

# Memorandum

TO : Mr. Robert S. Walleigh  
Associated Director Administration  
Through: Dr. Wayne W. Meinke  
Chairman, Radiation Safety Committee

DATE: March 22, 1968  
In reply refer to: 500.02

FROM : Abraham Schwebel  
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SUBJECT: Release of buildings at Van Ness Street after decontamination

From the early 1920's till 1952, the Radioactivity Laboratory was located in the East Building (Building #2). All radium samples used in this country for medical purposes during this period were measured in this building. Since the technology of sealing radioactive sources was then in the process of development, there were numerous leaking sources received for analysis. As a result, a number of rooms in the East Building became contaminated with radium-226. When the radium laboratory was moved to its new quarters in a specially constructed laboratory in 1952, all the wood benches, floors and other equipment in these rooms were removed as radioactive waste and new floors and baseboards were installed in a number of rooms. Since 1952 these rooms were used as non-radioactive laboratories and offices. At this time, it should be pointed out, there were no health physicists at the Bureau and this work of decontamination was supervised by the physicists in charge of the radium laboratory.

When the move was made to Gaithersburg, it was recalled that the attic in the East Building had been used as a laboratory and for storage areas. Room 507 had been cleaned, painted and new floors put down sometime after 1952. The walls, though they showed no removable contamination, were found to be radioactive in spots to the extent of  $\approx 1$  mr/hr. There were a number of spots on the floor which gave  $\gamma$ -ray readings of  $< 1$  mr/hr. The doors to this room were sealed and "Caution - Radioactive Material" (CRM) signs placed on the door. In rooms 518 and 519 numerous samples of radioluminescent paint were found as was a large amount of contaminated equipment which had been stored there years ago. All this material was removed as radioactive waste. A number of dry smears were made throughout the attic but no removable contamination was found. No attempt was made to decontaminate rooms 518, 519 or 520 but the doors were sealed with CRM tape and CRM signs were posted.

Since none of the areas in the East Building were controlled areas and since they had been used for other purposes since 1952, no further surveys were made in the East Building. The buildings were subsequently turned over to GSA who in turn leased them to the District of Columbia. At this point a D.C. radiological monitoring team found the CRM signs and made a survey. They found that the attic had a large number of spots which indicated  $\alpha$  contamination to the extent of 100,000-1,000,000 counts/minute. These were fixed and could not be removed by dry smears. They also found a few small areas in the hallways that contained over 100,000  $\alpha$  counts/minute. The question of who was to clean this mess arose. Mr. Morton Kelly very kindly supplied three laborers for a period of two weeks and a clean up was begun.

The first order of business was to determine the  $^{222}\text{Rn}$  content of the air. If there were excessive amounts of  $^{226}\text{Ra}$  in the buildings then there should be an elevation of the  $^{222}\text{Rn}$  and its daughter products. Air samples were taken outside the building and in the various rooms found contaminated. The  $^{222}\text{Rn}$  and daughter products were found to be approximately  $2 \times 10^{-10}$   $\mu\text{Ci/ml}$  of air in the outside air and from  $2 - 8 \times 10^{-10}$   $\mu\text{Ci/ml}$  inside the building. The International Commission on Radiological Protection has recommended a maximum permissible concentration for  $^{222}\text{Rn}$  and its daughter products of  $3 \times 10^{-9}$   $\mu\text{Ci/ml}$  for the population at large. The ICRP recommends a level of no more than  $1 \times 10^{-8}$   $\mu\text{Ci/ml}$  of air for people who live in the environs of a plant which gives rise to these radioactive materials, and a level of  $3 \times 10^{-8}$   $\mu\text{Ci/ml}$  of air for workers in a plant where such materials are generated. On the basis of the  $^{222}\text{Rn}$  the building air was certainly safe from radiological contamination. In no case was any long lived  $\alpha$  activity found in the air samples which were taken by means of Staplex air samplers and analyzed according to the method of Dr. John Harley of the Health and Safety Lab, New York Operations Office of the Atomic Energy Commission.

All floors were scrubbed with liquid detergents using wire brushes. Where necessary, paint remover was used. The levels were brought down to below 5,000  $\alpha$  counts/minute. At this point the floors were painted with a lead pigment paint. The lead pigment was used to dilute the isotopic  $^{210}\text{Pb}$ . After painting, no  $\alpha$  contamination could be detected except in one or two small areas. These areas were repainted. All the walls were vacuum cleaned and all contaminated equipment was removed as radioactive waste.

It was then decided to check all the rooms in which radium had at one time been handled. Hot spots reading as high as 20 mr/hr gamma radiation were found in rooms 418, 316A, 316 and 317. Further surveys revealed local contamination in other rooms, not used for radium work, as well as extensive contamination of the fourth floor hallway and, even more surprising, extensive contamination of the hallway in front of the fourth floor lecture room. No contamination was found in the lecture room itself. Investigation revealed that one of the physicists measuring radium had periodically vented the radium ampoules through the window of room 418. The windows next to the lecture hall were usually kept open for ventilation in the spring and summer, so that the air exhausted out one window swept back into the hallway through others.

