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UNITED STATES ATOMIC ENERGY COMMISSION  
APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved  
Budget Bureau No. 38-R0027

INSTRUCTIONS — Complete Items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commission with respect to Items 8 through 15 may be incorporated by reference provided references are clear and specific. Use supplemental sheets when necessary. Item 16 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C. 20545, Attention: Isotopes Branch, Division of Materials Licensing. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc. Include ZIP Code.)  
DEPARTMENT OF THE ARMY  
HARRY DIAMOND LABORATORIES (HDL)  
CONNECTICUT AVENUE & VAN NESS STREET N.W.  
WASHINGTON, D.C. 20438

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1(a) Include ZIP Code.)  
DIAMOND ORDNANCE RADIATION FACILITY (DORF)  
FOREST GLEN SECTION  
WALTER REED ARMY MEDICAL CENTER  
FOREST GLEN, MARYLAND

2. DEPARTMENT TO USE BYPRODUCT MATERIAL  
NUCLEAR VULNERABILITY BRANCH (280)

3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)  
RENEW AND AMEND AEC LICENSE NO. 8-2534-9

4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)  
WALTER L. GIESELER, PHYSICIST-IN-CHARGE (DORF)  
EMBERT D. McGARRY, ASST. PHYS-IN-CHARGE (DORF)  
MARCUS L. MOORE, NUCLEAR ENGINEERING TECHNICIAN

5. RADIATION PROTECTION OFFICER. (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)  
KEITH A. CAMANN - RPO  
JAMES M. McGARRITY - ALTERNATE RPO  
CLAUDE A. ROWE -ALTERNATE RPO

6. BYPRODUCT MATERIAL. (Elements and mass number of each.)

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLCURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)

AMERICIUM - 241

1 source of 10 curies.  
Vendor: NuMec, Apollo, Pa.  
Serial No. 3000 AM248

STRONTIUM-90

- A. Victoreen Model BB-1010A sealed source - one source of 5 microcuries.
- B. U.S. Radium Corporation Model Lab 277 sealed sources - 2.1 microcuries contained in 7 sources of 0.3 microcuries each.
- C. U.S. Radium Corporation Custom sealed source - two sources of 10 microcuries each.

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," Supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

AMERICIUM - 241 for Triga Mark F reactor at the Diamond Ordnance Radiation Facility.  
STRONTIUM - 90 Refer to Item 6 above: A. For use as check source in Victoreen "Radgun" Model AGB-10-KG-SR survey instrument. B. For use as check sources in sensing elements in Victoreen Model 716A Remote Area Monitor. C. For use as a check sources insensing element in Victoreen Model 717A Remote Area Monitor.

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TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

B. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)		FORMAL COURSE (Circle answer)	
			Yes	No	Yes	No
a. Principles and practices of radiation protection	See Supplement #1		Yes	No	Yes	No
b. Radioactivity measurement, standardization and monitoring techniques and instruments			Yes	No	Yes	No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes	No	Yes	No
d. Biological effects of radiation			Yes	No	Yes	No

9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
See Supplement #2				

10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mR/hr)	WINDOW THICKNESS (mg/cm <sup>2</sup> )	USE (Monitoring, surveying, measuring)
See Supplement #3					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE

See Supplement #4

12. FILM-BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)

Beta-Gamma and Neutron film badges are supplied by Lexington-Blue Grass Army Depot, Lexington, Kentucky 40507

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer)  Yes  No See Supplement #5

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. See Supplement #6

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. See Supplement #7

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date 12 Jun 72  
 Approved: Keith A. Camann  
 Keith A. Camann, RPO

HARRY DIAMOND LABORATORIES  
 Applicant named in item 1  
 By Thomas P. Mooney  
 T. P. MOONEY  
 Acting Associate Director/Administration  
 Title of certifying official

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.

SUPPLEMENT #1

Item 5. (See Item 8).

Item 8. Training of Radiation Protection Officer and Users.

