

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, 3198 CHESTNUT ST., PHILADELPHIA, PENNSYLVANIA 19101
Phone (215) 823-2000

SPACE DIVISION

RE-ENTRY SYSTEMS

Re-entry Systems Operation

January 25, 1983

To: U.S. Nuclear Regulatory Commission
Region I, Material Program Section 2
631 Park Avenue
King of Prussia, PA 19406

Dear Sirs:

Enclosed is an application for amendment to License No. SUB-831 (Docket or Reference No. 040-07344). Also enclosed is a check for \$40.00 to cover the application fee.

If there are any questions, please contact the undersigned.

Sincerely,

Jack McFadden
John R. McFadden, Health Physicist

Safety Office, Rm. 3026, x3745

RECEIVED BY LFMB	
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Applicant	
Check No.	6610577
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Act, exemptions 6
FOIA- 2007-304

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U.S. NUCLEAR REGULATORY COMMISSION
APPLICATION FOR SOURCE MATERIAL LICENSE

Pursuant to the regulations in Title 10, Code of Federal Regulations, Chapter 1, Part 40, application is hereby made for a license to receive, possess, use, transfer, deliver or import into the United States, source material for the activity or activities described.

1. (Check one) <input type="checkbox"/> (a) New license <input checked="" type="checkbox"/> (b) Amendment to License No. <u>SUB-831</u> <input type="checkbox"/> (c) Renewal of License No. _____ <input type="checkbox"/> (d) Previous License No. _____		2. NAME OF APPLICANT <u>General Electric Co., Re-entry Systems Operation</u>	
		3. PRINCIPAL BUSINESS ADDRESS <u>3198 Chestnut Street</u> <u>Phila., PA 19101</u>	
4. STATE THE ADDRESS(ES) AT WHICH SOURCE MATERIAL WILL BE POSSESSED OR USED <u>See Attachment 4.</u>			
5. NAME OF PERSON TO BE CONTACTED CONCERNING THIS APPLICATION <u>John R. McFadden - Rm. 3026</u>		6. TELEPHONE NO. OF INDIVIDUAL NAMED IN ITEM 5 <u>(215) 823-3745</u>	
7. DESCRIBE PURPOSE FOR WHICH SOURCE MATERIAL WILL BE USED <u>Research, development, and manufacturing programs related to the missile and space programs.</u>			
8. STATE THE TYPE OR TYPES, CHEMICAL FORM OR FORMS, AND QUANTITIES OF SOURCE MATERIAL YOU PROPOSE TO RECEIVE.			
(a) TYPE	(b) CHEMICAL FORM	(c) PHYSICAL FORM (Including % U or Th.)	(d) MAXIMUM AMOUNT AT ANY ONE TIME (kilograms)
NATURAL URANIUM			
URANIUM DEPLETED IN THE U-235 ISOTOPE			
THORIUM (ISOTOPE)	<u>thoriated magnesium (natural thorium oxide)</u>	<u>solid metal alloy plate (1-4% Th by wgt.)</u>	<u>66 kilograms</u>
(e) MAXIMUM TOTAL QUANTITY OF SOURCE MATERIAL YOU WILL HAVE ON HAND AT ANY TIME (kilograms) <u>790 kilograms</u>			
9. DESCRIBE THE CHEMICAL, PHYSICAL, METALLURGICAL, OR NUCLEAR PROCESS OR PROCESSES IN WHICH THE SOURCE MATERIAL WILL BE USED, INDICATING THE MAXIMUM AMOUNT OF SOURCE MATERIAL INVOLVED IN EACH PROCESS AT ANY ONE TIME, AND PROVIDING A THOROUGH EVALUATION OF THE POTENTIAL RADIATION HAZARDS ASSOCIATED WITH EACH STEP OF THOSE PROCESSES. <u>See Attachment 9.</u>			
10. LIST THE NAMES AND ATTACH A RESUME OF THE TECHNICAL QUALIFICATIONS INCLUDING TRAINING AND EXPERIENCE OF APPLICANT'S SUPERVISORY PERSONNEL AND THE PERSON RESPONSIBLE FOR THE RADIATION SAFETY PROGRAM (OR OF APPLICANT IF AN INDIVIDUAL). <u>See Attachment 10.</u>			
11. DESCRIBE THE EQUIPMENT AND FACILITIES WHICH WILL BE USED TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE OR PROPERTY AND RELATE THE USE OF THE EQUIPMENT AND FACILITIES TO THE OPERATIONS LISTED IN ITEM 9: INCLUDE: (a) RADIATION DETECTION AND RELATED INSTRUMENTS (including film badges, dosimeters, counters, air sampling, and other survey equipment as appropriate. The description of radiation detection instruments should include the instrument characteristics such as type of radiation detected, window thickness, and the range(s) of each instrument). <u>See Attachment 11.</u>			
(b) METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED IN (a) ABOVE, INCLUDING AIR SAMPLING EQUIPMENT (for film badges, specify method of calibrating and processing, or name supplier). <u>See Attachment 11.</u>			

