Regulatory Docket File

40-7344

GENERAL ELECTRIC

RE-ENTRY AND
ENVIRONMENTAL
SYSTEMS DIVISION

RECEIVED

GENERAL ELECTRIC COMPANY . . . . . 3198 CHESTNUT STREET
PHILADELPHIA, PENNSYLVANIA 19101, Phone (215) 823-1000
Safety Office, Room 2950 (215) 823-3745
Health Physicist - John R. McFadden

1978 APR 24 PM 12 03

U.S. NUCLEAR REG. COMMISSION
NMSS MAIL SECTION

To: UNITED STATES NUCLEAR REGULATORY COMMISSION
Source Material Licensing Branch
Washington, D.C. 20545

Dear Sir:

Enclosed are four copies of an application for renewal of GE/RESD's source material license (license number SUB-831, docket number 40-7344). The present license has an expiration date of May 31, 1978. 2D

If there are any questions concerning this application for renewal, please contact the undersigned individual.

Sincerely,

John R. McFadden

John R. McFadden, Health Physicist
General Electric Co. - RESD
Safety Office - Room 2950
3198 Chestnut Street
Phila., PA 19101
(215) 823-3745

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FOIA- 2007-304

FORM AEC-2
(3-64)

FORM APPROVED
BUREAU OF BUDGET NO. 38-R0002.

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR SOURCE MATERIAL LICENSE

RECEIVED
1978 APR 4 PM 12 03

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)
- ☐ (a) New license
- ☐ (b) Amendment to License No. _____
- ☒ (c) Renewal of License No. SUB-831
- ☐ (d) Previous License No. _____

2. NAME OF APPLICANT
General Electric Co., Re-entry and Environmental Systems Division

3. PRINCIPAL BUSINESS ADDRESS
3198 Chestnut Street
Philadelphia, Penna. 19101

4. STATE THE ADDRESS(ES) AT WHICH SOURCE MATERIAL WILL BE POSSESSED OR USED
See attachment.

5. BUSINESS OR OCCUPATION	6. (a) IF APPLICANT IS AN INDIVIDUAL, STATE CITIZENSHIP	(b) AGE
Manufacturing & Missile Research	Not applicable	Not applicable

7. DESCRIBE PURPOSE FOR WHICH SOURCE MATERIAL WILL BE USED.
Research, development, and manufacturing programs related to the Missle and Space Programs.

8. STATE THE TYPE OR TYPES, CHEMICAL FORM OR FORMS, AND QUANTITIES OF SOURCE MATERIAL YOU PROPOSE TO RECEIVE, POSSESS, USE, OR TRANSFER UNDER THE LICENSE

(a) TYPE	(b) CHEMICAL FORM	(c) PHYSICAL FORM (*Including % U or Th.*)	(d) MAXIMUM AMOUNT AT ANY ONE TIME (*in pounds*)
NATURAL URANIUM			
URANIUM DEPLETED IN THE U-235 ISOTOPE	See	attachment.	
THORIUM (ISOTOPE)			

(e) MAXIMUM TOTAL QUANTITY OF SOURCE MATERIAL YOU WILL HAVE ON HAND AT ANY TIME (*in pounds*)
724 kilograms or 1596 pounds.

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.

See attachment.

Applicant.....
Check No. C 152977
Amount $70 (2D Ren)
Date 4/19/78
Date Check Rec'd 4/25/78
Received By Jackson

10. DESCRIBE THE MINIMUM TECHNICAL QUALIFICATIONS INCLUDING TRAINING AND EXPERIENCE THAT WILL BE REQUIRED OF APPLICANT'S SUPERVISORY PERSONNEL INCLUDING PERSON RESPONSIBLE FOR RADIATION SAFETY PROGRAM (OR OF APPLICANT IF APPLICANT IS AN INDIVIDUAL).

See attachment.

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).

See attachment.

(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).

See attachment.

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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.

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.

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

See attachment.

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

See attachment.

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

(a) Quantity and type of radioactive waste that will be generated.

(b) Detailed procedures for waste disposal.

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.*

General Electric Company - RESD
(Applicant named in Item 2)

Dated March 29, 1978

BY: John R. McFadden
(Print or type name under signature)

John R. McFadden
Health Physicist, GE/RESD
(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.

GPO 881-771

General Electric Co. - RESD
3198 Chestnut Street
Phila., PA 19101
SUB-831 3/29/78

Item 4.

