

R. G. Page, Chief, Enforcement Branch
Division of State and Licensee Relations

NOV 2 1966

R. S. Cleveland, Radiation Specialist
(Review), Region I, Division of Compliance

TRANSMITTAL OF LICENSE COMPLIANCE INSPECTION AND INVESTIGATION REPORTS
10 CFR 20

CO:I:WBG

Transmitted herewith for review and appropriate action are the
following reports:

Compliance Investigation Report

General Electric Company
Missile and Space Division
Re-entry Systems Department
3198 Chestnut Street
Philadelphia, Pennsylvania 19104
License Number: 37-2006-6
Type B Case: Loss of Facility

Compliance Inspection Reports

General Electric Company
Missile and Space Division
Re-entry Systems Department
3198 Chestnut Street
Philadelphia, Pennsylvania 19104
License Number: 37-2006-6

and

Space Technology Center
Goddard Boulevard
King of Prussia, Pennsylvania
License Number: 37-2006-5

The inspection reports are forwarded as a 417 so that all corres-
pondence with respect to enforcement action is through one regulatory
office.

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 207-304

OFFICE ▶	COMPLIANCE				
SURNAME ▶	Grant:cc	Cleveland	Kirkman		
DATE ▶					

F-24

In the opinion of the investigator, the most important factor revealed by the investigation is that the licensee does not adequately evaluate the hazards associated with all of the activities conducted at General Electric Corporation. As an example, Harris admitted that he was not aware that the contaminated assembly was to be unwrapped. It was also apparent that neither Harris nor Lincoln knew that the hood exhaust, and thereby the room exhaust, was being turned off when the hood was not in use. Harris and Handley stated that there have been other instances where a particular use of radioactive material has occurred without the knowledge or consent of the RSO. It is the investigator's opinion that it is incongruous that the person in the company responsible for safety and radiological safety should not have the opportunity to advise of the hazards and to impose whatever safety measures he felt necessary. The investigator noted that adequate pre-evaluation would have detected the fact that Lincoln intended to unwrap the contaminated item and that action would have been taken to prevent him from doing so.

We feel that there is inadequate enforcement of the existing company policy requiring pre-evaluations and prior approval of proposed user, as stated in the Radiation Protection Procedures 10-9, Paragraph IIIA. We have listed a citation against the Licensee Condition 15 in the investigation report specifically for the incident of September 2, 1966 and again in the inspection report as reflecting this is a general problem of the program.

The investigator discussed with Harris at length the possibility that surveys within the room may have disclosed the contamination sooner. Harris allowed this as true, but said that both his and Werkley's other duties prevented more frequent surveys on a routine basis. He said to date surveys are conducted mainly on an operational basis, that is, each particular job is covered while it is in progress. He added that a limited number of routine surveys are made on an approximately weekly schedule. These are usually done in T596 and areas immediately adjacent, as 95% of all radioactive work is done there. Harris said that smear surveys were made in the areas around the room during the period in question, but that none were made within the room because (1)

he did not know the item was being unwrapped, (2) no removable contamination was found on the Engineer^B leaving the room and (3) no contamination was detected outside the room.

With regard to the failure to evaluate air concentrations within the room, Harris stated that he felt the wearing of respirators and the use of an absolutely filtered vacuum cleaner negated the need for air sampling. The investigator stated that one can not always be sure of the fit or efficiency of either respirators or absolute filters and that air sampling should be done to ensure compliance with 10 CFR 20.103(a). Harris agreed and stated that this would be included in the revised Health Physics procedures. It is noted that this licensee is not authorized to take advantage of respiratory protective equipment in determining compliance with 10 CFR 20.103.

The items of noncompliance as stated in the investigation report and in Item 6 of the inspection report were discussed with GE management in two conferences held the afternoon of September 8, 1966. Mr. H. Paige, Manager, Missile and Space Division was unavailable, so a conference was arranged with the Department Manager involved with each license.

The item of noncompliance under License -5 was discussed with Dr. L. Steg, Manager, Space Science Lab; Harris, Handley, and Gallagher. Dr. Steg, who was only recently promoted to his present position, expressed concern and a willingness to conform to the regulations; however, he could not provide much information as to his department's previous activities and use under License -5. He assured the inspector, however, that the users under his supervision would be more diligent about leak tests in the future. Harris stated apparently leak testing was the responsibility of the current user and that it was not surprising this system broke down. He added that all health physics procedures are under review by Gallagher, and will be rewritten naming a definite individual or individuals responsible.

Items of noncompliance under License -6 noted in the inspection and associated investigation were discussed with Mr. W. C. Dwyer, Division of Engineering; Gallagher, Harris and Handley. All four agreed that there is a need for a better communication between the engineers and the safety group. Harris stated that the health physics program was undergoing a review by Applied Health Physics, Inc. to update procedures, leak tests and surveys. It was noted

that Harris has authorization for a health physicist for the division. The investigator believes that the other duties of Harris and his fire inspectors were at least partially responsible for the incident. The addition of a man who can devote his full time to this growing program should help solve the problem. In general, the licensee management, including Harris and Handley, were aware of their problems and taking steps to solve them.

Licensee management was informed of the required 30 day report of the incident at the time of the inspection. This was received at CO:I as a letter dated September 30, 1966 and is attached to the investigation report as Exhibit B.

During the week of September 19, Harris informed the inspector by telephone that whole body counts of individuals in question were within the normal limits expected of non-radiation workers and that the room (T596) has been decontaminated to safe levels. He added that the room would be kept out of service for technical reasons until the end of the week (September 24.) Harris requested that the information pertaining to employees involved, time in room, and exposure be classified as Company Confidential.