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11(c). VENTILATION EQUIPMENT WHICH WILL BE USED IN OPERATIONS WHICH PRODUCE DUST, FUMES, MISTS, OR GASES, INCLUDING PLAN VIEW SHOWING TYPE AND LOCATION OF HOOD AND FILTERS. MINIMUM VELOCITIES MAINTAINED AT HOOD OPENINGS AND PROCEDURES FOR TESTING SUCH EQUIPMENT.

See Attachment 11.

12. DESCRIBE PROPOSED PROCEDURES TO PROTECT HEALTH AND MINIMIZE DANGER TO LIFE AND PROPERTY AND RELATE THESE PROCEDURES TO THE OPERATIONS LISTED IN ITEM 9; INCLUDE: (a) SAFETY FEATURES AND PROCEDURES TO AVOID NONNUCLEAR ACCIDENTS, SUCH AS FIRE, EXPLOSION, ETC., IN SOURCE MATERIAL STORAGE AND PROCESSING AREAS.

See Attachment 12.

(b) EMERGENCY PROCEDURES IN THE EVENT OF ACCIDENTS WHICH MIGHT INVOLVE SOURCE MATERIAL.

See Attachment 12.

(c) DETAILED DESCRIPTION OF RADIATION SURVEY PROGRAM AND PROCEDURES.

See Attachment 12.

13. WASTE PRODUCTS: If none will be generated, state "None" opposite (a), below. If waste products will be generated, check here ☒ and explain on a supplemental sheet:

- (a) Quantity and type of radioactive waste that will be generated.
- (b) Detailed procedures for waste disposal. See Attachment 13.

14. IF PRODUCTS FOR DISTRIBUTION TO THE GENERAL PUBLIC UNDER AN EXEMPTION CONTAINED IN 10 CFR 40 ARE TO BE MANUFACTURED, USE A SUPPLEMENTAL SHEET TO FURNISH A DETAILED DESCRIPTION OF THE PRODUCT, INCLUDING:

- (a) PERCENT SOURCE MATERIAL IN THE PRODUCT AND ITS LOCATION IN THE PRODUCT.
- (b) PHYSICAL DESCRIPTION OF THE PRODUCT INCLUDING CHARACTERISTICS, IF ANY, THAT WILL PREVENT INHALATION OR INGESTION OF SOURCE MATERIAL THAT MIGHT BE SEPARATED FROM THE PRODUCT.
- (c) BETA AND BETA PLUS GAMMA RADIATION LEVELS (Specify instrument used, date of calibration and calibration technique used) AT THE SURFACE OF THE PRODUCT AND AT 12 INCHES.
- (d) METHOD OF ASSURING THAT SOURCE MATERIAL CANNOT BE DISASSOCIATED FROM THE MANUFACTURED PRODUCT.

CERTIFICATE

(This item must be completed by applicant)

15. 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 40, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

BY: John R. McFadden
(Signature)

Dated Jan. 24, 1983

John R. McFadden
(Print or type name)

Health Physicist
(Title of certifying official authorized to act on behalf of the applicant)

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.

