GENERAL ELECTRIC

SPACE SYSTEMS DIVISION

GENERAL ELECTRIC COMPANY . . . . . VALLEY FORGE SPACE CENTER
(MAIL: P. O. BOX 8555, PHILADELPHIA, PENNSYLVANIA 19101), Phone (215) 962-2000

January 17, 1984

U.S.N.R.C.
Region I
Nuclear Material Section B
631 Park Avenue
King of Prussia, PA 19406

Dear Sirs:

The attached is an application for renewal of byproduct material license no. 037-02006-05.

Also, by means of this attached application, it is desired to terminate byproduct material license no. 037-02006-06 and to transfer NRC licensee accountability for material, equipment, and facilities covered by license no. 037-02006-06 to license no. 037-02006-05 (certificate of disposition of materials for license no. 037-02006-06 is attached).

Below are the license nos., docket nos., and licensee names for the present licenses:

License No.	Docket No.	Licensee Name
037-02006-05 (expiration date: 2/28/84)	030-06046	General Electric Company Space Systems Division Valley Forge Space Center P.O. Box 8555 Phila., PA 19101
037-02006-06 (expiration date: 2/29/84)	030-06047	General Electric Company Re-Entry Systems Division 3198 Chestnut Street Phila., PA 19101

8409270502 840801
NMS LIC30
37-02006-05 PDR

Applicant . . . .
Check No. . . . .
Amount, Fee Category . . . .
Type of Fee . . . .
Date Check Rec'd . . . .
Received By . . . .

The reason for the termination and transfer of accountability for license no. 037-02006-06 is that Re-Entry Systems is no longer a separate and equal organizational entity from Space Systems but is now a subordinate operation under and within Space Systems Division.

In addition, it is requested that the renewed license continue to contain the condition detailing reduced periodic leak testing required for stored sealed sources.

G624799 #110 Renewal 2/21/84 Brown
G632016 IJ #350 9/11/84 Cabell
G623480 IJ #150 Renewal 1/20/84 Brown (IJ, BK)

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23 JAN 1984

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GENERAL ELECTRIC

The following is an index (using page numbers in the upper right hand corner) for the material supplementing the three-page application form:

Page Nos.	Attachment Nos.	Content
1	5	Street addresses where licensed material will be used
2	6	Individuals who will use or directly supervise the use of licensed material
3-4	8A;8B;8C;& 8D	Licensed material: element and mass no.; chemical &/or physical form;manufacturer and model no. (sealed sources);and maximum activity per source and total
5-7	8E	Use of licensed material
8-9	10	Radiation detection instruments
10	11	Calibration of instruments
11-21	13	Facilities and equipment
22-23	14	Waste disposal
24-31	15	Radiation protection program
32-37	16 & 17	Formal training and experience in radiation safety
38-50	- - -	GE/SSD Mandatory Procedure, M-6, from Division Safety Manual - "Ionizing Radiation Control"
51-55	- - -	GE/SSD letter to NRC dated September 12, 1978
56-63	- - -	GE/SSD letter to NRC dated March 27, 1980
64-65	- - -	GE/SSD letter to NRC dated June 5, 1980
66-67	- - -	GE/SSD letter to NRC dated November 5, 1980

Also attached is a check in the amount of $150.00 to cover the renewal application fee.

If there are any questions, please call the undersigned.

Sincerely, Jack McFadden

J. McFadden, Health Physicist
Safety Office, 215/823-3745

NRC FORM 314
(12-81)
10 CFR 30.34(f)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB
3150-0028
EXPIRES 5/31/82

CERTIFICATE OF DISPOSITION OF MATERIALS

(All Blocks MUST BE Completed)

LICENSEE NAME AND ADDRESS	LICENSE NUMBER
General Electric Company Re-Entry Systems Division 3198 Chestnut Street Phila., PA 19101	037-02006-06
	LICENSE EXPIRATION DATE 2-29-84

The licensee or any individual executing this certificate on behalf of the licensee certify that: *(Check and/or complete appropriate item(s) below.)*

☐ 1. No materials have been procured by licensee.

☒ 2. All materials procured and/or possessed by licensee under license number shown above, have been transferred to: General Electric Co., Space Systems Division, Valley Forge Space Center, P.O. Box 8555, Phila., PA 19101
which has NRC license number: 037-02006-05

☐ 3. All materials procured and/or possessed by licensee under license number shown above have been transferred to: _____

which has license number: _____ issued by _____

an Agreement State pursuant to Section 274 of the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974.

☐ 4. Materials have been disposed of in the following manner. *(Describe specific disposal procedures — if additional space is needed, use reverse side.)*

PLEASE RETURN TO:
Director, Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

CERTIFYING OFFICIAL

SIGNATURE John R. McFadden

John R. McFadden, Health Physicist

DATE 1-16-84

NRC FORM 314 (12-81) SUPERSEDES PREVIOUS EDITIONS WHICH ARE OBSOLETE.

NRC Form 313 I (12-81) 10 CFR 30 — U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE
INDUSTRIAL

See attached instructions for details.

Completed applications are filed in duplicate with the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety, and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555 or applications may be filed in person at the Commission's office at 1717 H Street, NW, Washington, D. C. or 7915 Eastern Avenue, Silver Spring, Maryland.

1. APPLICATION FOR: *(Check and/or complete as appropriate)*

	a. NEW LICENSE
	b. AMENDMENT TO: LICENSE NUMBER
X	c. RENEWAL OF: LICENSE NUMBER 037-02006-05

2. APPLICANT'S NAME *(Institution, firm, person, etc.)*
General Electric Company
Space Systems Division
TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
(215) 962-2000

3. NAME AND TITLE OF PERSON ~~TO BE CONTACTED~~ REGARDING THIS APPLICATION
John R. McFadden-Health Physicist
TELEPHONE NUMBER: AREA CODE – NUMBER EXTENSION
(215) 962-4570 or 823-3745

4. APPLICANT'S MAILING ADDRESS *(Include Zip Code)*
(Address to which NRC correspondence, notices, bulletins, etc., should be sent.)
GE/SSD,Valley Forge Space Center,Safety Office-Rm.L9506,POB 8555, Phila., PA 19101

5. STREET ADDRESS WHERE LICENSED MATERIAL WILL BE USED *(Include Zip Code)*
See ATTACHMENT 5.

(IF MORE SPACE IS NEEDED FOR ANY ITEM, USE ADDITIONAL PROPERLY KEYED PAGES.)

6. INDIVIDUAL(S) WHO WILL USE OR DIRECTLY SUPERVISE THE USE OF LICENSED MATERIAL
(See Items 16 and 17 for required training and experience of each individual named below)

	FULL NAME	TITLE
a.	See ATTACHMENT 6.	
b.		
c.		

7. RADIATION PROTECTION OFFICER
See ATTACHMENT 6.

Attach a resume of person's training and experience as outlined in Items 16 and 17 and describe his responsibilities under Item 15.
See ATTACHMENTS 15,16, & 17.

8. LICENSED MATERIAL

LINE NO.	A ELEMENT AND MASS NUMBER	B CHEMICAL AND/OR PHYSICAL FORM	C NAME OF MANUFACTURER AND MODEL NUMBER *(If Sealed Source)*	D MAXIMUM NUMBER OF MILLICURIES AND/OR SEALED SOURCES AND MAXIMUM ACTIVITY PER SOURCE WHICH WILL BE POSSESSED AT ANY ONE TIME
(1)	See ATTACHMENTS 8A,	8B, 8C, & 8D.		
(2)				
(3)				
(4)				

	E DESCRIBE USE OF LICENSED MATERIAL
(1)	See ATTACHMENT 8E.
(2)	
(3)	
(4)	

STORAGE OF SEALED SOURCES

LINE NO.	CONTAINER AND/OR DEVICE IN WHICH EACH SEALED SOURCE WILL BE STORED OR USED. A.	NAME OF MANUFACTURER B.	MODEL NUMBER C.
(1)	See ATTACHMENT 8E.		
(2)			
(3)			
(4)			

10. RADIATION DETECTION INSTRUMENTS

LINE NO.	TYPE OF INSTRUMENT A	MANUFACTURER'S NAME B	MODEL NUMBER C	NUMBER AVAILABLE D	RADIATION DETECTED (alpha, beta, gamma, neutron) E	SENSITIVITY RANGE (milliroentgens/hour or counts/minute) F
(1)	See ATTACHMENT 10.					
(2)						
(3)						
(4)						

11. CALIBRATION OF INSTRUMENTS LISTED IN ITEM 10

☐ a. CALIBRATED BY SERVICE COMPANY

NAME, ADDRESS, AND FREQUENCY

☒ b. CALIBRATED BY APPLICANT

Attach a separate sheet describing method, frequency and standards used for calibrating instruments.

See ATTACHMENT 11.

12. PERSONNEL MONITORING DEVICES

TYPE (Check and/or complete as appropriate.) A	SUPPLIER (Service Company) B	EXCHANGE FREQUENCY C
☐ (1) FILM BADGE	Teledyne Isotopes Co., 50 Van Buren Ave., Westwood, NJ 07675. See ATTACHMENTS 10 & 11.	☐ MONTHLY
☒ (2) THERMOLUMINESCENCE DOSIMETER (TLD)		☒ QUARTERLY
☐ (3) OTHER (Specify): _____		☐ OTHER (Specify): _____

13. FACILITIES AND EQUIPMENT (Check were appropriate and attach annotated sketch(es) and description(s).

☐ a. LABORATORY FACILITIES, PLANT FACILITIES, FUME HOODS (Include filtration, if any), ETC.
☐ b. STORAGE FACILITIES, CONTAINERS, SPECIAL SHIELDING (fixed and/or temporary), ETC.
☐ c. REMOTE HANDLING TOOLS OR EQUIPMENT, ETC.
☐ d. RESPIRATORY PROTECTIVE EQUIPMENT, ETC.

See ATTACHMENT 13.

14. WASTE DISPOSAL

a. NAME OF COMMERCIAL WASTE DISPOSAL SERVICE EMPLOYED

See ATTACHMENT 14.

b. IF COMMERCIAL WASTE DISPOSAL SERVICE IS NOT EMPLOYED, SUBMIT A DETAILED DESCRIPTION OF METHODS WHICH WILL BE USED FOR DISPOSING OF RADIOACTIVE WASTES AND ESTIMATES OF THE TYPE AND AMOUNT OF ACTIVITY INVOLVED. IF THE APPLICATION IS FOR SEALED SOURCES AND DEVICES AND THEY WILL BE RETURNED TO THE MANUFACTURER, SO STATE.

See ATTACHMENT 14.

INFORMATION REQUIRED FOR ITEMS 15, 16 AND 17

Describe in detail the information required for Items 15, 16 and 17. Begin each item on a separate page and key to the application as follows:

15. RADIATION PROTECTION PROGRAM. Describe the radiation protection program as appropriate for the material to be used including the duties and responsibilities of the Radiation Protection Officer, control measures, bioassay procedures *(if needed)*, day-to-day general safety instruction to be followed, etc. If the application is for sealed source's also submit leak testing procedures, or if leak testing will be performed using a leak test kit, specify manufacturer and model number of the leak test kit.

See ATTACHMENT 15.

16. FORMAL TRAINING IN RADIATION SAFETY. Attach a resume for each individual named in Items 6 and 7. Describe individual's formal training in the following areas where applicable. Include the name of person or institution providing the training, duration of training, when training was received, etc.

a. Principles and practices of radiation protection.

See ATTACHMENT 16.

b. Radioactivity measurement standardization and monitoring techniques and instruments.

c. Mathematics and calculations basic to the use and measurement of radioactivity.

d. Biological effects of radiation.

17. EXPERIENCE. Attach a resume for each individual named in Items 6 and 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

See ATTACHMENT 17.

18. CERTIFICATE

(This item must be completed by applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 2, certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Part 30, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

WARNING.–18 U.S.C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

a. LICENSE FEE REQUIRED *(See Section 170.31, 10 CFR 170)* $ 150.00	b. CERTIFYING OFFICIAL *(Signature)* John R. McFadden
	c. NAME *(Type or print)* John R. McFadden
(1) LICENSE FEE CATEGORY: 3 K	d. TITLE Health Physicist
(2) LICENSE FEE ENCLOSED: $ $ 150.00	e. DATE 1-16-89

ATTACHMENT

5. Street addresses where licensed material will be used.

a. Valley Forge Space Center, 260 Goddard Blvd., King of Prussia, PA 19406, and ancillary facilities in King of Prussia on Third, Fifth, and Vandenburg Avenues and on Allendale Road; the ancillary facilities include, but are not limited to, the following:

i. CC&F Bldg. 8, 780 Third Avenue
ii. Antenna Lab, CC&F Bldg. 1, Allendale Road
iii. CC&F Bldg. 9, 751 Fifth Avenue
iv. Bldg. A, 751 Vandenburg Avenue

b. 3198 Chestnut St., Phila., PA 19101

c. D & Luzerne Sts., Phila., PA 19140

d. 401 E. Hunting Park Ave., Phila., PA 19140

e. Skeats Hi Power Lab, Test Cell No. 6 and Lab Bldg. 20, 7500 Lindbergh Blvd., Phila., PA 19142

f. Temporary job sites including, but not limited to, the following:

i. Satellite Assembly Bldg., Cape Canaveral Air Force Station, Cape Canaveral, Florida
ii. Vandenburg Air Force Base, CA 93437
iii. 600 Main St., Johnson City, NY 13902

ATTACHMENT

6. Individuals who will use or directly supervise the use of licensed material.

Prior to the start of any work with radioactive materials, all operations involving radioactive materials must be approved by the Ionizing Radiation Advisory Group (IRAG) according to mandatory safety procedure M-6.

A copy of M-6 is enclosed. This document includes: policy statement and responsibilities and procedures (for all personnel working with ionizing radiation, for their supervisors, for their managers, for the IRAG, and for each member of the IRAG). Also included in M-6 are the responsibilities and procedures for procuring, receiving, using, transporting, and disposing radioactive materials.

Current members of the IRAG are as follows (resumes enclosed):

Chairman:	T.P. Handley	- Mgr. of Industrial Security, Safety, and Administrative Services
Member:	C.B. Chilton	- Mgr. of Industrial Safety and Hygiene
Member:	S.J. Mucha, M.D.	- Medical Director
Secretary:	J.R. McFadden	- Health Physicist
Secretary: (Alternate)	A.W. Kobylinski	- Industrial Hygienist (Alternate Health Physicist)

ATTACHMENT

8. Licensed Material

Line No.	A Element and Mass No.	B Chemical &/or Physical Form	C Manufacturer & Model No. (Sealed Source)	D Maximum Activity per Source and Total
1	Any byproduct material with Atomic Nos. 3 thru 83 inclusive, except Strontium-90	Sealed	See attachment 8. E. (1)	10 Curies maximum per source and 75 Curies total
2	Any byproduct material with Atomic Nos. 3 thru 83 inclusive, except Krypton-85	Any	See attachment 8. E. (2)	20 Curies maximum total except for: Iodine-129 - 100 millicuries Iodine-131 - 330 millicuries Iodine-125 - 800 millicuries Phosphorus-32 - 1500 millicuries Strontium-90 - 2500 millicuries
3	Any byproduct material with Atomic Nos. 3 thru 83 inclusive	Neutron-irradiated electronic components	Not Applicable	2 Curies total
4	Hydrogen-3	Any	See attachment 8. E. (4)	100 Curies total
5	Krypton-85	Any	See attachment 8. E. (5)	45 Curies total
6	Strontium-90	Sealed	See attachment 8. E. (6)	10 Curies total
7	Polonium-210	Any	See attachment 8. E. (7)	0.6 Curies total

ATTACHMENT

8. Licensed Material

Line No.	Element and Mass No.	Chemical &/or Physical Form	Manufacturer & Model No. (Sealed Source)	Maximum Activity per Source and Total
	A	B	C	D
8	Uranium-235	Sealed	See attachment 8. E. (8)	4.7 grams total
9	Plutonium-238	Sealed	See attachment 8. E. (9)	5 sources, 6 milligrams total
10	Plutonium-239	Sealed	See attachment 8. E. (10)	3 sources, 1 milligram total
11	Americium-241	Sealed	See attachment 8. E. (11)	4 Curies total

General Elec..ic Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06
January 1984

ATTACHMENT

8.E. Use of Licensed Material

The by-product material, cited in 8.A, will be used for research and development as defined in section 30.4(q) of 10 CFR 30. The material, cited in 8.A.(1), will also be specifically used for instrument calibration, for density measurements, and for electron capture detection in gas chromatographs; the material, cited in 8.A.(2), will also be specifically used for instrument calibration; the material, cited in 8.A.(4), will also be specifically used for instrument calibration and as foils for gas chromatographs; the material, cited in 8.A.(5), will also be specifically used for leak detection and for density measurements; the material, cited in 8.A.(6), will also be specifically used for density measurements and for instrument calibration; the material, cited in 8.A.(7), will also be specifically used for control of electrostatic electricity; the material, cited in 8.A.(11), will also be specifically used for instrument calibration.