Inspector's Evaluation Summary

The licensee has apparently gotten by with a marginal health physics program under License -5 and -6 because of the limited scope of the program prior to September 1966. The contamination incident and the realization of future possibilities of problems under the planned increased scope of the program have made them re-examine the safety program. They plan to hire a full-time health physicist to review and rewrite existing radiation protection procedures to cover the marginal areas. In the inspector's opinion, the fulfillment of these two objectives should bring the program to an acceptable level. However, it is felt an early reinspection would be appropriate, and these two Category E, Priority III licenses will be scheduled for reinspection in six months. It is not felt that there is currently a significant safety problem because of the noted deficiencies.

Although the Isotope Laboratory was out of service for more than a week, it was reportedly cleaned up and ready for use again in a few days. The incident was therefore categorized as Type B.

cc: L. Dubinski, CO:HQ, w/orig of rpt
E. E. Cunningham, DML:HQ

COMPLIANCE INSPECTION REPORT

1. Name and address of licensee
**GENERAL ELECTRIC COMPANY
Missile and Space Division
Box 8555
Philadelphia, Pennsylvania**

2. Date of inspection
September 7 - 8, 1966

3. Type of inspection **Initial (-5)
Reinspection (-9)**

4. 10 CFR Part(s) applicable
20 - 30

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

<u>License Number</u>	<u>Date of Issue</u>	<u>Expiration Date</u>
37-2006-5		
Amend. 13 (amends license in its entirety)	9/30/65	10/31/67
Amend. 14	12/30/65	6/30/68
37-2006-6		
Amend. 7 (amends license in its entirety)	6/22/66	6/30/68
Amend. 8 (not inspected)	9/27/66	6/30/68
Amend. 9 (not inspected)	10/6/66	6/30/68

6. Inspection findings (and items of noncompliance)

The Missile and Space Division of the General Electric Company is involved in research, development, manufacture in connection with U. S. Air Force and NASA. The HSO for license -5 is J. H. Stricker, a Safety Engineer reporting to G. R. Harris, Manager, Safety and Fire Protection, NASD. T. P. Handley, Manager, Security and Safety and Plant Protection, NASD is HSO for License -6. Approximately 60 persons used byproduct material under both licenses at the Philadelphia area sites. There is a Radiation Advisory Board.

The following items of noncompliance were noted during the inspection:

License -5

1. License Condition 14C

- in that one 35 millicurie Co-60 source was not tested for leakage and/or contamination since 8/6/65, contrary to License Condition 14C which states such tests will be performed at six month intervals or less. See paragraph 24 of report details.

(Continued)

7. Date of last previous inspection
**License -5 (initial)
License -6 (1/24/64)**

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

DISTRIBUTION:

Approved by: **W. D. Grant, Radiation Specialist**
R. S. Cleveland, Radiation Specialist
(Review), Region I, Division of
Compliance (Operations office)

NOV 1 1966

(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.

16-75314-2 U. S. GOVERNMENT PRINTING OFFICE

RECOMMENDATIONS SHOULD BE SET FORTH IN A SEPARATE COVERING MEMORANDUM

Item 6 Continued

2. License Condition 8F

- in that one three millicurie Am-241 sealed source was possessed by the licensee since October 27, 1964, contrary to License Condition 8F which authorizes a maximum of one millicurie. See paragraph 14 of report details.

License -6

3. License Condition 15

- in that not all uses of radioactive material were approved by the Radiation Advisory Board, as when the project engineer having received the approval to have the contaminated component viewed in Room T596 failed to obtain from that Board specific authorization to unwrap the component, contrary to Radiation Protection Procedures 10-9, Paragraph IIIA, incorporated as part of this license conditions. See paragraphs 39 and 40 of report details.

PARTS 20 and 30 INSPECTION

GENERAL ELECTRIC COMPANY
Missile and Space Division
Re-entry Systems Department
3198 Chestnut Street
Philadelphia, Pennsylvania

and

GENERAL ELECTRIC COMPANY
Missile and Space Division
Space Technology Center
Goddard Boulevard
King of Prussia, Pennsylvania

Dates of Inspection: September 7 and 8, 1966 (Announced)

Persons Accompanying Inspector

None, Pennsylvania Department of Health notified

Persons Contacted

E. R. Harris, Manager, Safety and Fire Protection, Missile and Space Division
T. P. Handley, Manager, Security, Safety and Fire Protection, MASD, RSO Lic. -6
W. L. Dwyer, Manager, Division of Engineering
Dr. L. Steg, Manager, Space Science Laboratory
R. Gallagher, Applied Health Physics, Inc., consultant

DETAILS

Inspection History

9. License -5 was inspected initially on January 24, 1964. A Form AEC-591 noting noncompliance in Items 5-I and K was sent to the licensee on January 27, 1964. The current visit was the initial inspection of License -6. However, it was noted that License -4, cancelled by letter dated April 1, 1963, was incorporated into License -6 by Amendment #4. The most recent inspection of License -4, January 24, 1964, noted non-compliance with regard to (a) possession of H-3 sources in excess of authorization, and (b) use not under authorized supervision.

Organization and Administration

10. According to Harris, the Missile and Space Division of General Electric (GE) is concerned with research, development, and production of space vehicles and sub-assemblies under USAF and NASA contracts. The Division

Manager is H. Paige. Places of use of licensed material include: 3198 Chestnut Street, Philadelphia, Pennsylvania; the Space Technology Center; and the Cabot, Cabot and Forbes building in King of Prussia, Pennsylvania; and other sites as listed on each specific license.