The licensee's facilities at:

a. 3198 Chestnut St., Phila., PA

b. D and Luzerne Sts., Phila., PA

c. 401 E. Hunting Park Ave., Phila., PA

d. STC Building 100, Goddard Blvd., King of Prussia, PA

e. CC&F Building 9, 751 Fifth Ave., King of Prussia, PA

f. Building A, 751 Vandenberg Ave., King of Prussia, PA

g. Morgantown Test Facility, Elverson, PA

Except that: Mass simulator tests utilizing prefabricated depleted uranium metal alloy components and the testing and handling incident to launch of re-entry vehicles containing prfabricated depleted uranium components may also be performed at Vandenberg Air Force Base, California, and Cape Canaveral Air Station, Florida.

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Item 8.

(a) Type	(b) Chemical Form	(c) Physical Form (Including % U or Th)	(d) Maximum Amount at any one time (in pounds)
A-Natural or Depleted Uranium	pure	solid, powder (99+% U)	5 kilograms or 11 pounds of U
B- "	metal alloy	prefabricated solid metal alloy components (90-99+% U)	456 kilograms or 1005 pounds of U
C- "	uranium dioxide (UO_2)	solid, powder (88% U)	228 kilograms or 503 pounds of U
D "	acetylacetonate of uranium-$U(C_5H_7O_2)_4$	solid, powder (38% U)	5 kilograms or 11 pounds of U
E-Natural Thorium	pure	solid, powder (99+% Th)	5 kilograms or 11 pounds of Th
F- "	thoriated tungsten (ThO_2-in tungsten alloy)	solid metal alloy billets (2% Th)	20 kilograms or 44 pounds of Th
G- "	acetylacetonate of thorium-$Th(C_5H_7O_2)_4$	solid, powder (37% Th)	5 kilograms or 11 pounds of Th

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Item 9.

Items 8A, 8D, 8E, and 8G.

These items, after being received in approximately one pound quantities, are placed in a glovebox. At the surface of the bottles in which the items are received, the exposure level is approximately 2 mR/hr or less, and, at a distance of three feet, is equal to background. The glovebox contains a nitrogen atmosphere at a slight positive pressure (approximately 0.25 inch of water). The glovebox's gas outlet is equipped with an absolute filter disc. Approximately one hundred grams of radioactive powder is transfered to a beaker containing an epoxy resin; after mixing and addition of catalyst, the mixture is poured into rod-shaped molds and allowed to cure at room temperature. The cast epoxy rod is the end product; trimming and cleaning of these rods are performed in the glovebox. External radiation exposure is minimal, and the use of a glovebox for operations involving powder or liquid manipulation controls a potential incorporation hazard; periodic wipe tests on the glovebox and its vicinity are made to check on the glovebox's integrity. The rods are made to the specifications of the buyer who uses them for research purposes.

Item 8B.

This item is received as a prefabricated solid metal alloy component weighing approximately 20 kilograms and is utilized as a mass simulator in the shape and size in which it is received. The component is not altered chemically or physically. It is placed in a holding fixture. Mechanical and electrical connections are made to already existing and designated terminals on the component. Remote testing (3 to 6 feet) is performed on the component in uncovered and enclosed conditions. After testing, the radioactive component, in the uncovered or enclosed condition, is packaged and transfered to the original shipper or to an organization designated by the original shipper. Incorporation hazards associated with handling these components are zero to minimal; external whole body radiation exposure levels (uncovered or enclosed component: 0.5 mR/hr, gamma, at one foot) are not a problem during testing; "hands-on" time with uncovered component (233 mrem/hr, beta, at surface - Radiological Health Handbook, revised January 1970) is minimal and so skin dose is not a problem.

Item 8C.

This item is received in powder form. The usual shipment includes twelve 5 lb.-bags, and standard operating procedure requires that the total quantity on hand at one time not exceed 100 pounds. When needed, the powder is transfered from storage to a designated hood which is equipped with absolute filters; here, one kilogram of powder is transfered to a porcelain dish. The remainder of the powder is returned to storage; the dish, containing the dispensed powder, is placed in an oven set at 600 degrees F for six hours; at the end of six hours, the oven temperature is lowered to 300 degrees F and

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Item 9 (cont'd).

