

UNITED STATES
ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE
REGION I
970 BROAD STREET
NEWARK, NEW JERSEY 07102

201 645-3941

June 16, 1969

J. R. Roeder, Chief, Materials Inspection & Enforcement Br.,
Division of Compliance, Headquarters

COMPLIANCE INSPECTION REPORT
UNITED STATES RADIUM CORPORATION
BLOOMSBURG, PENNSYLVANIA
LICENSE NOS. 37-30-2 and -7

Transmitted herewith for appropriate enforcement action is the subject inspection report involving uncorrected and recurrent items of noncompliance.

The inspector noted improvement in the control and removal of contamination throughout the facility. However, the licensee's progress in the area was still found to be inadequate as evidenced by his records showing excessive tritium contamination each time he surveyed the unrestricted areas leading to his tritium handling areas. The inspector's findings of alpha contamination in the unrestricted areas and in the inactive restricted areas also indicates that there is a need for more frequent and diligent surveys and decontamination in these areas.

and evaluation of all sources of cont. in unrestricted areas.

The licensee's failure to conduct an adequate survey of the concentration of airborne effluents in the unrestricted area is a recurring item of noncompliance of long-standing. The inspector noted that some effort toward the solution of this problem had been made. Meteorological data from the Williamsport Airport, 30 miles northwest of the plant, had been applied to their dilution and dispersion calculation. The roof of their main building had been effectively restricted. However, as in the past, their efforts toward achieving compliance have been minimum and token efforts. They enclosed some of their stacks in a restricted area, others continue to discharge into unrestricted areas. Having failed to calibrate their effluent monitors they have only an approximate knowledge of the concentrations being discharged to the environment.

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Your enforcement letter of September 19, 1968, informed the licensee that the use of diffusion calculations was inappropriate unless his stacks discharged within the restricted area. Accordingly, since their use continues to be inappropriate, it may be irrelevant to comment on the validity of applying uncorrected, idealized calculations to the dispersion situation that results from the short, weather capped stacks and close obstructions to the free flow of the effluents that are found at the licensee's plant.

The inspector noted that the licensee had generally decreased the time lag between collection and evaluation of personal air sampling data. However, in the incident involving americium-241 exposure, in removing the ductwork from the Radium-Americium Laboratory, the licensee's failure to obtain prompt evaluations unquestionably contributed to the increased exposure of the workers.

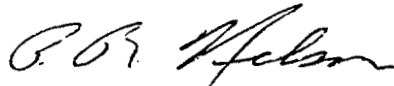
As indicated in the report, the inspector informed the licensee that he would probably be cited for having failed to remove [REDACTED] from risk of exposure after having found that the concentration of americium-241 in his urine exceeded their tolerance level of 0.9 dpm per 24 hour sample. However, after further consideration, it was concluded that the licensee's limit was more restrictive than 10 CFR 20.103(a). Further, the Helgeson counts (despite our in-house reservations of their value) of 6 and 9 nanocuries in March and October, 1968, respectively, and the records of low breathing zone concentrations for Baker provide a reasonable defense for the licensee's position in this matter.

It is expected that the licensee's response to an enforcement letter will present their imminent move (anticipated as July 1, 1969) as an extenuating circumstance with respect to their violations and as suitable corrective action for the future. With regard to the determination of the concentration of airborne effluent in the unrestricted area and their ability to control the spread of contamination, such a contention is probably valid. However, the change of location of operations will not be a panacea; their failure to preplan operations, to obtain prompt hazard evaluations, and to conduct timely post-incident evaluations is a matter of personnel discipline.

Despite the fact that the licensee has failed to properly evaluate the airborne tritium concentration in the unrestricted areas, we believe that this inspection did not reveal any facts which would indicate that the licensee's program presents a threat to health and safety. In the absence of an adequate tritium evaluation by the licensee CO:I discounts the actual threat to the unrestricted area on the following facts:

(1) It is unlikely that the licensee's estimate of the quantity of airborne tritium discharged from the stacks is in error by more than a factor of 2, (2) It is unlikely that the duration of occupancy within the unrestricted area enclosed by the licensee's property line is greater than 40 hours per week, and (3) A dilution factor of at least 20 could be reasonably applied to the effluent concentration at the licensee's property line.

The license will be reinspected after corrective action has been taken.



P. R. Nelson
Senior Reactor Inspector

Enclosure:

Orig + 2 cys rpt

COMPLIANCE INSPECTION REPORT

1. Name and address of licensee United States Radium Corporation 4150 Old Berwick Road Bloomsburg, Pennsylvania 17815	2. Date of inspection April 28 - May 2, 1969
	3. Type of inspection Reinspect Initial GL-253 37-30-2 and -7
4. 10 CFR Part(s) applicable 20, 30, 32	

5. License number(s), issue and expiration dates, scope and conditions (including amendments)

<u>License No.</u>	<u>Issue Date</u>	<u>Expiration Date</u>
37-00030-02 Amend. 33 (amends license in its entirety)	4/26/67	5/31/69
Amend. 34	9/26/67	5/31/69
Amend. 35	6/27/68	5/31/69
37-00030-07 Amend. 1 (amends license in its entirety)	2/27/67	4/30/69
GL-253	8/29/66	8/31/67
Amend. 1	9/19/66	8/31/67
Amend. 2	7/25/67	7/31/72

6. Inspection findings (and items of noncompliance)

The inspection was announced and accompanied by a representative of the Department of Health, Commonwealth of Pennsylvania. Items of noncompliance noted in the last inspection of License Nos. 37-30-2 and -7 were reviewed, additional information concerning two 30-day reportable incidents was obtained, and a complete inspection of the programs associated with the licenses identified above was conducted. The following items of noncompliance were noted:

License No. GL-253

None

License No. 37-00030-02

a. Contrary to 10 CFR 20.201(b) "Surveys", adequate evaluations were not made to insure compliance with 10 CFR 20.106(a) "Concentrations in effluents to unrestricted areas" in that:

1. The application of conventional diffusion formulas in determining the concentration of airborne material in unrestricted areas is inappropriate under the circumstances which obtain at this site unless such formulas are extensively modified to account for the aerodynamic distortions of the flow patterns which result from the structures in close proximity to the stacks (see paras 30 and 31).

7. Date of last previous inspection
Lic Nos 37-30-2 and -7:
July 8-12, 1968
GL-253 - Initial

8. Is "Company Confidential" information contained in this report? Yes No
(Specify page(s) and paragraph(s))

DISTRIBUTION:

Charles E. Coner
Charles E. Coner
(Inspector)
Approved by: *Paul R. Nelson*
Paul R. Nelson
Sr. Radiation Specialist
(Operations office)
Region I, Division of Compliance
June 11, 1969
(Date report prepared)

If additional space is required for any numbered item above, the continuation may be extended to the reverse of this form using foot to head format, leaving sufficient margin at top for binding, identifying each item by number and noting "Continued" on the face of form under appropriate item.

