GENERAL 🚱 ELECTRIC

SPACE DIVISION

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

#### April 7, 1978

Mr. Bernard Singer, Chief Radioisotopes Licensing Branch Director of Nuclear Material Safety and Safeguards U. S. Nuclear Regulatory Commission Washington, D.C. 20555

Dear Mr. Singer:

Enclosed is the revised application, in duplicate, for renewal of license #37-02006-05. Questions should be directed to R. G. Oesterling, telephone number (215) 962-5926 or Room 8714, C8 at the Space Center.

Very truly yours,

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

TPH:mon encls.

Information in this record was deleted COPIES SENT TO OFF. OF in accordance with the Freedom of Information SPECTION AND ENFORCEMENT Information in this record was deleted Act, exemptions 6 2007-304 :01A- \_\_\_\_

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Form AEC-313 (2-73)	UNITED STATES ATOMIC I	ENERGY COMMISSION	SE .	Form approved Budget Bureau Na. 38_20027
10 CFR 30	APPLICATION FUR DIFRUL	JUCI MATERIAL LICENS		
INSTRUCTIONS.—Complete items vious applications filed with the C specific. Use supplemental sheets sion, Washington, D.C., 20545, Atte Byproduct Material License. An AE eral Regulations, Part 30, and the I Federal Regulations, Part 170. The	1 through 16 if this is an initial applicat commission with respect to items 8 throu where necessary. Item 16 must be com antion: Materials Branch, Directorate of L C Byproduct Material License is issued in Licensee is subject to Title 10, Code of Fe license fee category should be stated in it	ion or an application for renewa ugh 15 may be incorporated by pleted on all applications. Mail i scensing. Upon approval of this s accordance with the general req oderal Regulations. Part 20, and t em 16 and the appropriate fee en	al of a license. In reference provid two copies to: I application, the juirements conta the license fee p closed. (See Not	formation contained in pre- led references are clear and U.S. Atomic Energy Commis- applicant will receive an AEC ined in Title 10, Code of Fed- rovisions of Title 10, Code of a in Instruction Sheet).
(a) NAME AND STREET ADDRESS OF son, etc. Include ZIP Code and tele	APPLICANT. (Institution, firm, hospital per-	(b) STREET ADDRESS(ES) AT WH different from 1(a). Include ZIP	ICH BYPRODUCT Code.)	MATERIAL WILL BE USED. (IF
GENERAL ELECTRIC	COMPANY			
Space Division		Valley Forge Spa	ace Cente	r
P O Box 8555	e Center	facilities in K	ing of Pr	ussia, PA
Philadelphia, PA	19101			
DEPARTMENT TO USE BYPRODUCT N	LATERIAL	3. PREVIOUS LICENSE NUMBER(S)	. (If this is an ap	plication for renewal of a license,
Any		Renewal 37-020	006-05	
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INDIVIDUAL USER(S). (Nome and	title of individual(s) who will use or directly Give training and experience in them 8 and 9 1	5. RADIATION PROTECTION OFFICE	ER. (Name of per I user. Attach res	con designated as radiation protoc- ume of his training and experience
Individuals autho	rized by the	as in Items 8 and 9.)		
Ionizing Radiatio	n Advisory Group	Richard G. Oeste	erling	
Thomas P. Handley	, Chairman		2	·
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(a) BYPRODUCT MATERIAL. (Elements	(b) CHEMICAL AND/OR PHYSICAL F	DRM AND MAXIMUM NUMBER OF	MILLICURIES OF	ACH CHEMICAL AND/OR PHYS-
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6) Polonium-210	(6) Any form	(6)	0.1 cur:	ies
7) Americium-241	(7) Sealed so	ources (7)	3 curi	25
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be stored and/or used.)				
Research and	development as defined	l in 10CFR Part 30	as author	rized
by the Ioniz	ing Radiation Advisory	Group. (see Attac	chment #1	)
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r. Principles and practices of radiatic protection	2n S	EE ATT	11				Y	es No	Yes No
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I. Biological effects of radiation				·····					
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SOTOPE MAXIMUM AMOUNT	WHERE EXPERIENC	E WAS GAINED	SE	DURATION	N OF EXPE	RIENCE		TYPE C	FUSE
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1. METHOD, FREQUENCY, AND STANDARD See attachment #4 2. FRM BADGES, DOSIMETERS, AND BIO-A Film or TLD badges as Taledyme. Eberline. P	SUSED IN CALIBR	ATING INSTRUME S USED. (For fil by comme	m bodges, rcial	specify method	of colibro	nting and proc h as, b	essing, or r ut no	t limi	olier.) ted to,
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INFORMA	TION TO BE	SUBMITTED	ON A	DITIONA	L SHE	ETS IN DU	PLICAT	E	
3. FACILITIES AND EQUIPMENT. Describe of facility is attached. (Circle answer)	laboratory facilitie Yes No	es and remote has See a	ndling equ ttach	ment, storogo ment #6	e containe	rs, shielding,	fume hood	s, etc. Exp	lanatory sketch
<ol> <li>RADIATION PROTECTION PROGRAM. testing procedures where applicable, non icing, maintenance and repair of the sour</li> </ol>	Describe the radi	ation protection p sperience of perso	program ir on to perfe	ncluding control orm leak tests,	I measures and arran	. If applica gements for p	tion covers erforming i	sealed sour nitial radiat	ces, submit leak an survey, serv-
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<ol> <li>WASTE DISPOSAL. If a commercial was be used for disposing of radioactive was</li> </ol>	ste disposal service tes and estimates o	s is employed, sp of the type and a NULLS	ecify name mount of c	e of company. scivity involved	Otherwis Tele	e, submit deta dyne Is	otope:	iption of me S , SCC	hods which will Attach.#
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WARNING.—18 U. S. C., Section 10 representation to any department or aget	001; Act of June hey of the United	25, 1948; 62 States as to any	Stat. 74 matter v	9; makes it a vithin its jurisd	criminal liction.	offense to	make a w	illfully fal	e statement or