Item 8C (cont'd).

maintained there until the powder is removed for use. This oven is not in the hood but is located in the same room in which the hood is located. This oven and two other ovens in the same room, which are used to heat cure epoxy compounds containing item 8C, are equipped with excess temperature cutoff devices. After the powder has been dried, the dish is transfered back to the hood where the powder is put into a beaker containing an epoxy resin and mixed with the resin. This mixture is rolled in a mill inside the hood. After milling, the hardener is added to the mixture. This compound is then poured into large syringes. The syringes are used to dispense the compound into molds outside the hood. The compound-filled molds are placed in an oven set at 140 degrees F for curing. After curing, the compound and the mold are mechanically and electrically mated to a subassembly; this subassembly is then mechanically and electrically tested before being incorporated into a larger assembly. None of the operations performed on the cured radioactive compound involve machining, drilling, heating, or any other stress which could produce respirable radioactivity. The final assembly containing the source material is transfered to a Department of Defense agency. In some cases, the mixture of resin and radioactive material, as a viscous paste (catalyst not added), is transfered to a DoD agency. Personnel radiation badges, air samples, and bioassay results have indicated that personnel involved in the mixing and curing operations receive far less than ten percent of the maximum permissible whole body radiation exposure; smear tests and air samples indicate minimal contamination levels. Personnel radiation badges indicated that assemblers and testers received less than twenty-five percent of the maximum permissible whole body radiation exposure.

Item 8F.

This item is received as solid metal alloy billets of approximately twenty pounds each. The billets are subsequently machined to the desired configuration and the machining operation is followed by brazing operations. After the machining and brazing operations, the thoriated parts are installed into a larger assembly. The final assembly containing the source material is transfered to a DoD agency or to another contractor as directed by the DoD agency. All machining and brazing is performed in well-ventilated areas. An initial air monitoring survey is performed by the health physicist for each of the potentially dust/gas-producing operations to determine if contaminated air control is necessary. Wipe tests are employed to check on removable surface contamination in these areas. External radiation exposure levels to personnel are not significant with the work procedures and quantities of material in use at this time (typical billet reads 1.25 mR/hr maximum, gamma, at the surface and 0.25 mR/hr, gamma, at three inches).

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Item 10.

The minimum technical qualifications of supervisory personnel with radiation safety responsibility are as follows: completion of U.S. Department of HEW course in basic radiological health or completion of equivalent course or equivalent past experience and supervisory responsibility in the management of radioactive material and radiation safety.

The minimum qualifications of the person responsible for the radiation safety program are as follows: college credits in radiological health/radiological safety/radiological science and one year's experience as radiation safety officer for a firm with a broad NRC license or an academic degree in radiological health.

For this particular request for license renewal, John R. McFadden is designated as the person responsible for the radiation safety program. Harold L. Hargis is designated as a supervisor with radiation safety responsibility. Resumes are enclosed.

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Item 10 (cont'd).

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

-Att6

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.

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 present: Health physicist for General Electric Company-RESD. Primary responsibilities are to insure compliance with all applicable radiation control regulations and to provide technical assistance in the handling of various sources.

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. 3-83inclusive	10 "	GE/RESD	4 "	Instrument Calibration and research
Ra-226	0.1 Ci	GE/RESD	4 "	Vacuum determination & fire detection
Any byproduct material between at. nos. 3 & 83, inclusive	60 Ci	"	4 "	Research & Development (10CFR 30)
H-3	100 Ci	"	4 "	"
Any byproduct material	1 "	"	4 "	Activated electronic components
Ni-63	0.024 "	"	2 "	GC detector cells
Natural or depleted U	1500 lbs.	"	2 "	Solid metal alloys & powders-R & D
Natural Th	40 "	"	2 "	Powders & metal alloys R & D

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Item 10 (cont'd).

RESUME - HAROLD L. HARGIS - GE/RESD SAFETY SPECIALIST

A. Education

A.A.	Allan Hancock College, Santa Maria, Calif.
50 Quarter Hours	Univ. of Calif., Santa Barbara, Calif.
Certificate	School of Industrial Radiography, Picker X-Ray Corp., Cleveland, Ohio.

B. Work Experience

Fifteen years experience in Aerospace Field Safety Programs for the test and launch support of radioactive re-entry systems. Functioned as radiological safety monitor under NRC license no. 37-02006-06. Established, monitored, and controlled access to radiation areas. Issued film badges and pencil dosimeters and recorded readings. Prepared procedures for the processing of radioactive material under GE/RESD control at Vandenberg AFB, California.