11. The Re-entry Systems Department RSO is T. P. Handley, Manager, Security, Safety and Plant Protection, M&SD. Handley stated that a recent reorganization has placed E. R. Harris in the position of Manager, Safety and Fire Protection, M&SD such that Harris is responsible for the administration of the health physics program within the Division and reports to Handley. Handley in turn reports to C. D. Dates, Manager of Employee and Community Relations, M&SD.
12. The RSO for the Space Technology Center is John Stricker, a Safety Engineer, who reports to E. R. Harris. The use of isotopes is currently reviewed by the Radiation Advisory Board consisting of:

Department Safety Engineer (chairman)
 Manager - Medical Operations
 Representative from Engineering Section
 Representative from Systems and Technology Section

License 37-2006-5

Facilities and Uses of Byproduct Material

13. According to Harris, byproduct material is used principally at the licensee's facilities at King of Prussia, Pennsylvania under License -5. Stricker was on personal business on the day of the inspection, so Harris provided license information. According to Harris, the following material was on hand at the time of the inspection:

<u>Isotope</u>	<u>Form</u>	<u>Amount</u>	<u>Possession Limit</u>
Po-210	foil source (3M micro-sphere in aluminum foil)	200 mc (2/17/66)	300 mc
Po-210	foil source (Monsanto)	3.5 mc (1/15/66)	10 mc
Sr-90	sealed sources (3M microsphere in tubes)	10 C (2/17/66)	10 C
P-32	H ₃ PO ₄ in water	20 mc (4/21/66)	20 mc
Ca-45	CaCl ₂ in HCL	10 mc (3/31/66)	20 mc
C-14	Solution	0.5 mc (12/8/65)	20 mc
S-35	Solution	10 mc (10/28/65)	20 mc
Ca-45	CaCl ₂	10 mc (10/28/65)	20 mc
S-35	H ₂ SO ₄	50 uc (9/30/65)	20 mc

<u>Isotope</u>	<u>Form</u>	<u>Amount</u>	<u>Possession Limit</u>
C-14	Solution	150 uc (10/20/65)	20 mc
S-35	H ₂ SO ₄	50 uc (10/20/65)	20 mc
Cs-137	sealed sources	1.18 uc (9/8/65)	General license
S-35	Solution	1 mc (9/8/65)	20 mc
Co-60	sealed source Nuclear Chicago Model RR-62	35 mc (12/31/64)	35 mc
H-3	High Voltage Engineer- ing tritium foil	1.87 c (10/27/64)	2 c
H-3	sealed light sources	3730 mc	3730 mc
Am-241	plated source	3.0 mc (10/27/64)	1 mc
Ru-106	sealed sources (US Radium Model LAB-370-1)	20 mc (2/7/64)	20 mc
Ra-226	3 foils (US Radium Corp.)	6.5 uc	

14. The inspector visited two areas of use within the Space Technology Center with the following results:

Room 9501 - the Radiation Detection Lab, uses one 1.8 curie H-3 tritium foil, one 3.3 mc Po-210 sealed source, one 3 mc Am-241 plated source, and one 10 mc Ru-106 sealed source in the development and testing of radiation detection instruments. The Lab is under the supervision of Dr. L. D. Cohen, Physicist. Dr. Cohen's training and experience are found in license application dated 9/23/63. All sources were noted to be stored in a locked cabinet which was posted with CRM and CRA signs of proper symbol and colors. The sources were in their shipping containers and each was labeled with a CRM label including information as to kind, quantity and date of assay.

The inspector noted that while a 3 mc Am-241 plated source was possessed by the licensee since 10/27/64, the license only authorizes a source of 1 mc.

15. Room 9546 - a Chemical Research Laboratory, is under the supervision of Dr. R. N. Griffin. Dr. Griffin's experience is listed on license application dated 12/7/65. The lab uses a 10 curie Sr-90 sealed source in a shielded device and a 75 mc (9/3/66) Po-210 sealed source imbedded in aluminum in radiation effects studies. Griffin stated that one recent experiment involved the curing of a paint coating on aluminum. The inspector noted that the Sr-90 device was designed to prevent exposure to the operator. All materials are exposed through a pass-through drawer.

16. The inspector noted that the sources were stored in a locked cabinet for which Griffin had the only key. The cabinet was posted with a CRM sign of proper symbol and color. The sources were labeled with CRM and information pertaining to kind, quantity and date of assay.

Instrumentation and Calibration

17. The licensee was noted to have the following operable instruments on hand:
 - 1 - Jordan Rad Gun, Model AGB-10K-5R, 0 - 10,000 mr/hr
 - 1 - Victoreen Model 489 Thyac, GM survey meter, 0 - 20 mr/hr
 - 1 - Victoreen Model 440 survey meter, 0 - 300 mr/hr
 - 1 - Victoreen Radeator, Model AGB-50B-5R, 0.1 - 100 r/hr
18. According to Harris, the instruments are calibrated by the Space Center's instrument section at three month intervals, using the 1.18 uc Cs-137 and the 6.5 uc Ra-226 sources. It was noted that each instrument has a paste-on tag stating date of last calibration. All were within three months.

Radiological Safety Precautions and Procedures

Instructions

19. According to Harris, Stricker meets with all individuals intending to use radioactive materials and they discuss the hazards of that particular use. Stricker reported that he advises user of precautions to be taken, if any, and of procedures to be followed. Harris stated Stricker's recourse for lack of cooperation would be through him. AEC-3 was noted to be posted on the wall bulletin board and the license and Part 20 and 30 were on hand.

Surveys

20. According to Harris, Stricker determines the frequency of his surveys. He added that the users make their own routine surveys using either portable instruments borrowed from Stricker or their own counting equipment and that Stricker follows up.
21. Records of Stricker's surveys were noted to contain date, instrument used, readings, and area surveyed. It was noted that survey records showed minimal readings for the licensee's operations.