ITEM 6 CONTINUED

License Number 37-00030-02 (cont'd)

- 14-3 ✓ 2. Pursuant to 10 CFR 20.106(d), the use of diffusion calculations in the determination of the concentration of tritium in unrestricted areas resulting from effluents from the Tritium Building is inappropriate since this stack does not discharge within a restricted area. (see paras 28 and 29).
- ✓ 3. The airborne effluent monitoring systems have not been calibrated (see para 59 and 61).
- ✓ 4. ^{Rn Am} The sum of the concentrations of airborne americium-241 and tritium in unrestricted areas was not determined (see para 60).
- 7 b. Contrary to 10 CFR 20.201(b) surveys were not conducted to insure that contamination levels in all areas did not exceed those specified in your Standard Operating Procedure 27, a document incorporated in License Condition No. 18G (see paras. 17, 18, 70-73, 82, 83).
- 7 c. Contrary to 10 CFR 20.301 "General requirement", refuse containing detectable quantities of licensed material was discarded as waste in the unrestricted area to the rear of the Etching Buildings (see para 84).
- d. Contrary to 10 CFR 20.201(b) adequate evaluations were not made to insure compliance with 10 CFR 20.103(a) "Exposure of individuals to concentrations of radioactive material in restricted areas" in that:
 - 1. Adequate preplanning of the disassembly of the ductwork in the americium radium area was not made (see paras 37, 38 and 44).
 - 2. Determination of the concentration of airborne radioactivity in the restricted area were not made in sufficient time to prevent the continued overexposure of the workers (see para 39 thru 41 and 44).
 - 3. Timely bioassays of the personnel involved in this operation were not performed (see paras 41 and 44).

ductwork & cleanup

bioassays

License Number 37-00030-07

- a. Contrary to 10 CFR 20.201(b) "Surveys", adequate evaluations were not made to insure compliance with 10 CFR 20.106(a) "Concentrations in effluents to unrestricted areas" in that:
 - ✓ 1. The application of conventional diffusion formulas in determining the concentration of airborne material in unrestricted areas is inappropriate under the circumstances which obtain at this site unless such formulas are extensively modified to account for the aerodynamic distortions of the flow patterns which result from the structures in close proximity to the stacks (see paras 30 and 31).
 - ✓ 2. Pursuant to 10 CFR 20.106(d), the use of diffusion calculations in the determination of the concentration of tritium in unrestricted areas resulting from effluents from the Tritium Building is inappropriate since this stack does not discharge within a restricted area. (paras 28 and 29).
 - ✓ 3. The airborne effluent monitoring systems have not been calibrated (see para 59 and 61).
 - ✓ 4. The sum of the concentrations of airborne americium-241 and tritium in unrestricted areas were not determined (see para 60).

PARTS 20, 30 and 32 INSPECTION

UNITED STATES RADIUM CORPORATION
4150 Old Berwick Road
Bloomsburg, Pennsylvania 17815

Dates of Inspection: April 28 through May 2, 1969

Persons Accompanying Inspector:

Mr. D. MacDonald, Pennsylvania Department of Health

Persons Contacted:

W. E. Umstead, Bloomsburg Division Manager
O. L. Olson, Director Nuclear Products Division, RSO
J. D. McGraw, Health Physicist
C. W. Wallhausen, ~~Consultant to U. S. Radium Corp.~~ !
J. G. MacHutchin, Former Chairman, Isotope Comm, Visitor !
R. C. Sorenson, President (by telephone, June 16, 1969)

DETAILS

Background Information

9. The last previous inspection of License Numbers 37-30-2 and -7 showed uncorrected and recurrent items of noncompliance and was reported on form AEC-417. By letter dated September 19, 1968, CO:HQ notified the licensee of two items on noncompliance for each of the two licenses and asked for comment on three matters relating to health and safety. The licensee responded by letter dated September 19, 1968. CO:HQ acknowledged this response in its' letter of October 28, 1968 and informed the licensee that his corrective action would be reviewed during the next inspection.
10. The licensee's corrective action was reviewed and the current status of these matters is shown below.

License Number -2


11. Item number 1, failure to collect breathing zone samples while Allam was handling 1,000 Ci of tritium as titanium tritide and in tritiating metallic foils.
12. Licensee's Response - No surveys were conducted for the tritide because none of the material has been handled since November 1966. If the operation is resumed suitable surveys and controls will be employed. With regard to the tritiating of metallic foils; this operation has been extensively monitored since the inspection and the breathing zone and urine data shows no significant uptake.
13. The inspector verified, by inspection of records, that the licensee's statements were true. He informed Olson and McGraw that if surveys had been conducted while Allam was preparing titanium tritide targets a defensive response would have been appropriate, but inclusion of the statement that no surveys had been conducted because no work with the tritide had been performed in the past 20 months was irrelevant to the citations, since of course the Commission was concerned with the time period when Allam was handling the tritide not the period when no tritide was being handled. The inspector also directed Olson's attention to the fact that although Allam's tritiating operations had been found to be well controlled this did not excuse the licensee's previous failure to survey. Olson stated that he concurred with the inspector's observations.

14. Present Status - The inspector noted that Ivor Allam has been enrolled in a weekly tritium urinalysis program since the last inspection. He noted that his approximate average concentration has been 1-2 uCi/liter. He noted that a Johnston Laboratories tritium air monitor was installed in the area where metal foils are tritiated. He discussed the appropriate use of the monitor and the interpretation of its data. Olson stated that he realized that it would not measure the tritium concentration to which the worker was exposed but he stated that it did provide an early warning of a change in the air concentration which might result from a ventilation failure or an unsafe change in procedures. The inspector considered this item to have been corrected.
15. Item number 2, levels of contamination throughout the plant exceeded the limits specified in SOP number 27.
16. Licensee's Response - A vigorous program has been initiated to eliminate areas of fixed contamination. A new contamination control program has been started. This program includes daily surveys for detection of removable contamination in restricted areas. Areas found to be contaminated to levels equal or higher than the appropriate limits of H.P. SOP number 27 are immediately placed under direct control of the Health Physics organization until decontamination has been completed - usually the same working day.
17. Present Status - The inspector determined, by inspection of records and questioning the Health Physics Staff, that all the licensee's statements were apparently true with the exception of one restricted area (see paragraph 83). He noted that the records did not always show the results of follow-up surveys that, according to Olson's statement, were made to verify the effectiveness of decontamination. The inspector noted that this failure to record follow-up surveys had been far less frequent since January 1969. He discussed, with Olson and McGraw, the value of recording these surveys and the requirement for maintaining the records.
18. With regard to the adequacy of the licensee's response to this citation, the inspector informed Olson and McGraw that here again, as with the previous citation, the response was partial and superficial. He stated that it was partial in that it indicated only the action that was to be taken with respect to fixed radium contamination and removable contamination in active areas. As will be indicated further in this report, little improvement was made in detecting and removing fixed and removable contamination in unrestricted areas and in inactive restricted areas. The inspector informed Olson and McGraw that their response was superficial because it failed to indicate what preventive action was to be taken. As an example, the inspector discussed those records which showed that each survey of the Northeast entranceway indicated levels of removable contamination requiring clean-up. He invited Olson and McGraw to compare the number of hours spent in survey and clean-up versus the number of study-hours it might take to prevent this contamination. The inspector considered that this item had been uncorrected.