To remove the contamination in room 418, the floor, floor moldings, exhaust dust cover, windows, doorway frames and doors had to be removed. The air duct was vacuumed and painted. On the third floor the floors in rooms 316A, 316 and 317 and a partition between 316A and 316 had to be removed. A 3-inch thick concrete floor had to be removed from all three rooms since it was highly contaminated. Fortunately, the permanent concrete sub-floor was not contaminated so that no structural demolition was necessary. The floor moldings, some of the window framing and doors had to be removed.

Since the hallway floors were contaminated, an outside contractor was hired to drill up parts of the floor with a jack hammer. Some of the floor on the fourth floor, especially the one in front of the lecture hall, had to be removed. Approximately 3 inches of concrete were removed. In the attic 3 sections of floor were removed with a jack hammer and replaced with Sakrete mix.

After all the rough work had been done, and all rooms and hallways vacuumed with special absolute filtered vacuum cleaners, a 10-man janitorial force came in to wash down all the floors and hallways in the building.

After the clean up, a recheck was made of the  $^{222}\text{Rn}$  and daughter products. The radon content in air outside the building was  $8.3 \times 10^{-11}$   $\mu\text{Ci/ml}$  of air while it varied from  $1.5 - 4 \times 10^{-10}$   $\mu\text{Ci/ml}$  of air in the building. This is well below the maximum permissible concentration in an unrestricted environment. In no case was any long lived radioactive contamination found. All smears were down to background after 72 hours indicating that all the  $\alpha$  activity was due to radon and thoron and their daughter products. Approximately 200 dry smears were

taken over 100 cm<sup>2</sup> areas. All smears read less than 10 α counts/minute which is the level permitted at NBS.

Tables and charts summarizing our findings are attached.

To the best of our knowledge, all the buildings in the downtown complex are now free of radioactive contamination. This is not to state that there may not be a small spot here and there that has escaped our detection, but we can unequivocally state that there is absolutely no radiation hazard of any sort.

Four weeks were spent in decontaminating the building. This amounted to approximately 1000 man hours, 50% contributed by the Health Physics Section, 25% by Plant Division courtesy of Mr. Morton Kelly, and 25% by GSA. Approximately 100 55-gallon drums were filled with radioactive waste. Approximately \$1500 was spent for supplies such as drums which cost \$750. In addition, a large number of respirators, coveralls, shoes, paint, towels, etc., were consumed. The Health Physics Section has absorbed the cost of the decontamination as far as supplies and equipment are concerned.

Attachments

Air Samples for  $^{222}\text{Rn}$

	Date Taken	Before Clean-Up	During Clean-Up	After Clean-Up
1. Outdoor - East Bldg.	2-23-68	$1.2 \times 10^{-10}$		
	2-28-68 AM	$1.0 \times 10^{-10}$		
	2-28-68 PM	$1.3 \times 10^{-10}$		
	3-19-68	$8.3 \times 10^{-11}$		$8.3 \times 10^{-11}$
2. Room 518 and 519	2-16-68	$2.0 \times 10^{-10}$		
	2-27-68			$1.5 \times 10^{-10}$
3. Room 522	2-16-68	$2.3 \times 10^{-10}$		
	2-27-68			$1.5 \times 10^{-10}$
	3-19-68			$1.6 \times 10^{-10}$
4. Room 507	2-16-68	$3.5 \times 10^{-10}$		
	2-19-68	$3.2 \times 10^{-10}$		
	2-23-68			$2.2 \times 10^{-10}$
	2-23-68			$1.5 \times 10^{-10}$
	2-23-68		$4.3 \times 10^{-10}$	
	2-27-68		Room sealed overnight - no ventilation	$6.2 \times 10^{-10}$
	3-19-68			$4.1 \times 10^{-10}$
5. Room 418	2-23-68	$3.8 \times 10^{-10}$		
	2-23-68		$7.4 \times 10^{-10}$	
	2-27-68			$1.6 \times 10^{-10}$
	3-19-68			$1.5 \times 10^{-10}$
6. Room 403	2-28-68	$2.8 \times 10^{-10}$		
	3-19-68			$2.4 \times 10^{-10}$
7. Room 316A	2-27-68	$3.6 \times 10^{-10}$		
	3-19-68			$2.5 \times 10^{-10}$
8. Room 316	2-27-68	$3.3 \times 10^{-10}$		
	3-19-68			$2.5 \times 10^{-10}$
9. Room 317	2-28-68	$3.6 \times 10^{-10}$		