Leak Tests

22. According to Harris, leak tests are performed on the 20 mc Ru-106 sealed sources at six month intervals. Records of the leak tests showed that all results were below 0.001 uc. The tests are conducted by Dr. Cohen utilizing a Budd Company Model LT-100 kit.
23. The ten curie Sr-90 sealed source was noted to have been leak tested by the manufacturer prior to its shipment to GE on 2/17/66. Harris stated that the source is due for a leak test during the week of September 4 by Applied Health Physics, Inc.

24. Records showed that the 35 mc Co-60 sealed source acquired 12/21/64, and leak tested on 8/6/65, has not been leak tested since. Harris stated that the source is used infrequently and had probably been missed through an oversight. The leak test performed was done by Stricker using a Budd Company kit LF-100 and found less than 0.001 uc contamination.

Procurement Procedures and Control

25. Harris stated that the Purchasing Office will not place orders for radioactive material unless Stricker signs the Purchase Requisition. The shipping receipt records for all radioactive materials are kept on file in a folder in Stricker's office. Stricker also keeps a byproduct material log book in which all incoming shipments are logged as per date received, kind, quantity, purchaser, shipping container smear results, ultimate disposition and date of transfer or disposal.

Storage and Security of Material

26. According to Harris, all byproduct material is either stored in locked cabinets or in areas restricted to personnel using the material. The entire Space Center was noted to be under strict security surveillance.
27. Harris stated that material is stored in a locked vault in the pipe tunnel area if it is not being used currently. The inspector noted that this area contained the 35 mc Co-60 sealed source in its shielded container. The container was labeled with a CRM sign of proper symbol and color and noted kind, quantity and date of assay of contained material therein. The vault was posted with CRM and CRA signs.

Waste Disposal

28. Harris stated that the only material currently disposed of as waste is generated at the Cabot, Cabot and Forbes building in the Space Technology Center. Harris stated that the material, mostly absorbent paper used on lab benches, is stored in 55 gallon drums until enough accumulates to warrant disposal. It is then surveyed and disposed of through Radiological Services. According to Harris, the records of these surveys are stored in the contaminated Room T596 of the Chestnut Street plant and therefore unavailable for review.

License 17-2006-6

Facilities and Uses of Byproduct Material

29. According to Harris, material authorized under License -6 is used principally at the licensee's Chestnut Street plant. Material currently on hand is as follows:

<u>License Item</u>	<u>Isotope</u>	<u>Form</u>	<u>Amount</u>	<u>Possession Limit</u>
F	Co-60 Fe-59 Ag-110	activated elec- tronic components	5 mc (5/25/66)	400 mc
H & J	3 - 83	irradiated phenolic plugs	39 mc (4/21/66)	30
F	3 - 83	activated elec- tronic components	5.5 mc (6/3/66)	400 mc
K	Cs-137	sealed sources Budd Model 17-323	1 mc 10 mc	100 mc

30. Harris stated that all of the above material is stored and worked on in Room T596. The room is located on the lower ground level of the Chestnut Street site. A drawing and description of the room and a description of the facilities are found in Attachment #7, Figure #1 of license application dated 5/31/66 and Exhibit B of the attached investigation report. The hood in the room has an absolute filter and an exhaust rate of 1600 cfm. It provides the room with a filtered exhaust system. At the time of the inspection, the room was contaminated and closed off until decontaminated. (For full details, see investigation report.)
31. Harris stated that he is made aware of all radioactive material being worked on and that he prescribes remote handling equipment, protective clothing, finger or wrist badges, and/or respiratory protection as the situation warrants. Harris added that usually components have only induced activity and require the wearing of appropriate monitoring equipment, i. e., extremity badges, and that all transfers of material in or out of Room T596 are monitored by his staff. (However, see also paragraphs 39 and 40.)
32. Harris stated that all personnel listed in License Condition 13 are potential users depending on the experiments in progress and that their experience and qualifications are listed in Attachment #5 of the license application dated 5/31/66.
33. According to Harris and Handley, the uses of license items 6 - 9, A - J are as described in Attachment #4 of the license application dated 5/31/66, in which space vehicle components are irradiated and used in USAF sponsored erosion tests. They added that specific uses of Item F are classified Secret Restricted Data by DOD. The inspector felt that for this purpose of the inspection, there was no "need to know" and the subject was not pursued. The Cs-137 sources authorized in Item K are used for calibration of instruments used in the ablation studies.

Instrumentation and Calibration

34. The following operable instruments were noted to be on hand:

- 1 - William B. Johnson, GSK-5, end window GM counter, S/N 201, 0-20 mr/hr
 - 1 - William B. Johnson, GSK-5, GM counter, S/N 315, 0-20 mr/hr
 - 1 - Nuclear Chicago Cutie Pie, Model 2588, S/N 28, 0-2500 mr/hr
35. According to Gallagher, the instruments are calibrated by Applied Health Physics, Inc. at three month intervals, using NBS sources and at 3 points on each scale. Records of calibrations are kept by Applied Health Physics, Inc. and they notify GE when calibration is needed. Tags pasted on each instrument show date of last calibration. The inspector noted that the calibrations were at three month intervals.

Radiological Safety Precautions and Procedures

Surveys

36. Harris reported that radiation surveys are made in Room T596 and surrounding areas. He said that one fire inspector, R. R. Werkley, performs these surveys routinely on an approximately weekly basis and also on a special basis during material transfers and during operations which Harris feels require them.
37. He added that one such operation was the one causing the incident reported September 2, 1966. Surveys were made of the equipment on arrival. Surveys were also made of the engineer's clothing, hands and shoes, after he had removed his protective clothing and egressed. Harris stated that at no time had contamination been found prior to September 2 during any of the surveys. He said that records were made of the surveys, but that they were stored in Room T596 and presumably contaminated. Harris stated that no air samples had ever been taken in Room T596 before detection of the contamination or since.

