooms, and a treatment room used for an ongoing program for blind patients. These barrels cause additional concern about contamination from leaking and handling procedures that could cause particulate matter to enter the air.

During the period of April 16 through May 14, 1979, monitoring by film dosimeter was conducted in the room occupied by occupational therapy above the radiation disposal facility with the following results: The average exposure over a period of 28.5 days was 1.2mR/hr. which is 24 times the normal background level of .05 mR/hr. Realizing that episodic exposure is difficult to monitor, we feel, nevertheless, that peak exposures are not reflected in this average reading. The monitoring conducted renders no useful data for determining these peak exposures nor the presence of any airborne particulate matter. It is not only the possibility of these higher transient exposures but the constant low-level exposure to personnel using the building that disturbs us.

A youthful population with reproductive years ahead of them constitute the majority of people working under the radiation levels described, and we are seriously concerned about the potential impact that radiation may have on them.

While there are a number of remedies to the situation, the best one seems to be the isolation of the radiation disposal facility from the University community. We request your prompt consideration of this proposal to eliminate a hazardous situation affecting human lives.

Sincerely yours,

Jerry A. Johnson, Ed.D., OTR, FAOTA
Professor and Elias Michael Director

JAJ:jt
Attachment: Signed petition
cc: Robert E. Shank, M.D., Head, Department of Preventive Medicine and Public Health
Robert J. Hickok, Assistant Vice Chancellor of Medical Affairs

PROGRAM IN OCCUPATIONAL THERAPY
Washington University School of Medicine

PETITION

We, the undersigned faculty, staff, and students of the Washington University Program in Occupational Therapy, are resolved that we do not wish to be exposed to any level of radiation in excess of normal background readings that may emanate from the radiation disposal facility housed in the School of Occupational Therapy building. We hereby request that the radiation disposal facility be removed from the University campus forthwith.

1. Mary L. Tregaskes, OTR
2. Steven Lewis OTR
3. Ellen Erwin, OTR
4. Linda Bu
5. Terry Lewis, OTR/L
6. Ellen Twining Tyler
7. Esther B. Kinnaeter, PhD, OTR
8. Jeff Price OT Student
9. Judith A Eckel Kemp OT student
10. Vicki M Dunbar
11. Annette Pankey
12. Becky Billington
13. Mildred Jones
14. Beverly C. Walker
15. Ellen J Arnold
16. Jocelyn Muller
17. Bob Eiman
18. Rosana Molina
19. Alice H. Marck
20. Linda Emanuel
21. Ann Lawler
22. Kathryn Goldstein
23. Barbara A. Benson
24. Debra A. Faulkner
25. Lisa Kusama
26. Jeanne M. Kloeckner
27. Deborah Denny
28. Steven Krohn
29. Phillip Ainsworth
30. Amy S. Rubin
31. Carole Ragan
32. Jo. K
33. Cindy Lewis
34. E Gail Ph.D.
35. Barb Hooper
36. Garth D. Robbs
37. Cynthia H Pennington
38. Becky Palacios
39. Deedra Halpern
40. Dan McKeon
41. Carol Dinan
42. Shirley Lake Pies

43. Judith F. Till
44. [illegible]
45. [illegible]
46. [illegible]
47. [illegible]
48. Debra A. Collins
49. Janet Beatty
50. [illegible]
51. Wendy Rogers
52. [illegible]
53. Eileen Sobol
54. Marjorie Craft
55. [illegible]
56. [illegible]
57. [illegible]
58. [illegible]
59. Dorothy J. Pennington
60. [illegible]
61. Tamar Montoya
62. Thomas M. Godoski
63. Julie A. Peskin

WASHINGTON UNIVERSITY

AT ST. LOUIS, MISSOURI 63110

DIVISION OF
RADIATION SCIENCES
BOX 8131

May 7, 1980

Jerry Johnson, Ed. D.
Professor and Elias Michael Director
Program in Occupational Therapy
Washington University Medical School

Dear Dr. Johnson:

I submit the following in response to your letter of April 8, 1980 in which you expressed concern regarding the safety of your staff due to the location of the Radiation Safety Office:

(1) Radiation Safety staff monitored the area of Occupational Therapy immediately above the Radiation Safety Office during the period of April 16 through May 14, 1979 and a report of the results was sent to Mr. Joseph Kempe, Jr. The Survey indicated that the exposures at the 5 monitored locations were less than 10 millirems (the threshold of exposure level for photographic film monitors) for a period of 28.5 days except for one location - the floor immediately above the northwest corner of the Safety Office. At that point the cumulative dose was evaluated by R.S. Landauer, Inc. to be approximately 30 millirems for the 28.5 day period. These values represented the cumulative dose at each of the monitored locations for 28.5 days or 684 hours. Thus, the dose rates at four of the locations were evaluated to be less than 0.015 millirem per hour and approximately 0.044 millirem per hour at the fifth location. Your assertion that the average exposure is of the order of 1.2 millirems/hr is in serious error and probably was generated by dividing 30 mR by 24 hours. It is unfortunate that your staff and students have become emotionally involved about an issue due to an erroneous assertion.