The by-product material, cited in 8.A., will be stored in their original shipping containers or in lead brick caves.

8.E.(1) Frequently, it is necessary to possess a large fraction of this total possession limit in one or two specific radionuclides; in the past, this has been the case for selenium-75 (New England Nuclear Model No. NER-8110, 5 sources, 5 Curies each).

Several times each year, sealed sources with activities of several Curies each are installed in re-entry vehicles so that measurement of ablation during flight can be made. Pre-installation calibration procedures using the sources are performed at locations 5.a. and 5.b. Final installation is performed usually at location 5.b. In some cases, installation is performed at a launch facility of the U.S. government.

An experimental density gauge at location 5.a. is used to test carbon billets and formed carbon specimens. The source used is a 100 millicurie cobalt-60 source (3M Co., model 4F3B, 1 source).

Instrument calibration and instrument testing using a wide variety of sealed sources in the microcurie and low millicurie range are performed at all locations listed in attachment 5.

Nickel-63 will be used as foils in electron capture detectors for gas chromatographs. Three detectors with foils will be used in location 5.a. Two of the detectors are made by Varian, and their kit numbers are: 02-000965-000 and 02-001972-000. The third detector is made by Tracor for their Model MT-150 gas chromatograph. These detectors contain 8, 8, and 135 millicuries of nickel-63, respectively. They will be used in gas chromatographs with a 400-degrees-centigrade upper temperature limit.

Ba-133 sources, with 30 microcuries per source activities, are used as instrument calibration sources at locations 5.a. and 5.f.i.

ATTACHMENT

8.E.(2) Frequently, it is necessary to possess a large fraction of this total possession limit in one or two specific radionuclides; in the past, this has been the case for tantalum-182 (8 sources, 0.3 Curies each).

Large unsealed sources are installed in re-entry vehicles for measurement of ablation during flight. This type of operation is performed several times each year. The physical form of these sources is always that of a solid, as a wire, ribbon, etc. The chemical form varies but is usually elemental or a carbide. The types and locations of work activities are identical to those enumerated above for sealed sources for the same application.

Various large specimens of structural and electronic gear, exposed at the U.S. Government underground testing site in Nevada or at a reactor facility, are given post-test examinations at locations 5.a. and 5.b. These specimens undergo mostly nondestructive testing and examination. When infrequent destructive testing or examination is required, it is performed at location 5.a. in a facility designed for control of airborne radioactivity.

There are numerous solid, macro-sized, unsealed sources used for instrument calibration and instrument testing at locations 5.a. and 5.b. These sources are in the microcurie and low millicurie range.

Also, there are numerous solid, macro-sized, unsealed sources used for beta thickness gauges at location 5.b.

At present, there are no liquid, gaseous, or powdered sources in use under this category. There are some liquid sources of calcium-45, sulfur-35, and phosphorus-32 in storage.

8.E.(3) The by-product material will be used for evaluating radiation effects. All of the induced activity is firmly fixed in the structure of the electronic components and the boards to which they are attached. Most of the operations performed with these items are nondestructive and are performed at locations 5.a., 5.b., and 5.f. When an infrequent destructive test is required, it is performed at location 5.a. in a facility designed for control of airborne radioactivity.

8.E.(4) In the past, tritium (as a gas and as calcium tritide) was employed in experiments involving the measurement of water vapor and calibration of instruments. None of the sources for this application are in use, and they are currently in storage.

Presently, one tritium foil in an electron capture detector for a gas chromatograph is being used in location 5.a. This is an Electron Canture Inc. unit (Model No. 2-2837) containing 200 millicuries. Several tritium electron capture detector units are in storage. Detector cells containing tritium shall only be used in conjunction with a properly operating temperature control mechanism which prevents foil temperature from exceeding 225 degrees centigrade.

General Elec : Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06
January 1984

ATTACHMENT

8.E.(5) The following sealed sources are presently in storage: five 1 millicurie Kr-85 sources (4/68) (I. Lite Co., Self Luminous Light Source Set, Model GL867, SN31) and one 100 mCi Kr-85 source (9/68) (3M, Model 4E4L, SN3047).

Kr-85 gas is used to determine the hermeticity of electronic components using a Trio-Tech International Model 40010-1A Half Gallon Tracer-Flow Kr-85 leak detector system. This use was more fully described on page 3, "Item 8," of a GE/SSD letter to the NRC which letter was dated September 12, 1978 (copy of this letter is attached).

Krypton-85 gas is also used for leak testing of spacecraft as described in GE's letter of March 27, 1980, to the U.S.N.R.C. A copy of this letter is attached. Also, another GE/SSD letter (attached) to the NRC, dated September 12, 1978, and ciated previously, contains information concerning this particular use on page 5 under the heading "Other Items."

8.E.(6) An experimental density gauge at location 5.a. is used to test carbon billets and formed carbon specimens. The source used is a 100 millicurie strontium-90 source (3M Co., Model 5F1B, 1 source).

Instrument calibration and instrument testing using a wide variety of sealed sources in the microcurie and low millicurie range are performed at all locations listed in 5.

A 10 Curie (4/66) Strontium-90 source (3M, Model SrY-90 Beta Irradiator) is in storage at location 5.a.

8.E.(7) Usage of P-210 is presently limited to calibration sources and 3M Brand Nuclear Static Eliminators.

8.E.(8), (9), & (10) The uses of these materials were fully described in the following previous correspondence to the NRC (attached):

a. GE/SSD letter dated June 5, 1980
b. GE/SSD letter dated November 5, 1980.

8.E.(11) The by-product material, cited in 8.A.(11), will be used for instrument testing and instrument calibration. Two sealed sources (Radiation Materials Corporation, Model No. LE.2, 10 millicuries and Radiation Materials Corporation, Model No. AR.5, 0.11 microcuries) will be used at location 5.a.

One sealed source (6.1 microcuries, New England Nuclear, Model No. NES-128S) will be used at location 5.b.

One sealed source (2 Curies (1/71), Amersham/Searle, Type X-93), is stored at location 5.a.

ATTACHMENT

10. Radiation Detection Instruments.

RADIATION DETECTION EQUIPMENT	#	RADIATION DETECTED	RANGES	WINDOW THICKNESS	USE
Victoreen Model 440 Air Ionization Survey Meter	1	alpha, beta, gamma, X-ray	0-3, 10, 30, 100, 300 mR/hr	3.0 mg/cm^2	Exposure rate surveys
Victoreen Model 470A Air Ionization Survey Meter	1	alpha, beta, gamma, X-ray	0-3, 10, 30, 100, 300, 1000 mR/hr and R/hr	17 mg/cm^2	Exposure rate surveys
Eberline Model E-120 GM Survey	1	beta, gamma, X-ray	0-0.5, 5, 50 mR/hr (0-700, 7K, 70K cpm)	30 mg/cm^2	Contamination & radiation surveys
Eberline Model E-500B GM Survey Meter	2	beta, gamma, X-ray	0-0.2, 2, 20, 200, 2000 mR/hr	30 mg/cm^2	Contamination & radiation surveys
W.B. Johnson & Assoc. Model GSM-5 Survey Meter with Model GP-200 GM probe	1	beta, gamma, X-ray	0-0.2, 2, 20 mR/hr (0-500, 5K, 50K cpm)	1.4 mg/cm^2	Contamination & radiation surveys
Nuclear Measurements Corp. Model PC-4 Proportional Counting System	1	alpha, beta, gamma, X-ray	0-3500K cpm	windowless	Counting wipe samples and air filters

ATTACHMENT

10. Radiation Detection Instruments.

RADIATION DETECTION EQUIPMENT	#	RADIATION DETECTED	RANGES	WINDOW THICKNESS	USE
W.B. Johnson & Assoc. Model (A/B) SP-2A Scintillation Probe with W.B. Johnson & Assoc. GSM-5 Meter	1	alpha with alpha phosphor wafer	0-500, 5K, 50K cpm	1 mg/cm^2 aluminized mylar	Contamination surveys
"	1	beta with beta phosphor wafer	"	"	"
W.B. Johnson & Assoc. Model (A/B) SP-2A Scintillation Probe with NMC PC-4	1	alpha with alpha phosphor wafer	0-3500K cpm	"	Counting wipe samples and air filters
"	1	beta with beta phosphor wafer	"	"	"
Teledyne Isotopes Multi Area Dosimeter and Personnel Badge (TLD type) - supply and processing by Teledyne (whole body and ring badges)	as needed	beta, gamma, X-ray	-	-	Monitoring personnel using items

General Electric Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06

January 1984

ATTACHMENT

11. Calibration of Instruments

Radiation monitoring equipment is calibrated every six months and following repair at four different distances from one of the following three sources: Cobalt-60, 15 millicuries on 2/19/70, in Radiation Products Division's Model 571 meter calibration kit, SN 108; Cesium-137, 100 millicuries on 12/77, in Eon Corporation/Nuclear Associates's Model 64-764 gamma calibrator, source SN 224; Cobalt-60, 36 millicuries on 12/18/64, in Nuclear Chicago's Model RR-62 source holder, SN B7.

Radiation monitoring equipment is calibrated every six months and following repair at four different distances from the following source: Cobalt-60, 15 millicuries on 2/19/70, in Radiation Products Division's Model 571 meter calibration kit, SN 108.

Radiation counting equipment is calibrated on each day that counting operations are performed. The following calibrated sources are used:

Am-241	6.1	microcuries	on 07/06/77
Ba-133	1.19	"	" 10/07/77
C-14	0.046	"	" 06/18/76
Cd-109	11.0	"	" 05/12/77
Co-57	1.17	"	" 08/09/77
Co-60	0.01	"	" 09/18/69
Co-60	1.25	"	" 08/11/77
Cs-137	1.08	"	" 08/18/77
I-129	0.099	"	" 01/ /77
Na-22	8.36	"	" 04/01/69
Ni-63	0.0345	"	" 12/06/76
Pu-239	0.005	"	" 12/10/74
Sr-90	0.01	"	" 02/26/69

Personnel monitoring badges (TLD-type) are supplied and processed quarterly by Teledyne Isotopes Co., 50 Van Buren Avenue, Westwood, New Jersey 07675.

Air sampling equipment is calibrated once per year or before use. Low volume samplers are calibrated using a Mark III flo ater kit from Fisher Scientific Co. (0.4 to 23,400 cc/minute), and high volume samplers are calibrated using a tubular extension (21.5 inches long and 4 inches in diameter) with an Alnor Instrument Co. Series 600 Velometer (30-300 fpm).

Calibrations are normally performed by, or under the direction of, the health physicist.

ATTACHMENT

13. Facilities and Equipment

Space Systems Division has shielding, shielded source containers, shielded rooms, handling equipment (tongs, forceps, etc.), fume hoods, gloveboxes, high-efficiency filtration systems, and other equipment utilized for the control of radioactive materials. The IRAG may require the use of any existing facility and equipment, may require new facilities and equipment, and may require modification of existing facilities and equipment in order to maintain personnel exposure levels as low as reasonably achievable. The IRAG utilizes the criteria found in various recommendations of national and international groups and regulatory guides to determine the facility and equipment requirements for a particular use.

General Elect Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06

January 1984

ATTACHMENT 13.

13. FACILITIES AND EQUIPMENT (cont'd).

A. Specific Facilities

i. Health Physics Storage Vault

Room T596 at Chestnut Street is used as the health physics storage area. A sketch of the room is attached. Pertinent dimensions are as follows:

North wall:	12" solid concrete block
South wall:	16" " " "
West wall:	12" " " "
East wall:	16" " " " plus 8" cinder block
Ceiling:	5" concrete
Floor:	room is on lowest level; earth beneath floor.
Room elevation:	14'

This room is secured by a combination lock and hasp on the door.

ii. Nosetip Scanner Room

A localization line scanner for flight nosetips containing gamma emitters is located in room T9278 of Building 100 King of Prussia. A sketch of the room is attached. The room contains a shielded detector assembly in one corner of the room which is used to measure and localize the radioactivity in the nosetips. The nosetip is unshielded during the scanning process. If a 200 millicurie tantalum-182 nosetip were placed in the scanning device, a high radiation area would exist around the nosetip (circular zone with a radius of 3.8 feet and an area of 45.4 square feet). The nosetip being scanned is situated in a corner of the room and is about two feet from the two adjacent walls; these two walls are earth-backed and approximately twelve inches thick (poured concrete). On a third side of the nosetip and approximately two feet distant from it, a six-foot-high barrier of solid cinder block has been erected with a thickness of eight inches. A permanent wooden barrier has been erected in the two foot opening between the earth-backed wall and the cinder block barrier. A lab bench with a wooden gate (equipped with a lock) attached completes the enclosure of the nosetip and the high radiation area. A radiation survey is performed to verify that the high radiation area does not extend beyond this enclosure when more active or different type nosetips are to be scanned. During scanning operations, the gate is kept locked except during periods when access to the scanner is required by the operator. In addition, when the operator is not in attendance and a nosetip is being scanned automatically, the door to the scan room is also locked.

iii. Airborne Radioactivity Control Room

As mentioned before, it is occassionally necessary to perform dust-producing operations on radioactive material (usually low specific activity specimens). These operations are performed in room U8604 of Building 100 in King of Prussia. A sketch of the room is attached.

ATTACHMENT

13. Facilities and Equipment (cont'd)

A. Specific Facilities (cont'd)

iii. Airborne Radioactivity Control Room (cont'd)

In this room, two hoods and one glovebox are connected to an absolute filter unit. When both doors to the two hoods are two-thirds closed, the face velocity is greater than 100 fpm at each opening.

Entry into this room is controled by a cypherlock.

iv. Radioactive Material Use Lab

Attached is a plan view of room U8614 of Building 100 in King of Prussia. The glovebox and HEPA-filtered hood are shown; also, the location of lockable storage cabinet where small quantities of radioactive material are stored is indicated.

v. Health Physics Storage Vault - L1310 - Bldg. 100

Attached is a sketch of the health physics storage vault, room L1310, Bldg. 100, King of Prussia. The inside dimensions of the room are 6.5 feet in length, 6 feet in width, and 8.25 feet in height. The walls are constructed of double-reinforced poured concrete with the following thicknesses: north, west, and east walls (10 inches) and south wall (13 inches). The steel door in the east wall has an equivalent thickness of approximately 0.125 inch of steel. The poured concrete floor is over earth. The roof, a six-inch-thick poured concrete slab, is covered by a 1.75 feet-thick layer of earth.

The steel door has a keylock.

vi. Trio-Tech Facility - U8301 - Bldg. 100

Attached is a sketch of the facility used for leak-testing electronic components using a Trio-Tech (TM) pressurization system. The sketch is not to scale. The system is described in attachment 8.E.5.

vii. Satellite System Test - M8636 - Bldg. 100

Attached is a sketch of the room used for leak testing of satellite propulsion systems. The test procedure is described in attachment 8.E.5.

General Electr' Co. - SSD
Renewal Applic..ion-037-02006-05
Termination/Transfer Application-
037-02006-06

January 1984

ATTACHMENT

13. Facilities and Equipment (cont'd)

B. Air Sampling Equipment

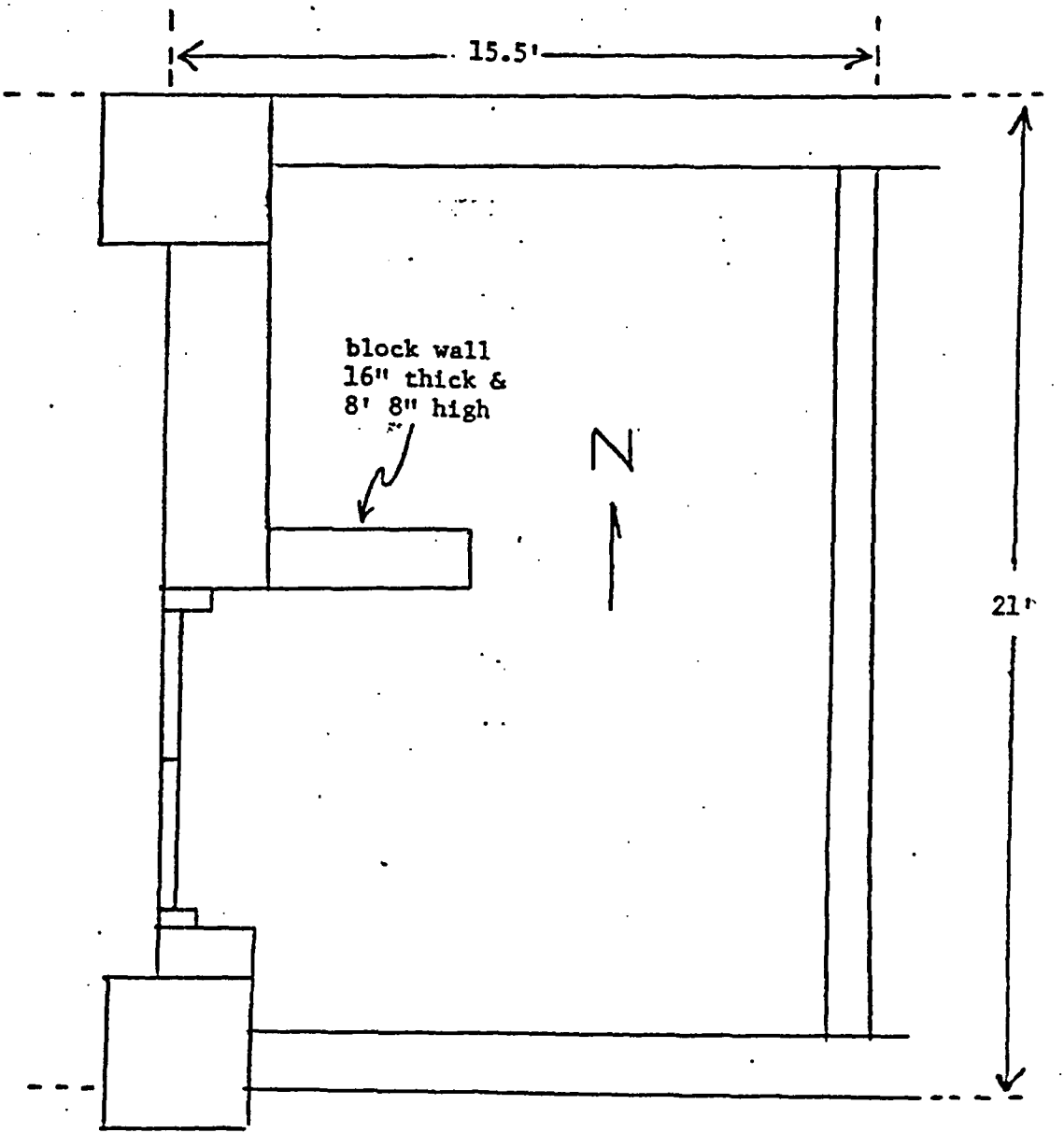
UNICO Model 300, 6.7 cfm thru 4-inch diameter Whatman 41 filter, equipped with rotameter, one unit available.