+ U.S. GPO: 1973-543-126/515

A. Uses of radioactive material under this license will extend to those uses permitted by regulations and the license and approved by the Ionizing Radiation Advisory Group (IRAG). Administrative control is achieved through use of the attached procedure #M-6, "Ionizing Radiation Control," of the Valley Forge Space Center Safety Manual.

Note: Procedure M-6 is currently under review. Revisions will include:

- change "Health Physicist" to "Manager-Industrial Safety & Hygiene"
- change "Atomic Energy Commission" and "AEC" to "Nuclear Regulatory Commission" and "NRC", respectively, where the context indicates licensing
- change "Atomic Energy Commission" and "AEC" to "Energy Research and Development Administration" and "ERDA", respectively, where the contents clearly indicates activities exempt from NRC licensing and subject to ERDA control
- B. Technical control of potential radiation hazards will be achieved through application of criteria such as those found in the American National Standards and the Recommendatics of the International Commission on Radiological Protection. The specific control measures adopted will be commensurate with the potential hazard.

The IRAG does not contemplate approving programs which require respiratory protection or generate significant intentional exposure to radioactive aerosols other than noble gases. Uses which may intentionally release radioactive materials to the environment in excess of those limits specified in 10CFR 20.106 will not be approved by the IRAG.

C. Leakage tests on sealed sources are performed for those sources and at the frequency indicated in the current license. The test normally consist of a wipe of the source with moistened paper followed, after drying, by counting in 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.

D. The composition of the Ionizing Radiation Advisory Group currently is:

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

Secretary: Richard G. Oesterling, C.H.P., Manager-Industrial Safety and Hygiene

Member: Rudolph J. Panaro, M.D., Manager-Medical Services

Their qualifications are listed in appendix B and Attachment #2.

ATTACHMENT #1, App. A



# Valley Forge Space Center Safety Manual

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IONIZING RADIATION CONTROL MANDATORY PROCEDURE

CLASSIFICATION

JUNE 1974

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 Atomic Energy 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

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

INTERPRETATION CONTACT HEALTH PHYSICIST SUPERCEDES PAGE MARCH 1971 OF

### 6.2.6 Permissible Limits for External Exposure

- 1. Personnel who are occupationally exposed to ionizing radiation in programs that are conducted under AEC contracts will be governed by the limits specified in AEC Safety Manual Appendix 0524 entitled, "Standards for Radiation Protection."
- 2. Personnel who are occupationally exposed to radioactive materials licensed by the U.S. Atomic Energy Commission shall adhere to the provisions found in U.S. Code of Federal Regulations, Title 10, Part 20, "Radiation Protection."
- 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."

