

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 030-00706/85001(DRSS)

Docket No. 030-706

License No. 13-09639-05

Priority VI

Category F

Licensee: Indiana State University  
Terre Haute, IN 47809

Inspection Conducted: July 11, 1985

Inspectors: W. J. Slawinski  
Radiation Specialist

*J. S. Mueller*  
J. S. Mueller  
Engineering Aide (Co-op)

*14 Aug 85*  
Date

*14 August 85*  
Date

Approved By: D. J. Sreniawski, Chief  
Nuclear Materials Safety Section 2

*28 August 85*  
Date

Inspection Summary

Inspection on July 11, 1985 (Report No. 030-00706/85001(DRSS))

Areas Inspected: This was an unannounced special safety inspection prompted by allegations to the NRC Region III office received by telephone on July 10, 1985. The special inspection included radiological surveys, interviews of laboratory personnel, and review of the licensees methods for posting/access to restricted areas. The inspection involved seven inspector-hours onsite by two NRC inspectors.

Results: Of the areas inspected, no violations or deviations of NRC requirements were identified.

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## DETAILS

### 1. Persons Contacted

\*John Corrigan, Associate Dean, College of Arts and Sciences  
\*William Brett, Ph.D., Chairman, Department of Life Sciences  
\*John Swetz, Ph.D., Professor of Physics and Director, Radiation Laboratory  
James Hughes Ph.D, Assistant Professor  
Frank Favoli, Laboratory Technician

\*Denotes those present at exit meeting.

### 2. Purpose of Inspection

This was an unannounced special safety inspection to review allegations of (1) improper storage of liquid radioactive waste in Rooms 272 and 280 of the Life Sciences Building; and (2) law-suit filed by a former student concerning cancer.

The primary purpose of this site visit was to determine if high radiation levels were present in Rooms 272 and 280, and determine if any other radiological hazards exist in these areas. The inspection was limited to the areas that involved the allegations.

### 3. Specific Allegations and NRC Findings

A. Allegation: Liquid radioactive wastes are improperly stored in rooms 272 and possibly 280 of the University's Life Sciences Building. It is believed that high radiation levels exist in these areas, primarily from liquid waste stored in plastic bleach bottles. Radiation levels were reported to be off scale on a Geiger-Mueller survey instrument used in these areas.

Findings: On July 11, 1985, the NRC inspectors met with John Swetz, Ph.D., after initially attempting to contact the University Radiation Safety Officer (Mark Oster), or the Chairman of their Radiological Control Committee (Donald Ormond). Dr. Swetz, a member of the Indiana Area Radiological Emergency Response Team, informed the inspectors that similar allegations were brought to his attention on July 9, 1985 by Mr. Hal Stocks (Chief, Radiological Health Section, Indiana State Board of Health). Mr. Stocks requested Dr. Swetz respond to the allegations as a member of the Radiological Emergency Response Team and determine if unsafe radiation practices exist. Dr. Swetz performed his investigation on July 9 and 10, 1985. A report of his findings to Mr. Stocks is included as Attachment A.

The NRC inspectors visited rooms No. 280 and No. 272 of the Life Sciences Building. Laboratory 280B, an annex of room 280, routinely uses radioactive materials for research work. This lab is used primarily for radioimmuno assay studies with iodine-125, approximately 5 millicuries every other month. Lesser quantities of phosphorous-32 are also reported to be used in this lab on occasion.

Laboratory 280B is a relatively small area, roughly 18 by 20 feet, containing a fume hood, lab benches and tables, and a refrigerator-freezer for storage of licensed materials. Individuals working in this laboratory, including the principal investigator, Dr. Hughes, stated that liquid radioimmuno assay (RIA) waste is normally stored in plastic bleach bottles. Paper and other solid wastes are usually stored in cardboard boxes or other designated receptacles. Waste is stored in lab 280B for periods up to a few weeks, prior to its transfer to room 272 where it is held pending ultimate disposal to an authorized disposal firm.