Gelman Little Giant, 14 lpm (0.49 cfm) at vacuum load of 10 inches of mercury (from manufacturer's pressure-volume characteristic curve), one unit available.

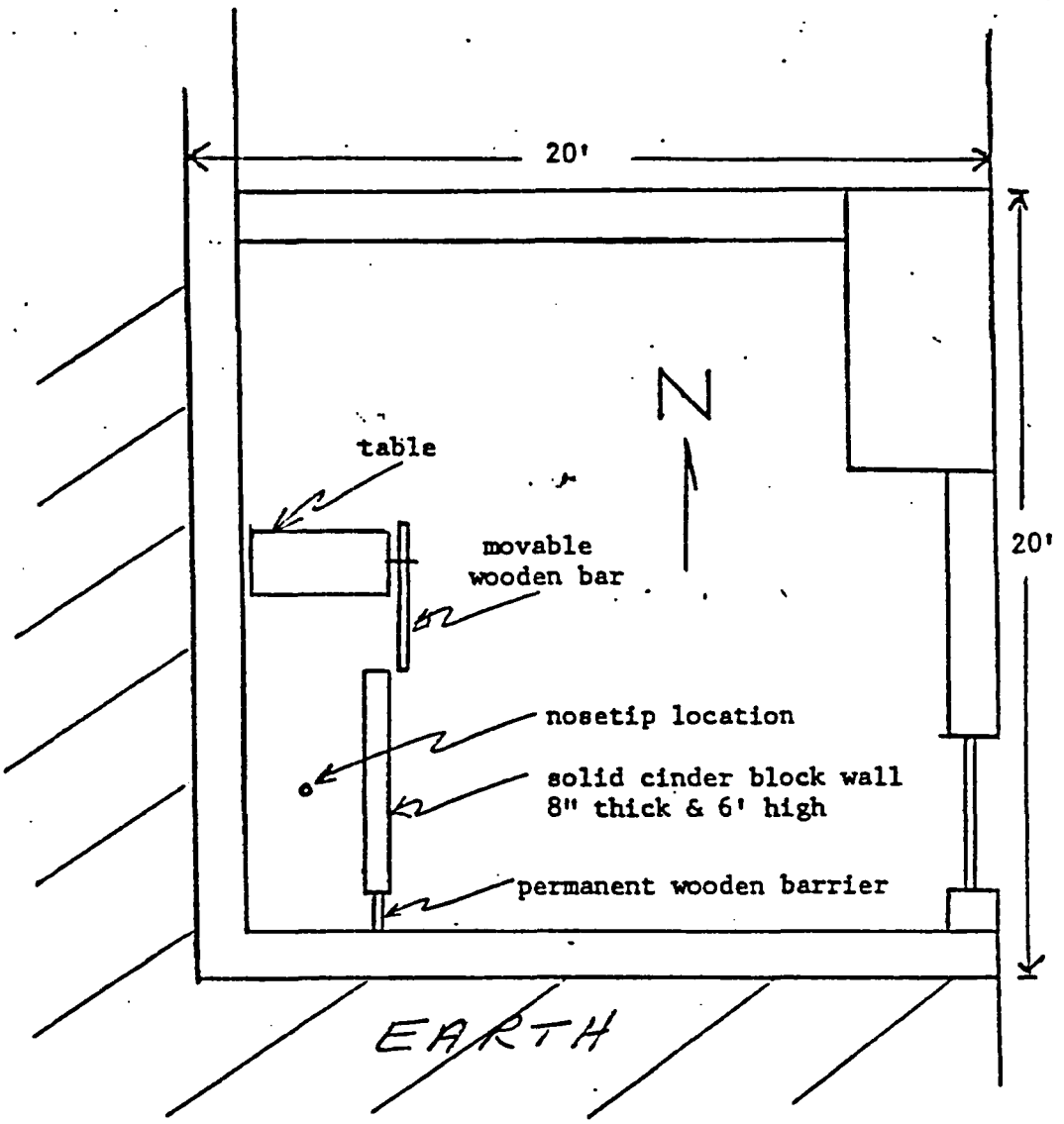
MSA Monitaire Sampler, 0-10 cfh (0-0.166 cfm) flow range, equipped with rotameter, one unit available.

Dupont Personnal Air Sampler, 2 lpm (0.07 cfm), three units available.

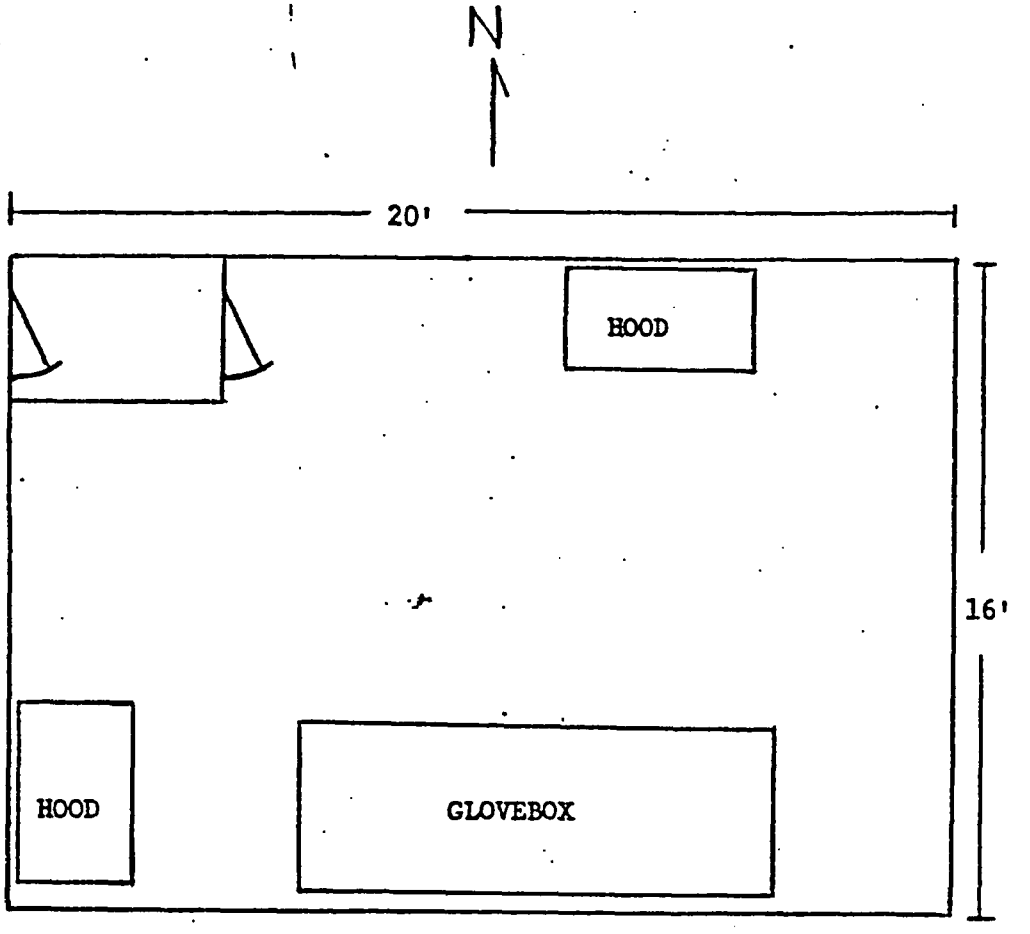
Bendix Model 4-16003, 15 cfm thru 4-inch diameter Whatman 41 filter, equipped with guage reading directly in cfm based on calibrated orifice principle.



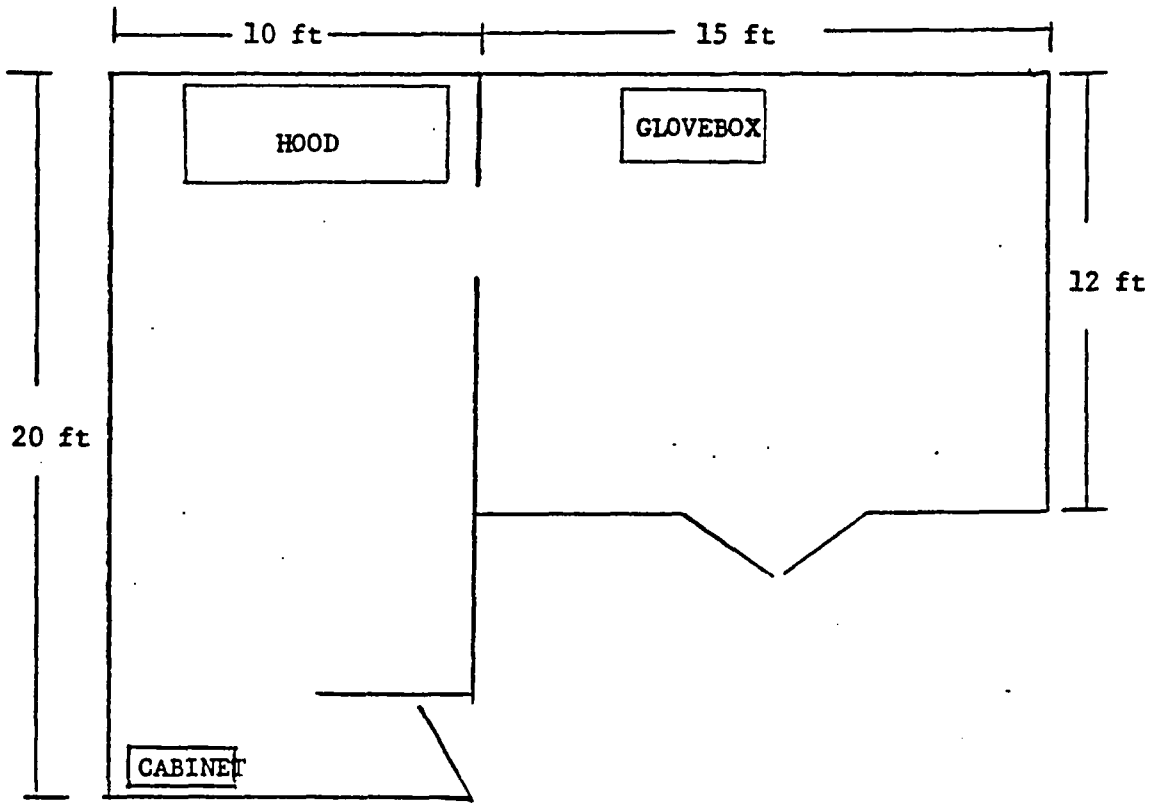
HEALTH PHYSICS STORAGE AREA ROOM T596 Chestnut Street



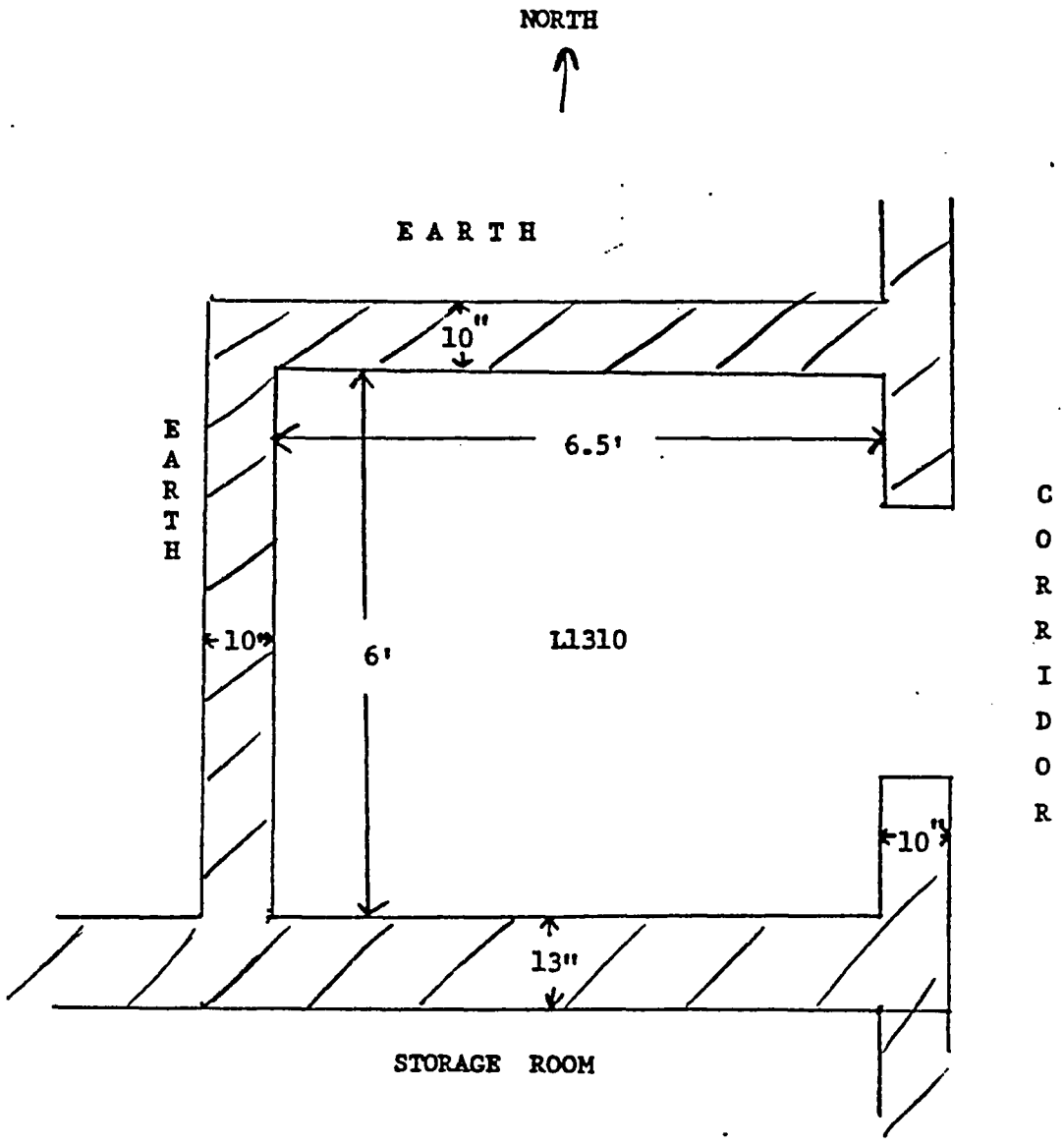
NOSETIP LINE SCANNER ROOM T9278 BLDG. 100 KING OF PRUSSIA