## 4. Permissible Limits for External Exposure (a)

Part of Body	Dose per 13 Consecutive Weeks (rems	Accumulated Dose (rems
Whole body, head and truck blood forming organs, gonads, lens of eyes.	1.25 (b)	5(N-18)(c)
Skin of whole body	7.5	
Hands and forearms, feet and ankles	18.75	

- (a) On AEC contracts exempt from licensing, the limits are slightly different. Contact the Health Physicist for information.
- (b) If exposure history is documented and approved by Health Physics and Medical Services, 3.0 rems, but accumulated dose not to exceed 5(N-18) rems.
- (c) 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 without specific approval from the Health Physicist.

6.2.7 Contamination

Is the spread of radioactive material to places where it may harm personnel or spoil experiments.

# 6.3 POLICY

6.3.1 It is the policy of all components in the Valley Forge Area to keep the ionizing radiation 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 & Administrative Services

Member: Manager, Medical Services

Secretary: Health Physicist

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

6.3.4 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 radiactive material or body contamination shall be reported immediately to the members of the IRAG. Accidental exposures (actual or suspected) in excess of the quarterly limits stated 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., film badge, etc.) whenever working with radiation.

- 2. Using the recommended contamination control equipment and following contamination control procedures as required.
- 3. Keeping his exposure as low as possible by recommending improved 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.
- 6. Not deviate from the approved program without the prior approval of the IRAG.

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. Coordinating with the Health Physicist to obtain all necessary radiation safety advice and assistance.
- 3. Disposal of radioactive material in accordance with AEC and State of Pennsylvania regulations as set forth by the Health Physicist.

6.4.3 The manager of a component requiring radioisotopes or ionizing radiationproducing 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 radioisotopes to be used or description or 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.)

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- 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 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. Posting the safety requirements provided by IRAG.
- 6. Obtaining 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 radioisotopes or ionizing radiationproducing equipment which in the Group's opinion does or does not adequately meet safety requirements set forth by the AEC, 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.
- 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 Atomic Energy Commission, the Interstate Commerce Commission, 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: AEC

licenses will only be secured by the Chairman, IRAG as needed. In order to avoid unnecessary delays, advise him of needs well in advance of critical dates).

- 6.4.6 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 Atomic Energy Commission.
  - 6. Developing and maintaining emergency procedures.
  - 7. Investigating and preparing reports of all actual or suspected excessive or unauthorized exposure to ionizing radiation.
- 6.4.7 The Manager, Medical Services is responsible for:
  - 1. Determining the medical program to be followed by all employees involved in working with ionizing radiation.
  - 2. Serving as a member of the IRAG.

6.4.8 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.

6.4.9 The initiating manager shall secure the written approval of the IRAG prior to the purchase or other means of obtaining any ionizing radiation 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.)

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

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

6.4.11 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 USAEC, DOT and state regulations.

6.4.12 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.

6.4.13 Facilities Engineering 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.

## 6.5 PROCURING, RECEIVING AND TRANSPORTING OF RADIOACTIVE MATERIALS

6.5.1 Licensæs 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 SD-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 SD-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 non-purchase transfers.

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

#### 6.5.3 Receiving Radioactive Materials

- Receiving shall notify the Health Physicist, x5926 or x3130, 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 USAEC Compliance, Region I, shall be notified immediately. The Health Physicist shall immediately take action to determine the extent of contamination in SD-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 certification to receive radioactive materials.
  - 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. USAEC or DOT approved shipping containers shall be used where applicable.

# ELECTRIC GENERAL

SPACE 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

Gentlemen:

This certifies that the Space Division, General Mectric Company, is authorized to receive, possess and use the radioactive materials listed below, according to the provisions afficense number

which expires



Quantity

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

> General Electric Company Valley Forge Space Center, Room M1138 Goddard Boulevard King of Prussia, Pennsylvania 19101

> > R. G. Oesterling, C.H.P. Health Physicist

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

GENERAL 🛞 ELECTRIC

SPACE DIVISION Valley Forge Space Center P. O. Box 8555, Phila., PA.