License Number -7

19. Item number 3, failure to evaluate radon exposures to janitors who periodically mopped the floor in the old radium screening facility.
20. Licensee's Response - 43 room air samples were measured in December 1967 and January 1968 and 28 room air samples were measured in August and September 1968. These measurements showed that the radon concentration was less than 20% of the limit specified in 10 CFR 20. Following the inspection, entry to the facility was restricted by Health Physics and all occupants were monitored and directly supervised by Health Physics.
21. Present Status - The inspector noted that the licensee's records showed that the radium screening facility had been decontaminated to meet the limits for an unrestricted area, as specified by SOP number 27. Olson stated that decontamination by air hammer and acid etching had been accomplished under Health Physics supervision by personnel who had been continually monitored by breathing zone samplers. The inspector noted that the records of the air concentration measurements were not greater than 3×10^{-11} uCi/ml (Appendix B, Table I, Column 1, value for soluble Ra-226).

22. The inspector asked Olson and McGraw if they considered the sampling of the radon concentrations in the facility to be a measure of the concentration to which the occupants were exposed. They said that they did consider it to be a valid measure of personnel exposure for several reasons: (1) there was a fixed deposit of radium imbedded in the surface areas (2) there was a moderate flow of air through the area which prevented any significant build-up of radon, and (3) the 70 samples that were collected showed no significant variation with location within the room or with time. The inspector asked why this data and evaluation had not been made known to the previous inspector. Olson and McGraw stated that they did not know, since they were not present during that phase of the inspection. The inspector considered this item to have been corrected.
23. Item number 4 - This citation against License number 7 was the same as Item number 2 against License number 2. The licensee's response and the present status is as indicated previously in this report.
24. Item A (Health and Safety) - Diffusion calculations for determining airborne concentrations in the unrestricted area may only be applied if the stacks discharge within the restricted area. Valid meteorological parameters must be used in diffusion calculations.
25. Licensee's Response - Roof areas have been restricted. Until valid meteorological data is obtained very conservative, assumed parameters have been used and these show that the point of maximum airborne tritium concentration is below the limits of 10 CFR 20.
26. Present Status - The inspector noted that the roof areas of the main building were restricted by a rope barrier at the roof edge. He noted that the rope was posted at approximately 20' intervals with signs showing the radiation caution symbol and the words Caution Airborne Radioactivity Area. He noted that the only means of access to the roof was by ladder from the ground or through windows that overlooked the roof. Olson stated that all employees had been notified that occupancy of the roof was prohibited except with the permission of the Health Physicist. He stated that all persons who were allowed to occupy the roof area were required to wear breathing zone samplers (see paragraph 81 for description of these samplers). When the inspector, MacDonald, Olson and McGraw inspected the roof area each man wore such a sampler.
27. Present Status (continued) - Olson gave the inspector a copy of his determination of the airborne tritium concentration in the unrestricted area (see enclosure number 1). The inspector noted that Olson's calculations determined the maximum concentration at ground level for Stack numbers 2, 9, 10, 11 and 14 and the concentration at the plume centerline as the plume passes over the U. S. Radium property line. The inspector directed Olson's attention to the paragraph which had been referenced (10 CFR 20.106(d)) in the CO:HQ letter of September 19, 1968. He stated that this paragraph gave the licensee the option of either determining the concentration at the point of release or at the boundary of the restricted area. He asked Olson if U. S. Radium was contending that their property line was the boundary of the restricted area. Olson stated that he understood that the boundary of the restricted area was the roof line of the main building. **The inspector informed Olson that it was therefore apparent that he had not met the requirements of the regulation.**
28. The inspector noted that the stacks from the Tritium Building (number 10) and from the Watch Dial Operation (number 15) did not discharge into a restricted area and, therefore, as stated in the CO:HQ letter, the application of diffusion calculations to the effluents from these stacks were not appropriate. He also noted (see paragraph 56) that the 1968 yearly average concentration of airborne tritium measured at the point of release from Stack number 10, as shown by the licensee's records, exceeded the Appendix B, Table I, Column 1 value (2×10^{-7} uCi/ml) by a factor of 5.21. He noted that the 1968 average for Stack number 15 did not exceed 2×10^{-7} uCi/ml.

29. The inspector discussed his observation, that the stack from the Tritium Building did not discharge into a restricted area, with Mr. Olson. Olson stated that the area surrounding the Tritium Building was completely enclosed by a fence that was posted with signs prohibiting occupancy by unauthorized personnel. The inspector noted that during the week of inspection that the two gates to this area were open. He asked Olson if he had made any determinations of the tritium exposure to the contractors who were engaged in the construction of the new building within this fenced enclosure. Olson stated that he had not made such determinations. The inspector asked if the construction workers had been instructed as required by 10 CFR 20.206(a) or if a form AEC-3 was posted as required for a restricted area. Olson stated that the construction workers had not been instructed nor had the area been posted with a form AEC-3.
30. The inspector, escorted by McGraw, inspected the roof area of the main building and the Etching Building. He noted that the rear portion of the main building, which was nominally one story, is partitioned by short walls separating roof sections having height differentials of from 2' to 4'. He noted that there were several ventilation housings, a penthouse (containing a fan and absolute filter bank), and four foot high skylight windows of this shape . He noted that the North, or front, of the building was two stories high. He noted that on top of the two story section, there was a penthouse that overlooked the lower rear section of the roof. McGraw identified the penthouse as the hand painter's lunch room. The inspector noted that the windows to this lunchroom were taped or nailed closed thus preventing intake of the effluent from the stacks located on the lower, rear section of the roof. He noted, however, that this higher front section, with its lunchroom penthouse, presented a barrier to the free flow of the effluents from the stacks on the lower, rear roof. He noted that only Stack number 14 (Hand Application) rose above the highest level of the roof (the lunchroom penthouse).
31. The inspector informed Olson that he doubted that one could apply theoretical diffusion equations under these circumstances and expect to make a realistic determination of the concentrations of airborne material in the unrestricted areas immediately adjacent to the buildings from which the material was being released. On his return to CO:I the inspector consulted Section 5-5 of "Meteorology and Atomic Energy 1968" (TID 24190) and confirmed his statement to Olson. The inspector considered that the corrective action taken by the licensee in response to this item affecting health and safety was inadequate.