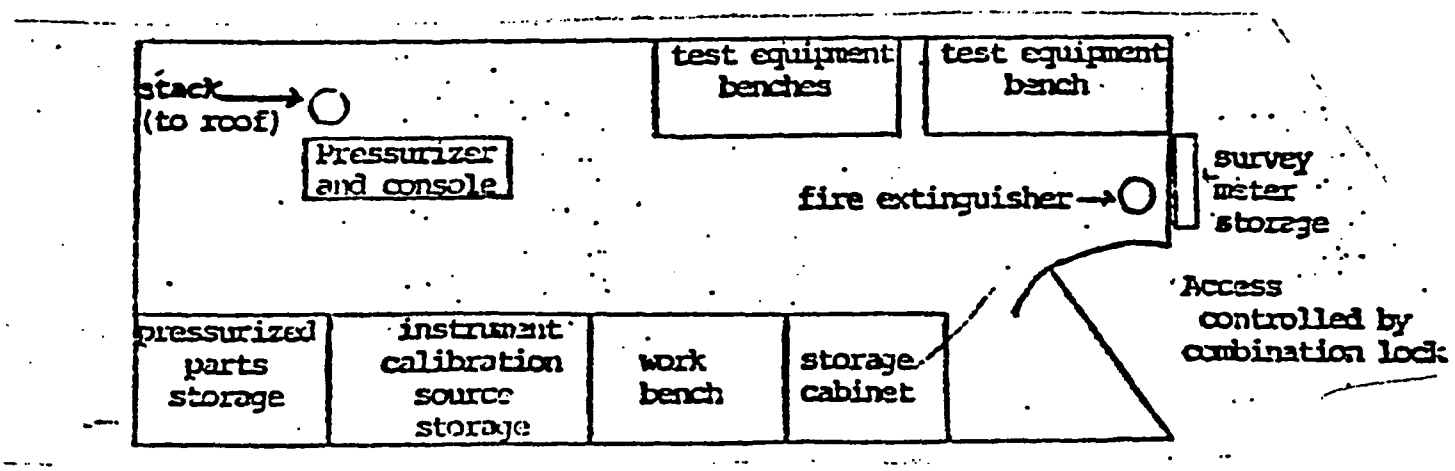
AIR-BORNE RADIOACTIVITY CONTROL ROOM ROOM U8604 KING OF PRUSSIA



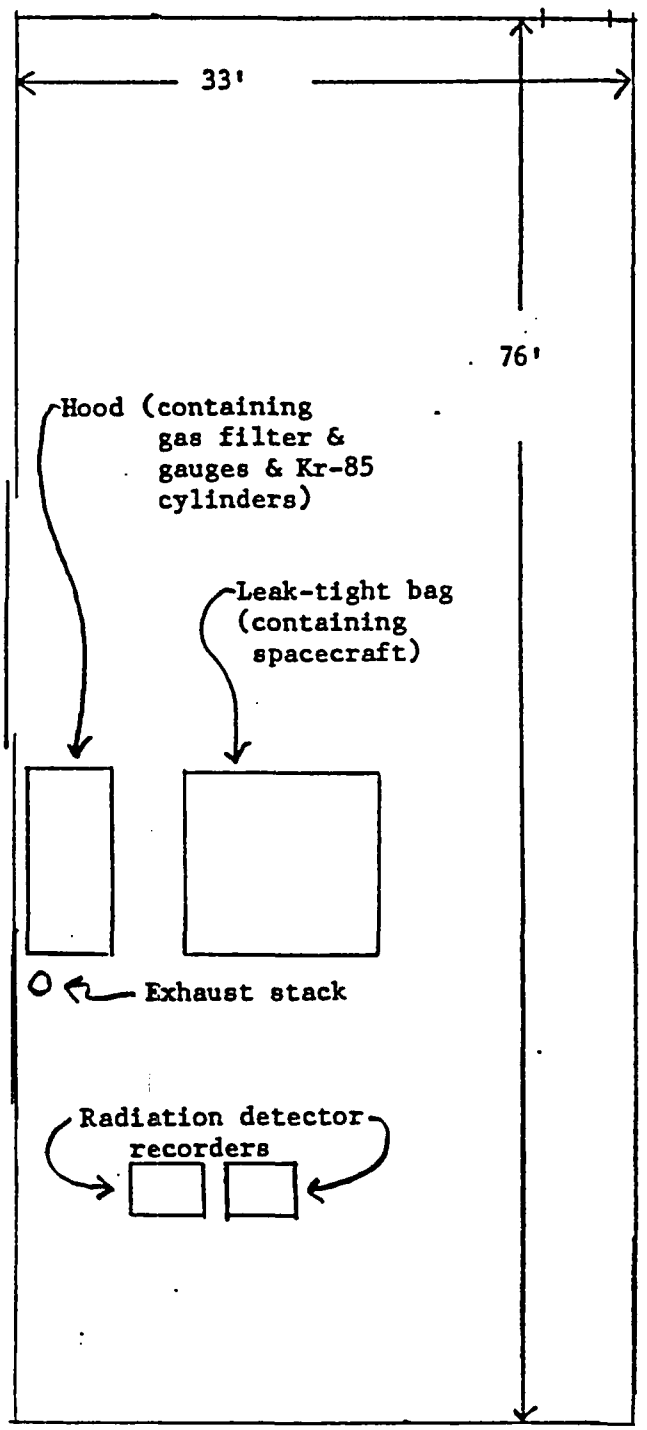
RADIOACTIVE MATERIAL USE LAB ROOM U8614 KING OF PRUSSIA



Health Physics Storage Vault L1310 Bldg. 100 VF



Trio-Tech Facility - U8301 - Bldg. 100



Scale: 1 inch = 10 feet

Satellite System Test Room M8636 Bldg. 100 VF

General Electric Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06

January 1984

ATTACHMENT

14. Waste Disposal

Normal waste disposal procedure is for the waste to be transfered to a commercial firm licensed to accept such wastes. Currently, waste is transfered to Radiological Services of Teledyne Isotopes, 50 Van Buren Avenue, Westwood, NJ 07675.

Any liquid waste produced will be checked for radionuclide concentrations. Large volumes will be transfered to a licensed commercial waste disposal firm. Small amounts of waste solution may be disposed into the regular sewage system after any necessary dilution with water to reduce the concentration to the required radioactive concentration levels.

Permission is requested to hold waste with short-lived radionuclides in storage for decay to background levels and then to dispose of it in the ordinary trash.

The following information is provided concerning the proposed procedures for the disposition of radioactive waste by decay-in-storage method:

1. Waste will be decayed-in-storage in room T596 Chestnut Street and in room L1310 Building 100 VF. Descriptions and diagrams of these areas are found in attachment 13.

   Waste will normally be inside shielded storage containers when in the above-cited rooms.

   Surveys of unrestricted areas, adjacent to these rooms, will be made after waste input. These surveys will be made to assure that radiation levels outside the storage rooms do not exceed the limits specified in 10 CFR 20.105.

2. Room T596 has a hasp and combination lock on the door. Room L1310 has a keylock on the door. Both rooms are kept locked when unattended.

3. Surveys of unrestricted areas, adjacent to these rooms, will be made and recorded at least weekly.

ATTACHMENT

14. Waste Disposal (cont'd)

4. Monitoring procedures to assure that waste has decayed to background levels prior to disposal will be as follows:

   a. Waste will be monitored in a confirmed low-background area.

   b. A low-level GM-type survey meter (as appropriate for contamination surveys) will be used to monitor the waste. The most-sensitive scale on the instrument will be used during monitoring.

   c. The instrument probe will be placed as close as possible to the waste (in contact for dry solids) for monitoring. All shielding will be removed prior to monitoring.

   d. Records of these surveys will be maintained as required by 10 CFR 20.

15. Radiation Protection Program

Uses of radioactive material under this license will extend to those uses permitted by NRC regulations and the NRC license and approved by the Ionizing Radiation Advisory Group (IRAG) which was established to meet the requirements for a broad scope license. Administrative control is achieved through use of mandatory procedure M-6, "Ionizing Radiation Control", of the Safety Manual.

The Safety Manual is established by Division Policy. Mandatory Procedure M-6, "Ionizing Radiation Control", establishes policy for use of ionizing radiation and authorities of the Ionizing Radiation Advisory Group.

Policies and Authorities

It is the policy of all components to keep the ionizing radiation exposure of all personnel as low as reasonably achievable (ALARA) and, in particular, below all existing federal, state, and Company regulations.

All proposed uses of ionizing radiation shall be reviewed and prior written approval for use secured from the Ionizing Radiation Advisory Group consisting of:

Chairman:	Manager, Industrial Security, Safety, and Administrative Services
Member:	Manager, Industrial Safety and Hygiene
Member:	Director, Medical Services
Secretary:	Health Physicist

The composition of the IRAG currently is: T.P. Handley, Chairman; C.B. Chilton, Member; Dr. S. Mucha, M.D., Member; J.R. McFadden, Secretary. Their resumes are attached.

IRAG approval of a proposed use of ionizing radiation is contingent upon a satisfactory completion of a safety evaluation of the proposed use which takes into consideration such matters as the adequacy of facilities and equipment, training and experience of the user, and the operating or handling procedures.

All ionizing radiation machines and radioactive materials shall be procured, received, used, stored, handled, transported, transfered, or disposed in accordance with existing regulations and approvals (i.e., Nuclear Regulatory Commission, Commonwealth of Pennsylvania, General Electric Company, and the IRAG).

The IRAG may revoke any approval which it has issued when an investigation shows justification for such action. In such an event, the radiation user shall immediately relinguish all radioactive materials and ionizing radiation machines to the Manager, Industrial Safety and Hygiene.

Accidents involving radioactive materials in which there is a possibility of ingestion or inhalation of radioactive material or body contamination shall be reported immediately to the members of the IRAG. Accidental exposures (actual or suspected) in excess of the quarterly limits stated in M-6 shall be immediately reported to the IRAG.

Control of potential radiation hazards will be achieved through the application of criteria in the NRC regulations and guidelines and supplemented by criteria in standards and guides of organizations such as the ICRP, the NCRP, the ANSI, the ACGIH, etc.

15. Radiation Protection Program

The specific control measures adopted will be commensurate with the potential hazard and will be based on the safety evaluation of the proposed use. The adequacy of these control measures will be monitored by a specific radiation survey program.

The IRAG does not contemplate approving any proposed use which would require (a) a respiratory protection program, (b) a routine bioassay program, (c) the generation of airborne radioactivity which could cause concentration levels in restricted areas greater than those specified in 10 CFR 20.103(b)(1), or (d) the generation of airborne radioactivity which could cause concentration levels in unrestricted areas greater than a few percent of levels specified in 10 CFR 20.106 (a).

Responsibilities of Health Physicist

The health physicist is responsible for the following:

1. Providing radiation safety evaluation and assistance before, during, and at termination of proposed/approved uses.
2. Radiation safety orientation and training.
3. Ongoing evaluation of radiation hazards incident to receipt, use, storage, handling, transport, and disposal of radioactive materials by approved users (radiation survey program).
4. Ongoing evaluation of radiation safety procedures incident to procurement, receipt, use, storage, handling, transport, transfer, and disposal of radioactive materials by approved users (radiation inspection program).
5. Management of radiation safety records (surveys, inspections, material inventories, personnel exposures, and receipt, use, and disposal of materials).
6. Radioactive waste disposal.

15. Radiation Protection Program

General Radiation Protection Program

1. Radiation Safety Evaluations

As mentioned previously, a safety evaluation is performed before approval of any use. Control measures are imposed on the approved use and are based on the pre-operational evaluation. The appropriateness and adequacy of these control measures are operationally evaluated by the radiation survey and radiation inspection programs described later. A further safety evaluation is conducted at termination of an approved use which considers such matters as transfer or disposal of the balance of radioactive material and the contamination levels of material and the contamination levels of facilities and equipment.

2. Radiation Safety Orientation and Training

Personnel whose work involves potential exposure to ionizing radiation and their supervisors are expected to have knowledge of radiation safety commensurate with the potential radiological health problems involved in the proposed use.

The requirements for instruction of individuals vary with the proposed use and with the experience of the individual. Personnel with prior similar experience are nromally considered qualified by the IRAG. Personnel without the required prior experience receive instruction commensurate with the potential radiological health problems involved in the proposed use and in accordance with the requirements of 10 CRF 19.12.

The instructor normally is the radiation safety officer. However, with IRAG approval, other qualified persons have provided this training.

Participative lecture, completion of assigned readings, and on-the-job instruction, separately and in combination, have been used to provide radiation safety training, and the choice is based again on the proposed use and on the experience of the individuals. An orientation session can take anywhere from a quarter of an hour to over an hour.

The competency of an authorized user is verified by various methods. The most common method is observed use under the supervision of an authorized and certified user. The supervising user then certifies to the IRAG that the new user has demonstrated the capability to perform the required work safely. Observation by the radiation safety officer has also been used as a means of verifying user competency. Oral or written t..ts are seldom used.

3. Radiation Survey Program

This involves measurements of levels of radiation or concentrations of materials present and the evaluation of the consequent radiation bazards incident to receipt, production, use, release, shipping, handling, transport, disposal, or presence of radiioactive materials under the specific set of conditions of approved use.

15. Radiation Protection Program

The survey program utilizes standard instrumentation and techniques in various combinations and at various frequencies depending on the types and degrees of potential exposure.

Frequency of surveys will ordinarily be greater during pilot studies, initial phases of routine operations, and when there is a change in operations which could increase levels of radiation or concentrations of radioactive material.

A. Air Sampling Surveys: Types include personnel (lapel), restricted area, and unrestricted area air sampling and can be performed pre-operationally, during pilot/initial operation, during routine/established operation, and when nature or degree of a routine/established operation changes. Unrestricted area air sampling should be performed at the release point and/or at the common boundary of the restricted and unrestricted areas and/or in the environment as appropriate to the specific approved use and release conditions.

B. Surface Contamination Surveys: Surface types include personnel (ex. skin, hands, etc.), personnel protective clothing (ex. gloves, boots, etc.), equipment and tools, and facilities and plant surfaces. Surface contamination can be classified as fixed or removable. Fixed surface contamination can be measured during exposure/radiation level surveys.

Removable surface contamination of areas and equipment where powdered and liquid radioactive materials are stored and used must be checked by smear/wipe surveys at a frequency based on wipe results, work activity, type of work activity, and type of radioactivity. Busy areas must be checked at least monthly. Busy areas of operations with a high incidence or risk of producing removable radioactive contamination must be surveyed daily or weekly by the material users as directed by the IRAG approved procedures.

Surface contamination evaluation should include unrestricted areas surrounding a restricted area which contains surface contamination requiring periodic surveys.

C. Acceptable average surface contamination levels for unrestricted use of premises and equipment (dpm/100 cm^2) are as follows:

	Fixed	Removable
Transurancies, Ra-226	100	20
Th-nat, Th-232, Sr-90, U-232, I-131	1000	200
U-nat, & U-238 (and associated decay products)	5000 α	1000 α
Other β/γ emitters	5000 β/γ	1000 β/γ

15. Radiation Protection Program

D. Exposure/Radiation Rate Surveys:

External radiation levels from concentrated radioactive sources and fixed surface contamination must be checked by direct radiation surveys at a frequency based on the external radiation hazard and quantity of the radioactive material involved, work activity, and type of work activity. Low and medium risk areas must be surveyed at least monthly, and high risk areas, daily or weekly, by the material users as directed by the IRAG approved procedures.

E. Effluent monitoring for releases to unrestricted areas: For airborne effluents, calculational evaluations, calculational evaluations supplemented by stack monitoring, or other environmental monitoring is required as appropriate for any planned and potential releases; for liquid effluents, calculational evaluations, calculational evaluations supplemented by waste stream monitoring/water sampling, or other environmental monitoring is required as appropriate for any planned and potential releases.

As stated previously, the IRAG does not as a policy permit "airborne radioactivity areas" in restricted areas. In almost all cases, this policy results in the use of hepa-filtered contaminated-air-control equipment for filtering air before release to unrestricted areas. At present, there is no generation of contaminated liquid waste. When such waste was generated, it was disposed through a licensed disposal company. Using the method cited in 10 CFR 20.303 would only be considered for small and infrequent amounts of liquid radioactive waste.

F. Personnel Dose Monitoring

Personnel radiation badges must be worn by all personnel engaged in operations which have been designated as requiring badges by IRAG. Each individual who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in excess of 25 percent of the applicable value specified in paragraph (a) of 10 CFR 20.101 must wear a personnel radiation badge. Badges may be required by the health physicist/IRAG even if one could not or would not likely receive 25 percent of the values referenced previously.

The vendor may be the one listed or any other supplier with high quality and accuracy of service. The normal badge exchange frequency is quarterly. More frequent exchanges would be used if warranted. For example, highly variable dose rates to personnel or dose rates above three rems per year would warrant a monthly or more frequent exchange. Currently, there is no need for badge exchanges more frequent than quarterly.

Self-reading pocket dosimeters are used only to supplement the badge. The need for pocket dosimeters is very rare for licensed activities. Pocket dosimeter readings are not used for record purposes under licensed activities.

15. Radiation Protection Program

G. Sealed Source Leak Tests

The radiation safety officer performs a leak test on each sealed source at the frequency indicated by the appropriate license. The tests normally consist of wipes of the source with moistened filter paper followed, after drying, by counting in a windowless flow counter. Tongs, etc., are used as required. Leaking sources are normally disposed to radioactive waste. Arrangements may be made with the original supplier to return a source when required.