Using the NRC survey instruments identified in section 5 of this report, the NRC inspectors measured 1.0 millirem/hour at the surface of one plastic bleach bottle nearly filled with iodine-125 RIA waste. Miscellaneous iodine-125 contaminated paper waste stored in a cardboard box measured 7.0 millirems/hour at its surface. All other laboratory areas measured at or near normal background levels. In addition, five area wipe tests were taken to check for possible removable iodine contamination and for contamination from material other than strong beta and gamma emitters. These wipe tests are currently being analyzed by the NRC Region III laboratory. The inspectors were informed that all iodinations for this lab are performed exclusively by Dr. Hughes, inside this lab's fume hood.

A William B. Johnson Model GSM-5 (with sodium iodide probe Model DGSP-2A) survey meter is used by the licensee for routine area surveys in rooms No. 280 and No. 272. The inspectors noted that on its highest scale, this meter measures only up to 20 millirems per hour. The cardboard waste box measuring 7.0 millirems per hour with the NRC instruments, read "off scale" on the highest range of the licensee's Johnson meter. This is expected since the sodium iodide probe is quite sensitive to iodine-125. The Johnson meter was last checked for proper operability by the Licensee in early July 1985.

Laboratory surveys are performed approximately every two weeks by Dr. Hughes or a lab technician and the area is decontaminated if necessary. Licensee survey records and techniques for the last twelve months were reviewed and appeared adequate. Survey records occasionally showed radiation levels being "high" or off scale, prior to decontamination.

No radiation levels in excess of regulatory limits or significant radiological hazards were found in laboratory, 280B. However, inspectors did recommend that beta/gamma emitting radioactive wastes be placed in adequately shielded receptacles to reduce external radiation levels, rather than plastic and cardboard containers.

The NRC inspectors visited Room 272 of the Life Sciences Building next. This room is a former laboratory used for long term radioactive material storage. It has been used in this capacity for

about the last year. The room is approximately 20 by 25 feet and connects into another smaller room segregated by a locked door. The main room is an appropriately labeled, restricted access area, containing two side-by-side fume hoods, lab benches and counters, refrigerator-freezer, and a cabinet. Keys for the rooms are maintained by authorized individuals.

At the time of this inspection, room 272 contained the following radioactive wastes:

- ° Approximately 15 cardboard boxes of solid mixed waste reported to contain small amounts of calcium-45, phosphorus-32, carbon 14 and tritium. These boxes are stored on bench tops.
- ° Approximately 150 trays of carbon-14 and tritium scintillation vials on bench tops.
- ° 15 cardboard boxes of mixed solid waste reported to be contaminated with iodine-125 sitting on the floor near the fume hoods.

The inspectors were informed that this waste would fill approximately six to eight 55-gallon drums and was being stored here pending transfer to an authorized disposal firm. Mr. Corrigan stated that such waste shipments are made about once per year, with the next shipment tentatively scheduled for August 1985. No radioactive waste was stored in the smaller inner room.

Direct surveys performed in room 272 by the NRC inspectors revealed two areas measuring greater than normal background. (1) The inside corner of one fume hood measured 1.0 millirems per hour. (2) The base of a ring stand inside this same fume hood measured 6.0 millirems per hour at its surface. (The area measuring 1.0 millirem with the NRC instrument, measured 500,000 cpm using Dr. Swez's Bicon Analyst with sodium-iodide probe). These fume hoods were said to contain small amounts (less than a few millicuries) of iodine-125 recently transferred over from Dr. Hughes Lab. In addition to direct surveys, inspectors wipe tested six areas for removable contamination. These wipes are currently being analyzed in the NRC Region III laboratory.

No radiation levels in excess of regulatory limits or significant radiological hazards were found in room 272. The inspectors recommended this waste be packed into steel drums and prepared for shipment, rather than remaining in glass vial and/or cardboard boxes. However, this is not an NRC regulation or requirement of their license.

This allegation was not substantiated. No violations or deviations were identified in the review of this program area.

- B. Allegation: A former student is involved with the University in a lawsuit concerning cancer. No other information was given by the alleged regarding this cancer suit.

Finding: This matter was discussed at the exit interview on July 11, 1985. Messrs Corrigan and Brett stated that a lawsuit has recently been filed. They further stated that, to the best of their knowledge, the suit does not relate to use or storage of radioactive material or any other hazardous materials in any way.