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Item 11(a).

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	Surveying and measuring items 8A, 8B, 8C, and 8F.
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 8A, 8B, 8C, and 8F.
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 8A, 8B, 8C, 8D, 8E, 8F, and 8G.
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 8A, 8B, 8C, 8D, 8E, 8F, and 8G.
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 8A, 8B, 8C, 8D, 8E, 8F, and 8G.
Nuclear Measurements Corp. Model PC-4 Proportional Counting System	1	alpha, beta, gamma, X-ray	0-3500K cpm	windowless	Counting wipes and filters from items 8A, 8B, 8C, 8D, 8E, 8F, and 8G.

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Item 11(a) (cont'd).

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	Surveying and measuring items 8A, 8B, 8C, 8D, 8E, 8F, and 8G.
"	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 from items 8A, 8B, 8C, 8D, 8E, 8F, and 8G.
"	1	beta with beta phosphor wafer	"	"	"
Teledyne Isotopes Multi Area Dosimeter and Personnel Badge (TLD type) - supply and processing by Teledyne	as needed	beta, gamma, X-ray	-	-	Monitoring personnel using items 8A, 8B (if three or more units are processed per calendar quarter), 8C (personnel involved in mixing and potting), 8D, 8E, and 8G.

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Item 11(a) (cont'd).

RELATED 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), two units available.

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

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Item 11(b).

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 by Teledyne Isotopes Co., 50 Van Buren Avenue, Westwood, New Jersey.

Air sampling equipment is calibrated once per year. 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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Item 11(c).

(i)

Scale: 1" = 10'

1, 2, cc, & dd = column nos.

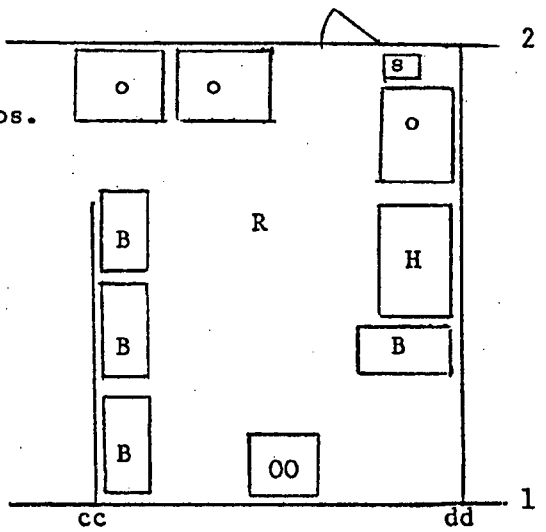
H = hood used for mixing Item 8C

s = sink

OO = oven used for drying Item 8C

o = ovens used for curing

B = work benches



The hood used for mixing Item 8C is a booth-type one with the absolute filters underneath the working surface.

Face area (fully open) = 5.8 feet x 3.0 feet

Face area (half open) = 5.8 feet x 1.5 feet

Minimum face velocity is 100 fpm with hood door half-closed (normal operating condition). Face velocity (average of 8 to 10 readings over face area) is measured every six months with an Alnor Velometer, Jr. (0-200 and 0-800 fpm).

General E[illegible]tric Co. - RESD
3198 Chest[illegible]t Street
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Item 12(a).

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.

Ovens in which item 8C is dried and cured are equipped with over-temperature-cutoff devices.

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

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Item 12(b).

If a spill of radioactive material has occurred or if there is reason to suspect that leakage of a potentially hazardous amount of radioactive material may have occurred, the following emergency measures should be taken at once:

1. No immediate attempt should be made to clean up the spill.
2. The immediate response of all personnel in the area should be to hold their breath, close all windows, shut off fans, and air conditioners, and leave the room.
3. Call the Safety Office immediately for assistance.
4. While waiting for assistance, all involved personnel should limit the spill to the room (i.e. close and lock all doors; if powdered sources are involved, the door and other openings leading into the room should be sealed with wide masking tape or adhesive tape and heavy wrapping paper).
5. All involved personnel should remain in one area to limit spread of contamination (every person who might have been in the immediate area should be considered contaminated until checked by the health physicist or his designee).
6. Entrance to the contaminated area should be prohibited and the health physicist or his designee will direct all subsequent operations, such as:
   a. Survey the area and evaluate the extent of the emergency.
   b. Survey all personnel involved.
   c. Supervise decontamination of all personnel if necessary.
   d. Supervise decontamination of the room.