January 6, 1969 Exposure to [REDACTED] (Additional Information)

32. McGraw reaffirmed the statements contained in the licensee's letter of February 5, 1969 regarding this incident. He stated that [REDACTED] had been exposed as follows:

<u>Date of Exposure</u>	<u>Duration of Exposure</u>	<u>Concentration of Am-241</u>	<u>Date Sample counted</u>
January 8, 1969	120 minutes	1.86×10^{-12}	January 9, 1969
January 9, 1969	270 minutes	4.33×10^{-10}	January 10, 1969
January 10, 1969	180 minutes	7.75×10^{-12}	January 11, 1969

(Appendix B, Table I, Column 1 - Soluble Am-241 - 6×10^{-12} uCi/ml)

He stated that [REDACTED] was occupied during the three days in the preparation of a 1200 mCi Am-241 compact. He said that the operation was completed on the morning of January 10 before the results from the January 9 air sampling had been evaluated. He stated that he and Olson discussed the circumstances of the exposure with [REDACTED]. He stated that [REDACTED] said that the only unusual event related to a difficulty he had in shearing the source. McGraw stated that the shearing operation normally took 15 minutes but on this day [REDACTED] spent two hours in obtaining the correct cut. However, McGraw stated, he was not able to determine in what way [REDACTED] had deviated from the normal procedure. [REDACTED] terminated employment with U. S. Radium in March 1969.

33. The inspector noted that the licensee's records of americium urinalysis showed the following results for [REDACTED]

8/18/68	-	0.15	dpm/24 hour voiding
9/8/68	-	0.0	
11/1/68	-	0.0	
1/12/69	-	0.0	
1/19/69	-	0.0	
2/2/69	-	0.27	
2/16/69	-	0.0	
2/23/69	-	0.0	
3/10/69	-	0.05	

- 33.A McGraw stated that U. S. Radium used 0.9 dpm/24 hour voiding as a urinalysis investigational level for Am-241. The inspector noted that this was essentially the same value used by ORNL as an excretion index for chronic exposure.

34. The inspector informed Olson that it appeared to him that the entire matter had been handled carelessly in that more effort should have been given to determining what aspect of the control program had failed. He stated that the requirements of 10 CFR 20.405 should not be sloughed off by a statement that "... production problems ... were most likely the cause of the overexposure". He stated that the licensee's statement, that no corrective action was to be taken since the operation had been terminated, was equally unacceptable. Olson stated that he had misinterpreted the word "cause" in the regulation. He stated that his best present judgement was that the cause had in fact been his failure to assure that the flow rate through the face of the hood was sufficient to permit extended operation within the hood. He stated that he now considered the appropriate corrective action to be - such operations will be given preoperational evaluations to insure that the ventilation control is adequate under normal conditions and predictable emergency conditions.

35. The inspector also informed Olson that a single report of having found no Am-241 in [REDACTED] urine on the third day after exposure should not have been considered a sufficient indication of no uptake. The inspector stated that early fecal bioassay would have been advisable, but in lieu of this, he should have informed the Commission that [REDACTED] possible exposure would be followed by serial urinalyses, as indeed was the case. In summary the inspector informed Olson that the Commission expected a licensee to make a thorough investigation of each overexposure and submit a comprehensive report of his findings.

March 31, 1969 Incident (Additional Information)

36. On April 24, 1969 the licensee reported that seven employees were exposed to excessive concentrations of Am-241 and Ra-226 while dismantling ductwork from the Americium-Radium Laboratory. The inspector reviewed the licensee's letter to CO:HQ with Olson and McGraw and determined that the facts given in the letter were true.
37. The inspector, having just completed a discussion with Olson and McGraw concerning the cause of the previously reported incident, asked Olson if he would care to reconsider the basic cause of the March 31, 1969 incident. Olson stated that the cause of this incident was their failure to conduct realistic prior planning. He stated that he had been misled by previous experience in removing the ductwork from other parts of the plant. He stated, and the inspector confirmed his statement, that the procedures previously followed had shown negligible concentrations of airborne material in the breathing zones of the workers. He stated, however, that he had failed to consider the length of time that the ductwork in the Americium-Radium Laboratory had been in place and the higher toxicity of this material.
38. McGraw stated that [REDACTED], was in charge of the operation. McGraw stated that he had given the men verbal instructions to disconnect the ducts, one section at a time, lower them carefully without disturbing their contents, place each section in a plastic bag (custom made), seal the bag, and place it in a crate for disposal.

39. He stated that on April 2, 1969 [redacted] worked on the job. At the end of the day the filters from their breathing zone samplers (MSA Monitaire) were collected. He stated that the filters were not counted until the following day, to allow for the decay of the naturally occurring radon daughter products. He stated that [redacted] filter showed exposure to a high concentration but since the exposure to his fellow workers was low McGraw believed that it might have been a large particle or a transfer from hand contamination. The inspector asked if McGraw took any nare swipes. McGraw stated that he did not.
40. McGraw stated that the work continued on April 3, 1969 and at the end of the day the filters from the samplers were collected. He stated that these filters would normally have been counted on the following day, April 4, 1969, but the following day was Good Friday and the plant was closed. He stated that on April 5, 1961, a Saturday, five men were assigned to work on the disassembly but no counting technicians were authorized to work on this day. Consequently, he stated, on Monday April 7, 1969 the filters used on April 3 and 5 were counted. He stated that he was informed of the findings on April 8, 1969.
41. McGraw stated that no work had been done on the disassembly project on April 7 or 8. He stated that when he received the results of the personal air samplers he informed management that the project should be suspended. He stated that between April 8 and 23 he was engaged in determining, by alpha spectrometry, the percentage composition of the Ra-226 and Am-241 components of the contaminant. He stated that on April 25, 1969 urine samples were sent to Eberline for assay of Ra-226 and Am-241. He stated that another urine sample was collected from each man on May 2, 1969 and that additional samples would be collected each week until it was evident that no significant uptake had occurred.
42. On May 15, 1969 the inspector obtained the following urinalysis data from McGraw for the samples collected on April 25, 1969:

Name	Concentration of Am-241 in dpm/24 hour	Concentration of Ra-226 in pCi/24 hour
[redacted]	0.19 ± 0.11	0.05 ± 0.02
[redacted]	0.06 ± 0.03	0.04 ± 0.02
[redacted]	0.11 ± 0.08	0.31 ± 0.22
[redacted]	0.21 ± 0.07	0.27 ± 0.12
[redacted]	0.00 ± 0.03	0.24 ± 0.14
[redacted]	0.34 ± 0.08	0.06 ± 0.04

McGraw stated that no urine sample had been collected from [redacted] because he was hospitalized with a heart attack. He stated that a urine sample was collected May 9, 1969.