Bruce Berson, NRC regional legal counsel, contacted the University legal counsel, Edward Pease, by telephone on August 23, 1985. Mr. Berson was told the only actions pending which resemble the allegation are:

1. Sadat vs. Rogers, et.al. in the Superior Court of Zigo County, case SC-83-1384.
2. Sadat vs Heatherington, et.al. for review by the State of Indiana Medical Licensing Board.

Both actions were reported to involve the claim that Sadat had developed rectal cancer and the University Center doctors had failed to diagnose the conditions in time for treatment to have maximum effect. No claim was made that the cancer was contacted at the University.

This matter is being handled by a court of law. No further review or evaluation will be undertaken at this time.

#### 4. Posting/Access to Restricted Areas

During the inspection, it was noted that the areas where radioactive materials are used and stored were posted and labeled in accordance with applicable sections of 10 CFR 20.203.

Life Science Building rooms No. 272 and No. 280 are considered restricted areas and are appropriately posted with "Caution-Radioactive Materials" signs. Since room 272 is used primarily for storage purposes, it is locked when unattended. Keys to room 272 are controlled by individuals who have need to frequent this area. Both Drs. Hughes and Brett have keys to this room.

No violations or deviations were identified in the review of this program area.

#### 5. Independent Measurements

NRC radiation surveys were performed using an Eberline E-520, NRC No. 009576, last calibrated on June 13, 1985. Those areas measuring greater than normal background levels were confirmed with a Xetex Model 305B, NRC No. 008358, last calibrated on July 8, 1985.

All radiation levels measuring greater than normal background levels were previously detailed in the body of this report. Additionally, eleven wipe tests were taken in various areas of rooms 272 and 280B. Wipes are currently being analyzed at the NRC Region III laboratory.

No violations or deviations were identified in the review of this program area.

6. Exit Interview

On July 11, 1985, the inspectors met with those individuals denoted in Section 1 to reiterate the purpose of this visit and summarize the inspection findings. The individuals were informed that a investigation and inspection of the entire program may be performed in the near future.

Attachment: Letter dated July 15, 1985 from John Swez, Ph.D.  
to Mr. Hal Stocks



# Indiana State University

Department of Physics

July 15, 1985

Mr. Hal Stocks, Chief  
Radiological Health Section  
Indiana State Board of Health  
1330 W. Michigan Street  
Indianapolis, IN 46206

Dear Hal:

On June 9, 1985 I received your phone call at approximately 9:20 a.m. informing me that a report had been made to your office concerning various unsafe radioisotope and radiation practices in the Department of Life Sciences at Indiana State University. It was my understanding that it was your request for me to respond to this incident on behalf of my being a member of the Indiana Area Radiation Emergency Response Committee. As a member of this Committee in response to this incident I can assure you that I acted not as the role of a staff member at Indiana State University but as an independent observer with trained eyes and ears whose sole duty is to determine whether an "emergency condition" exists and to report to you my observations. This letter is a detailed description of my actions and observations.

At 11:30 a.m. of that same day I met with Associate Dean John Corrigan and Dean Effie Hunt of the College of Arts and Sciences to inform them of my intent to visit laboratories that afternoon at the Department of Life Sciences and to determine whether gross violations of radiation and radioactive handling practices were indeed present so to act in an injurious manner to occupational workers and the general public. I also made an attempt then to contact the Radiation Safety Officer, Dr. Mark Oster who, I was informed, was not on campus. At 2:45 p.m. I contacted Dr. William Brett, Chairman of the Department of Life Sciences, and informed him of my previous meeting with the Deans and of my immediate intentions. Dr. Brett offered my full cooperation in the pursuing investigations that were conducted as so did the Dean of College of Arts and Sciences.