H. Bioassay Program

The IRAG does not contemplate approving programs which would require routine use of bioassay. Control of exposure to unsealed radioactive materials is achieved through engineered controls. The need for bioassay is therefore limited to accident or emergency situations. Bioassay would, for example, be required in the event an emergency entry is made to clean up a contamination spill outside a hood or glove box. Another example is the situation where an employee is found to be contaminated on the face or head.

Bioassay, when needed, is performed by commercial vendors. Vendors which may be used include Eberline Co., Teledyne Isotopes, Radiation Management Corp., Helgeson Nuclear Services or others depending on the specific isotope to be assayed and the vendor's detection capabilities.

4. Radiation Inspection Program

A. IRAG-approved Radiation Safety Conditions and Procedures

Conditions and procedures, based on the safety evaluation of the proposed use, specific to the proposed use, and documented for the approved use, are used as a baseline for periodic tailored inspections. Documented changes to the IRAG approval, which are a result of operational experience, become part of the baseline inspection.

B. Postings, Signs, Labels, and Tags

Areas and containers in which radioactive material is present must be approved and properly posted and labeled. The radioactive material itself must be tagged or labeled if feasible.

C. Materials Control Provisions for Procurement, Receipt, Use, Shipping, and Disposal through the Radiation Safety Organization

Written procedures require the health physicist's written approval (i) before purchase of any source of ionizing radiation, (ii) before its release to user (after receipt), and (iii) before its shipment. Incoming shipments are surveyed per 10 CFR 20.205 and for dose rate levels before release to user.

Outgoing shipments receive a dose rate and removable contamination (when appropriate) survey of the unpackaged and packaged material to assure that radiological shipping regulations are met.

15. Radiation Protection Program

D. Engineering Controls for Exposure Rate Reduction

Shielding and remote manipulation are used as much as possible to keep exposures as low as reasonably achievable.

E. Engineering Controls for Control of Airborne Radioactivity

Operations producing significant airborne radioactive contamination in a restricted area must provide engineering controls for contaminated air control (complete enclosure, booth/hood-type enclosure, or, only as a last resort, local exhaust) approved by the health physicist. Airborne contamination is considered significant either when concentrations, equal to or in excess of the amounts specified in Appendix B, Table I, Column I of 10 CFR 20, exist (for no matter how short a duration) or when concentrations, which, averaged over the number of hours in any week during which individuals are in the area, exceed 25 percent of the amounts specified in the prior reference. Operations producing any airborne radioactive contamination should provide contaminated air control in order to keep exposures as low as reasonably achievable. All operations given approval must be resurveyed if warranted by increased work activity, new work procedures, or changes in room ventilation.

All exhaust systems are designed following specifications in the "Industrial Ventilation" manual published by the American Conference of Governmantal Industrial Hygienists or equivalent specifications. If air sampling indicates a need for contaminated air control, exhaust systems equipped with HEPA filters are used; for booths, air flow is maintained at 100 to 200 cfm per square foot face; for local exhaust, air capacity and distance between exahust line intake and point of operation are adjusted to give the recommended capture velocity at the point of operation. Ventilation equipment, if required, is checked for proper air flow at least annually using an air velocity meter. Filters are checked periodically and replaced when saturated.

F. Use of Respiratory Protection

The IRAG does not contemplate approving programs which would require routine respiratory protection. Control of exposure to unsealed radioactive materials is achieved through engineered controls. The need for respiratory protection is therefore limited to accident or emergency situations. Its use would, for example, be required in the event an emergency entry is made to clean up a contamination spill outside a hood or glove box.

G. Use of Protective Clothing

Protective clothing must be worn by personnel as specified by IRAG approved procedures in order to prevent personnel contamination and the possible incorporation of radioactive materials.

15. Radiation Protection Program

H. Protective Coverings for Plant Surfaces, Equipment, and Instruments

Protective coverings (trays, etc.) on lab benches and other working surfaces must be used to prevent their contamination when working with powdered or liquid radioactive material (unsealed radioactive material); with liquid radioactive material, the covering should be absorbent and have a leak-proof backing.

I. Surface Contamination Control Areas

Where the spread of surface contamination cannot be limited to a tray or bench top area, a barricaded area may be set up; in the case where the contamination is released with high initial velocity, the barricade may have solid walls and/or ceiling. In either case, the designated surface contamination zone would have a single access/egress point and written procedures for entering or leaving at that point would address the use/disposition of protective clothing and the use of contamination survey instrumentation if required.

J. Storage Conditions

All storage containers and areas for radioactive material must be approved and properly posted by the health physicist. Storage areas for large quantities of radioactive materials (especially those in liquid or powdered form) which produce gaseous radioactive decay products must be well ventilated. Periodic contamination surveys are taken of the storage areas.

K. Radiation Emergency Procedures

See pages 9 thru 11 of the attached mandatory safety procedure, "Ionizing Radiation Control".

5. Records Management

Management of radiation safety records is the responsibility of the health physicist. Records maintained include, but are not limited to, the following: radiation level surveys, radiation safety inspections, radioactive material inventories, personnel exposure results, and the receipt, use, and disposal of radioactive materials.

6. Waste Disposal

Radioactive waste must be kept segregated and disposed of through the Safety Office. Presently, all waste generated is in the solid form including scrap radioactive material, below specification products, contaminated tools and protective coverings, contaminated filters, and decontamination materials. All solid waste and normally all liquid waste, if liquid waste is produced, is disposed through a licensed disposal firm. Small amounts of liquid waste can be disposed through the sanitary sewer system.

General Electric Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06

ATTACHMENT
January 1984

16. & 17. Formal training and experience in radiation safety.

RESUME - THOMAS P. HANDLEY - MGR. INDUSTRIAL SECURITY, SAFETY & ADMINISTRATIVE SERV.

A. Education

Wentworth Institute 1942-1943
Boston, Massachusetts 1946-1948

Numerous company sponsored courses in Business Management, Safety for Supervisors, Computer Programming, Radiographic Course, Office of Civil Defense Courses in Radiological Monitoring for Instructors. MHW Radiation Safety Course.

B. Work Experience

1961-1963 Radiation Protection Officer, License #37-2006-05

1963-1965 Instructed Radiological Monitoring for PA Fallout Shelter Management Course at Penn State University

1968-1978 Chairman, Ionizing Radiation Advisory Group, License #37-2006-05 per Valley Forge Space Center Safety Manual Procedure M-6.0

General Elec. ..c Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06

ATTACHMENT January 1984

16. & 17. Formal training and experience in radiation safety.

RESUME:

Charles B. Chilton
Manager, Industrial Safety & Hygiene
General Electric Company
Space Systems Division
P.O. Box 8855
Philadelphia, Pa 19101

Education:

BS - Virginia Polytechnic Institute, Blacksburg, Va. - Agricultural Eng.
MS - Temple University, Philadelphia, Pa. - Industrial Hygiene

Certified Safety Professional - #1410
Registered Professional Engineer in Safety Engineering, State of California - #676

Work Experience:

U.S. Army - 6 months active duty, 23 years active reserve, rank of Lt. Col. Taught/attended numberous chemical, biological, radiological (CBR) courses.

Factory Insurance Association - Fire Protection Engineer - 5 years

Celanese Corporation - Safety Supervisor - 5 years

Borg-Warner Corporation - Safety Manager - 1 year

General Electric Company - Safety Manager - 12 years

Member:

ASSE
NFPA
AIHA

Supervised HP activities 12 years.

Attended numerous HP short courses (U.S. Army, AIHA).

Completed two graduate level HP courses (Temple University)

General Elec. .c Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06

ATTACHMENT January 1984

16. & 17. Formal training and experience in radiation safety.

RESUME - STEPHEN J. MUCHA, M.D., F.A.C.S., MEDICAL DIRECTOR

A. Education

1952 - B.S. Degree in Biology from Franklin & Marshall College Lancaster, Pa.

1956 - M.D. Degree from the University of Pennsylvania, School of Medicine, Philadelphia, Pa.

B. Post Graduate Training

1956-1957	Internship rotating at U.S. Naval Hospital, Philadelphia, Pa.
1957-1961	General Surgical Residency, U.S. Naval Hospital, Philadelphia, Pa.
1961-1964	Assistant Chief of Surgery, U.S. Naval Hospital, Camp Lejeune, N.C.
1964-1967	Chief of Surgery, U.S. Naval Hospital, Roosevelt Roads, Puerto Rico.
1967-1971	Assistant Chief of Surgery, U.S. Naval Hospital, Philadelphia, Pa.
1971-1978	Chairman, Department of Surgery, Naval Regional Medical Center, Philadelphia, Pa.
1978-	Medical Director, General Electric Company RSO, Philadelphia, Pa.
	Private Practice.

C. Memberships

1971-1978	Chairman, Disaster Committee, Naval Regional Medical Center, Philadelphia, Pa.
1971-1978	Member, Radiation Committee, Naval Regional Medical Center, Philadelphia, Pa.
1978-1982	Member, Ionizing Radiation Advisory Committee, General Electric Company RSO, Philadelphia, Pa.

General Elec .c Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06

ATTACHMENT
January 1984

16. & 17. Formal training and experience in radiation safety.

RESUME - JOHN R. McFADDEN - GE/SSD HEALTH PHYSICIST

A. Education
Ph.D. Purdue University, W. Laf., Ind., 1967-1971, Bionucleonics.
M.S. Temple University, Phila., Pa., 1966-1967, Radiological Health.
B.A. St. Joseph's College, Phila., Pa., 1962-1966, Biology

B. Work Experience
7/72 to 10/72: Public Health trainee in radiological health unit of Philadelphia Health Department. Primary responsibilities included inspection of diagnostic x-ray machines and operations by industrial radiographers.
11/72 to 12/73: Health physicist with Nuclear Radiation Consultants, New Haven, Conn. Consultation in health/medical physics provided to hospitals in Conn. and Mass.
1/74 to 6/82: Health physicist for General Electric Company - RESD.
6/82 to present: Health physicist for General Electric Company - SSD.

C. Experience with Radiation

Isotope	Maximum Amount	Employer	Duration	Type of Use
Co-60	5000 Ci	N. R. Consultants	1 year	Radiation Therapy
P-32	0.02 "	"	1 "	"
Ra-226	0.1 "	"	1 "	"
Au-198	0.002 "	"	1 "	Nuclear Medicine
Se-75	" "	"	1 "	"
Hg-197	" "	"	1 "	"
I-131	0.001 "	"	1 "	"
Tc-99m	0.05 "	"	1 "	"
I-125	0.02 "	"	1 "	In Vitro Research
Depleted U	50 lbs.	"	1 "	Shielding
C-14	0.001 Ci	Purdue University	2 "	In Vivo Research
Any accelerator produced radionuclide with atomic no. 3-83 inclusive	10 "	GE/RESD	4 "	Instrument calibration and research
Ra-226	0.1 Ci	GE/RESD	4 "	Vacuum determination and fire detection
Any by-product material between at. nos. 3 and 83 inclusive	60 Ci	"	4 "	Research and Development (10 CFR 30)
H-3	100 Ci	"	4 "	"
Any by-product material	1 "	"	4 "	Activated electronic components
Ni-63	0.024 "	"	2 "	GC detector cells
Natural or depleted U	1500 lbs.	"	2 "	Solid metal alloys and powders-R & D
Natural Th	40 "	"	2 "	Powders and metal alloys-R & D

D. Certification in Comprehensive Health Physics by HPS-1981

General Electric Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06

ATTACHMENT January 1984

16. & 17. Formal training and experience in radiation safety.

Resume Alfred W. Kobylinski GE/SSD Industrial Hygienist

A. Education

MS Occupational Health (Industrial Hygiene)
Drexel University, Philadelphia, PA 1980

BS Biology, Pennsylvania State University
University Park, PA 1976

Also attended several professional development courses dealing with radiation safety presented by the American Industrial Hygiene Association and other professional organizations.

B. Work Experience

1974-76 Toxicology Technician
Ayerst Laboratories, Animal Health Division
Chazy, NY 12921

Assisted in the operation of diagnostic x-ray equipment used for the examination of laboratory animals.

1976-78 Research Technician
Physiology Department
Thomas Jefferson University
Philadelphia, PA

Performed cardiovascular physiology studies utilizing radioactive tracer micorspheres labelled with SR^{85}, Ce^{147} and I^{125}. I was responsible for: Safe handling and use of microspheres, conducting surveys to determine radiation levels in lab area, and for the determination of and safe disposal of all contaminated materials.

12/79- present Industrial Hygienist
General Electric Company
Space Systems Division
King of Prussia, PA 19406

Under the direction of the Space Systems Division Ionizing Radiation Advisory Group, I have functioned as Radiation Safety Officer for the divisions 3 NRC Licenses.

General Elec .c Co. - SSD
Renewal Application-037-02006-05
Termination/Transfer Application-
037-02006-06

ATTACHMENT
January 1984

16. & 17. Formal training and experience in radiation safety.

Experience with Radiation

Isotope	Maximum Amount	Location	Duration	Type of use
Cerium-147	4 millicuries	Thomas Jefferson University	1.5 years	Medical Research
Strontium-85	4 millicuries	Thomas Jefferson University	1.5 years	Medical Research
Iodine-125	4 millicuries	Thomas Jefferson University	1.5 years	Medical Research
Cobalt-60	5000 curies	General Electric Company	3 years	Gamma Irradiation
Krypton-85	18 curies	General Electric Company	3 years	Leak Tests
Strontium-90	10 curies	General Electric Company	3 years	Irradiation Source
Plutonium-238	90 millicuries	General Electric Company	3 years	Calibration
Plutonium 239	microcuries	General Electric Company	3 years	Calibration
Cesium 137	100 millicuries	General Electric Company	3 years	Calibration Source
Americium-241	millicuries	General Electric Company	3 years	Research
Uranium-235	microcuries	General Electric Company	3 years	Research
Uranium 238	microcuries	General Electric Company	3 years	Research
Natural Thorium	50 kilograms	General Electric Company	3 years	Structural Material
Any Neutron activated radionuclide with atomic no. 3-83 inclusive	0.1 Ci	General Electric Company	3 years	Electronic Component Research

Valley Forge Space Center Safety Manual

SUBJECT	CLASSIFICATION	ISSUED	NUMBER
IONIZING RADIATION CONTROL	MANDATORY PROCEDURE	JULY 1982	M-6.0

6.1 PURPOSE

To state the requirements that shall apply in the use of all ionizing radiation, ionizing radiation machines, and radioactive materials to insure the maximum safety to all persons in the Valley Forge Space Center. These requirements are intended to be consistent with the regulations of the Nuclear Regulatory Commission, Pennsylvania Department of Environmental Resources, U.S. Department of Labor, and the recommended practices of the General Electric Company.

6.2 DEFINITIONS

6.2.1 Ionizing Radiation

Gamma rays and x rays, alpha and beta particles, high-speed electrons, neutrons, protons, and other nuclear particles; but not sound or radio waves, or visible, infrared or ultraviolet light.

6.2.2 Ionizing Radiation Machine

Any device which produces ionizing radiation when the associated control devices are energized.

6.2.3 Radioactive Materials

Any material (solid, liquid, gas) which emits ionizing radiation spontaneously, for example: carbon-14, cesium-137, cobalt-60, radium, thorium, etc. Note: all compounds of uranium, thorium and radium and all general-licensed sources are included, whether labeled radioactive or not by the vendor.

6.2.3 Occupational Dose

Includes exposure of an individual to ionizing radiation, (1) in a restricted area; or; (2) in the course of employment in which the individual's duties involve exposure to ionizing radiation. Occupational dose shall not include any exposure of an individual to ionizing radiation for the purpose of medical therapy or diagnosis.

6.2.5 Rem

The quantity of any type of ionizing radiation which causes the same biological effect as one roentgen of X or gamma radiation.

6.2.6 Permissible Doses

1. Every reasonable effort shall be made to maintain all radiation exposures as low as reasonably achievable and within applicable limits. (ALARA)

2. Personnel who are occupationally exposed to radioactive materials licensed by the U. S. Nuclear Regulatory Commission or who are working under DOE contracts shall adhere to the provisions found in U. S. Code of Federal Regulations, Title 10, Part 20, "Standards for Protection Against Radiation." Copies of the regulations, licenses, and operating procedures are available for examination in the Industrial Safety and Hygiene Office.

3. Personnel who are occupationally exposed to other radioactive materials or to ionizing radiation machines shall be governed by the regulations found in 29 CFR 1910. 96, "Occupational Safety and Health Standards - Ionizing Radiation," and in Pennsylvania Title 25, Part I, Subpart D, Article V, Chapter 227 "Standards for Control of Radiation Exposure." Copies of the regulations, licenses and operating procedures are available for examination in the Industrial Safety and Hygiene Office.

4. Permissible Limits for External Exposure

Part of Body	Rems per Calendar Quarter	Accumulated Dose in Rems
Whole body, head and trunk, active blood-forming organs, lens of eyes, gonads	1.25[(a)]	5(N-18)[(b)]
Hands and forearms, feet and ankles	18.75	
Skin of whole body	7.5	

(a) If exposure history is documented and approved by Health Physics and the Medical Operation, 3.0 rems per quarter is permissible, but accumulated dose must not exceed 5 (N-18) rems.