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ATTACHMENT 4

The licensee's facilities at:

- a. 3198 Chestnut Street, Phila., PA 19101
- b. 401 E. Hunting Park Ave., Phila., PA
- c. Building 100, Goddard Blvd., King of Prussia, PA

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ATTACHMENT 9

A. NARRATIVE DESCRIPTION OF RECEIPT, USE AND DISPOSAL

The thoriated magnesium will be received as solid plates. Each plate will be approximately 4.5 feet wide x 7 feet long x 1.5 inch thick and will weigh approximately 400 pounds (containing approximately 8 pounds of thorium).

Each plate will be milled and drilled in the machine shop one at a time. After completion of machining, the machined part will have approximately the same outside dimensions as the raw stock but will only weigh approximately 80 pounds (containing approximately 1.6 pounds of thorium). The other approximately 320 pounds of the raw stock plate will be in the form of metallic chips and some small pieces.

The machined part will be transferred to another Aerospace Operation prior to its assembly into an Aerospace Vehicle.

At this time, it is planned to dispose of the scrap (320 pounds of each raw stock plate) by one or a combination of the following methods:

1. NRC - licensed radioactive waste disposal company
(Ex: Chem-Nuclear Systems, Inc.)
2. Return to plate manufacturer
(Dow Chemical Co.)

B. DESCRIPTION OF PROCESSES

The milling and drilling will all be done on one machine one plate at a time. This means that approximately 400 pounds of thoriated magnesium (approximately 8 pounds of thorium) will be the maximum amount being machined at one time.

C. EVALUATION OF POTENTIAL RADIATION HAZARDS

Based on information from users of magnesium thoriated to the percentages requested in item 8.C. and on the frequency and types of processes outlined in this application, there will be no significant radiation hazards associated with normal planned use of the material.

1. Machining

Machining and drilling of this material normally does not result in airborne concentrations which would require contaminated air control equipment or procedures.

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ATTACHMENT 9 (cont'd)

Air monitoring will be performed initially to verify that airborne contamination does not exceed the levels specified in 10CFR20.203(d). Subsequent monitoring will be performed when the nature or frequency of the machining/drilling process changes to one which could increase the generation of airborne contamination.

HEPA - filtered enclosures or local exhaust equipment will be used if required due to generation of significant airborne contamination.

2. Surface Contamination

Routine surveys for removable surface contamination will be made in the machining and drilling area. Fines and chips will be collected and controlled as radioactive material.

3. Material Handling

Removable surface contamination from large pieces of thoriated magnesium is not expected to be a problem. Surveys will be performed to quantify the magnitude of this hazard.

External exposure dose control should not be a significant hazard. A typical raw stock plate will measure approximately as follows:

<u>Distance from plate surface (feet)</u>	<u>mR/hr</u>
0	3
1	2
3	0.5
6	0.2

Again, the type and frequency of operations covered in this application should not result in an exposure dose greater than 25% of the established limits. Personnel radiation badges will be issued initially to verify this.

4. Contamination Due To Magnesium Fire

Magnesium is one of the combustible metals, and a magnesium (thoriated) fire could result in the spread of airborne and surface radioactive contamination.

Strict adherence to existing, successful magnesium fire control procedures will be implemented.

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ATTACHMENT 10

6. 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 supervisors of personnel working with ionizing radiation, for managers of components utilizing ionizing radiation, for the IRAG, for the Manager - Industrial Security, Safety and Administrative Services, for the Manager - Industrial Safety and Hygiene, for the Health Physicist, and for the Medical Director). Also included in M-6 are the responsibilities and procedures for procuring, receiving and transporting of radioactive materials.

Members of the IRAG include:

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

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ATTACHMENTS 10

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

A. Education

Wentworth Institute (b)(6)
Boston, Massachusetts (b)(6)

EWB

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

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ATTACHMENTS 10

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 numerous 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)

ATTACHMENTS 10

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

A. Education

(b)(6)

- CV*
- 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.