Beginning at approximately 3:00 p.m. of that same day, I entered a total of five laboratories at the Department of Life Sciences Building with equipment for monitoring gross alpha, beta, and gamma activity and also a specialized detector for measuring Iodine-125. The specialized detector was a Bicron Analyst equipped with a GELL scintillation probe with at least 90% efficiency for measuring Iodine-125 as compared with two pi geometry. The latter detector was recently factory calibrated and was checked the next day on a Atomlab Model 043-365 Standard Thyroid Uptake Neck Phantom using a New England Nuclear NES-222 simulated Iodine-125 source of approximately 0.0103 microcurie activity. I was also equipped and did take smears of two of the laboratories involved. The next day at approximately 11:45 a.m. I visited the last remaining laboratory using radioisotopes located at the Electron Microscope Facility in the Student Health Services Building. Laboratories in rooms 210, 204, 277, and the EMF laboratory seemed to be using various low levels of Phosphorus-32, Tritium, and Calcium-45 so I was not very concerned with them and everything seemed in order. The research laboratory under the direction of Dr. James Hughes in room 282 seemed to have operating levels of Iodine-125 as did the storage areas in room 272 so I shall concentrate the remaining of my report on these areas. On the afternoon of July 9th I surveyed Dr. Hughes' laboratory and took floor swipes in the areas indicated in Figure 1. Immediate scans of floor swipes show no detectable activity. Iodine laboratory levels are indicated in the diagram on areas marked R. These areas were clearly marked for radioactive handling. The door to the laboratory (located to the right of smear #1) was also clearly marked. I scanned three workers who were present at various times in the laboratory and none had any significant detectable thyroid activity. The next day I scanned Dr. Hughes who had a minimal level of thyroid activity about 0.01 microcuries as compared with the thyroid phantom. Dr. Hughes stated that he was the only laboratory member who performed iodinations and that his thyroid activity was that which would be expected. I felt his explanation was in order. Clearly satisfied that no injury to human health was occurring in this laboratory I moved to the last remaining laboratory, room 272 which is indicated in Figure 2.

Room 272 apparently is used as a room for radioactive storage. The room was locked when I arrived. Most of the room is used to house used radioactive scintillation vials yet filled with scintillations fluid. A diagram of the room is indicated in Figure 2. The majority of the vials appear to be marked as low level Tritium and Carbon-14. There are large numbers of vials stored in the areas marked as R on the laboratory benches and all boxes seemed to be radioactively labeled and consist mainly of used scintillation trays and sealed cardboard boxes. There are other smaller areas in the room which contain smaller packages of

Mr. Hal Stocks  
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apparently marked radioactive material. The area on the opposite side of the room acted as a storage area for Iodine-125 and consisted of the hood and the area adjacent to it. I was mainly concerned with the hood since activity levels as measured on the Bicron Analyst exceeded 500,000 cpm at the face of the hood but radiation levels did not exceed 2 mr/hr. The hood door was partly opened. The column appearing to the right of Figure 7 seemed to have the most activity. I subsequently asked Dr. Hughes as to how much Iodine-125 activity was stored in the hood and he made a rough estimate of 25 millicuries with approximately 100 microcuries in one column. I had some concern as to whether Iodine-125 activity in the ambient air in this room poses a problem to occupational workers and the general public according to standards set forth in Nuclear Regulatory Commission guidelines (Code of Federal Regulations, Title 10, Section 20). However, after brief discussion with several people I am under the conviction that since the air turnover in the room is about 5 exchanges per hour and since there seems to be air upflow in the hood that this is not the case. Again, a quick check of the smears as indicated in Figure 2 showed no detectable activity.

On July 11, 1985 at approximately 9:00 a.m. I phoned you and related you to my findings in this investigation.

On July 11, 1985 at approximately 2:00 p.m. I was met by two investigators from the U.S. Nuclear Regulatory Commission, Region III (Chicago Office). Mr. Wayne J. Slawinski, a Radiation Specialist, informed me that similar allegations were brought to the Chicago Office via an unanimous phone call but were directed to only two laboratories, room 282 and room 272. I informed Mr. Slawinski that I had already been alerted by your office and had made a preliminary investigation. Over the next two hours the investigators made what appeared to be a thorough investigation of the two laboratories and reported to Associate Dean John Corrigan and myself that "No hazard existed".

On July 12 and July 13 I concluded counting of all smears using a thin end window probe and a 3 inch sodium iodine crystal coupled with a Series 80 Canberra multichannel analyzer. Again there was no significant detectable activity.

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Over the next few weeks, however, it is my intention (unless otherwise directed by you) to take air samples of the air in the room and also nearby and ascertain Iodine levels using an environmental air sample. However, at this point, I feel quite confident in Dr. Hughes' laboratory techniques after some discussion with him.