Instructions

38. Harris stated that Werkley was trained on the job and has also completed the Picker X-ray Co. course given in Cleveland, Ohio.
39. Both Harris and Handley stated that individual users are given instructions on precautions to be taken and procedures to be followed by either one or both of them prior to the start of each project involving radioactive material. However, they said the adequacy of these instructions depends a great extent on the experimenter's explanation of just what exactly he intends to do. The licensee's Radiation Protection Procedures, Numbers 10-9, paragraph IIIA, Policy, states that all proposed uses of radioactive materials or ionizing radiation producing devices shall be reviewed and prior approval for use secured from the Radiation Advisory Board. These instructions are included in the license application dated 5/31/66, which is incorporated into License Condition 15.
40. Harris and Handley stated that R. A. Lincoln, the Project Officer, had not informed the Board of his intent to unwrap the equipment for viewing.
41. Harris said that he thought Lincoln's ten years experience with radiation effects studies at Sandia, New Mexico, qualified him to recognize potential hazards. He added that in his opinion, Lincoln is a well qualified engineer and project officer, and that probably his anxiety

to show the subassembly led him to overlook the hazard of unwrapping the contaminated apparatus. They said that this is not the first time that the RSO had not been informed at all or informed after the fact of work involving radioactive materials. None of these have been documented, however, since no incidents had occurred.

42. AEC-3 was noted to be posted on the bulletin board of the Re-entry Systems Department. Parts 20 and 30 and the license were on hand.

Leak Tests

43. Harris stated that leak tests are performed on the Cs-137 sources at 6 month intervals or less. He said the tests are done utilizing Budd Company LT-100 kits and evaluated by Budd. Records showed that the sources were leak tested on 8/12/66 and less than 0.005 uc was detected on these samples.

Procurement and Control Procedures

44. All radioactive material is ordered through the Purchasing Department and over Harris' signature. According to Harris, Purchasing will not order material without his signature. He showed the inspector a purchase order which was sent by him to Purchasing because it lacked his signature. Harris keeps a radioactive material log book which contains material ordered, date received, purchase order number, requisition number, type of radiation, quantity, mr/hr on package as received and destination. In addition, all incoming radioactive material is tagged with a CRM tag (Form 5-8726) which states type, amount and date of assay. The back of this tag has the following statements: "I understand that this item contains radioactive materials and I will insure that this receipt is signed by the person to whom I transfer this item" and a place for signature. Harris stated that the use of this tag is rather light at this point since most of the radioactive material is contained in irradiated missile and space vehicle components and is not transferred. The inspector noted that the Cs-137 source containers were tagged.

Storage and Security of Material

45. The inspector noted that the door to the storage area, Room T596, has a special security combination lock. Harris stated that only his office and the security personnel have the combination and that the lock is checked on security lock rounds. All entries into the room are recorded in a security log book.

Waste Disposal

46. Harris stated that disposals of waste are made through Radiological Services as needed. He said they are always of solid material and that records are maintained, but that the records are stored in the contaminated Room T596 and therefore not readily available. According to Harris, the last transfer to Radiological Services was of three 55 gallon drums containing microcurie amounts on 12/9/65.

Posting and Labeling

47. The door to the storage area was noted to be posted with CRA and CRM signs with standard symbol and color. Harris stated that the irradiated equipment is labeled with a CRM tag noting only a date and the radiation reading.

Personnel Monitoring

48. Harris reported that R. S. Landauer monthly film badges service is provided for persons working with radiation sources under Licenses -5 and -6. Film badge results were noted to be maintained on the Landauer monthly report and previous exposure history forms. It was noted that about 60 persons are assigned body film badges, with 10-15 of these also assigned extremity badges. The typical exposures reported for both types of badges were less than 20 mrem/month with a maximum of 70 - 90 mrem/quarter extremity exposure for one or two individuals.

DIVISION OF COMPLIANCE

Region I

Re-entry Systems Department

3198 Chestnut Street

Philadelphia, Pennsylvania 19104

License Number: 37-2006-6

and during the last year of the war, the Government of the United States has been very generous in its aid to the Government of the United Kingdom, and the Government of the United Kingdom has been very generous in its aid to the Government of the United States.

Type B Cases: Loss of facility for 24 hours or more
(10 CFR 20.403(b)(3)) through extensive

contamination of horizontal surfaces of one-room lab-storage area; six persons involved, but did not incur any exposure.

[illegible]

Period of Investigation: September 7 and 8, 1966

[illegible]

that had been working with him during his work at the University of Chicago. The subject had been known to him as well as to the other members of the group. The subject was a member of the group and was known to all of the members of the group. The subject was a member of the group and was known to all of the members of the group.

NOV

Investigator: William B. Grant, Radiation

Investigator:

William B. Grant, Radiation Specialist

Reviewed by:

NOV 1 1956
R. S. Cleveland, Radiation Specialist

Reviewed by: R. S. Cleveland, Evaluation Specialist NOV 1 1966

EXHIBITS

- A. Floor Plan of Room T596
- B. Licensee's 30 day report

DETAILS

Introduction

1. On September 2, 1966, CO:I was informed by telephone that Room T596, a combination lab and storage facility in the Chestnut Street plant, had been extensively contaminated and lost as an operating facility for 24 hours or more. The telephone call was from E. R. Harris, Manager, Safety and Fire Protection, Missile and Space Division (MASD).
2. Harris stated that the contaminants were alpha and beta emitting mixed fission products and that the initial smear survey showed removable contamination of 10,000 - 15,000 dpm beta and 6 dpm alpha per 100 cm². He added that eight to ten persons had spent significant time in the room and possibly had been exposed to airborne contamination in excess of MPC. Therefore, these individuals would be given whole body counts and complete blood counts at Presbyterian Hospital, Pittsburgh, Pennsylvania, during the coming week.
3. The telephonic notification was confirmed by teletype received at CO:I on September 6, 1966. CO:HQ was notified of this incident by a Compliance Investigation Memo dated September 12, 1966. Investigation was begun by CO:I personnel on September 7, 1966.