43. The inspector noted that ICRP Publication 10 gives an equation showing urinary excretion following an uptake of 0.015 uCi of transportable Ra-226 in the whole body. He noted (see Incl # 2) that a level of 2 picocuries in a 24 hour urine sample taken 22 days postexposure would indicate an "investigational level" of 0.015 uCi in the whole body. He also noted that ORNL uses a Urinary Excretion Index of 1 dpm/24 hour sample for chronic exposure to Am-241.
44. The inspector informed Olson and McGraw that they had not only been at fault in failing to have anticipated these problems in the planning stage but their failure to promptly evaluate the breathing zone findings and to obtain prompt bioassay data after the data had been evaluated was difficult to understand. Olson said that the 18-hour delay in assay of the filters was necessary to allow for decay of the natural radioactivity. The inspector suggested that in the future, they consider collecting a control sample in a nearby clean area and subtracting this activity from the quantity found on the filters worn by the exposed persons. With regard to the delay in obtaining bioassay data, McGraw stated that he wanted to obtain data that would allow him to make a correct report to the Commission. The inspector informed McGraw that if he had obtained early fecal and urine data he could have reported (as the available data would indicate) that the exposures had not resulted in any significant intakes, a fact that would have been far more relevant than the percentage composition of the contaminant.

45. The inspector, Olson and McGraw discussed the value of testing respirators for proper fit before use and doing nare and face swipes after a suspected exposure.

Organization and Administration

46. J. G. MacHutchin, who was visiting the licensee during the inspection, informed the inspector that he was no longer associated with U. S. Radium Corporation. He stated that he terminated employment on December 31, 1968. C. S. Wallhausen, who was also visiting the licensee during the inspection, informed the inspector that he was no longer an employee but he was retained by U. S. Radium Corporation as a consultant.
47. Olson stated that a new radioisotope committee had been organized on January 1, 1969. He stated that the chairman is W. E. Umstead and the members are Olson, McGraw and D. B. Cowan, Manager, Phosphor Application and Gas Filling Departments. He stated that the committee will not meet regularly but will meet, and record the minutes of its meeting, if it is necessary to resolve differences of opinion among the managers regarding policy which may affect health and safety. Olson stated that he thought that it was unlikely that any disagreements would arise since the president, Mr. R. C. Sorenson and Mr. Umstead have delegated sufficient authority to him for the very purpose of obviating such disagreements. (See paragraph 7 of form AEC-313, dated March 28, 1969, for renewal of License Number 7).
48. Mr. Olson stated that the responsibilities of the RSO (Olson) and the Health Physicist (McGraw) are as detailed in the form AEC-313 referenced above. He stated that the management organization of the Bloomsburg Division is as shown in enclosure 3 to this report. He stated that the organizational diagram shown in paragraph 8 of the referenced form AEC-3 shows his relation to the principal users and to the Health Physics Department. He stated that Beaver, McCurley and D. Carl (employees shown on the organizational diagram) had been temporarily assigned to McGraw but were no longer so assigned.

Inventory and Use Rate

49. Olson stated that the following material was on hand at the time of the inspection:

Radium Bromide	2 Ci (to be shipped)
Radium-beryllium	32 mCi
Am-241	2.552 Ci
Kr-85	30.5 Ci
H-3 (gas)	18.881 Ci
Tritiated Paint	639.9 Ci

Olson stated that he plans to dispose of all materials other than tritium and calibration sources. He stated that the tritiated paint on hand was manufactured by Radium Chemie, and is type PS-362. The inspector noted that possession of Radium Chemie Type PS-362 is authorized by License Number 7. Olson stated that U. S. Radium has not manufactured tritiated paint since November 1968.

50. Olson stated that no material other than tritium had been ordered or shipped (except as waste) since January 1, 1969. He stated that the following quantities of tritium had been shipped during the first quarter of 1969:

As tritium foil	- 1,135 Ci
As Exit Signs (gas)	- 8,005 Ci
Tritium combined phosphors	- 671 Ci
Watch dials and hands	- 133 Ci

Disposal - Liquid and Transfers

51. Olson stated that all liquid waste, except as noted in the next paragraph, is released by the users into a plumbing system that drains into one of two, 2,800 gallon storage tanks. He stated that drains from tritium operations flow into one storage tank and drains from all other operational areas flow into the other tank. He stated that the liquids from these tanks are evaporated to a sludge in a closed system which collects the condensate. The tritiated condensate is collected in one of two holding tanks and the condensate from the other storage tank is collected in the second holding tank. He stated that the sludge is absorbed in calcium sulphate and shipped out as solid waste.

52. Olson stated that liquid wastes containing acids, alkalies, or organic chemicals, and those liquids that are not soluble or miscible in water, are collected in containers that are collected by health physics personnel. He stated that if it is not economically possible to evaporate this waste it is absorbed in calcium sulphate and disposed of as solid waste.
53. Olson stated that when a holding tank contains approximately 1500 gallons its contents are stirred, for at least 30 minutes, by the injection of compressed air at the bottom of the tank. He stated that, if the holding tank contains tritiated waste, a sample is collected for liquid scintillation counting. He stated that a sample of nontritiated waste is collected from the nontritiated holding tank, evaporated to dryness, and counted on a planchet for alpha, beta and gamma. He stated that the alpha contents of this latter sample are considered to be Ra-226, its beta contents Sr-90, and its gamma contents Cs-137. He stated that the ratios (assayed concentration divided by the Appendix B, Table II Col. 2 concentration) of these nuclides is summed to determine a dilution factor that will reduce the sum to 1 or less. He stated that this determined quantity of water is added as the holding tank contents are discharged to the Susquehanna River. *open top tanks*
54. The inspector noted that Ra-226, Sr-90 and Cs-137 were the radionuclides, possessed by the licensee, which had the most restrictive concentrations (Appendix B Table II Col. 2) for alpha, beta and gamma emitters, respectively. He examined the licensee's records of liquid discharges since July 1968 and noted that the average sums of the ratios was less than 1. He selected a record of a discharge episode and went through the record and computation step by step and found the system and the result to be correct.
55. The inspector noted, by examining the licensee's records, that 8 shipments of dry waste and gas had been sent to the Nuclear Engineering Co., Moorehead, Kentucky since the last inspection. He noted that the records showed the identity, quantity and date of shipment. He noted that the shipments totaled 63 tons, 5500 cubic feet, and 1063 Ci. He noted that the material was comprised of Ra, Sr, Tl, Cs, Pm, Am, Ni, Kr, tritium and C. *air during this*

Airborne Effluent to Unrestricted Area

56. Olson stated that at the time of the last inspection there were 8 stacks from which airborne effluent was being discharged, 7 having tritium effluent and 1 having Am-241 effluent. He stated that the Tritium Resin stack (stack #2) and the R & D dark rooms stack (Stack #11) had been removed since the last inspection. He stated that measurements of tritium effluent showed 1968 averages as follows:
- Tritium Resin (#2) - 5.13×10 CFR 20 Limit (dismantled January 1969)
 - Gas Fill Operation (#9) - 12.47×10 CFR 20 Limit
 - Tritium Bldg (#10) - 5.21×10 CFR 20 Limit
 - R & D Dark Rooms (#11) - 2.30×10 CFR 20 Limit (dismantled March 1969)
 - Hand Application (#14) - 20.7×10 CFR 20 Limit
 - Watch Dian (#15) - 0.95×10 CFR 20 Limit
 - Exit Signs (#16) - $.095 \times 10$ CFR 20 Limit
57. McGraw stated that the effluent concentration from all tritium stacks, except stack #16, had been measured daily since the last inspection. The inspector noted that the records confirmed his statement. The records showed that the concentration of the effluent from stack #16 had been measured for one week in December 1968 and for one week in January 1969 and that an average concentration of less than 10^{-8} microcurie/ml (Appendix B, Table II Col. 2 value is 2×10^{-7}) was recorded.
58. The inspector noted that the licensee's records showed that the americium stack (stack #1) effluent had been monitored for two one week periods in 1968 (since the last inspection) and daily since January 1, 1969. He noted that on 6 sampling days the concentrations exceeded the 10 CFR 20 value (2×10^{-13} uCi/ml) by approximately 50% and that on all other sampling days it was less than 2×10^{-13} uCi/ml. He noted that the effluent concentration on April 2, 3 and 5, 1969, days during which workers were exposed to excessive concentrations while dismantling ductwork in the americium laboratory, was not greater than 2×10^{-13} uCi/ml.