Sincerely yours,

*John Swez*

John Swez  
Member Indiana Area Emergency  
Response Team  
Professor, Indiana State University

cc: Mr. Wayne J. Slawinski, Radiation Specialist  
U.S. Nuclear Regulator Commission Region III

Dr. John Corrigan  
Associate Dean, College of Arts and Sciences  
Indiana State University

# LAB BENCH

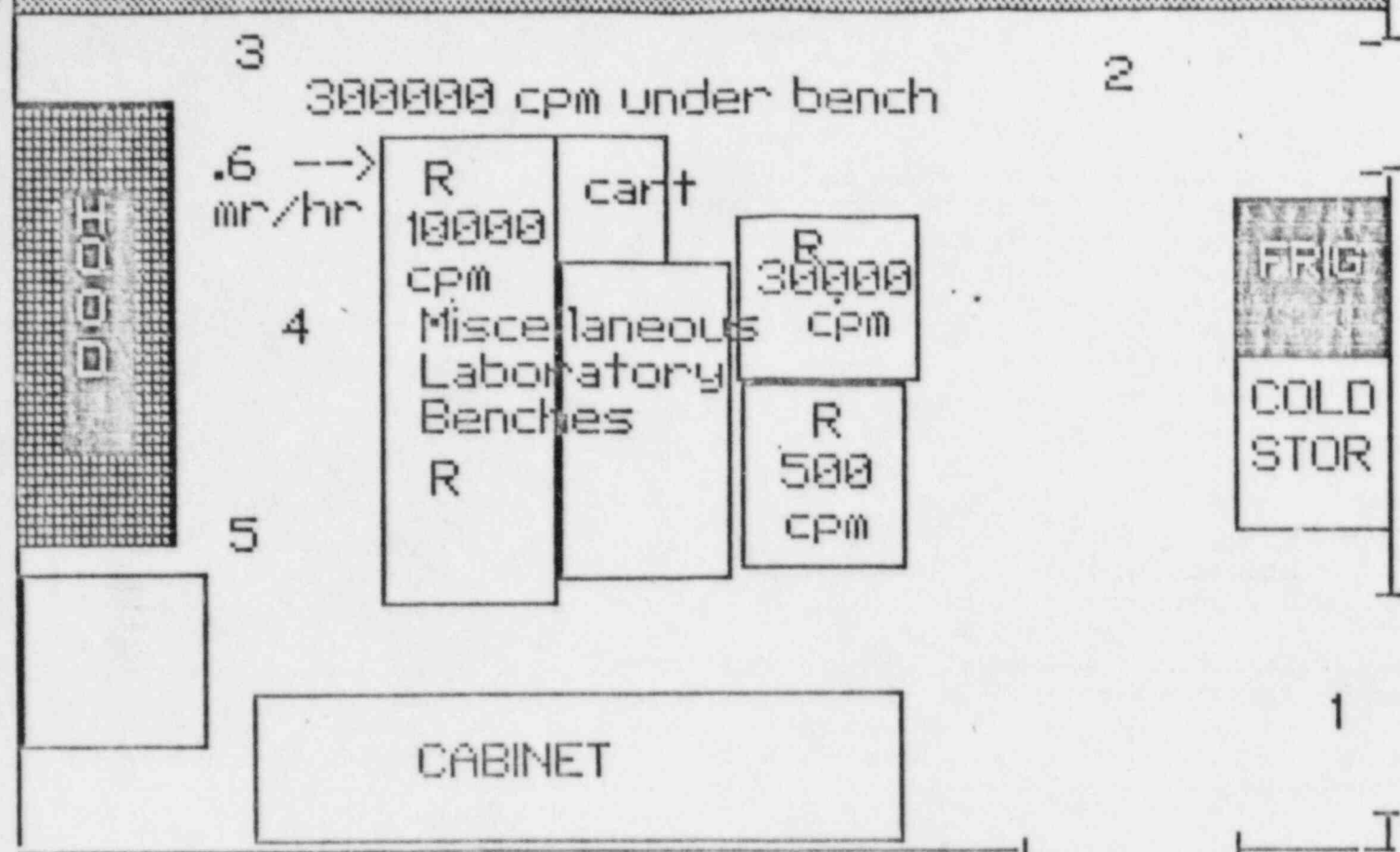


Figure 1. Schematic of Room 282 (inner room) depicting counts per minute and mr/hr measured on July 9, 1985 at approximately 3 P.M. CPM activity was measured using a BICRON ANALYST survey meter equipped with a GEL1 scintillation probe set for an Iodine-125 window. Radiation levels were measured with a WB John-GSM-5 equipped with a thin end-window probe. All other areas on the diagram measured less than .1 mr/hr.