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ATTACHMENTS 10

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., (b)(6) Biology

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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 radio-nuclide 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

3198 Chestnut Street
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ATTACHMENT 11

Equipment, Facilities, and Instrumentation

A1. Site

The milling and drilling will be performed on one machine in room T470 at 3198 Chestnut Street in Philadelphia. This room is actually a pit below the basement level and is 35 feet wide by 40 feet long. The pit is approximately 10 feet below the basement floor elevation. This gives the machine shop pit a ceiling height of about 20 feet with the top 10 feet on all sides open to the surround-basement floor.

Raw stock will be warehoused at 401 E. Hunting Park Ave. in Philadelphia.

Waste (chips and small pieces) will be kept in closed metal drums and will be stored in room T470 and in an outside covered ramp area at the Chestnut Street address.

A2. General Safety Equipment

The machine operators will wear fire-retardant clothing and gloves in addition to safety glasses.

Chips and fines will be collected in separate, plainly marked, and covered noncombustible receptacles.

A 30-lb. Met-L-X fire extinguisher and an ample supply of powdered graphite will be available at each machining and chip storage location.

Initial air sampling will be accomplished using the following:

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

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

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

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ATTACHMENT 11

A3. Radiation Detection Instruments

<u>RADIATION DETECTION EQUIPMENT</u>	<u>#</u>	<u>RADIATION DETECTED</u>	<u>RANGES</u>	<u>WINDOW THICKNESS</u>	<u>USE</u>
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	Surveying and measuring items
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	Surveying and measuring items
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	Surveying and measuring items
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	Surveying and measuring items
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	Surveying and measuring items
Nuclear Measurements Corp. Model PC-4 Proportional Counting System	1	alpha, beta, gamma, X-ray	0-3500K cpm	windowless	Counting wipes and filters

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ATTACHMENT 11

A3. Radiation Detection Instruments

<u>RADIATION DETECTION EQUIPMENT</u>	<u>#</u>	<u>RADIATION DETECTED</u>	<u>RANGES</u>	<u>WINDOW THICKNESS</u>	<u>USE</u>
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	Surveying and measuring items
"	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 wipes and 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 need- ed	beta, gamma, X-ray	-	-	Monitoring personnel using items

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ATTACHMENT 11

B1. Methods, Frequency, and Standards

Radiation monitoring equipment is calibrated every six months 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 flowmeter 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).

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ATTACHMENT 11

C1. Ventilation Equipment

Machining and drilling will be performed in a well-ventilated area. No special contaminated air control equipment should be necessary (see Attachment 9).

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ATTACHMENT 12

12A. Safety Procedures-Nonnuclear Accidents

Flammable solvents, other than those to be of reagent grade, may be used only from approved containers. Large quantities in work areas must be stored in approved flammable liquid storage cabinets or in approved safety cans of not over five gallons capacity; only quantities needed for one day's use should be on hand outside the storage cabinet; bulk storage must be in a designated central facility.

Fire protection planning is in accordance with OSHA, NFPA, and Factory Mutual recommendations.

Special in-house permits are required for the use of heat-producing devices outside certain designated areas.

Attached are copies (following five pages) of specific fire prevention instructions concerning combustible metals from the plant safety manual; see the following:

	<u>page designation</u> <u>in manual</u>	<u>paragraph</u> <u>designation</u>	<u>topic</u>
a.)	F-1-7	1.6.5.1	Reporting fires
b.)	F-1-8 & 9	1.6.7.4	Class "D" Fires
c.)	F-1-14 & 15	1.7.3.3	Combustible metal scrap

(Note: radioactive combustible metal scrap will be disposed in a manner separate from nonradioactive combustible metal scrap.)

12B. Emergency Procedures

See "Reporting Fires" in attachment referenced in 12A above.

1.6.5 FIRE EMERGENCY PROCEDURE

1.6.5.1 Reporting Fires

1. In event of fire, if you are not absolutely sure of your ability to extinguish the fire, go to the nearest fire alarm pull box and pull handle down. If you are in an area where there are no fire alarm boxes, go to the nearest telephone and dial A-FIRE (2-3473). Give your name, phone number and location of the fire.
2. Attempt to extinguish the fire by using the fire extinguisher available for the area. If there is any question of personal safety, leave the fire area immediately and close all doors.