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Item 12(c).

General procedures which apply to all operations listed in Item 9.

a. 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. Members of the IRAG include:
   Chairman - C.B. Chilton, Manager - Industrial Safety Engineering
   Secretary - J.R. McFadden, Health Physicist
   Members - J.R. Ficke, M.D., Medical Director

b. As part of the application for IRAG approval, each user must define a radiation protection program that will be used in his operation. The IRAG will approve, reject, or amplify the submitted operational safety procedures.

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 operation,
   4. radiation safety orientation and training,
   5. record keeping, inventories, and other clerical requirements,
   6. waste disposal,
   7. providing radiation safety advice and assistance, and
   8. radiation emergency procedures including dry runs.

e. Supervisory personnel and radiation workers receive a basic orientation in radiological health to inform them of the biological hazards associated with ionizing radiation and the protective measures to be taken to reduce their exposure.

f. The health physicist performs a leak test on each sealed source every six months. The smear/wipe technique is employed. If the wipe reveals a level in excess of five nanocuries, the source will be taken out of use and either returned to the vendor or disposed of in radiological waste.

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Item 12(c) (cont'd).

Specific procedures which apply to selected operations listed in Item 9.

a. Receiving - All radioactive materials should be marked with an appropriate shipping tag. Receiving segregates all radioactive materials upon arrival and notifies the Safety Office. The Safety Office arranges for a direct radiation and contamination survey before delivery of the radioactive material to the user.

   This applies to all items listed in item 9.

b. Storage - All radioactive materials must be stored in a locked room or cabinet which has been properly posted and which has been approved 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.

   Storage areas for all items listed in item 9 must be approved, properly posted, and surveyed. The well-ventilated-storage requirement applies to items 8B and 8C.

c. Inspection - Minimal contamination control is required for this operation. All inspectors should wear gloves when handling unsealed radioactive material. Periodic contamination surveys are made.

   This applies to all items listed in item 9.

d. Shipping - All radioactive materials should be marked with an appropriate shipping tag before shipment. The Safety Office must arrange for a direct radiation and contamination survey to assure that all radiological shipping regulations are met.

   This applies to all items listed in item 9.

e. 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 10CFR20.101 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.

   Personnel directly involved in manufacturing operations with items 8A, 8D, 8E, and 8G wear badges. Personnel involved in assembly and test operations with item 8B are periodically badged. Personnel involved in mixing and potting item 8C wear badges.

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Item 12(c) (cont'd).

Specific procedures (cont'd).

f. 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 material.

Lab coats and gloves must be worn when handling open containers of items 8A, 8C, 8D, 8E, and 8G in powder or liquid form.

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

This applies to operations with items 8A, 8C, 8D, 8E, and 8G when they are in powder form or in the form of uncured potting compound.

h. Posting - Areas in which radioactive material is present must be properly posted.

"Caution - Radioactive Material" signs are posted in all areas where the items listed in item 9 are stored and used.

i. Surveys for removable surface contamination - 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.

This applies to the mixing of powders with items 8A, 8C, 8D, 8E, and 8G, to the potting operation with item 8C, and to the manufacturing operation with item 8F.

j. Surveys for external radiation levels - 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.

This applies to storage areas of items 8B, 8C, and 8F and to use areas of items 8A, 8C, 8D, 8E, and 8G.

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Item 12(c) (cont'd).

Specific procedures (cont'd).

k. Contaminated air control - 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 10CFR20, 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.

   Items 8A, 8D, 8E, and 8G are mixed in a glovebox; item 8C is mixed in a booth-type hood.

l. Radioactive waste must be kept segregated in work areas and disposed of through the Safety Office.

   This applies to Items 8A, 8C, 8D, 8E, 8F, and 8G.

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Item 13(a).

In general, about fifty percent of the radioactive material received is discarded as solid waste which includes contaminated protective coverings, kimwipes, paper towels, mixing cans, etc. Approximately two waste drums of 55-gal. capacity each are used each month.

Item 13(b).

Waste disposal services are supplied by Radiological Services of Teledyne Isotopes, 50 Van Buren Avenue, Westwood, N.J. 07675.