59. Olson stated that the exhaust air from the radium-ameridium area is filtered through a bank of "absolute" filters prior to discharge through the stack. The inspector asked Olson if the filters had been tested. Olson stated that they had not been tested. The inspector asked if isokinetic sampling was accomplished. Olson stated that it was not. The inspector asked from what point in the stack the sample was being collected. Olson stated that a 0.426 "I.D. brass tubing was positioned along the axis of the stack with its intake at a point 8" from the top of the stack. He estimated that the radius of curvature of the brass tubing was at least 3" and that the connected Tygon tubing extended from 12' to 15' to the sample collector, a Gellman 0.3 micron filter. The inspector noted that the stack had an I.D. of 32". He asked Olson if he had determined the efficiency of the sample collection system. Olson stated that he had not. The inspector and Olson discussed means by which the collection efficiency of such a system might be determined.
60. The inspector asked Olson if the concentration of americium in the unrestricted area had been added to the tritium concentration as required by the foot note following Appendix B of 10 CFR 20. Olson stated that no summation of concentration had been made.
61. The inspector noted, by observation and questioning McGraw, that all tritium stacks were sampled by drawing air, at 6 to 10 liters/min, thru a filter paper and then thru a Greenburg impinger containing approximately 75 ml of water. He noted that the effluent from the tritium building and the gas-fill operation was also measured for tritium gas content in a Johnston Triton. The inspector asked Olson if this sampling system had been calibrated. Olson stated that he thought the efficiency of collection of tritium oxide by the Greenburg impinger had been calibrated and that the countings systems, liquid scintillation and windowless proportional counter, had been calibrated. The inspector stated that each system, as a whole, should be calibrated. Olson agreed and stated that he would have this done.

Bioassay Program

62. Olson stated that all persons who work in areas where tritium is handled are enrolled in a weekly tritium urinalysis program. He stated that no other persons in the plant, occupying restricted or unrestricted areas, are bioassayed for tritium. The inspector examined the urinalysis records and noted that the highest concentration of tritium in urine, since the last inspection, was 7.8 uCi/liter. He noted that the average concentration was approximately 2 uCi/liter.
63. Olson stated that urine samples are collected each Monday from persons who have been working with americium during the preceding week. He stated that a limit of 0.9 dpm/24-hr sample is used as an investigation level. The inspector noted that paragraph XI C. 2. d. of H.P. #27 read "Individuals showing concentrations above the applicable tolerance will be removed from work with radioactive materials and subjected to physical examination and other possible medical care".
64. The inspector examined the records of americium urinalysis and noted that the recorded concentration were all less than 0.9 dpm/24 hr sample except those for [redacted]. The concentrations for these men are shown below: [redacted]
7/14/68 - 0.0, 7/20 - 0.81, 7/26 - 0.18, 8/11 - 2.21, 8/18 - 1.56, 8/25 - 0.15
9/1 - 0.38, 9/8 - 1.12, 9/15 - 0.43, 9/22 - 0.65, 9/29 - 1.1, 10/6 - 1.9, 10/13 - 0.44, 10/20 - 0.0, 10/27 - 0.0, 11/3 - 0.96, 11/10 - 0.57, 11/17 - 1.65, 11/24 - 2.93, 12/15 - 1.52, 12/22 - 2.93, 12/29 - 2.85, 1/5/69 - 4.00, 1/12 - 2.46, 1/19 - 2.67, 8/31/68 - 0.3, 9/8 - 0.50, 9/15 - 0.26, 9/22 - 0.21, 9/29 - 0.22, 10/6 - 0.0, 10/13 - 0.18, 10/20 - 0.0, 10/26 - 0.0, 11/10 - 0.22, 11/17 - 0.89, 11/24 - 0.14, 11/30 - 0.12, 12/8 - 0.22, 12/15 - 0.39, 12/22 - 0.46, 12/29 - 0.38, 1/4/69 - 0.3 and 1/12 - 1.01.
65. Olson stated that [redacted] had not been occupationally exposed to ionizing radiation since 1/12/69, the date on which the concentration of americium in his urine exceeded the tolerance limit of 0.9 dpm. He stated that [redacted] had terminated employment with U. S. Radium during January 1969. Olson offered no explanation as to why [redacted] had not been removed from exposure when the concentration of americium in his urine was found to exceed the licensee's limit of 0.9 dpm/24-hour sample. The inspector noted that ORNL uses an investigation level of 1.0 dpm/24-hour sample for Am-241. The inspector examined the licensee's records of airborne concentrations of Am-241 in the breathing zone samples of [redacted]. He noted that frequent samples were collected but none exceeded the limit of Appendix B, Table I, Column 1 of 10 CFR 20 for soluble Am-241 (6×10^{-12} uCi/ml), since the last inspection.

66. Olson stated that all persons who had been handling americium prior to October 21, 1968 were counted by Helgeson's mobile whole-body counter on that date. He gave the inspector a copy of the data derived from the measurements and this is shown on enclosure 4 to this report.

Air Sampling - Restricted Areas

67. Olson stated that he has evaluated each authorized operation in the plant and has identified those for which the worker must wear a breathing zone sampler. He stated that he has informed the manager, in whose department the operation was conducted, the persons who have the training and experience to conduct the operation, and the health physics personnel who monitor the operations. The inspector examined the records of the concentrations determined by the use of breathing zone samplers. He noted that the records showed the date, duration of the operation, the place, the known or suspected contaminant, the MPC, the serial no. of the sampler, the flow rate, and the man's name. He checked the calculations on four records, discussed the counting procedures, the calibration of the counter and the maintenance and use of the samplers. He found no significant deviation from acceptable practices.
68. The inspector noted the concentrations recorded on each sampling record. He noted no instance in which a man had been exposed to concentrations in excess of those authorized by 10 CFR 20.106 except as indicated by the licensee's reports to the Commission. The inspector also crosschecked to verify that personnel who had been working in internal exposure risk areas (i.e. they were wearing b. z samplers) were also being followed by bioassay. This crosscheck revealed no instance in which exposed persons had not been followed by bioassay as required by there H.P. 27.
69. The inspector noted that the licensee had accumulated, since the last inspection, a large quantity of data from area samplers. He informed McGraw and Olson that although this data could have value in demonstrating compliance (under conditions which he discussed with McGraw and Olson) the principal value of this type of monitoring lay in its use in identifying the need for controls or the need for modification of existing controls. These remarks were made because it was apparent to the inspector that here, as in the licensee's swipe survey program (see following paragraphs) he was spending too much time collecting data and too little time in considering why the data is being collected and how the greatest benefit can be derived from the data.