License Conditions

4. The following conditions of the license (57-2006-6) are considered relevant to the investigation:
 - a. Conditions 6, 7, 8, and 9H authorize the possession of three ounces of irradiated phenolics, silicones, or epoxies for use in research and development in oblation studies. Harris stated the item involved was one that was covered by these license conditions.
 - b. Condition 15 requires the licensee to use byproduct material in accordance with procedures contained in his application dated May 31, 1966. This application includes "Radiation Protection Instructions, Re-entry Systems Department."

Interviews

5. The information contained in paragraphs 6 - 14 was obtained from E. R. Harris, except as specifically noted.
6. Harris noted that he had been a Safety Engineer and RSO for the Re-entry Systems Department until about 18 months ago when he was transferred to the Schenectady, New York plant. He returned the summer of 1966 to his present capacity, which includes responsibility for the health physics program within the Missile and Space Division. Harris reports to Mr. T. P. Handley, the current RSO. Handley reported that Harris is acting RSO under his supervision.
7. The classified missile sub-system assembly involved in the incident was neutron activated in joint AEC-DOD experimental studies at USAEC Nevada Test Site (NTS). Due to unknown circumstances, the assembly became grossly contaminated. Attempts to decontaminate it

at NTS were only moderately successful, and the assembly was doubly bagged in plastic, crated and shipped by rail under armed surveillance to the Chestnut Street Plant on August 15, 1966.

9. According to Harris, the activated assembly was under the custody of DOD from the time of its irradiation until its delivery to General Electric's Chestnut Street Plant. He added that it was packaged and shipped according to ICC regulations. The NTS survey report accompanying the shipment showed the following information:

10 mrad at contact with contents
5 mrad at contact with container (primary)
4 mrad at contact with container (secondary)
Wipe of outside plastic bag - less than 50 dpm alpha

Internal removable contamination was not noted on the report which was signed by Plummer/per Saltzman.

9. The Safety Office at Chestnut Street was notified of the shipment's arrival on the morning of August 17, 1966. Fire Inspector and Health Physics Technician (b)(6) surveyed the exterior of the crate and had it moved to Room T596 that same day. The survey found the same activity as reported by NTS. Records of this and other surveys are presently in Room T596 and considered contaminated. Ex 6

10. The assembly was removed from the crate by (b)(6) still in its plastic bag and the crate which was assumed to be free of contamination, disposed of as general trash. The bags were intact at this point and assumed to be free of contamination. A survey of the assembly was made through the bags with William B. Johnson GM-5 end window GM counter, serial number 201, and the results were as follows:

15 - 20 mr/hr, closed window
110 - 120 mr/hr, closed window
400 - 400 mr/hr, open window

11. Harris stated that he was not aware of how the NTS survey was made. He assumes that the discrepancy between the readings is due to either instrumentation or distance. Harris said his readings were at contact, through the bags and with the window as stated above.
12. Harris was aware that the assembly would be displayed to groups of interested men during the course of the next few weeks. His fire inspector escorted the groups and surveyed the engineer doing the displaying, after he left the room. No contamination was ever found on the engineer's person. The viewers are kept at a distance of 4 - 5 feet, while the engineer, dressed in paper coveralls, gloves, and shoe covers, displayed the assembly. Harris explained that each showing lasted about 10 minutes. The distance factor and protective clothing were precautionary measures. A floor plan of Room T596 showing the hood, work bench and line of demarcation is attached as Exhibit A.
13. Harris stated that he was not aware that the "hardware" had been unwrapped until September 1, 1966. He therefore did not have an opportunity to give or not give his permission. On that date, his "intuition" revealed that the assembly was in fact being unwrapped and rewrapped for each inspection party. Direct surveys

made on September 1, 1966 by Harris with a GM counter revealed general horizontal surface contamination which read up to 2 mr/hr at contact within the room. Harris stated that no air samples were taken prior to or during entry to the room. (b)(6)

(b)(6) wearing full protective clothing and absolute filtered respirators vacuumed the floor and bench tops in the room that afternoon, using a vacuum cleaner having an absolute filter. Surveys showed only moderate success. Therefore, Harris closed the room off and called Applied Health Physics, Inc. for consultation. 646

14. Mr. R. Gallagher of Applied Health Physics, Inc. arrived the morning of September 2, 1966. Direct surveys of all areas adjacent to the room and smears of horizontal surfaces within the room were made by Harris and Gallagher. Only one spot of contamination (0.2 mr/hr at contact) was detected outside of the room (see Exhibit B). The direct surveys were made using William B. Johnson GM 5 end window GM detector and Eberline PAC-30 alpha counter. The smears counted in Applied Health Physics, Inc. alpha-beta-gamma proportional counters in the home office, Bethel Park, Pennsylvania showed 10,000 - 15,000 dpm beta and 6 dpm alpha/100 cm². Gallagher said an isotope determination of the smears was in progress.
15. Harris telephoned CO-1 the afternoon of September 2, 1966 and reported the loss of the facility for a 24 hour period.
16. Gallagher stated that his procedure on decontamination would be as follows:
 - a. Construct an "Ante Room" just outside Room T596 (completed September 7, 1966). This room would be completely lined with plastic and would serve as an area of storage and clothing change and would permit entry and egress in a restricted area.
 - b. Make airborne concentration determinations.
 - c. Make complete surveys, direct and smear.
 - d. Decontaminate - sample air.
 - e. Resurvey.
17. Other persons as previously listed in the report were interviewed by the investigator. The information elicited from them corroborated the facts previously presented. (b)(6) (Project Officer) provided additional information.
18. Mr. (b)(6) has 10 years experience in radiation effects studies at the Sandia Corporation, including completion of a "Chemical and Radiation Hazards" course given by that organization, prior to joining the General Electric staff in July 1965.
19. (b)(6) stated that he had accompanied the assembly to NTS and was on hand when it was bagged and shipped. He said that he was aware that it was contaminated when it was shipped, but that the NTS "Rad Safe" people had not seemed overly concerned about it. He said that air samples had been taken by NTS Radiation Safety people during the initial decontamination attempt, and that he was informed