1.6.6 PROCEDURE FOR EVACUATION OF BUILDING

If conditions are such that evacuation of the building or parts of the building becomes necessary, the following procedures shall be used:

1. The Fire Chief, Patrol Captain, Emergency Brigade officer or other authorized employees shall initiate the evacuation signal for affected zone(s) or, if necessary, the entire building when conditions warrant.
2. The evacuation signal is a steady ringing of the bells for one minute. Do not evacuate if the bells ring intermittently (coded signals). The coded signals are used to inform only the Plant Emergency Brigade of the emergency location.
3. When the evacuation alarm sounds, secure all classified material and prepare to leave the building. Close all doors when leaving the area.
4. Fire monitors assigned to each area shall advise personnel of their assigned fire exit route and the outside assembly area as part of the overall emergency plan and, when the evacuation alarm sounds, shall instruct personnel to leave the area.
5. Personnel shall not reenter the building until the "ALL CLEAR" signal is sounded. This signal is the same as the signal for evacuation (a steady ringing of the bells for one minute).
6. All personnel shall comply with instructions of the Fire Monitors and fire fighting personnel.
7. Evacuation drills shall be conducted periodically and shall be announced well in advance. If the evacuation alarm sounds, and plans for a drill have not been announced, it shall be assumed there is a true emergency and the instructions above followed precisely.

8. All exits, corridors and aisles shall be kept clear and free of materials to ensure unimpeded egress from the building in case evacuation is necessary or other emergency usage is required.

1.6.7 CLASSIFICATION OF FIRES AND SUITABLE EXTINGUISHING AGENTS

Fires are classified by the kind of combustible materials involved and must be treated by using different extinguishing agents and different methods of attack. The size of the fire, hence the quantity of fuel, will dictate in many cases the kind and quantity of equipment needed. Obviously, the smaller the fire the easier to control and the less damage; and conversely, the larger the fire the more difficult to control and extinguish and the greater the damage and loss.

1. Class "A" Fires. Fires involving ordinary combustible materials such as paper, wood and cloth are extinguished by using water extinguishers which effects cooling quenching. These pressurized water extinguishers are strategically located and are preferred for Class "A" fires.
2. Class "B" Fires. Fires involving flammable liquids such as grease, paint, gasoline, oil, acetone, kerosene, ether and flammable solvents are extinguished by either smothering (excluding oxygen) or destroying the chemical chain reaction of the fire. Carbon dioxide (CO₂), dry chemical, and Halon 1211 extinguishers control such fires and are available in areas where these materials are handled.
3. Class "C" Fires
 - a. Class "C" fires occur in electrical equipment where non-conducting extinguishing agents must be used.
 - b. Carbon dioxide (CO₂) dry chemical or Halon 1211 extinguishers shall be used to extinguish Class "C" fires.
 - c. Because water or water base extinguishing materials are electrically conductive, they shall not be used under any circumstances on Class "C" fires. Such extinguishers may not only injure or kill a person operating such an extinguisher but may also subject electrical equipment to severe damage.
4. Class "D" Fires. Class "D" fires occur in combustible metals such as magnesium, sodium, potassium, cesium, lithium, titanium, etc.
 - a. Normal extinguishing agents shall not be used on metal fires because there is a danger in most cases of increasing the intensity of the fire. Chemical reaction may be violent between some extinguishing agents and the burning metal.

- b. Met-L-X extinguishers are available in all areas handling combustible metals and shall be used exclusively on this particular class of fire. Operations planning to use combustible metals shall contact the Industrial Safety and Hygiene Office prior to such use so that suitable extinguishing agents may be provided.

1.6.8 FIRE EXTINGUISHER CONTROL

This instruction details the importance of the availability, use and maintenance of fire extinguishers throughout the Valley Forge Space Center.