Survey - Exposure Levels and Removable Contamination

70. The inspector asked to see records of surveys, conducted since the last inspection, showing exposure levels and removable contamination. McGraw, making three trips to his office, presented the inspector with files, which if stocked in one pile would have been at least 3' high. The inspector noted that the surveys were recorded on forms that were completed daily for each working area and monthly for unrestricted areas. He noted that generally there were 10 to 20 random swipes taken in each working area. He noted that a rough sketch of the area was made by the technician and the swipe measurements were shown on the sketches. He noted that prior to Jan 1969 the records showed the levels of contamination which had been found but gave no indication that the areas had been decontaminated. He noted that subsequent to January 1969 the records showed the results of resurveys after decontamination. He noted that each swipe, that indicated a value above the limits allowed by S.O.P. 27, was encircled and the results of decontamination were recorded.
71. McGraw stated that the swipes were counted on an NMC proportional counter for the contaminant that was known or suspected to be in the area. He stated that the fixed contamination was measured by an Eberline PAC 1S, and cpm were recorded as dpm. He stated that it was his belief that the instrument was electronically adjusted to correct for the instrument efficiency. The inspector expressed considerable doubt about the validity of this assumption and invited McGraw to present any available evidence that would support his belief. McGraw presented no evidence in the course of the inspection.

72. The records showed that the levels of removable contamination in each tritium work area was consistently above 50,000 dpm/100 cm² in at least several localized areas. The records also showed that these areas had been decontaminated to below this level on the same day.
73. In the records for the unrestricted areas, the inspector noted that monthly surveys were conducted with the greatest attention being given to the areas immediately adjacent to the tritium handling areas. The inspector noted that the records made subsequent to January 1969 showed that these areas were decontaminated when the levels exceeded the limits given in S.O.P. 27. The inspector informed Olson and McGraw that since these records showed that each month these areas were contaminated beyond the levels of S.O.P. 27 it could be reasonably concluded that they were generally contaminated throughout the year and the records showed only, that on one day/month the areas were clean. He also stated that the solution to the problem would be obtained by prevention of the transport of the contamination rather than by increased frequency of monitoring and decontamination. Olson and McGraw agreed with the inspector and stated that they would work forward this solution.

Security of Material

74. Olson stated that all areas in which material was handled or stored were locked when not attended by persons who were authorized to use the material or occupy the area. The inspector noted no instance which contradicted this statement.

Personnel Monitoring

75. McGraw stated that all persons, employees and visitors, who were exposed to penetrating, ionizing radiation were required to wear film badges and two 0-200 mr pocket dosimeters. The inspector noted no instance which contradicted this statement. He examined the film badge records from January 1968 to March 1969 and noted that the greatest quarterly whole body exposure was 805 millirem received by ██████████ in the first quarter of 1968. He noted that ██████████ also received the greatest annual exposure; 1.29 rem. Olson stated that all persons who handled radium or americium wore ring badges. The inspector noted that the highest quarterly exposure was that received by ██████████ in the first quarter of 1968; 9.70 rem. He noted that the average for all persons wearing ring badges was less than 2 rem/quarter. He noted that the film badge service was provided by Radiation Detection Co.

Posting and Labeling

76. All areas or rooms in which radioactive material were used or stored were noted to be posted as required by 10 CFR 20.203(e). All containers holding radioactive material during use or storage, which were seen by the inspector, were noted to have been labeled as required by 10 CFR 20.203(f). The inspector noted that the tritium work areas and the areas in which decontamination or dismantling of equipment were being accomplished were posted as Airborne Radioactivity Areas as required by 10 CFR 20.203(d).

Instruction of Employees in Restricted Areas

77. The inspector noted that forms AEC-3 were posted in at least ten locations throughout the plant at such locations that it was quite unlikely that all persons who work in or frequent restricted areas could fail to observe a copy on their way to or from their place of employment.
78. In many instances throughout the inspection when Olson or McGraw informed the inspector of who was accomplishing a task, how it was being accomplished and what instructions had been issued regarding health and safety, The inspector asked if the responsibility and the specific instructions were written or oral. Their answers indicated that very little attention was given to written instruction beyond that which is given in S.O.P. 27. The inspector informed Olson and McGraw of the value, to the health physics staff, and to the man who handles the material, to have the normal and emergency hazards of each operation clearly defined. Olson stated that he understood this matter and plans to rewrite H.P. 27 so that it will provide more specific instructions relating to the change in operations that have recently occurred. The inspector agreed that this change was needed but emphasized the value to be derived from written operational studies of the health physics aspects of each process to eliminate or control the release of waste products and the spread of contamination.

79. Olson stated that the cooperation between operational and health physics personnel has been excellent since management has required production departments to obtain Health Physics approval before making changes in procedures.

Instrumentation

80. The inspector, using the list of instruments shown as Item 10 Attachment to the licensee's form AEC-313 dated March 28, 1969, inspected or inquired about each instrument listed. He noted that the licensee possessed the listed instruments and had in addition 2 Eberline PAC 1S alpha detectors, an NMC Model PC-3A windowless proportional counter, and a Packard alpha spectrometer, 400 channels. The inspector noted that calibration and check sources were available for each instrument. McGraw stated that the laboratory counting equipment was calibrated each day before use. He stated that the alpha detectors were checked against a check source before use and were repaired and calibrated, as required, by Eberline. He stated that the beta gamma survey meters were checked before use by a check source and calibrated against a small radium source each 3 months.
81. The inspector noted that McGraw had on hand 8 personal air samplers 5 MSA Monitors and 3 Mighty-Mite samplers. He noted that the battery operated samplers drew from 0-10 cfh thru a filter paper or a midget impinger. He noted that the impingers had been designed for entrapment of particles. He informed McGraw that their efficiency for tritium vapor monitoring could be improved by having a glassblower attach a fritted disk 1/8" from the end of the tube. McGraw said he would try this modification. He stated that he was assuming for practical purposes that the impinger sampler was 100% efficient in collecting tritium vapor. The inspector noted that A. M. Valentine reported in LA-3916 "An Investigation of a Bubbler Tritium Sampler" April, 1968 that such a device had a collection efficiency of > 90%.