#### SHIPPER'S CERTIFICATION FOR RADIOACTIVE MATERIALS

AIR TRANSPORT ONLY	This is to certify that the contents of this consignment are properly described by name and are packed, marked and labeled and are in proper condition for carriage by air according to all applicable carrier and governmental regulations, (International shipments add, and to the lata restricted articles regulations,) this consignment is within the limitations prescribed for passenger/cargo (cross out one) carrying aircraft,
SUFACE TRANSPORT ONLY	THIS IS TO CERTIFY THAT THE HEREON NAMED ARTICLES ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, Makked, 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 AUTHORIZED AGENT

NA	TURE AND QUANTIT	Y OF CONTENT		P.	ACKAGE		
RADIONUCLIDE	GROUP	FORM	ACTIVITY	ATEGORY	TRANSPORT INDEX	Type	
Name of Princifal Radioactive Content	Group Number of Groups I to VII	EITHER CHEMICAL FORM PLUS GAS/ LIQUID/SOLID, ON SPECIAL FORM ON ENCAPSULATION	NULLIOUT CURNE OR MULLIOUTES	I - WHITE OR II - YELLOW OR III - YELLOW LABEL	For Yellow Label Category Only	INDU OR T OR T	STRIAL YPE A
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ADDITIONAL CERTIF	ICATION OBTAINED	BY THE SHIPPER WHEN	NECESSARY:				<u> </u>
SPECIAL FOR	M ENCAPSULATION	CERTIFICATE(S)					
TYPE B PACE	AGING CERTIFICAT	z(s)					
CERTIFICATE	(S) FOR FISSILE M	ATERIAL					
Government	APPROVALS/PERM	ITS					
RADIATION LEVELS: Contamination Leve	Surface	_mrem/hr: Three fi dpm/100 cm <sup>2</sup> ; bet	EET MRE M; "A~GA MMA	HR: ONE METER_	MRE M/HF	3	

APPROVED FOR SHIPMENT

(SIGNATURE OF HEALTH PHYSICS)

Distribution: Original and 1 copy; Copy 1 - Traffic; Copy 2 - Health Physics

M-6-10

#### ATTACHMENT #1, APPENDIX B

#### RAJIOACTIVE MATERIALS EXPERIENCE

THOMAS P. HANDLEY, Manager		
Industrial Security, Safety and	Administrative Service	s
	(b)(6)	
Education: Wentworth Institute Boston, MA	6.4 ¢	

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.

Experience:

- 1961 1963 Radiation Protection Officer, License Number 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 Number 37-2006-05 per Valley Forge Space Center Safety Manual Procedure M-6.0

RUDOLPH J. PANARO, M.D. Manager, Medical Services

Experience:

- 1957 1960 Battle Group Surgeon, U.S. Army, rank-Captain
- 1960 present General Electric Co., Space Division Physician and Medical Director

Currently Medical Director at the Valley Forge Space Center, King of Prussia. Responsibilities include medical surveillance of radiation workers and medical management of personnel suspected of being overexposed.

Member of the Ionizing Radiation Advisory Group since its inception.

#### RADIOACTIVE MATERIALS EXPERIENCE

#### RICHARD G. OESTERLING, MANAGER-INDUSTRIAL SAFETY & HYGIENE

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#### Education

B.S. (General Studies), Eastern Oregon College,

Numerous Company-sponsored courses in manufacturing management, Fortran programming, criticality control, noise control and nuclear criticality safety. Health Physics Society sponsored courses in certification preparation. Office of Civil Defense courses in radiological monitoring for instructors and industrial civil defense management.