1. Fire extinguishers shall be placed throughout the Valley Forge Space Center in such a manner so that, in an emergency, the proper extinguisher will be within fifty (50) feet. However, in certain office areas they may be somewhat farther apart, but not to exceed 100 feet from any point. Appropriate extinguishers shall be available for specific occupancies or operations and shall be inspected on a monthly schedule to assure reliable and efficient operation in case of fire.
2. All fire extinguishers shall be clearly labeled stating their specific use and instructions for proper handling techniques.
3. When a fire extinguisher has been used or the seal has been broken, the Industrial Safety and Hygiene Office shall be notified so that it can be recharged and returned to service or replaced immediately.
4. Articles such as clothing, wires, cables, tools or any other materials, shall not be placed on fire extinguishers or fire blankets.
5. Clear access to all fire extinguishers shall be maintained at all times.
6. Fire extinguisher locations shall not be changed unless the Fire Chief or Safety Engineer approves such changes.

1.6.9 AUTOMATIC SPRINKLER SYSTEMS - PROPER USE, MAINTENANCE AND CONTROL

Automatic sprinkler systems cover a major portion of the Valley Forge Space Center, especially the areas that are considered as ordinary and extra hazard classes. This instruction will cover the use, maintenance and control of sprinkler systems and all the auxiliary and related equipment of the plant fire protection water supply system and includes riser valves, post indicator valves, sectional valves, hydrants, fire pumps and reserve water supply.

1. The Valley Forge Space Center fire protection water loop shall not be used for any purpose other than fire protection without specific permission from the Safety Engineer or Fire Chief.

Emphasis must be placed on disposal of such combustibles when it has been determined that they are of no use, and those materials that are to be retained shall be stored neatly in sprinklered areas only. Such materials shall be stacked in a safe manner, no higher than a point 24 inches from sprinkler heads, so that they will not interfere with effective distribution of water in case of fire.

Cleaning rags or cloths shall be stored in metal cans with covers when used in shop or laboratory operations. When rags or cloths have been used and are soiled, they shall be placed in approved safety cans equipped with self-closing lids.

2. Storage of large quantities of flammable liquids such as drums (55 gal.) and bulk lots of smaller size containers, shall be stored in the flammable storage facility equipped with automatic sprinklers, positive floor level ventilation (continuous), safety shower and an eye bath. Good housekeeping shall be maintained at all times and no foreign combustibles stored in the area. Oxidizing materials shall not be stored in or close to the area or facility used for bulk storage of flammable liquids.
3. Unopened drums (manufacturer's seal intact) may be stored upright until placed in service. Once a drum is opened, it shall be placed in a steel rack, end bungs toward the aisle and side bungs at the top. The more volatile liquids shall be stored in the top tier of the dispensing rack. All drums shall have approved safety vents, vacuum relief vents, self-closing drum faucets and drip cans. Drums in service shall be grounded with approved grounding equipment to the established building ground. If a pump is used for dispensing, the pump shall be equipped with an approved dispensing hose (wire insert, full length) to form a suitable bond between the nozzle and the pump. An approved copper grounding cable with a ground clamp on the drum end and a spring clamp on the receiver end shall be used whenever liquid is transferred. The drum shall also be properly connected to the established ground in the facility.

1.7.3 COMBUSTIBLE WASTES

1. Common combustible waste such as paper, wood, rags, etc., shall be handled daily by Environmental Control. If an excessive amount of such waste material accumulates before the daily pick up, the Foreman, Environmental Control, shall be notified and the waste material removed promptly.
2. Flammable liquid waste shall be placed in approved waste containers provided by the Hazardous Waste Coordinator from the Environmental Control office and removed from the building as soon as possible. All flammable and other hazardous wastes shall be disposed of according to procedures outlined in Mandatory Procedure Waste Chemical Disposal, M-16.0, Section 16.4, Disposal of Chemicals.