<u>Type of Training</u>	<u>Where Trained</u>	<u>Duration of Training</u>	<u>On The Job</u>	<u>Formal Course</u>
<u>Keith A. Gemann</u> <u>(Radiation Protection Officer)</u>				
a. Principles	AFRRI* Public Health Service (ORPC**)	18 months 10 days	Yes No	No Yes
b. Measurement	AFRRI* Public Health Service (ORPC**)	18 months 10 days	Yes No	No Yes
c. Mathematics	AFRRI* Alma College Purdue University	18 months 3 years 1 year	Yes No No	No Yes Yes
d. Biological	AFRRI* Public Health Service (ORPC**)	18 months 10 days	Yes No	No Yes

\*Armed Forces Radiobiology Research Institute

\*\*Occupational Radiation Protection Course

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SUPPLEMENT #1

Item 8.

<u>Type of Training</u>	<u>Where Trained</u>	<u>Duration of Training</u>	<u>On The Job</u>	<u>Formal Course</u>
<u>James M. McGarrity (Alternate RPO)</u>				
a. Principles.	University of Maryland	4 years	No	Yes
	University of Maryland	1 year	Yes	No
b. Measurement.	University of Maryland	3 years	No	Yes
	University of Maryland	1 year	Yes	No
c. Mathematics.	Harry Diamond Laboratories	1 year	Yes	No
	University of Maryland	4 years	No	Yes
d. Biological Effects.	University of Maryland	1 year	Yes	No
	Harry Diamond Laboratories	1 year	Yes	No

SUPPLEMENT #1

Item 8.

<u>Type of Training</u>	<u>Where Trained</u>	<u>Duration of Training</u>	<u>On The Job</u>	<u>Formal Course</u>
<u>Claude A. Rowe (Alternate RPO)</u>				
a. Principles.	Navy Nuclear Power School (Health Physics)	1 year	No	Yes
	U.S. Navy	6 months	Yes	No
	Argonne Nat'l Laboratories	1 year	No	Yes
b. Measurement.	Navy Nuclear Power School (Health Physics)	1 year	No	Yes
	U.S. Navy	6 months	Yes	No
	Argonne Nat'l Laboratories	1 year	No	Yes
c. Mathematics.	Navy Nuclear Power School (Health Physics)	1 year	No	Yes
	U.S. Navy	6 months	Yes	No
	Argonne Nat'l Laboratories	1 year	No	Yes
	Lewis College	2 years	No	Yes
d. Biological Effects.	Navy Nuclear Power School (Health Physics)	1 year	No	Yes
	U.S. Navy	6 months	Yes	No
	Argonne Nat'l Laboratories	1 year	No	Yes

SUPPLEMENT #1

Item 2.

<u>Type of Training</u>	<u>Where Trained</u>	<u>Duration of Training</u>	<u>On the Job</u>	<u>Formal Course</u>
<u>Marcus L. Moore</u>				
a. Principles.	Montgomery Jr. College	2 years	No	Yes
	Nuclear Power Field School, Ft. Belvoir, Virginia	4 months	No	Yes
	DORF Reactor Operator's Course	4 months	Yes	Yes
b. Measurements.	Montgomery Jr. College	2 years	No	Yes
	DORF Reactor	5 years	Yes	No
c. Mathematics.	Montgomery Jr. College	1 year	No	Yes
d. Biological.	Nuclear Power Field School, Fort Belvoir, Virginia	4 months	No	Yes
	DORF Reactor Operator's Course	4 months	Yes	Yes

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Assignment to Supplement #1

Item 5. (See Item 8).

Item 8. Training of Radiation Protection Officer and Users.

Walter L. Gieseler

<u>Type of Training</u>	<u>Where Trained</u>	<u>Duration of Training</u>	<u>On The Job</u>	<u>Formal Course</u>
a. Principles	American University	1 year	No	Yes
	Harry Diamond Labs.	2 years	Yes	No
b. Measurement	Harry Diamond Labs.	2 years	Yes	No
c. Mathematics	HDL/ Univ. of Colorado	3 years	No	Yes
d. Biological	Harry Diamond Labs.	1 year	Yes	No

Ernest D. McGarry

a. Principles	Penn State University	2 years	No	Yes
	Univ. of Pittsburgh	2 years	No	Yes
	AFSWP, Sandia, New Mexico	10 months	Yes	No
b. Measurement	Univ. of Pittsburgh	1 year	No	Yes
	BAPL, Pittsburgh	8 years	Yes	No
c. Mathematics	Penn. State University	3 years	No	Yes
	Univ. of Pittsburgh	2 years	No	Yes
	BAPL, Pittsburgh	8 years	Yes	No
d. Biological	Univ. of Pittsburgh	6 months	No	Yes

SUPPLEMENT #2

Item 2. Experience with Radiation for RPO and Users.