(b) Where N is age in years and is greater than 18.

5. Exposure to airborne radioactivity shall not exceed the concentrations listed in the applicable regulations.

6. Individuals have the right to request a report of their occupational radiation exposure data. Contact the Industrial Safety and Hygiene Office for further information.

6.2.7 Contamination

The unintentional spread of radioactive material to places where it may harm personnel or interfere with experiments.

6.3 POLICY

6.3.1 It is the policy of all components in the Valley Forge Area to keep the ionizing radiation exposure of all personnel as low as practicable and, in particular, below all existing federal, state and Company regulations.

6.3.2 All proposed uses of radioactive material or ionizing radiation-producing devices shall be reviewed and prior written approval for use secured from the Ionizing Radiation Advisory Group (IRAG) consisting of:

Chairman: Manager, Industrial Security, Safety and Administrative Services
Member: Medical Director
Member: Manager, Industrial Safety and Hygiene
Secretary: Health Physicist

6.3.3 All ionizing radiation producing machines and radioactive materials shall be used, stored, handled, transported, or disposed of in accordance with existing regulations and approvals (i.e., Nuclear Regulatory Commission, Commonwealth of Pennsylvania, General Electric Company and the IRAG).

6.3.4 All ionizing radiation machines and radioactive materials shall be used only in the manner approved by the IRAG; the IRAG may revoke any approval it has issued when an investigation shows justification for such action. In such event, the radiation user shall immediately relinquish all radioactive materials or ionizing radiation producing devices to the Health Physicist.

6.3.5 Accidents involving radioactive materials in which there is a possibility of ingestion or inhalation of radioactive material or severe body contamination shall be reported immediately to the members of the IRAG. Accidental exposures (actual or suspected) in excess of the quarterly limits stated above shall be immediately reported to the IRAG.

6.3.6 Where the aforementioned rules or regulations may not necessarily apply, the Ionizing Radiation Advisory Group's activity will be guided by recommendations of organizations such as the National Committee on Radiation Protection and Measurement and also by Company recommendations, particularly where recommendations establishing lower levels of exposure are concerned.

6.4 RESPONSIBILITIES AND PROCEDURES

6.4.1 It is the responsibility of all personnel working with ionizing radiation to acquaint themselves with the regulations bearing on their duties and their responsibility with regard to ionizing radiation safety. In particular, each individual is responsible for:

1. Wearing the prescribed monitoring equipment (i.e., TLD badge, etc.) whenever working with radiation.

2. Using the recommended contamination control equipment and following contamination control procedures as required.

3. Keeping his or her exposure as low as possible by recommending improvement procedures, etc., when applicable.

4. Observing and obeying all signs, tags, etc., posted by the Health Physicist.

5. Reporting conditions that are considered hazardous or may result in over-exposure, a violation of procedures or regulations, or unnecessary exposure.

6. Adhering to the approved program unless prior approval of the IRAG has been obtained for any deviations therefrom.

6.4.2 Supervisors are responsible for the ionizing radiation safety of all personnel reporting to them. In particular, each supervisor is responsible for:

1. Assuring that each individual understands and follows all regulations regarding ionizing radiation safety.

2. Assuring that each individual is aware of the location of the NRC or state Notice to Employees posted in the area.

3. Coordinating with the Health Physicist to obtain all necessary radiation safety advice and assistance.

4. Disposal of radioactive material in accordance with NRC, EPA and State of Pennsylvania regulations as set forth by the Health Physicist.

6.4.3 The manager of a component requiring radioactive material or ionizing radiation-producing devices shall:

1. Submit a written request to the Chairman of the IRAG prior to performing any work on the requested program. The request shall include the following information:

   a. Quantity, type and form of any radionuclides to be used or description of ionizing radiation-producing equipment.

   b. Name, title and radiation or radioactive materials experience of the individual responsible for the work to be performed.

   c. Names, title and radiation or radioactive materials experience of individuals who will work with the materials or equipment.

   d. A description of the work to be performed and facilities to be used.

   e. A specific description of the safety precautions to be taken and procedures to be followed. (Assistance in preparing this section may be obtained from the Health Physicist.)

2. Provide such information to the IRAG as it may require for periodic audits of the approved ionizing radiation program.

3. Assure that personnel under his or her direction shall not deviate from the approved program without the prior approval of the IRAG.

4. Follow all Safe Work Practices in this Manual, specifically those applicable to ionizing radiation.

5. Post the safety requirements provided by IRAG.

6. Obtain the approval of the Health Physicist prior to performing any operation involving machining, melting, welding, heating, or otherwise altering any source of radiation.

7. Deliver radioactive materials for disposal to the Health Physicist.

6.4.4 The IRAG will:

1. Accept or reject any proposed use of radionuclides or ionizing radiation-producing equipment which in the Group's opinion does or does not adequately meet safety requirements set forth by the NRC, State of Pennsylvania (or other states as they may apply), General Electric Company and VFSC instructions. The Group's authority is limited to the ionizing radiation safety criteria only.

2. Notify the requesting component manager of its decision, and supplement the safety requirements submitted when it feels the need to do so.

3. Perform such periodic audits and inspections as it deems necessary.

6.4.5 The Manager, Industrial Security, Safety and Administrative Services is responsible for:

1. Serving as Chairman of the Ionizing Radiation Advisory Group.

6.4.6 The Manager, Industrial Safety and Hygiene is responsible for:

1. Serving as a Member of the IRAG.

2. Providing the overall administration of an effective ionizing radiation control program and the health physics function; insuring compliance with applicable regulations; and reviewing and approving, prior to procurement or use, radioactive materials and equipment specifically designed to produce ionizing radiation.

3. Obtaining from the Nuclear Regulatory Commission, the Department of Transportation, and other authorized government agencies those licenses required to obtain, possess, use and ship radioactive materials and register the licenses with

the Commonwealth of Pennsylvania (Note: NRC licenses will only be secured by the Chairman, IRAG as needed. In order to avoid unnecessary delays, advise him or her of needs well in advance of critical dates).

6.4.7 The Health Physicist is responsible for:

1. Serving as Secretary of the Ionizing Radiation Advisory Group.

2. Keeping records of IRAG activities and such other information as required by regulatory agencies.

3. Assisting supervisory personnel in the writing of all ionizing radiation safety requirements, and development of such information and training programs as may be required to assure proper handling of these materials.

4. Conducting such surveys, leakage tests, and environmental studies as may be required to insure the integrity of the program.

5. Insuring that suitable warning signs and devices are in place and operating as required in accordance with the regulations of the Department of Health, Commonwealth of Pennsylvania and the Nuclear Regulatory Commission.

6. Developing and maintaining emergency procedures.

7. Investigating and preparing reports of all actual or suspected excessive or unauthorized exposure to ionizing radiation.

6.4.8 The Medical Director is responsible for:

1. Serving as a Member of the IRAG.

2. Determining the medical program to be followed by all employees involved in working with ionizing radiation.

6.4.9 All responsible supervisory personnel shall submit for review to the Health Physicist all Planning Sheets, MSI's, STP's or other applicable documents which set forth a program, process or procedure for working with or otherwise involving ionizing radiation.

6.4.10 The initiating manager shall secure the written approval of the IRAG prior to the purchase or other means of obtaining any ionizing radiation producing machine or radioactive material. The Purchasing component shall not complete a Purchase Order for these items unless it has been properly approved by the IRAG. (Also see Section 6.5.)

6.4.11 Each operation using radioactive materials shall maintain detailed records of all radioactive materials on hand. These records shall be readily available for

inspection by the Health Physicist. All radioactive materials not in use shall be relinquished to the Health Physicist for storage or disposal.

6.4.12 Receiving and Shipping shall:

1. Not release any radioactive materials or ionizing radiation-producing devices without the written approval of the Health Physicist. Procedures specified in Section 6.5.3 shall be followed.

2. Ship or transport radioactive materials only in accordance with Section 6.5.4 and applicable NRC, DOT and state regulations.

6.4.13 The Accountant-Taxes, Insurance and Royalties will ascertain that adequate insurance coverage exists for possession and use of radioactive materials at Valley Forge area components.

6.4.14 Facilities Engineering/Drafting shall obtain the approval of the Health Physicist on all drawings of ionizing radiation-producting devices, radioactive materials or facilities or devices to house or contain radiation devices or radioactive materials. All such drawings shall be labeled RADIATION DEVICE OR RADIOACTIVE MATERIALS in prominent lettering.

6.4.15 Property management, or the manager responsible for the use of an ionizing-radiation-producing machine, shall notify the Industrial Safety and Hygiene Office in advance of any plans to transfer/sell/terminate any machine which produces ionizing radiation (ex., cabinet x-ray machines, x-ray diffraction apparatus, etc.) so that federal and state regulations concerning the transfer/sale/termination of each device can be addressed.

6.5 PROCURING, RECEIVING AND TRANSPORTING OF RADIOACTIVE MATERIALS

6.5.1 Licensees for radioactive materials are required to conform to several sets of regulations related to obtaining, receiving and transporting radioactive materials. Adherence to the procedures and requirements listed below is required to achieve compliance with the regulations. Where applicable, these procedures and requirements are amended to all SSD-VF IRAG approvals.

6.5.2 Purchasing or Otherwise Obtaining Radioactive Materials

1. Each Material Request for radioactive materials shall bear the note: RADIOACTIVE.

2. All Purchase Orders for radioactive materials shall be forwarded to the Health Physicist for approval before any order, including by telephone or TWX, is placed.

3. In all other circumstances where radioactive materials are transferred into SSD-VF facilities, e.g., a loaned source, return of a source from a customer, etc., the transferee shall obtain the approval of the Health Physicist before the transfer is initiated.

4. The Health Physicist shall complete the certification to receive radioactive materials (Figure 1) when necessary. The original shall accompany the Purchase Order when applicable, or be sent to the transferor in nonpurchase transfers.

5. All radioactive materials shall be shipped to the attention of the Health Physicist, Bldg. 100.

6.5.3 Receiving Radioactive Materials

1. Receiving shall notify the Health Physicist, x4570 or x1085, immediately upon receipt of radioactive materials. Receiving shall not open any shipping container before the Health Physicist has completed the acceptance surveys.

2. The Health Physicist shall promptly survey the shipment, utilizing the following general procedure:

   a. Radiation and contamination survey of outer container.

   b. Radiation and contamination survey of inner container, if applicable.

   c. Leak test or radiation and contamination survey of the source, whichever is applicable, except unsealed sources.

3. In the event a leaking container is found, the carrier and the Nuclear Regulatory Commission Inspection and Enforcement Regional Office I, shall be notified immediately. The Health Physicist shall immediately take action to determine the extent of contamination in SSD-VF facilities and decontaminate as needed.

6.5.4 Shipping or Transport of Radioactive Materials

1. Any person who plans to ship radioactive materials shall contact the Health Physicist at least three working days prior to the date of the shipment. The transferor shall supply to the Health Physicist the type, quantity and form of the material, the name and telephone number of the receiver, the type of container and the mode of transport. The Health Physicist shall contact the receiver to obtain his or her certification to receive radioactive materials.

2. Immediately prior to shipment, the Health Physicist shall survey the container(s), attach shipping labels and complete the shipping certification (Figure 2).

3. The Health Physicist shall be notified prior to any interplant transfers of radioactive material. NRC or DOT approved shipping containers shall be used where applicable.

6.6 EMERGENCY PROCEDURES

Procedures for radiological emergencies are established as appropriate to each application. These procedures supplement the general emergency plan in effect for the Space Center. See A-3.0, A-4.0, and F-1.0 in the Safety Manual for procedures for reporting general emergencies, accident emergencies, and fire emergencies, respectively.

The basic instruction for all employees to report any emergency is to telephone the Plant Protection Center by dialing the emergency number (FIRE, 3473). Personnel in the Protection Center are given standing orders for contacting various personnel according to the type of emergency.

Personnel who work with radioactive materials are instructed in specific actions to be taken in the event of an emergency involving radioactive materials. This would include such situations as fires, spills, monitor alarms, and mission sources.

In addition, the plant Fire Brigade receives general instruction regarding fighting fires involving radioactive or other toxic materials.

On the following page, there are examples of emergency procedures for operations involving radioactive material.

SAMPLE EMERGENCY PROCEDURES

Minor Spills - Unsealed Radioactive Material

1. NOTIFY: Notify persons in the area that a spill has occurred.

2. PREVENT SPREAD: Cover the spill (with absorbent paper if spill is liquid).

3. CLEANUP: Use disposable gloves and remote handling tongs. Carefully fold the absorbent paper containing the spill. Insert into a plastic bag and dispose of in the radioactive waste container. Also insert into the plastic bag all other contaminated materials such as disposable gloves. Non-liquid spills are to be cleaned up in a manner which will minimize the possibility of any of the spill becoming airborne and inhaled.

4. SURVEY: With a low-range, thin-window G-M survey meter, check the area around the spill, hands, and clothing for contamination.

5. REPORT: Report incident to the Industrial Safety and Hygiene Office.

Major Spills - Unsealed Radioactive Material

1. CLEAR AREA: Notify all persons not involved in the spill to hold their breaths and to vacate the room.

2. PREVENT SPREAD OF SPILL: While holding their breaths, personnel involved in the spill should: cover the spill (with absorbent paper if spill is liquid), close all windows, shut off fans and air conditioners, and leave the room. No immediate attempt should be made to clean up the spill.

3. SHIELD SOURCE: If possible, the spill should be shielded (if penetrating radiation is involved), but only if it can be done without further contamination or without significantly increasing your radiation exposure.

4. CLOSE ROOM: Leave the room and lock the door(s) to prevent entry.

5. CALL FOR HELP: Notify the Industrial Safety and Industrial Office.

6. PREVENT SPREAD OF CONTAMINATION: All involved personnel should remain in one confined area to limit spread of contamination (every person who might have been in the immediate area of the spill should be considered contaminated until checked by the Health Physicist); if the spilled material was powdered, the door(s) and other openings leading into the room should be sealed with wide masking tape or adhesive tape and heavy wrapping paper in order to limit spill to the room.

7. PROHIBIT ENTRY: Entry into the contaminated area should be prohibited and the Health Physicist will direct all subsequent operations, such as: surveying the area and evaluating the extent of the emergency, surveying all personnel involved, supervising decontamination of all personnel, if necessary, and supervising decontamination of the room.

8. PERSONNEL DECONTAMINATION: Contaminated clothing should be removed and stored for further evaluation; if the spill is on the skin, flush thoroughly and t then wash with mild soap and lukewarm water.

Missing Source - Sealed Radioactive Material

1. CLEAR AREA: Notify all persons not involved in the search to vacate the area.

2. CALL FOR HELP: Notify the Industrial Safety and Hygiene Office.

3. SURVEY: Survey and cordon off the radiation hazard area.

4. PROHIBIT ENTRY: Prohibit entry into the radiation hazard area and await assistance from the Industrial Safety and Hygiene Office.

GENERAL ELECTRIC

SPACE SYSTEMS DIVISION

GENERAL ELECTRIC COMPANY . . . . . VALLEY FORGE SPACE CENTER
(MAIL: P. O. BOX 8555, PHILADELPHIA, PENNSYLVANIA 19101), Phone (215) 962-2000

Certification of Authorization to Receive Radioactive Materials

This certifies that the Space Systems Division, General Electric Company, is authorized to receive, possess and use the radioactive materials listed below, according to the provisions of license number_____which expires_____.