(2) There are several other data points to substantiate the exceedingly low radiation levels in the immediate area of the Safety Office:

(a) routine monitoring since April 1979 of the basement area at points near the ceiling for prolonged periods (~2months at a time) have never indicated dose rates exceeding 0.025 millirems/hr.

(b) periodic sampling of airborne radioactivity in the safety area and immediately outside the building have indicated amounts of activity due only to the radioactivity in air (primarily radon).

(c) two individuals occupy the Radiation Safety office nearly 100% of their working hours. During this time, despite working in close proxmity to low level radioactive material (receiving and distributing packages of radioactive material, packaging radioactive waste, etc.) their cumulative radiation doses for the calendar year 1979 predict an average exposure rate of approximately 0.025 millirems/hour within the Radiation Safety area for these individuals.

(d) a photographic film monitor is worn by Mr. Frank Rhodes of your housekeeping staff. A measurable exposure to his monitor has not been recorded by R.S. Landauer, Inc., despite the presence of Mr. Rhodes in the area of question of approximately one to two hours per day.

(3) To provide some comparison consider the following:

(a) The limits of exposures (Title 10 Code of Federal Regulations Part 20.105) to individuals in the area of question are:

(i) two millirems in any one hour

(ii) 100 millirems in any seven consecutive days

(iii) 500 millirems per year

(b) The predicted dose in excess of natural background for persons in the area immediately above the Safety Office:

Less than 5 millirems per year (based on 5 hours occupancy per individual per week)

(c) The radiation dose due to background in St. Louis is approximately 100 millirems per year.

Thus, exposure data demonstrate that the radiation levels in the area above the Radiation Safety Office impart radiation doses to individuals in the area that are less than 1% of the limits and the predicted radiation doses amount to less than 5% of the radiation dose due to natural background radiation.

(4) The barrels stored outside the building are empty; furthermore, they are barrels received from our supplier of barrels Great Lakes Container Corporation, and have not been previously exposed to radioactive waste. Accordingly, the barrels outside the building provide no radiation risk whatsoever.

(5) The Radiation Safety functions have outgrown the limited space allocated to us and relocation to a more favorable location will be well received by our Division. However, such a move

could not be justified, in my opinion, by the radiation exposure of the Occupational Therapy group. It should also be kept in mind that our Division's function is one of service providing support for approximately one-half of the funded research at this University and all of the medical diagnosis and therapy employing radioactive material.

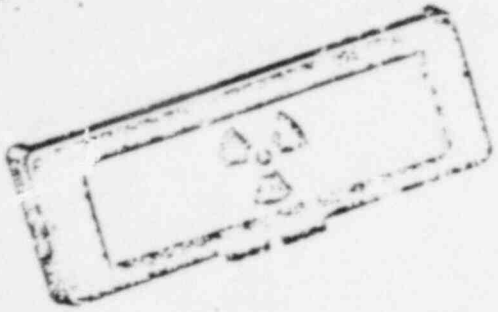
Sincerely,

John Eichling

John Eichling, Ph.D.
Radiation Safety Officer
Washington University

JE:fi

cc: Robert Hickok
Robert E. Shank, M.D.



RADIATION SAFETY DIVISION

WASHINGTON UNIVERSITY

APPLIED HEALTH PHYSICS — BOX 8053, 4567 SCOTT AVE. ST. LOUIS, MO. 63110 314-454-2282

MEMO

To: John Eichling, Ph. D.
Radiation Safety Officer

From: Mary Feldhaus, R.T., BSRT
Health Physics

Re: Dosimetry Report of Spare Badges in Occupational Therapy

Date Badges were placed in O.T. : April 16, 1979
Date Bagdes were picked up : May 14, 1979

Total days(24 hrs.) badges were in O.T. : 28.5 days(684 hrs.)

Location of room monitored: Above Radiation Safety Office waste storage area.

Maximum time this room is used per week: 4-5 hrs.

Spares used: Account 67871 Series C

LOCATION	Badge #	mR/28.5 days
South Wall, on floor above RSO freezer	00024	M(< 10mR)
West Wall, by compactor shaft	00025	M
West Wall, South Window, above hood by compactor	00026	M
West Wall, North Window, above hood in RSO used to vent liquid waste	00027	M
North Wall, floor above RSO's leaded storage area	00028	30 mR

At the time these badges were in place, the leaded storage area contained various highenergy waste materials from Nuclear Medicine, including ^{68}Ge.

Date: June 6, 1979