<u>Isotope</u>	<u>Maximum Amount</u>	<u>Where Experience Was Gained</u>	<u>Duration of Experience</u>	<u>Type of Use</u>
<u>Keith A. Camann</u> ( <u>Radiation Protection Officer</u> )				
Tritium	6 mc	AFRRI*	18 months	Calibration of Counting Instruments
Carbon-14	100 uc	AFRRI*	18 months	Calibration of Counting Instruments
Cobalt-60	1700 mc	AFRRI*	18 months	Calibration, Instrument
Pu-Be	10 c	AFRRI*	18 months	Calibration of neutron Survey Instruments
Cesium-137	110 c	AFRRI*	18 months	Instrument Calibration
Misc. (3-83)	Various Amounts	AFRRI*	18 months	Routine Health Physics
	(few uc to several hundred mc)			

EXPERIENCE c̄ RADIATION FOR RPO

Mr. Camann was a Health Physics assistant, while on active duty in the U.S. Army, at the Armed Forces Radiobiology Research Institute in Bethesda, Maryland. In this capacity, he was responsible for monitoring the environs of a pulsing steady-state reactor, radiochemistry and radiobiology laboratories. He recommended decontamination, waste disposal, and exposure reduction methods to investigators. He was responsible for performing calibration of radiation survey instruments.

\* Armed Forces Radiobiology Research Institute

SUPPLEMENT #2

Item 9. Experience with Radiation for RPO and Users.

<u>Isotope</u>	<u>Maximum Amount</u>	<u>Where Experience Was Gained</u>	<u>Duration of Experience</u>	<u>Type of Use</u>
<u>James M. McGarrity (Alternate RPO)</u>				
Cobalt-60	5000 c	Univ. of Maryland	2 years	Calibration and Research
Strontium-90	Several mc	Harry Diamond Labs.	3 years	Instrument Calibration
Cesium-137	Several mc	Harry Diamond Labs.	3 years	Instrument Calibration
Pu-Be Neutron Source	1 c	Univ. of Maryland	4 years	Instrument Calibration and Sub-critical Assembly

In addition, as a graduate assistant and reactor staff member for 2 years at the University of Maryland Reactor, Dr. McGarrity assisted as an instructor in courses on Reactor Technology which included Health Physics as well as reaction operations. Also, he had 10 years experience at the HDL Triga Reactor Facility (DORF) as Reactor Staff Physicist advising the Physicist-in-charge on matters of operation and safety. His work at the University of Maryland included 5 years experience with a PS-100 500 Kev Van de Graaf accelerator.

Claude A. Rowe (Alternate RPO)

<u>Isotope</u>	<u>Maximum Amount</u>	<u>Experience Was Gained</u>	<u>Duration of Experience</u>	<u>Type of use</u>
Cs-137	100 mc	NBS	3 years	Instrument Calibration
Co-60	10 c	NBS	3 years	Instrument Calibration
Pu-Be	10 c	NBS	3 years	Instrument Calibration
I-131	100 mc	Univ. of Kentucky Medical Center	5 months	Radiation Therapy
Au-198	100 mc	" "	5 months	Radiation Therapy
Misc. (3-89)	Various amounts (few uc to several hundred mc).	" "	10 years	Routine Health Physics

In addition, Mr. Rowe was employed as a Health Physicist at the Argonne National Labs for approximately 4 years, the National Bureau of Standards for 3 years, the University of Kentucky Medical Center for 5 months and the Charleston Navy Shipyard for 2 years.

SUPPLEMENT #2

Item 9. Experience with Radiation for RPO and Users.