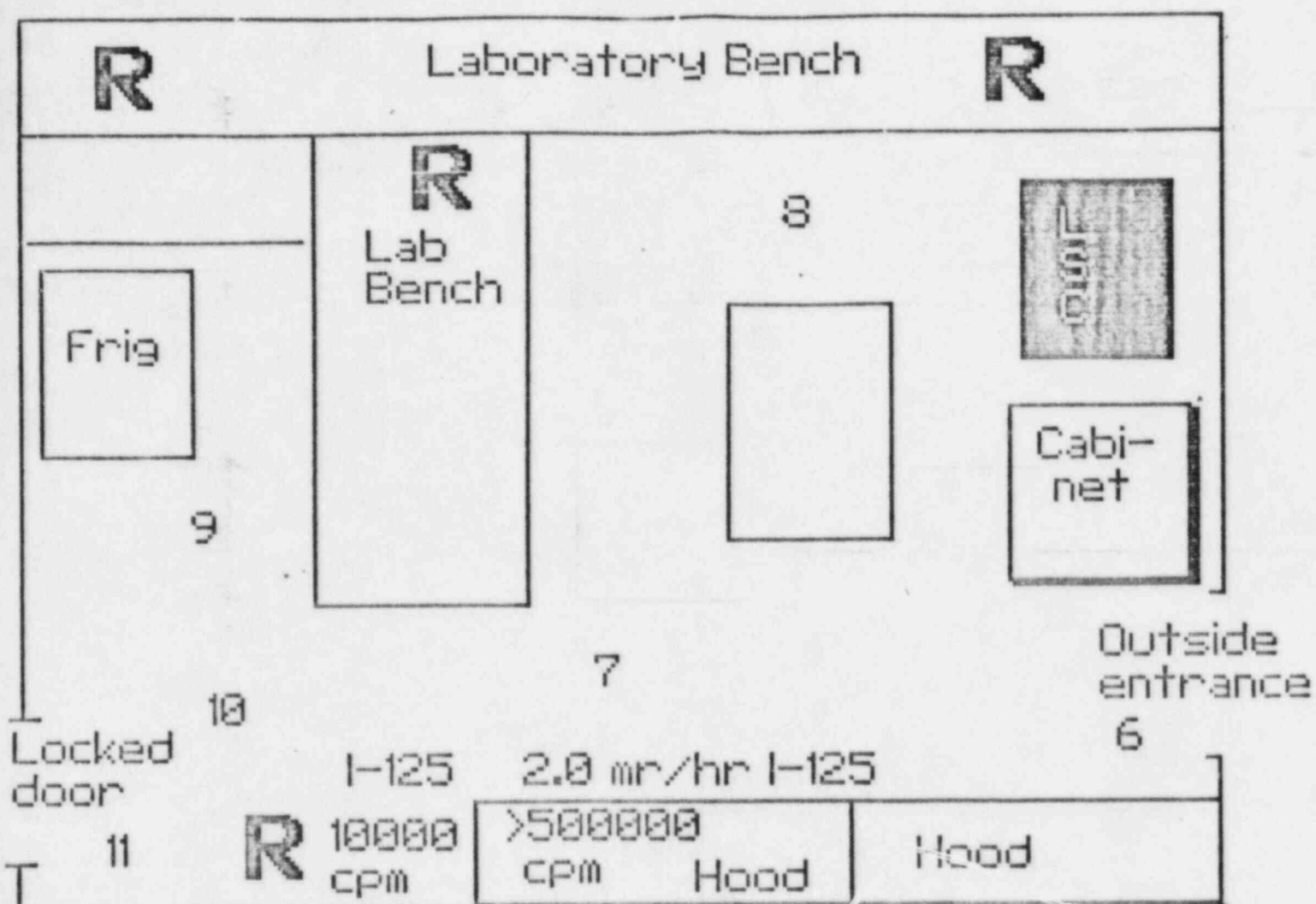


Figure 2. Schematic depicting cpm activity and radiation levels in Room 272. Explanation is similar to Figure 1.