Before Decontamination

1. No contamination >2500 c/m  $\alpha$  was detected in Rooms 500, 501, 505, 506, 508, 509, 510, 512, 516, 517, and the Filter Room.
2. Room 502
  - $\leq 30,000$  c/m on wood shelving
  - $\leq 2,000$  c/m ledge over door
  - $\leq 5,000$  c/m concrete floor
3. Room 503
  - $\leq 12,000$  c/m wood shelving
  - $\leq 1,500$  c/m ledge over door
  - $\leq 1,800$  c/m wood frame for room partition
  - $\leq 2,500$  c/m floor
4. Room 504
  - $\leq 4,000$  c/m spots on wood shelving
  - 1,500 c/m floor
5. Room 507
  - $\leq 20,000$  c/m steel beams
  - $\leq 250,000$  c/m concrete ceiling by skylight
  - 5,000-150,000 c/m brick section of left wall
  - >500,000 c/m spots on lower section left brick wall
  - 5-20 mr/hr contact spots on concrete ceiling
  - $\leq 40$  mr/hr contact 4 spots on floor in room
6. Room 518
  - $\leq 36,000$  c/m wood shelving
  - $\leq 500$  c/m walls
  - $\leq 1,500$  c/m ledge over door
  - $\leq 7,500$  c/m floor
7. Room 519
  - $\leq 22,000$  c/m wood shelving
  - $\leq 500$  c/m walls
  - $\leq 3,000$  c/m floor
8. Room 520
  - $\leq 48,000$  c/m wood shelving
  - $\leq 28,000$  c/m ledge over door
  - $\leq 8,000$  c/m floor
  - $\leq 7,500$  c/m wood frame between rooms

9. Room 521

≤ 3,500 c/m spots on wood shelving  
≤ 12,000 c/m floor

10. Room 522

≤ 120,000 c/m inside ventilation duct  
≤ 200,000 c/m floor around air duct  
≤ 40,000 c/m other floor area  
≤ 35,000 c/m ledge over door  
≤ 60,000 c/m section wall behind air duct  
≤ 75,000 c/m wood shelving  
≤ 12,000 wood frame for room partition

11. Steps leading to roof

≤ 70,000 c/m

12. Roof

≤ 10,000 c/m gravel on roof near skylight  
≤ 350,000 c/m fan vent  
≤ 150,000 c/m skylight  
> 500,000 c/m fan  
≤ 5 mr/hr contact fan vent and skylight  
≤ 15 mr/hr contact fan

Before Decontamination

Fourth Floor

1. Room 403

- ≤ 20,000 c/m air duct
- ≤ 30,000 c/m and 1.0 mr/hr contact windows and frames
- ≤ 5,000 c/m and 1.5 mr/hr contact wall molding

2. Room 418

- ≤ 60,000 c/m and 10 mr/hr contact windows and frames
- 2-6 mr/hr contact on wall molding
- ≤ 150,000 c/m air duct

3. Room 410

- ≤ 10,000 c/m to left door 6 ft<sup>2</sup> area
- 2 mr/hr contact spot floor by door to Room 411

4. Room 411

- 0.8 mr/hr contact floor area by room entrance ≈ 2 ft<sup>2</sup>

5. Auditorium Lobby Area

- ≤ 30,000 c/m and 0.5-8 mr/hr windows and frames
- ≤ 12,000 c/m marble room molding
- ≤ 15,000 c/m rug
- ≤ 60,000 c/m major portion of terrazzo floor



Before Decontamination

Third Floor

1. Room 315A

≤ 30,000 c/m baseboard  
≤ 20,000 c/m wood floor

2. Room 315

≤ 15,000 c/m eleven spots on floor

3. Room 316A

≤ 75,000 c/m and ≤20 mr/hr contact floor  
≤ 20,000 c/m and ≤20 mr/hr window and frame  
≤ 75,000 c/m baseboard  
≤ 5 mr/hr contact all wallboards and door frame

4. Room 316

≤ 8,000 c/m and ≤10 mr/hr window and frame  
≤ 5 mr/hr contact all wallboards and door frame  
≤ 80,000 c/m baseboard  
≤ 5 mr/hr contact floor

5. Room 317

≤ 6,500 c/m and ≤5 mr/hr window and frame  
≤ 3 mr/hr contact all wallboards and door frame  
≤ 32,000 c/m baseboard  
≤ 3 mr/hr contact floor

After decontamination no gamma-ray readings could be detected anywhere with the exception of Room 507. In Room 507 there was a hot area on one wall reading 1.5 mr/hr and over an area of approximately 5 feet readings of approximately 0.2-0.5 mr/hr can be found. Since this is on bearing walls no attempt was made to decontaminate by removal of brick. The areas were painted with 2 coats of lead paint. On the opening for the skylight the concrete reads up to 0.2 mr/hr in several small areas (approximately 10 in<sup>2</sup>). The overall readings in the room are approximately equal to normal background of about 0.01 mr/hr. Two hundred dry smears taken in the various rooms gave counts of less than 10  $\alpha$  counts/minute.

Since the acceptable limits set were 2500 fixed  $\alpha$  counts maximum and 1000 average and 0.2 mr/hr maximum gamma and 0.05 mr/hr average gamma readings, we have more than met the standards we set.