#### Experience

Certified in Health Physics by American Board of Health Physics, 1970

- 1963 Engineer Radiation Monitoring, Redox Facility, Hanford
- to Responsible for providing health physics advice and assistance to the operating 1965 components of a nuclear fuel reprocessing facility and associated analytical laboratory, a kilocurie research laboratory, a decontamination facility for large radioactive equipment, a uranium oxide calcination facility, high-level waste storage facilities and radioactive waste burial sites. Participated directly in decontamination and recovery operations following fire in a plutonium concentration facility.
- 1965 Supervisor Radiation Monitoring, Redox Facility, Hanford to Directed a staff of 14 health physics technicians in performing radiation and 1966 contamination surveys and effluent monitoring for the facilities listed under the previous position. Served as technical liaison with other Hanford components, particularly instrument development group. Provided direct health physics consultation to the operating components of the above listed groups and a plutonium metal fabrication facility.
- 1966 Engineer Nuclear Safety Technology, N-Reactor, Hanford to Responsible for (1) auditing the radiation safety performance of the operating 1968 components of a large nuclear power and production reactor and a uranium fuel fabrication facility; (2) providing technical health physics support for these components; (3) serving as technical liaison with groups contracted to perform studies of site geology, hydrology and micrometeorology and studies of fuel failure modes; (4) performing or directing investigations of actual or postulated releases of radioactive materials or chemicals to the environment; (5) performing radiation shielding anayles; and (6) participating directly in assorted projects such as decontamination of reactor piping and heat exchangers, effluent monitoring and containing an oil spill to the adjacent river.
- 1968 Engineer Nuclear Safety, Vallecitos Nuclear Center to (1) Supervised a staff of six (6) at a test reactor; (2) provided health physics 1969 support to operating components; (3) performed neutron and gamma shielding analyses; (4) directed the environmental monitoring program; (5) participated in safety reviews and criticality analyses.

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1969 Manager - Plant Safety, Midwest Fuel Recovery Plant

to Responsible for developing and administrating the radiation and industrial 1973 safety programs for a new nuclear fuel reprocessing plant. Specific areas included: (1) emergency plan, (2) environmental monitoring, (3) effluent monitoring, (4) personnel training, including training of health physics technicians, (5) procurement of instrumentation and equipment and equipment design and (7) supervision of a staff of six (6).

1973 Health Physicist, Valley Forge Space Center

- to Administered the radiation protection and licensing program for a major 1977 aerospace facility. Responsible for licenses which include byproduct, source and special nuclear material. Managed the radiation protection program to assemble and test Pu 238 fueled generators under an ERDA contract.
- 1977 Manager Industrial Safety & Hygiene, Valley Forge Space Center
- to Responsible for managing the occupational safety, industrial hygiene, fire date protection and radiation protection programs for a large aerospace manufacturing and research and development facility. Staff includes a Safety Engineer and Fire Chief.

Types of Traini	ng Where	e trained	Duration of training	On the Job?	Formal Course?
Principles & Pr of Radiation Pr	actices East otection/Gen	ern Oregon Colle eral Electric C	ege 8 years o.	Yes	Yes
Radioactivity	East	ern Oregon Colle	ege 8 years	Yes	Yes
Standardization Monitoring Tech and Instruments	and Gene niques	ral Electric Co	•	- - -	
Mathematics and Calculations Ba the use and mea of Radioactivit	East sic to Gene surement Y	ern Oregon Colle ral Electric Co	ege 8 years •	Yes	Yes
Biological Effe of Radiation	cts East Gene	ern Oregon Coll ral Electric Co	ege 8 years •	Yes	Yes
Experience with	Radiation				
Isotope	Max. Amount	Location		Duration	Type of Use
Mixed fission products	megacuries	Redox, N Vallecit	-Reactor os, MFRP	8 years	Reprocessing, researce and in reactor fuel
Plutonium	100 kilogra	ms Redox fa Vallecit	cility & os	4 years	Reprocessing, resear
Uranium unenriched	metric tons	Redox fa Fuel Reo	cility & Midwest overy Plant	2 4 years	Calcination, MFRP cold runs
Polonium - 210	100 curies	Redox fa	cility	3 months	Recovery research
Promethium isotopes	100 curies	Redox fa	cility	6 months	Separations research