3. Combustible metal scraps such as magnesium, titanium, sodium, potassium, cesium and others are subject to spontaneous heating and ignition and, as such, require special handling for disposition.
 - a. Magnesium and titanium chips, turnings and other fines require frequent collection to avoid large accumulations. Such scraps shall be placed in plainly labeled, dry, steel containers and stored outside of the building for regular scrap metal pickup.
 - b. Sodium, potassium, cesium and other alkali metals react on contact with air and require special handling for waste disposition. When these materials are to be disposed of, the Industrial Safety and Hygiene Office shall be noticed and safe disposition effected under the Safety Engineer's direction.

1.7.4 ELECTRIC OVENS, HOT PLATES, ETC.

Prevention of fires in electric ovens requires good design, housekeeping and a comprehensive preventive maintenance program.

1. Care must be exercised so that safe operating temperatures are not exceeded.
2. Foreign materials shall not be left in an oven when placed in operation.
3. Ovens shall be checked daily and cleaned whenever spills or vapor deposit accumulations introduce a fire potential.
4. All ovens shall be equipped with temperature limit controls and shall be checked periodically to preclude overheating.

1.7.5 HOT PLATES, COFFEE POTS, SPACE HEATERS AND OTHER HEAT-PRODUCING APPLIANCES

Hot plates, coffee pots, space heaters and other heat-producing appliances can be a source of fire when proper controls are not exercised. Such appliances shall not be left turned on and unattended, except approved laboratory type hot plates in use for test purposes. If it is necessary to leave an approved hot plate turned on, the Industrial Safety and Hygiene Office shall be notified and the hot plate tagged to that effect with the signature of the operation's manager affixed. In all other cases the leads (cords) shall be disconnected before leaving at the close of the workday.

All such appliances shall have the Underwriters Laboratory approval mark and shall be in good repair at all times, especially the controls, switches and leads. It is suggested that whenever possible, the leads (cords) be removed from the appliance and secured until it is used again. This will eliminate the possibility of unauthorized use of the appliance.

In all cases, combustible materials shall not be placed on or near heat-producing electrical appliances.

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12C. Radiation Survey Program and Procedures

General procedures which apply to all operations.

- a. Prior to the start of any work with ionizing radiation, all operations must be approved by the Ionizing Radiation Advisory Group (IRAG) according to Mandatory Safety Procedure M-6. A copy of M-6 is enclosed. Members of the IRAG include:
 - Chairman - T.P. Handley, Manager-Industrial Security, Safety, and Administrative Services
 - Secretary - J.R. McFadden, Health Physicist
 - Member - S.J. Mucha, M.D., Medical Director
 - Member - C.B. Chilton, Manager-Industrial Safety and Hygiene
- b. As part of the application for IRAG approval, each user must define a radiation protection program that will be used in the proposed operation. The IRAG will approve, disapprove, or amplify the operational safety procedures submitted.
- c. All operations thus approved must be coordinated with the health physicist. He is responsible to the IRAG for assuring that the written safety procedures are followed.
- d. The health physicist is responsible for the following:
 1. Radiation control including surveys and personnel badge program
 2. Contamination control including leak tests
 3. Coordinating with other departments to assure proper radiation safety procedures are followed
 4. Radiation safety orientation and training
 5. Record keeping, inventories, and other clerical requirements
 6. Waste disposal
 7. Providing radiation safety advice and assistance
 8. Radiation emergency procedures including dry runs
- e. 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.

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e. (continued)

The requirements for instruction of individuals vary with the proposed use and with the experience of the individual. Personnel with prior similar experience are normally 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 CFR 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 tests are seldom used.

- f. 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.

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- g. Receiving segregates all radioactive materials upon arrival and notifies the Safety Office. The Safety Office arranges for a direct radiation and contamination survey as appropriate before delivery of the radioactive material to the user. Shipping notifies the Safety Office when a shipment containing radioactive material is impending and the Safety Office arranges for a direct radiation and contamination survey of the unpackaged and packaged material to assure that radiological shipping regulations are met.
- h. 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.
- i. 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.
- j. 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.
- k. 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.
- l. Areas in which radioactive material is present must be properly posted.
- m. 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.