Material	Form	Quantity

All radioactive materials are to be shipped to the attention of the undersigned at the following address:

General Electric Company
Space Systems Division
Valley Forge Space Center
230 East Goddard Boulevard
King of Prussia, Pennsylvania 19406

_____

Health Physicist and Date

Distribution: Original accompanies Purchase Order or sent to transferor
Copy #1 Health Physicist
Copy #2 RAM Requestor

M-6-12

Figure 1

GENERAL ELECTRIC
SPACE SYSTEMS DIVISION
VALLEY FORGE SPACE CENTER
P.O. BOX 8555, PHILA., PA. 19101

SHIPPER'S CERTIFICATION FOR RADIOACTIVE MATERIALS

☐ AIR TRANSPORT ONLY	THIS IS TO CERTIFY THAT THE CONTENTS OF THIS CONSIGNMENT ARE PROPERLY DESCRIBED BY NAME AND ARE PACKED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR CARRIAGE BY AIR ACCORDING TO ALL APPLICABLE CARRIER AND GOVERNMENTAL REGULATIONS. (INTERNATIONAL SHIPMENTS ADD AND TO THE IATA RESTRICTED ARTICLES REGULATIONS.) THIS CONSIGNMENT IS WITHIN THE LIMITATIONS PRESCRIBED FOR PASSENGER/CARGO (CROSS OUT ONE) CARRYING AIRCRAFT.
☐ SUFACE TRANSPORT ONLY	THIS IS TO CERTIFY THAT THE HEREON NAMED ARTICLES ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION, ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

NAME AND ADDRESS OF SHIPPER OR HIS/HER AUTHORIZED AGENT _____

_____

_____
(SIGNATURE AND DATE)

NATURE AND QUANTITY OF CONTENT				PACKAGE		
RADIONUCLIDE	GROUP	FORM	ACTIVITY	CATEGORY	TRANSPORT INDEX	TYPE
NAME OF PRINCIPAL RADIOACTIVE CONTENT	GROUP NUMBER OF GROUPS I TO VII	EITHER CHEMICAL FORM PLUS GAS/ LIQUID/SOLID, OR SPECIAL FORM OR ENCAPSULATION	NUMBER OF CURIES, OR MILLICURIES AS SPECIFIED	I – WHITE OR II – YELLOW OR III – YELLOW LABEL	FOR YELLOW LABEL CATEGORY ONLY	INDUSTRIAL OR TYPE A OR TYPE B

ADDITIONAL INFORMATION REQUIRED FOR FISSILE MATERIALS ONLY

EXEMPTED FROM THE ADDITIONAL REQUIREMENT FOR FISSILE MATERIALS

NOT EXEMPTED
FISSILE CLASS I ☐
FISSILE CLASS II ☐
FISSILE CLASS III ☐

NAMES, PLUS QUANTITY IN GRAMS, OR CONCENTRATION OR ENRICHMENT IN USE

ADDITIONAL CERTIFICATION OBTAINED BY THE SHIPPER WHEN NECESSARY:

- SPECIAL FORM ENCAPSULATION CERTIFICATE(S) ☐
- TYPE B PACKAGING CERTIFICATE(S) ☐
- CERTIFICATE(S) FOR FISSILE MATERIAL ☐
- GOVERNMENT APPROVALS/PERMITS ☐

RADIATION LEVELS: SURFACE_____ MREM/HR: THREE FEET_____ MREM/HR: ONE METER_____ MREM/HR

CONTAMINATION LEVELS: ALPHA_____ DPM/100 CM^2: BETA-GAMMA_____ DPM/100 CM^2

APPROVED FOR SHIPMENT_____
(SIGNATURE OF HEALTH PHYSICIST AND DATE)

Distribution: Original and copy #1 Traffic; Copy #2 Health Physicist

M-6-13

Figure 2

GENERAL ELECTRIC

SPACE DIVISION

GENERAL ELECTRIC COMPANY . . . . . VALLEY FORGE SPACE CENTER
(MAIL: P. O. BOX 8555, PHILADELPHIA, PENNSYLVANIA 19101), Phone (215) 962-2000

September 12, 1978

Mr. Bernard Singer, Chief
Radioisotopes Licensing Branch
Division of Fuel Cycle & Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Ref: File Code 90088

Dear Mr. Singer:

The items below refer to Mr. Paul R. Guinn's letter of May 24, 1978. These responses are based on discussions among Mr. R. G. Oesterling of General Electric Company and Messrs. Guinn and Basson and Ms. Tremper of NRC on July 18, 1978.

Item #1 - Locations of use.

The Space Division occupies several buildings in King of Prussia, PA. Some of these buildings are separated from the main complex by 2 to 3 road miles. Over the life of the license the Division may desire to vacate one or more of these buildings. In such an event, the occupancy of the vacated buildings would be reviewed to determine any needed surveys or decontamination. Given these circumstances, we believed it appropriate to designate the locations as Valley Forge Space Center facilities in King of Prussia, PA.

Since this designation appears to be too broad for licensing purposes, it is proposed that section 1(b) of form NRC-313 read as follows:

> Valley Forge Space Center, 260 Goddard Blvd., King of Prussia, Pa. and ancillary facilities on Allendale Road and on Third Ave., King of Prussia, Pa.

This nomenclature is similar to that of the existing license with the addition of a specific address for the Division's Valley Forge area headquarters.

Item #2 - Designation and training of individual users.

The requirements for experience or instruction of individual users vary somewhat with the proposed use. Personnel with prior similar experience are normally considered qualified by the IRAG. Personnel without the required experience are instructed in subjects which meet the requirements of 10CFR19.12. The instructor normally is the Radiation Safety Officer. However, with IRAG approval, the

vendors of certain specialized equipment have provided this instruction as part of an overall training package. The competence of the user is verified by various methods. The most common in this facility is use under the supervision of an authorized user. The authorized user then certifies to the IRAG that the new user has the capability to perform the required work safely. Much less frequent are observation during use or oral tests administered by the Radiation Safety Officer. A written test is seldom used. When written test are used, they are normally incorporated into a test of overall operation.

Item #3 - Ionizing Radiation Advisory Group.

The authority of the IRAG to administer the radiation protection program is clearly stated in section #M-6 of the Valley Forge Safety Manual. The Safety Manual in turn is established by Space Division Policy.

Items #4 & #5 - Quantities of byproduct material.

The format of the submittal was identical to the most recent amendment. Nevertheless, section 6 of form NRC-313 is revised as shown below. The quantities listed include a comparatively large quantity of tritium which is awaiting disposal.

6(a) Byproduct Material	6(b) Form and Quantity	
(1) Any byproduct material with atomic numbers 3 to 83, inclusive and except Sr90.	(1) Sealed sources	(1) 40 curies, NTE 1 curie per source
(2) Any byproduct material with atomic numbers 3 to 83, inclusive and except Kr85.	(2) Any form	(2) 5 curies, NTE 0.5 curie per nuclide
(3) Strontium-90	(3) sealed source	(3) 10 curies
(4) Krypton-85	(4) Any form	(4) 45 curies
(5) Hydrogen-3	(5) Sealed sources	(5) 30 curies
(6) Hydrogen-3	(6) Any form	(6) 5 curies
(7) Polonium-210	(7) Sealed sources	(7) 0.5 curies
(8) Polonium-210	(8) Any form	(8) 0.1 curie
(9) Americium-241	(9) Sealed sources	(9) 3 curies

Item #6 - Calibration procedures.

Calibrations are normally performed by, or under the direction of, the Radiation Safety Officer. When an instrument is returned to the manufacturer or sent to a facility

which specializes in radiation protection instrumentation repair, calibration is normally requested as part of the repair service.

The calibration sources used are appropriate to the type of radiation detected and/or measured. Gamma dose rate measurements are compared against instrument response to either a 100 millicurie Cs137 source or a 30 millicurie Co60 source, both corrected for decay. Alpha emitter contamination measurements are compared against the response to plutonium plated disc sources. Beta emitter contamination measurements are compared against response to C14, Co60, C136 or Sr90/Y90 sources depending on the energy range, with source strength corrected for decay as needed.

Item #7 - Personnel monitoring.

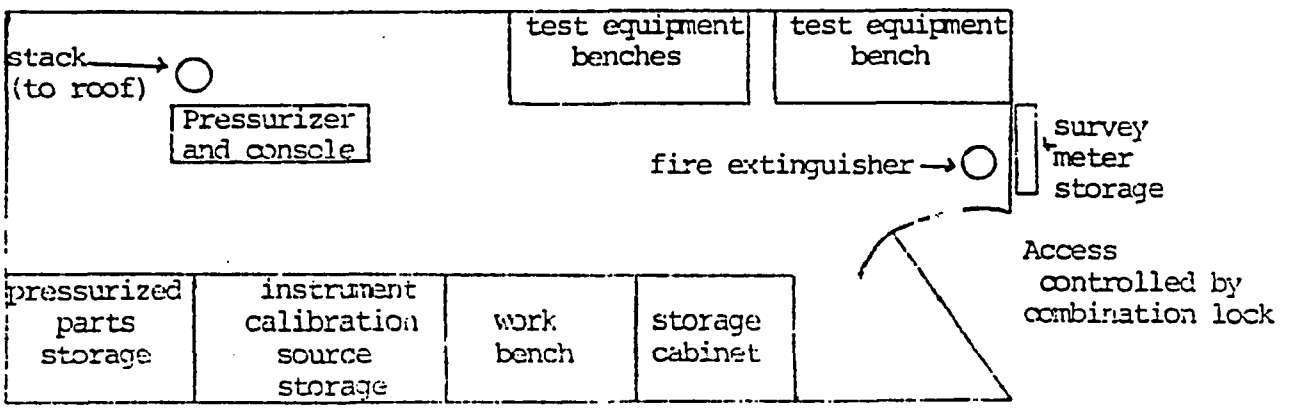
The normal badge exchange frequency is quarterly. More frequent exchanges would be used if warranted. For example, highly variable dose rates to personnel or dose rates above three rems per year would warrant a monthly or more frequent exchange. Currently, there is no need for badge exchanges more frequent than quarterly.

The practice of the IRAG for work with unsealed radioactive materials is to require engineered controls to minimize exposures such that bioassay would not be needed. The need for bioassay is therefore limited to accident or emergency situations. Bioassay would, for example, be required in the event an emergency entry is made to clean up a contamination spill outside a hood or glove box. Another example is the situation where an employee is found to be contaminated on the face or head.

Bioassay is not required for tritium since the entire inventory is in storage, with the major part awaiting disposal. In the event work with unsealed tritium is required, the "Guidelines for Bioassay Requirements for Tritium" will be used as a guide.

Item #8 - Facilities and equipment.

In the meeting of July 18, 1978, it was indicated that a sketch of one example of a facility would be a sufficient response. The sketch below is of a facility for leak-testing electronic components using a Trio-Tech (TM) pressurization device. The sketch is not to scale. This facility utilizes approximately 12 curies of Kr85.



The exhaust system is on uninterruptible power the exhaust stack terminates at 1.3 times the building height as recommended by the ACGIH. The stack monitor and exhaust flow alarm in the Plant Protection Center.

Item #9 - Radiation Protection.

(9a) The limits for contamination are stated in Attachment #7 to the license application. The detection limit for the portable instrumentation in use is approximately 30--50 dis/min. On large surfaces, wipes with an area of approximately 1000 cm^2 are taken. Any equipment which in internally contaminated is tagged as radioactive material.

(9b) Personnel working with unsealed radioactive materials are required to make frequent surveys during the course of a work day using standard, accepted techniques. The Radiation Safety Officer or his delegate makes daily record surveys in areas where unsealed materials, other than noble gases, are in use. Standard good practices such as surveying and/or bagging materials removed from the hood or glove box and surveying the hands, arms and front of the body frequently are used.

(9c) The Radiation Safety Officer or his delegate surveys equipment with a history of contamination prior to disassembly or removal. Where practicable the equipment is decontaminated. Where decontamination is not practicable or removal contamination remains, a restricted area is set up and the work performed under the direction of the Radiation Safety Officer.

(9d) Air sampling or monitoring is performed for any work with quantities of unsealed byproduct material which exceed the values in 10CFR30.71.

(9e) The primary criteria are the linear flow velocity at the front of hood faces and the differential pressure between a room and the interior of a glove box. The specification for hood faces is 100 feet/min as checked with a velometer. Glove boxes are maintained at negative 0.2 to 0.5 inches water gauge with respect to the surrounding room.

(9f) The basic instruction for all employees to report any emergency is to telephone the Plant Protection Center by dialing the emergency number (A-FIRE, 2-3473). Personnel in the Protection Center are given standing orders for contacting various personnel according to the type of emergency.

Personnel who work with radioactive materials are instructed in specific actions to be taken in the event of an emergency involving radioactive materials. Included are such items as fires, spills, monitor alarms and missing sources.

In addition, the plant Fire Brigade receives general instruction regarding fighting fires involving radioactive or other toxic materials.

GENERAL ELECTRIC

(9g) A semiannual inventory is made by physically locating sealed sources and verifying quantities of unsealed sources. The attached "Source History" form is used. Entries to this form are at changes only. That is, the semiannual inventories aren't recorded unless a change in location is determined.

Item #10 - Waste disposal.

Attached is a revised Attachment #8 to correct the oversight.

Other Items.

During the meeting of July 18, 1978, Mr. Guinn indicated that Krypton-85 may be released to the environment at an annual average concentration of up to $1x10^{-5}$ uCi/ml with no need for micrometeorological data or determining effluent pathways. An increased release rate for venting of Kr85 from leak test facilities is requested. The Space Center, on Goddard Blvd., is equipped with two exhaust stacks which terminate at a height of approximately 64 feet above grade, which is slightly greater than 1.3 times the height of the building. Grade level is above the surrounding terrain. The nearest residence is further than one-half mile. No site micrometeorological data have been taken. The total flow rate of both exhausts is 860 ft^3/min. The quantity emitted during one year at a concentration of $1x10^{-5}$ uCi/ml would be 128 curies. This value is greater than the anticipated annual requirements.

Please contact me or the Radiation Safety Officer, Mr. R. G. Oesterling, at 215-962-5926 if there are additional questions.

Cordially,

Thomas P. Handley, Manager
Industrial Security, Safety
and Administrative Services

TPH:mon
attachments
cc: RG Oesterling

GENERAL ELECTRIC

SPACE DIVISION

GENERAL ELECTRIC COMPANY . . . . . VALLEY FORGE SPACE CENTER
(MAIL: P. O. BOX 8555, PHILADELPHIA, PENNSYLVANIA 19101), Phone (215) 962-2000

March 27, 1980

Mr. Bernard Singer, Chief
Radioisotopes Licensing Branch
Division of Fuel Cycle & Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Ref: U.S. NRC License #37-02006-05

Dear Mr. Singer:

The referenced license is a Type A specific license of broad scope. One of the activities under this license and approved by the radiation safety committee is the use of krypton-85 for leak testing of spacecraft. The method of use is described in the attachments.

This letter is to request an amendment to license #37-02006-05 which would permit our radiation safety committee to authorize testing at the USAF Eastern Test Range, Cape Canaveral, Florida. The five attachments contain a description of the testing, the facilities and provision for radiation protection services.

Also attached is a check for $40.00 in accordance with the fee schedule in 10CFR Part 170 for an amendment to a category 3K license. Your early attention to this request will be greatly appreciated to assure that we may meet our schedule committment under a US Dept. of Defense contract.

T. P. Handley

T. P. Handley, Manager
Industrial Security, Safety,
Medical & Administrative Services

TPH:mon
attachments

Attachment #1

Leak Test Operator Qualifications

The personnel who will perform krypton-85 leak testing at the ETR will be approved by the Ionizing Radiation Advisory Group. Requirements for approval include the following:

- Completion of training in the use of the TRW leak detection apparatus as certified by the Manager, Systems Test
- Experience with at least one leak test at the Valley Forge Space Center
- Education and training in the radiation protection aspects of Kr85 by the Space Division Health Physicist
- Education in license requirements by the Health Physicist
- Approval by the VFSC Medical Services to perform radiation work

The Manager, Systems Test will maintain a roster of all currently approved leak test operators and be responsible for the conduct of all General Electric personnel associated with these tests.

Attachment #2

Description of Leak Test System

Purpose

The reason for leak testing the spacecraft by the method described below is to conform with quality assurance specifications of the U.S. Dept. of Defense. This method provides greater sensitivity to leakage than do other methods.

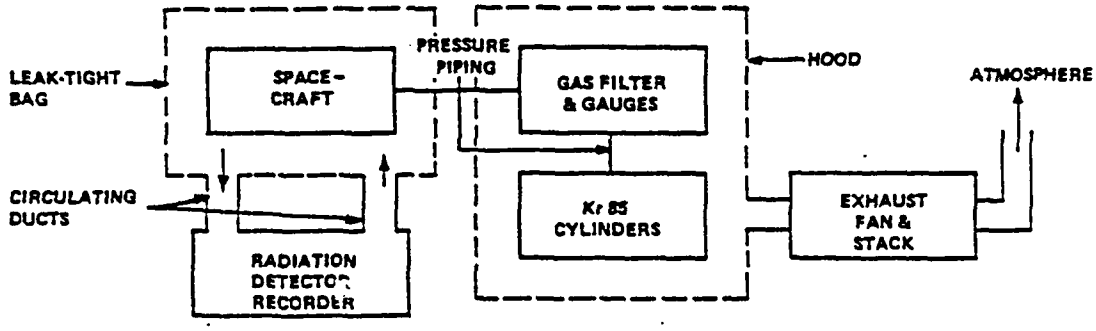
Apparatus

The following items are utilized to perform these tests:

- Kr-85 diluted with helium in standard gas cylinders at a concentration of about 1.5 microcuries per milliter
- gauges, piping, filters and pressurizing pump associated with Kr-85 cylinders
- a hood with powered exhaust ventilation to enclose the Kr85 cylinders and associated equipment during the progress of the test
- the spacecraft to be tested
- a leak-tight bag to enclose the article under test
- a radiation detector and associated circulating fan to measure the concentration of Kr85 in the bag enclosing the test article
- radiation protection monitoring equipment

Description of Leak Test Set-up

The leak test apparatus is set up according to the following block diagram to perform the leak test:



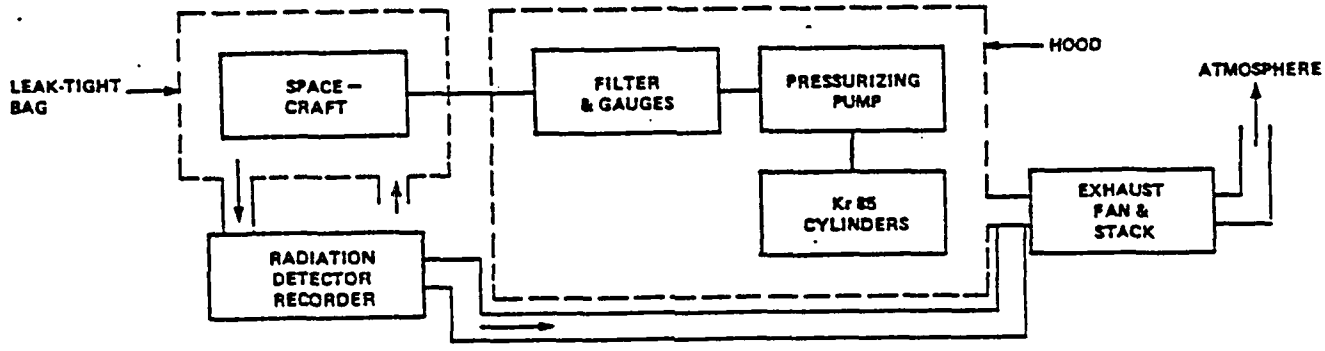
Attachment #2
continued

The spacecraft is pressurized with the Kr85/He mix through a filter and gauges. The Kr85 leaks from the test article into the leak-tight bag. The atmosphere in the bag is circulated in a closed loop through the radiation detector/recorder. The pressurization of the test article is controlled so that the expected concentration of Kr85 inside the leak-tight bag is normally less than 10 microcuries per cubic meter.