# Radioactive Materials Experience .

Pichard G. Oosterling

# Experience with Radiation ... continued

Isotope	Max. Amount	Location	Duration	Type of Use
Cobalt - 60	kilocuries	N-Reactor, Vallecitos, Valley Forge	3 years	Source production, activation product, gamma irradiation
Tritiun	megacuries	N-Reactor	1½ years	Production
Activation products	curies	N-Reactor, Vallecitos	3 years	Reactor coolant
Uranium, slightly enrich	metric tons ed	N-Reactor	l⁵ years	Fuel fabrication
Mixed fission products	10 curies	N-Reactor	1岁 years	Fuel failure research
Radioactive noblegases	l curie	Vallecitos	3 months	Calibration
Cobalt - 60	30 millicuries	Washington State, Illinois State, Valley Forge	8 years	Civil Defense instruction, calibration source
Various	generally licensed	Eastern Oregon College	6 months	Education
Radium	1 milligram	Eastern Oregon College	3 months	Education
Plutonium beryllium	10 curies	Vallecitos MFRP	2½ years	Neutron source
Americium beryllium-curiu	100 curies m	Vallecitos	6 months	Neutron source
Plutonium 238	300,000 curies	Valley Forge	4 years	RIG fuel
Strontium - 90	10 curies	Valley Forge	4 years	irradiation source
Various	0.5 curies	Valley Forge	4 years	research & development

# ATTACIENENT +3

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Type of Instruments Make & Model Name	Number <u>Available</u>	Radiation Detected	Sensitivity Range(mr/hr)	Window Thick- ness(mg/cm <sup>2</sup> )	Use Monitoring Surveying Measuring
Eberline Instrument Corp. E-120	1 .	Beta Camma	0 ro 50 mR/hr 0 = 70000 cpm	$30 \text{ mg/cm}^2$ (	Surveying
Eberline PAC-4G	1	Alpha	0 Lo 5000,000 cpm	0.83 mg/cm <sup>2</sup>	Surveying
Eborline 5112	<b>)</b> .	Beta Gamma	0.1 to 1,000 R/h	30 mg/cm <sup>2</sup> :	Surveying
Eberline Rm-12A	1	Gamma	0 to 20 mR/hr	2 AMPEREX 90 ND-3 GM Tubes	Monitoring
Eberline Rm-3C	1	Alpha Beta Gamma	0 to 50,000 cpm	0.85 mg/cm <sup>2</sup> Alpha 3.5 mg/cm <sup>2</sup>	Nonitoring Surveying
Eberline Pc6-4 Scaler Counter Sh-1 Sample	1	Alpha Beta Gamma	0 to 999,999 counts	0.85 mg/cm <sup>2</sup>	Measuring
norder		• • •			
Nuclear Measurements Corp. Pc-3T	2	Alpha Beta Gamma	U to 99,999,999 counts	Windowless Gas Flow Counter	Measuring
Scaplex Co. T_F I A	2	High Volume	Air Sampler	60 CFM	Sampling
Eberline Inst. Corp. ATM-3	1	Alpha	0 to 1,000 cpm	$1 \text{ mg/cm}^2$	Monitoring
Îtador Col	Mod. 330 - 1 Mod. 440 - 1 Mod. 441 - 1	Alpha	0 to 5000 cpm	• Semi- condu tor	Monitoring

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Type of		
Instruments		
Make & Model	Number	Radiation

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Alpha

Make & Model <u>Name</u>	Number <u>Available</u>	Radiation Detected	Sensitivity <u>Range(mr/hr)</u>	Window Thick- ness(mg/cm <sup>2</sup> )	Surveying, Measuring
Texas Nuclear 9140	1	Neutron Rem Meter	0 to 1,000 m rem/hr	4x8 mm Li <sup>6</sup> I (Eu) Crystal	Surveying
W. B. Johnson & Associates, Inc. GSM-5	2	Beta Gamma	0 to 20 mR/hr	30 mg/cm <sup>2</sup>	Surveying
Mine Safety Appliance Co. O-10 CFH	. 2	Personnel Ai	r Samplers 0-10 (	CFH	Sampling
Victoreen 440	1	Alpha Beta Gamma X-ray	0-300 mR/hr	1 mg/cm <sup>2</sup>	Surveying
Eberline RO-1	1	Beta Gamma X-ray	0-5000 R/hr 0-5000 mR	1 mg/cm <sup>2</sup>	Surveying Monitoring
Pocket Self- reading dosimeter: Victorcen and Landsverk	20 s	Gamma	0-200 mR		Monitoring

Eberline Alpha-3 0-5000 cpm

Semi-Conductor Monitoring

Use Monitoring

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#### CALIBRATION

Instrument type: gamma dose rate meters

Method: Exposure to source of known intensity at various distances. Twopoint calibration on each range, limited by source strength. Current sources limit calibration levels to approximately one R per hour.