Inspectors Findings

82. The inspector, accompanied by Olson and McGraw made a physical inspection inside and outside all buildings on the licensee's property. He noted that the concentration of fixed contamination in the following unrestricted areas exceeded the limit established by the licensee's S.O.P. 27, the provisions of which are binding on him by conditions of both license number -2 and -7. Paragraph VIII, E of S.O.P. 27 specifies a limit of 1,000 dpm/100 cm² for alpha emitters and 0.1 mrad/hr at 1 cm from a surface contaminated by a beta gamma emitter. The inspector used an Eberline PAC 1S, serial 880 which was calibrated by HASL on 10/31/68 and an Eberline Model 120G calibrated on 2/1/69.
- a. Outside surface of door to Radium Vault - 40,000 dpm/100 cm²
 - b. South entranceway to Americium Laboratory - 10,000 dpm/100 cm²
 - c. Loading platform outside Radium Vault - 6,000 dpm/100 cm²
 - d. Entranceway and many items within Old House - 2,000 dpm/100 cm²
 - e. Table surface in Art Photo Darkroom - 2,000 dpm/100 cm²
 - f. Bottom of doors in Westclox Area - 3,000 dpm/100 cm²
 - g. Seat of chair, Plexiglas Sawing Room - 2,000 dpm/100 cm²
 - h. Electric outlet, Screening Room - 200,000 dpm/100 cm²
 - i. Table top, Plexiglas Machine Shop - 30,000 dpm/100 cm² alpha
 - j. Light switch on wall Plexiglas Machine Shop 15,000 dpm/100 cm² alpha
 - k. Seat of chair, Plexiglas Machine Shop - 2,000 dpm/100 cm²
 - l. 18" from rear of kick press, Plexiglas Machine Shop 2 mrad/hr beta gamma
83. The inspector detected a concentration of 15,000 dpm/100 cm² of fixed alpha contamination on the floor of the Radium Vault, a restricted area. On the surface of a table within this room he detected 600,000 dpm/100 cm² of fixed alpha contamination. He asked McGraw if any surveys had been made in this building since the last inspection. McGraw said that no inspections had been made in this interval and the building had been only transiently occupied by health physics technicians who delivered some radium shields for storage. He stated that plans called for the decontamination of this building in the near future.

84. About 50' to the South of the Etching Building the inspector noted a collection of debris which appeared to be shelves and cabinets that had been removed from one of the areas being decontaminated. He asked McGraw what was to become of this debris. McGraw stated that it was to be discarded as normal refuse. The inspector monitored the items and found detectable alpha beta and gamma contamination on several wooden boards. At contact he detected 1,000 cpm alpha, 4 mrad/hr beta and 0.5 mr/hr gamma. He noted that the area to the rear of the Etching Building was not restricted by posting or enclosure. McGraw stated that he would have a technician monitor all the debris and remove those pieces found to be contaminated. He also stated that he would discover who had discarded the debris and why it had not been surveyed prior to discard.

Inspection of License Number GL-253 Program

85. This program was inspected by verification of each license condition as follows;
- a. Condition 10 - The inspector examined U. S. Radium Bulletin Number 100.12 which Olson stated was distributed with each Isolite Photometer Model 1016. He noted that the Bulletin met the requirements of Condition 10.
 - b. Condition 11 - The inspector examined a Photometer and ascertained that each label required by this condition was affixed to the device as required.
 - c. Condition 12 - The inspector examined copies of reports submitted by the Licensee to DML since the date of issuance of the license (August 29, 1966). He noted that 18 devices have been shipped, to persons generally licensed under 10 CFR 31.5, since the date of issuance. He noted that the quarterly reports were submitted with 30 days after the end of each calendar quarter and that they contained the required information.
 - d. Condition 13 - The inspector discussed the provisions of each paragraph of the licensee's application dated August 8, 1966. He noted that the licensee maintained leaktest records for each device that had been manufactured. He noted that no device showed removable contamination in excess of 0.005 uCi. Olson stated that all the specification of the letter were followed in the assembly and test of the devices.
 - e. License Condition 14 - Olson stated that each device contained not more than 3 millicuries of Carbon 14 in the form of U. S. Radium Corporation Model LAB 706-1 sealed sources.

Discussion with Management

86. The following persons were present during the discussion with management: Umstead, Olson, Wallhausen, McGraw, MacDonald, and four Department Managers (D. Cole, R. Raff, R. VanEpps and F. Freisch)
87. The inspector informed Mr. Umstead that he had compiled a list of items which had been discussed at length with Olson, McGraw and Wallhausen. He stated that the items were divided into two categories: those that would probably appear as citations from HQ and those which, though worthy of discussion, probably would not appear as citations. The inspector then related the specifications of each item of noncompliance listed in this report. He detailed the findings which substantiated each item. He asked Mr. Umstead what action would be taken to correct these matters.
88. Umstead acknowledged the items of noncompliance and stated that action would be taken to correct each item. He stated the frequency of surveys in the unrestricted areas and in the restricted areas that were seldom occupied would be increased and these areas would be decontaminated. He stated that the contaminated waste would be removed from in back of the Etching Building and that fixtures and equipment to be discarded would be more carefully monitored. With regard to the effluent to the unrestricted areas; the preplanning of decontamination operations, and the bioassay follow-up on exposed personnel, he stated that corrective action would be taken when these matters had been discussed at length with his staff. He indicated that this discussion would be held during the following week.

89. In addition to the items of noncompliance identified in this report the inspector also included the following citation as one that would probably be made against License Number 37-30-2:

- Contrary to the requirements of your Standard Operating Procedure 27, [REDACTED] was not removed from risk of exposure to ionizing radiation, when it was known that the concentration of americium 241 in his urine, as shown by 24 urinalyses since January 1968, exceeded your established tolerance level of 0.9 dpm/24 hour sample.-

90. In his response to the inspector's question concerning what action would be taken to correct this item Mr. Umstead grouped the item with those which were to be resolved in his staff meeting.

Send Notice to him!

91. On June 16, 1969 the inspector informed Mr. Sorenson by telephone of the items of noncompliance contained in this report. Mr. Sorenson stated that he had previously discussed these items with Umstead. He stated that he acknowledged the items as being valid and that he would personally check to insure that Umstead had taken the corrective action which had been agreed upon.

I favor not citing for this, for the reasons given on p. 2 of memo. GWR

DIVISION OF COMPLIANCE MONTHLY REPORT MAY, 1969

United States Radium Corporation, Bloomsburg, Pennsylvania - The licensee is currently processing only tritium products but is still engaged in extensive decontamination and dismantling of facilities in which other byproduct material had been handled. The inspection revealed that although the quantities of airborne effluent have decreased since the last inspection, the licensee has not yet obtained a valid measure of these concentrations in the unrestricted areas. The dismantling of the americium-radium ductwork was poorly planned and resulted in the exposure of seven employees to excessive airborne concentrations. The actual intake by the employees was decreased by the use of respirators (the licensee does not have respiratory approval). The licensee did not obtain bioassay data for an evaluation of their exposure for 21 days but the findings of this data indicated that the intakes were not significant. Several of the items of noncompliance were either uncorrected or recurring items which had been previously reported. Management acknowledged the items of noncompliance and indicated that corrective action would be taken.