The piping and connections are checked for leak tightness prior to the introduction of Kr85 by pressurizing with inert gas. Valve manipulations are performed inside the hood.

Gas Recovery and Venting

At the end of the leak test, the set-up is reconfigured as shown in the following diagram:



The pressurizing pump is introduced into the system by means of valving. The gas in the spacecraft is pumped back into the cylinders. The leak-tight bag is vented through the detector/recorder as shown until the count rate in the detector reaches background. The amount of Kr85 vented through this route is somewhat less than 500 microcuries.

After the pump has reached its capability to pump the gas from the test article to the cylinders, a small amount of Kr85 remains in the spacecraft. The quantity is on the order of 1 millicurie. The quantity in the spacecraft is reduced to less than 100 microcuries by repetitive pressurizing and venting with nitrogen.. The venting gas is directed into the exhaust system.

At the completion of the entire test cycle the apparatus is surveyed for radiation due to residual radioactivity.

Attachment #3

Description of Facilities

The leak test operations will be conducted in the Satellite Assembly Building at the USAF Eastern Test Range. This building is equipped with an exhaust ventilation system. The flow rate is 500 cubic feet per minute. The stack terminates at 88 feet above grade. The building height is 70 feet above grade. The hood in attachment #2 would be connected to this exhaust system.

The occupancy of the site in a radius of 400 meters is about 75 people. The population within a radius of 800 meters is approximately 1500. All of these people are employees at the ETR.

Attachment #4

Safety Analysis & Radiation Protection

Emergency Actions

The spacecraft piping and associated equipment will have been tested for leakage prior to the final test at the ETR. Extreme care is used to avoid damaging the spacecraft in any manner due to its high value. The gas cylinders are handled with carts and normal industrial good practices to avoid damage.

Emergency situations and actions are as follows:

- Castrophic failure - evacuation of all personnel until Kr85 has dispersed to a concentration of 10 uCi/m^3 or less.
- Major piping break or other leak - one previously identified individual valves off the cylinder, then evacuates. All others evacuate at the start.
- Minor or over-specification leakage - gas supply is valved off, gas is recovered as appropriate or vented so that repairs can be performed.

Experience at the Valley Forge Space Center has shown that the systems described herein are highly reliable against leakage.

Gas Release Analysis

All Kr85 is normally vented through the 27 meter stack on the Satellite Assembly Building. The normal release rates are expected to be less than 2 millicuries over a period of about one hour at the end of a test.

However, in the event of failure of the cylinder pressurizing pump, it may be necessary to vent the spacecraft and release the inventory in the spacecraft of about 0.5 Ci. In this case, the maximum permitted venting rate is determined by the ground level concentration. The limiting concentration is taken to be 3×10^{-7} uCi/ml, which is the maximum permitted continous concentration for exposure to the general population. Sutton's equation for the maximum downwind concentration:

$$X_{max} = \frac{2Q\ Cz}{e\pi u h^2 Cy}$$

Values:

$X_{max} = 3 \times 10^{-7}$ uCi/ml = maximum downwind concentration
Q = release rate
e = 2.71
π = 3.14
u = wind speed = 1 meter/second
h = stack height = 27 meters
Cz,Cy = diffusion coefficients
Cz = Cy (isotropic diffusion)

This yield maximum permitted leak rate of 1.9 millicuries per second.

Attachment #4
continued

Radiation Protection & Administrative Controls

Radiation protection services will be under the direction of the Valley Forge Space Center Radiation Protection Officer. The available instrumentation of the VF Space Center will be utilized at the Eastern Test Range as needed.

Administrative control will be in accordance with the test procedure #DC3-TP-6103. This procedure will be available at the site.

Attachment #5

Radioactive Materials

Isotope	Form	Quantity	Use
Kr85	any	15 Curies	leak test gas
Ba133	sealed	20 microcuries	calibration source

64.

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SPACE DIVISION

GENERAL ELECTRIC COMPANY . . . . . VALLEY FORGE SPACE CENTER
(MAIL: P. O. BOX 8555, PHILADELPHIA, PENNSYLVANIA 19101), Phone (215) 962-2000

June 5, 1980

U.S. Nuclear Regulatory Commission
Office of Nuclear Materials Safety & Safeguards
Materials Licensing Branch
Washington, D.C. 20555

Dear Sir:

This letter requests an amendment to materials license SMB-1005 to include source materials presently covered under Special Nuclear Materials license SNM-1199.

Concurrent with this amendment we are also requesting that Special Nuclear Material license SNM-1199 be allowed to expire as of June 30, 1980.

The specific nuclear materials that need to be transferred from SNM-1199 to SMB-1005 are as follows:

Material	Maximum Amount
A. Plutonium	5 sealed sources of Pu^{238} totalling less than 6 milligrams 3 sealed sources of Pu^{239} totalling less than 1 milligram

Only one of the Pu^{238} sources and a set of Pu^{239} calibration sources have been used in the last 4 years. Both of these sources are only used to check and calibrate health physics instruments.

The remainder of this plutonium is and will remain stored in our radiation safety vault until an acceptable means of disposal of transfer to another Special Nuclear Materials License can be arranged.

C. Uranium enriched 4.7 grams as sealed sources
in the U-235 isotope

These sources have also not been used for several years and will also be kept in storage until some transfer can be arranged.

GENERAL ELECTRIC

Items B and D of License SNM-1199 (one milligram of sealed U-233 and 300 grams of contained U-235) were never purchased or used by this facility. Thus, there is no need to transfer these materials to License SMB-1005.

The use of Uranium and Thorium presently covered by license SMB-1005 will remain the same as outlined in our application dated August 23, 1979. Of the materials being transferred from license SNM-1199 to SMB-1005 only a small amount of the plutonium will be used to calibrate Health Physics instruments.

There will be no specific use of the remaining special nuclear material presently covered by license SNM-1199 and this material will remain in storage until an acceptable method of disposal or transfer to another SNM license holder can be arranged.

Enclosed with this request is a check for $40.00 to cover this amendment fee.

If there are any further questions concerning this amendment, please contact me at 215-962-3129 or A. W. Kobylinski our Radiation Safety Officer at 215-962-1085.

Very truly yours,

T. P. Handley

T. P. Handley, Chairman
Ionizing Radiation Advisory Group

TPH:mon
cc: A. W. Kobylinski

encl.

66

GENERAL ELECTRIC

SPACE DIVISION

GENERAL ELECTRIC COMPANY . . . . . VALLEY FORGE SPACE CENTER
(MAIL: P. O. BOX 8555, PHILADELPHIA, PENNSYLVANIA 19101), Phone (215) 962-2000

November 5, 1980

Ms. Lynn O'Rielly
US Nuclear Regulatory Commission
Office of Nuclear Materials Safety & Safeguards
Materials Licensing Branch
Washington, D.C. 20555

Dear Ms. O'Rielly:

Attached is a copy of a letter that was sent to the Materials Licensing Branch on June 5, 1980, requesting an amendment to License SMB 1005.

At this time, we are again requesting an amendment to Materials License SMB 1005 (Control Number 15-997) to allow it to include materials presently covered under License SNM 1199 (Control Number 15-998).

Shortly after speaking with you last June, I was informed by the local NRC Office and the former Space Division Health Physicist, that this amendment would have a greater chance of being approved if we were to transfer three 30 millicurie Pu ^{238} sealed sources, presently covered under SNM 1199, to some other Special Nuclear Material license holder.

For the past several months I have been attempting to find another SNM license holder who has some use for these sources. In August, I was finally put in contact with the Department of Energy's Pu ^{238} reclaimation operation at Savannah River. I was told on the phone by a DOE representative that the Savannah River Operation would most likely be able to accept our Pu ^{238} sources for reclaimation purposes. However, on October 17, 1980, I received a letter from Savannah River stating that they could not accept these sources due to their small size.

The letter from Savannah also directed me to contact DOE's Director of Operations in Washington, D.C. and have the Pu ^{238} declared as waste.

The response I received from the DOE's Director of Operations Division was that since the three Pu ^{238} sources are presently the property of the General Electric Company, they are considered to be commercial sources and thus cannot be declared as waste under DOE regulations.

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It now appears that there is no acceptable way for us to transfer or dispose of this material and we are back where we started.

As stated in our letter of June 5, 1980, with the exception of four very small Pu 239 sources that are used for instrument calibration, none of the material covered under SNM 1199 has been used for any purpose in several years. Further, there is no intended use for any of this material in the foreseeable future.

The specific Special Nuclear Material that we do have at this facility under SNM 1199 is as follows:

Number	Source	Activity	Type	Present Location	Present Use
12	Pu 238	5 pico curies	Solid	Radiation Vault	None
13	Pu 238	5 micro curies	Sealed	Radiation Vault	None
16	Pu 238	30 millicuries	Sealed	Radiation Vault	None
17	Pu 238	30 millicuries	Sealed	Radiation Vault	None
18	Pu 238	30 millicuries	Sealed	Radiation Vault	None
14	Pu 239	5 micro curies	Sealed	Radiation Vault	None
9	Pu 239	4 micro curies	Sealed	Radiation Vault	None
11	Pu 239	$\approx$0.38 microcuries (Total) a) 3.78 E^{-4} μCi b) 2.84 E^{-3} μCi c) 3.1 E^{-2} μCi d) 3.36 E^{-1} μCi	Sealed	H.P. Office	Instrument Calibration
19	U 235	1.0 microcuries	Sealed	Radiation Vault	None
20	U 235	$<$0.01 microcuries	Sealed	Radiation Vault	None

All of the above material is located at General Electric Company's Valley Forge Space Center, Goddard Blvd., King of Prussia, PA. Source number 11, the Pu 239 calibration set, is the only Special Nuclear Material for which there is any use at this facility.

If you believe that it will not be possible to approve this amendment request as it is, please advise me of the possibility of obtaining a license to cover this Special Nuclear Material for storage only.

A check for Seventy Dollars ($70.00) to cover the additional cost of this amendment application will follow shortly.

If you have any further questions about this amendment, please contact me at (215)962-1085.

Sincerely,

A. W. Kobylinski
Radiation Safety Officer

attachments
cc: TP Handley

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

January 25, 1984

Docket No. 030-06046

General Electric Company
Space Systems Division
ATTN: John R. McFadden
Health Physicist
GE/SSD, Valley Forge Space Center
Safety Office Room L9506, POB 8555
Philadelphia, PA 19101

License No. 37-02006-05

Control No. 02064

SUBJECT: LICENSE RENEWAL APPLICATION

Gentlemen:

This is to acknowledge receipt of your application for renewal of the material(s) license identified above. Your application is deemed timely filed, and accordingly the license will not expire until final action has been taken by this office.

Any correspondence regarding the renewal application should reference the control number specified and your license number.

Sincerely,

Original Signed By
Doris J. Foster

John E. Glenn, Ph.D., Chief
Nuclear Materials Section B
Division of Engineering and
Technical Programs

"OFFICIAL RECORD COPY"

MLIO

FEB 1 1984

General Electric Company
Space Systems Division
ATTN: Mr. John R. McFadden
Health Physicist
Valley Forge Space Center
P.O. Box 8555
Philadelphia, Pennsylania 19101

Gentlemen:

This refers to your application dated January 16, 1984, for renewal of Materials License 37-02006-05.

We received your check for $150. Your application, however, is subject to renewal fees totalling $610 as specified in Categories 1J ($460) and 3K ($150) of Section 170.31, 10 CFR 170, copy enclosed. Payment of the additional $460 should be made to the U.S. Nuclear Regulatory Commission and mailed to my attention at our Washington, D.C. address.

Your application will be processed by the Region I Licensing staff located at 631 Park Avenue, King of Prussia, Pennsylvania 19406. The additional fee, however, is required prior to issuance of the renewal. When submitting the fee, please refer to CONTROL NUMBER 02064.

Sincerely,

Glenda Jackson
License Fee Management Branch
Office of Administration

IJ fee due not 1J per call w/ GE 2/10/84 - sources for storage only

Enclosure:
10 CFR 170

cc: Region I

DISTRIBUTION:
Pending Fee File
Weekly Reading File
Materials Reading File

8409270482 840801
NMS LIC30
37-02006-05 PDR

MLIO

OFFICE	LFMB:ADM	LFMB:ADM
SURNAME	FBrown:rej	GJackson
DATE	2/ /84	2/ /84

OFFICIAL RECORD COPY

2/68

AUG 0 1 1984

License No. 37-02006-05
Docket No. 030-06046
Control No. 02046

General Electric Company
Space Systems Division
ATTN: Thomas P. Handley, Manager
Industrial Security, and
Administrative Services
Valley Forge Space Center
P. O. Box 8555
Philadelphia, Pennsylvania 19101

Gentlemen:

Enclosed is Amendment No. 39 to renew License No. 37-02006-05. You should review this amendment for correctness and to assure that any changes in procedures required by the conditions are implemented.

We wish you continued success with your licensed program.

Sincerely,

/s/ John E. Glenn, Ph.D., Chief
Nuclear Materials Section B
Division of Engineering and
Technical Programs

Enclosures:
1. Amendment No. 39
2. Form NRC-313(I)
3. Form NRC-3

RI:DETP
Davis/cop
8/1/84

RI:DETP
Glenn
8/1/84

OFFICIAL RECORD COPY 37-02006-05/LTR - 0001.0.0
07/27/84

MLIO

AUG 2 2 1984

General Electric Company
ATTN: Mr. Jack McFadden, Health Physicist
Safety Officer
Valley Forge Space Center
P.O. Box 8555
Philadelphia, Pennsylvania 19101

Gentlemen:

This refers to License 37-02006-05, Amendment No. 39, which was issued August 1, 1984 in response to your application for renewal dated January 16, 1984. Through an oversight, the license was reviewed without remittance of the prescribed fee.

We received your checks totalling $260 in payment of the renewal fee specified in fee Categories 1I ($110) and 3K ($150) of §170.31 of the enclosed 10 CFR 170, which was in effect at the time your application was filed. Your request for storage only of special nuclear material, however, should have been subject to a renewal fee of $460 as specified in fee Category 1J. Fee Category 1I applies only to licenses authorizing possession and use of special nuclear material in sealed sources contained in devices used in industrial measuring systems. Accordingly, please remit the additional $350 fee within 20 days from the date of this letter. Payment should be made to the U.S. Nuclear Regulatory Commission and mailed to my attention.

We apologize for the inconvenience this oversight may cause you or your Company.

Sincerely,

Original Signed by
A. S. Cabell

Glenda Jackson
License Fee Management Branch
Office of Administration

Enclosure:
10 CFR 170

DISTRIBUTION:
Pending Fee File
Weekly Reading File
Materials Reading File

OFFICE	LFMB:ADM	LFMB:ADM					
SURNAME	ASCabell:rej	/ GJackson					
DATE	8/ /84	8/ /84					

NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY

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SPACE SYSTEMS DIVISION
GENERAL ELECTRIC COMPANY • VALLEY FORGE SPACE CENTER • P.O. BOX 8555 • PHILADELPHIA, PENNSYLVANIA 19101 • (215) 962-2000

September 5, 1984

Glenda Jackson
License Fee Management Branch
Office of Administration
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Ms. Jackson:

Per your letter of August 22, 1984, attached is a check for $350.00 to cover the additional fee for Amendment No. 39 to license 37-02006-05.

Sincerely,

A. W. Kobylinski
Senior Industrial Hygienist

/aab
Enc.

Applicant.....
Check No. 663016
Amount, Fee Category 1T-$350.
Type of Fee... REN
Date Check Rec'd. 9/10
Received By... ann

See 1/17/84 ltr.