that they were "negative". He added that, in his opinion, Room T596 was not properly equipped for this work, since the assembly was too large to fit into the hood and it was contaminated, but that it was the only room in the building with a filtered exhaust system. However, he felt that the major problem would be the direct radiation exposure from the unit and that this exposure could be reduced significantly by the distance factor involved.

20. (b)(6) felt that the protective clothing worn by his people while showing the unit would be adequate for any "slight" contamination that might be present. He said he had not asked for a survey of the area after each showing. When asked by the investigator why he felt that any contamination present on this assembly would be no hazard, (b)(6) stated that the NTS "Rad Safe" people had taken air samples and found nothing and had not been concerned over the contamination of the unit. Furthermore, the NTS people had taken only such precautions as were followed at GE. He admitted that the NTS Radiation Safety program does operate under a different set of circumstances, mainly because of geography, and that contamination levels which can cause concern may be quite different in the Nevada desert from those in downtown Philadelphia. Ex 6

21. Harris stated that the following personnel had spent significant time in Room T596 since August 15, 1966:

Company Confidential

Name

Estimated Time in Cell

(b)(6)

2 hours
3 hours
2½ hours
6 hours
10 hours
7 hours

Harris said that arrangements were being made to have these individuals sent for whole body and blood counts either on September 9 or September 12, 1966. He requested that this information be classified as Company Confidential. Ex 6

22. On September 8, 1966, the investigator held a discussion of the findings of the investigation and related items of noncompliance with W. L. Dwyer (Manager, Division of Engineering), Handley, Harris and Gallagher. The investigator informed the group that the purpose of the Commission's investigation was to determine what had happened, why it happened, and what action the licensee had proposed to prevent a recurrence of similar incidents.
23. Harris, Handley, and the investigator agreed that the "why" aspect of the incident was the lack of communication between the engineering group and the responsible health physics group. Both Harris and Handley stated that the Engineering and Scientific groups have, in the past, been negligent in informing the RSO of all of their work with radioactive materials. They said that none of these had been documented as no incidents has occurred, but that they were concerned about them.

24. The investigator stated that he was particularly concerned with the fact that the incident and the probable cause of it, the unwrapping, had remained undetected for two full weeks. Harris and Handley agreed a better overall health physics program was needed and, in that respect, "the incident" was fortunate because they had since gotten Personnel's authorization for a health physicist and an additional safety engineer. Also, the incident had prompted authorization for a revaluation of the present program by Applied Health Physics, Inc. Gallagher assured the investigator that the revised program would include provisions for prompt communications between operating groups and the health physics section as to specific plans for working with byproduct material, also detailed emergency procedures covering the adequate radiation safety precautions to be followed during any such incidents.