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- n. 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.
- o. Operations producing significant airborne radioactive contamination must provide 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. All operations given approval must be resurveyed if warranted by increased work activity, new work procedures, or changes in room ventilation.
- p. Radioactive waste must be kept segregated and disposed of thru the Safety Office.
- q. Acceptable average surface contamination levels for unrestricted use of premises and equipment (dpm/100 cm²) are as follows:

	Fixed	Removable
Transuranics, 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

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ATTACHMENT 12

Specific procedures which apply to possession and use of thoriated magnesium (machining and drilling) follow:

- a. Contaminated air control-see Attachment 9.C.1., 11.A2., 11.C1.
- b. Surface contamination-see Attachment 9.C.2.
- c. External exposure-see Attachment 9.C.3.
- d. Magnesium fire control-see Attachment 11.A2., 12.12A.
- e. Waste disposal-see Attachment 9.A., 9.C.2., 11A1., 11.A2., 13.
- f. Protective clothing-see Attachment 11.A2.
- g. Emergency procedures-see Attachment 12.12B.

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13. Waste Products

Close to one hundred percent of the radioactive waste will consist of metallic chips and small pieces of thoriated magnesium generated in the machining and drilling operation. There will also be some waste generated by decontamination processes. It is anticipated that all waste will be in the solid form. Each raw stock plate will generate approximately 5 to 10 cubic feet of waste product, and approximately 6 plates will be processed each year.

At this time, it is planned to dispose of the scrap by one or a combination of the following methods:

- a. NRC-licensed radioactive waste disposal company (ex. Chem-Nuclear Systems, Inc., 240 Stone Ridge Drive, Columbia, SC 29210)
- b. Return to plate manufacturer (ex. DOW Chemical Co.)



Valley Forge Space Center Safety Manual

SUBJECT
IONIZING RADIATION
CONTROL

CLASSIFICATION
MANDATORY
PROCEDURE

ISSUED
JULY 1982

NUMBER
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.

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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

<u>Part of Body</u>	<u>Rems per Calendar Quarter</u>	<u>Accumulated Dose in Rems</u>
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 rem per quarter is permissible, but accumulated dose must not exceed 5 (N-18) rem.

(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-producing 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 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.

01121



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

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

SHIPPER'S CERTIFICATION FOR RADIOACTIVE MATERIALS

<input type="checkbox"/> 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.
<input type="checkbox"/> SURFACE 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 <input type="checkbox"/> FISSILE CLASS II <input type="checkbox"/> FISSILE CLASS III <input type="checkbox"/>
NAMES, PLUS QUANTITY IN GRAMS, OR CONCENTRATION OR ENRICHMENT IN USE	
ADDITIONAL CERTIFICATION OBTAINED BY THE SHIPPER WHEN NECESSARY: SPECIAL FORM ENCAPSULATION CERTIFICATE(S) <input type="checkbox"/> TYPE B PACKAGING CERTIFICATE(S) <input type="checkbox"/> CERTIFICATE(S) FOR FISSILE MATERIAL <input type="checkbox"/> GOVERNMENT APPROVALS/PERMITS <input type="checkbox"/>	

RADIATION LEVELS: SURFACE _____ MREM/HR: THREE FEET _____ MREM/HR: ONE METER _____ MREM/HR

CONTAMINATION LEVELS: ALPHA _____ DPM/100 CM²: BETA-GAMMA _____ DPM/100 CM²

APPROVED FOR SHIPMENT _____
 (SIGNATURE OF HEALTH PHYSICIST AND DATE)

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

BETWEEN: William O. Miller, Chief
License Fee Management Branch
Office of Administration

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

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED

Applicant/Licensee:

General Electric Co.

Application Dated:

1/24/83

Control No.:

01121

License No.:

SUB-831 (40-7344)

2. FEE ATTACHED

Amount:

\$40.00

Check No.:

G610577

3. COMMENTS

Hedgcock Case

Signed

DJ Forter

Date

1/28/83

B. LICENSEE FEE MANAGEMENT BRANCH

1. Fee Category and Amount:

FEE

2. Correct Fee Paid. Application may be processed for:

Amendment

Renewal

License

Signed

Date