Frequency: Semi-annually and after maintenance

Instrument type: portable contamination meters

Method: Exposure to source(s) of known strength(s)

Frequency: Semi-annually and after maintenance

Instrument type: laboratory counting systems

Method: Source check with known source of appropriate radiation type prior to each use. Where appropriate, determination of counting plateau and counting efficiencies semiannually and after maintenance.

Frequency: As stated

Instrument type: Airborne activity monitors

Method: Calibration of meter response with electronic pulser. Determination of counting efficiencies with known sources.

Frequency: Semi-annually and after maintenance

#### DOSIMETRY

Personnel who are required to be monitored pursuant to 10CFR20.202 are assigned a TLD or film badge. The vendor may be any one of those listed under item #12 or any other supplier with high quality and accuracy of service.

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

The need for bioassay services is limited accident or emergency situations. The IRAG does not countemplate approving programs which would require respiratory protection or routine use of bioassay. Control of exposure to unsealed radioactive materials is achieved through engineered controls.

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

#### FACILITIES

The Valley Forge Space Center has fume hoods, glove boxes, highefficiency filtration systems and other equipment utilized for the control of radioactive materials. The IRAG may require the use of any existing facility and require new facilities and modifications of facilities in order to maintain personnel exposure levels as low as practicable. The IRAG utilizes the criteria found in various recommendations of national and international groups and regulatory guides to determine the facility requirements for a particular use.

Most work with radioactive materials currently is with submillicurie quantities of sealed sources. These sources are required to be stored in a locked area when not is use. Radiation levels are controlled by the use of shielding, tongs, etc. Larger sources are normally purchased with self-contained shielding.

The only highly hazardous material handled in unsealed form currently is polonium-210. Unsealed materials in this hazard category are handled in glove boxes with HEPA filtration Other unsealed materials, except noble gases, are used in fume hoods or similar facilities with HEPA filtration.

#### RADIATION PROTECTION PROGRAM

#### Radiation Safety Committee

The radiation safety committee at Valley Forge Space Center is the Ionizing Radiation Advisory Group (IRAG). The IRAG's functions, members and their qualifications, responsibilities and procedures are delineated in Attachments #1 and #2.

The IRAG meets to consider each application for use of radioactive materials. This arrangement has been adopted due to the small number of users and the low frequency of applications.

## Radiation Safety Officer

The radiation safety officer's duties and responsibilities are listed in Attachment #1, appendix A.

#### Radiation Protection Procedures

The general radiation protection procedures are found in Attachment #1, appendix A. In addition, specific procedures and responsibilities are established for each application. Specific procedures include:

- (1) definition of responsible individual
- (2) definition of authorized personnel
- (3) access control, if required

- (4) storage and handling requirements
  (5) inventory control requirements
  (6) emergency procedures, as required
  (7) specialized facility requirements, if necessary

Emergency procedures are established as appropriate to each application. These procedures supplement the general emergency plan in effect for the Space Center.

Bioassay criteria are found in Attachment #5.

The usage of unsealed byproduct material, other than noble gases, has been very limited. Ordinary use periods are in the range of a few days to a few weeks. Since this work is normally performed in a hood or glove box, the practice has been to limit contamination levels outside the hood or box to nondetectable with portable instrumentation. Levels in the hood or glove box have been limited to those necessary to minimize spread of contamination. At the end of the use period, equipment and facilities have been decontaminated to nondetectable levels before release to unrestricted areas.

#### WASTE DISPOSAL

Solid waste and liquid waste are transferred to Teledyne Isotopes for disposal. In between pick ups, the waste is stored in the waste drum located in the radiation vault. Loose or contaminated materials are bagged before placing in the waste drum. Liquids are in tightly closed plastic or metal containers or sorbed into solid material.