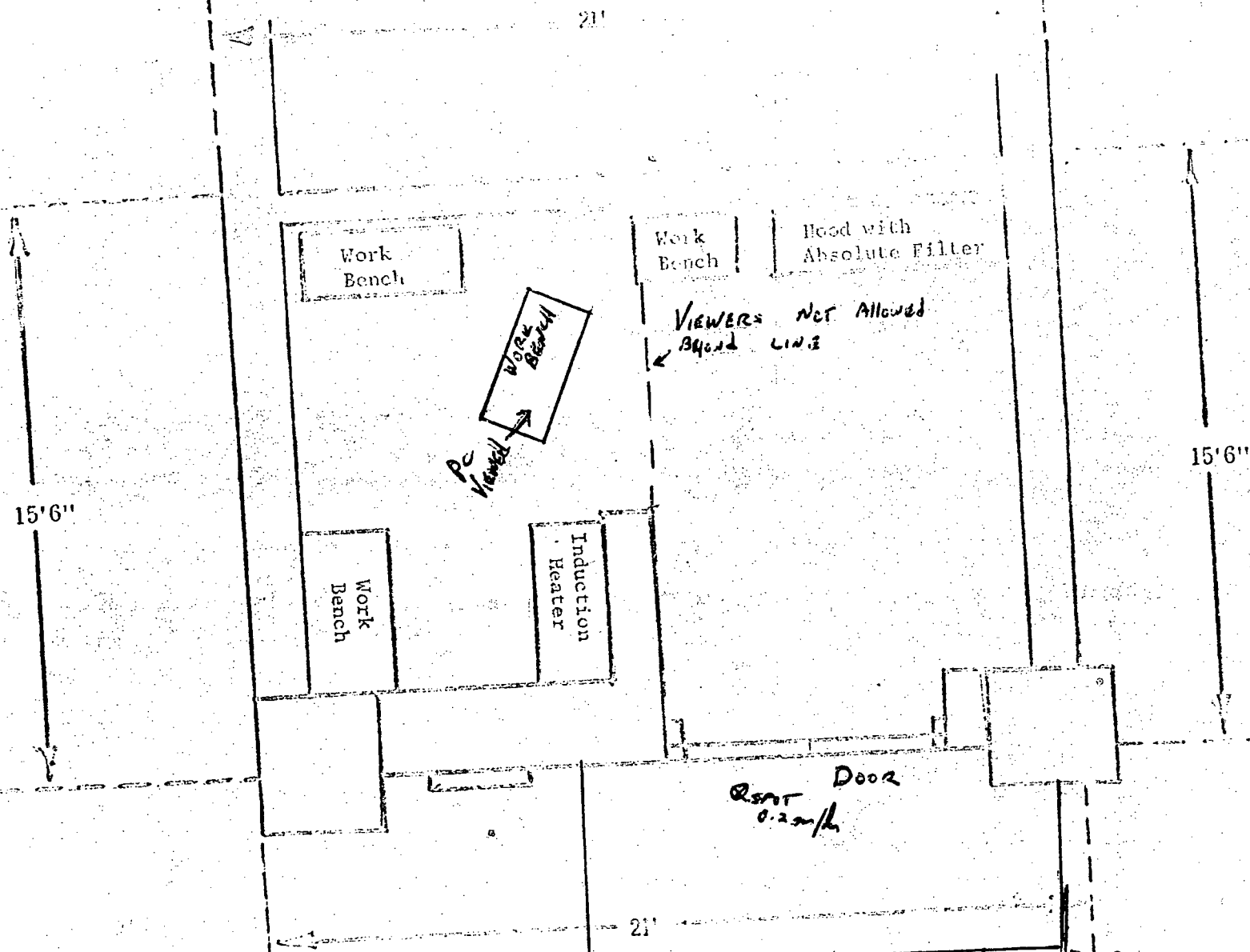


Exhibit A 1 of 1

ANTE ROOM FOR DECONTAMINATION

Door WITH VENT

Fig. 1

GENERAL ELECTRIC
COMPANY

3198 CHESTNUT STREET, PHILADELPHIA, PENNA. 19101 . . . TELEPHONE 823-1000

September 30, 1966

MISSILE AND
SPACE DIVISION
RE-ENTRY SYSTEMS
DEPARTMENT

Ref. 37-2006-06

Regional I, Division of Compliance, USAEC
376 Hudson Street
New York 14, New York

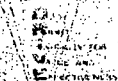
Re: Report of Radiation Incident - September 2, 1966 in Room T-956

Gentlemen:

On September 2, 1966, we telephoned your Office to report the discovery of radioactive contamination in a radioisotope laboratory at our Plant at 3198 Chestnut Street, Philadelphia, Penna. The presence of loose radioactive contamination resulted in our decision to prohibit the use of this laboratory until these facilities and equipment could be decontaminated.

The six (6) men who worked in this lab at the time the contamination occurred were sent to the Presbyterian University Hospital, Pittsburgh, Penna. where whole body gamma counting and complete blood counts were performed. Results of these tests indicate that the total amount of radionuclides are within normal limits expected for non-radiation workers. Neither the total gamma activity nor the gamma spectra showed anything above average for unexposed individuals. The results of the complete blood tests were also within normal limits. Monitoring of the protective clothing worn by these men failed to show any radioactive contamination above background. The names of the six individuals are given on the attached sheet. Since there is no indication of any radiation dosage above the limits set forth in Title 10-CFR-20, no further report will be made to these men.

A thorough investigation of the incident was made by a certified health physicist from Applied Health Physics, Inc., of Bethel Park, Penna. The radioactive materials that contaminated the facilities and equipment in the radioisotope labs., Room T-596 were fission products from classified devices involved in recent underground nuclear tests. Although these devices had been properly packaged at NTS, they were unpackaged and examined visually without adequate consideration of contamination control measures. Another factor associated with the incident was the spread of radioisotopes from the fume hood. The exhaust system was turned off when personnel were not using the lab. Other exhaust systems operating in adjacent areas caused a reverse in the direction



ZERO DEFECTS

Exhibit 8

143

September 30, 1966

of the air in the radioisotope hood and the laboratory when the lab hood was inoperative, thus causing some radioactive contamination to spread from the hood onto the lab floor. However, thorough radiation surveys by Applied Health Physics and General Electric personnel failed to find any radioactive contamination outside of the radiation area.

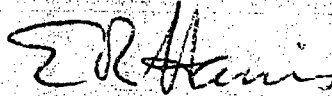
The decontamination of all facilities, instrumentation, and equipment was performed by Applied Health Physics, Inc., during the period September 2-24, 1966. Radioactive wastes have been packaged, labeled, monitored, and will be shipped by Applied Health Physics, Inc., to a licensed waste disposal facility. The final costs of the incident did not exceed \$10,000.00, but did result in our restricting the use of the facilities for the entire period of September 2 to 24, 1966. This restriction was a precautionary measure which we took in order to assure effective contamination control for technical reasons, as well as for radiological safety. The contamination levels were down to safe limits within a few days after decontamination work started.

In order to avoid any reoccurrence of this type of incident, we are taking the following actions:

- (1) The exhaust system in the radioisotope lab will continue to operate when other exhaust systems in adjacent areas are operating and unsealed radioactive materials are in the hood.
- (2) Those persons who work on irradiated devices or on any unsealed radioactive materials will be instructed on appropriate contamination control measures and their operations will receive frequent health physics surveillance, during this work.
- (3) Until adequate facilities and equipment are available for our use, we will not permit irradiated devices to be unpacked or worked on by our personnel in the laboratory.

We trust that the above information provides your office with the necessary details concerning this incident and will comply with the reporting requirements of your agency's regulations. Please contact me if you require any additional information concerning this incident or on our radiological operations.

Sincerely,



E. R. Harris, Manager
Safety and Fire Protection
Room 5203 Chest. - Exts. 8-242-3743/46

Exhibit B 2 of 3

ERH:mca
Attached: List

September 30, 1966

ATTACHMENT:

(b)(6)



E46

Exhibit B 3 of 3