<u>Isotope</u>	<u>Maximum Amount</u>	<u>Where Experience Was Gained</u>	<u>Duration of Experience</u>	<u>Type of Use</u>
<u>Walter L. Gieseler</u>				
Misc. Isotopes	100 mc	DORF-TRIGA General Atomics	3½ years	Research
Polonium 210 (Po-Be neutron source)	20 c	DORF	3 years	Research
Cesium-137	10 mc	HDL	6 months	Research
<u>Emmert D. McGarry</u>				
Cobalt-60	100 curies	BAPL	5 years	Calibration, Dosimetry
Plutonium	1 curie	Air Force	18 months	Research
Misc 3-83	50 Micro-curies	BAPL	8 years	Research
<u>Marcus L. Moore</u>				
Cobalt-60	25,000 c	NBS	5 years	Research
Americium-241	10 c	HDL (DORF)	5 years	Start-up source for Triga Mark F Reactor
Cesium-137	100 c	WRAMC	5 years	Instrument Calibration
Misc. Isotopes (3-83)	Various Amounts	HDL (DORF) (few mc to several hundred mc)	5 years	Routine

SUPPLEMENT #3

Item 11. Radiation Detection Instruments.

<u>Type of Instruments</u>	<u>Number Available</u>	<u>Radiation Detected</u>	<u>Sensitivity Range (mR/hr)</u>	<u>Window Thickness (mg/cm<sup>2</sup>)</u>	<u>Use</u>
Nuclear Measurements Corp. PC-3A Gas Flow internal proportional counter.	1 (HDL)	Alpha, Beta Gamma	----	----	Measuring
Baird Atomic Model 135 Scaler-Timer with Shield & end window G-M Tube.	1 (DORF)	Beta, Gamma	----	1.4	Measuring
Victoreen Model 570 Condenser R-meter chambers.	1 (HDL)	Gamma	----	----	Measuring
Anton CD V-700 G-M Survey Meter	2 (HDL)	Beta, Gamma	0-50	30	Surveying & Monitoring
Eberline E-120 Geiger Counter	1 (DORF)	Beta, Gamma	0-50	----	Surveying & Monitoring
Eberline, E-400 Geiger Counter	1 (DORF)	Beta, Gamma	0-200	----	Emergency Instrument
Johnson, GSM-5 Survey Meter, GM Tube	1 (DORF)	Beta, Gamma	0-20	----	Surveying & Monitoring
Nuclear Chicago, 2586 Ionizing Chamber	2 (DORF)	Beta, Gamma	0-2500	----	Surveying & Monitoring
Nuclear Chicago, 2650 G-M Tube	2 (DORF)	Beta, Gamma	0-100	----	Surveying & Monitoring
Tele Tester, 6112 G-M Tube	5 (DORF)	Beta, Gamma	0-10 <sup>6</sup>	----	Surveying & Monitoring
Victoreen 490 Thyac III G-M Tube	1 (HDL)	Beta, Gamma	0-20	30	Surveying & Monitoring
Victoreen 440 BF/A Ionization Chamber	1 (HDL)	Gamma	0-300 mR/hr		Surveying & Monitoring
Nuclear Chicago Model 2112, Survey Meter with DN-3 Neutron Probe	2	Neutrons	----	----	Monitoring
Eberline PNR-4 Portable Neutron Rem Counter	1	Thermal & Fast Neutrons	0-5 R/hr	----	Surveying & Monitoring



SUPPLEMENT #5

Item 13. Facilities and Equipment

Americium-241

General.

a. The neutron source will be used in the Triga Mark F reactor at the Diamond Ordnance Radiation Facility (DORF), which is located on the Walter Reed Army Medical Center Forest Glen Annex, Forest Glen, Maryland. The reactor and attendant facilities are housed in a reinforced concrete and brick building.

b. Handling. Personnel handling the source will be equipped with beta-gamma and neutron film badges and will be required to use tongs when handling the source.

c. Shielding. During reactor operation the source will be shielded by 17 feet of water. No other use of this source is anticipated.

Normal storage will be in the reactor pool. In case of unforeseen events requiring removal of the source from the reactor pool, it will be stored in an appropriate paraffin shielded storage container and placed in the warm storage room.

Strontium-90.

General.

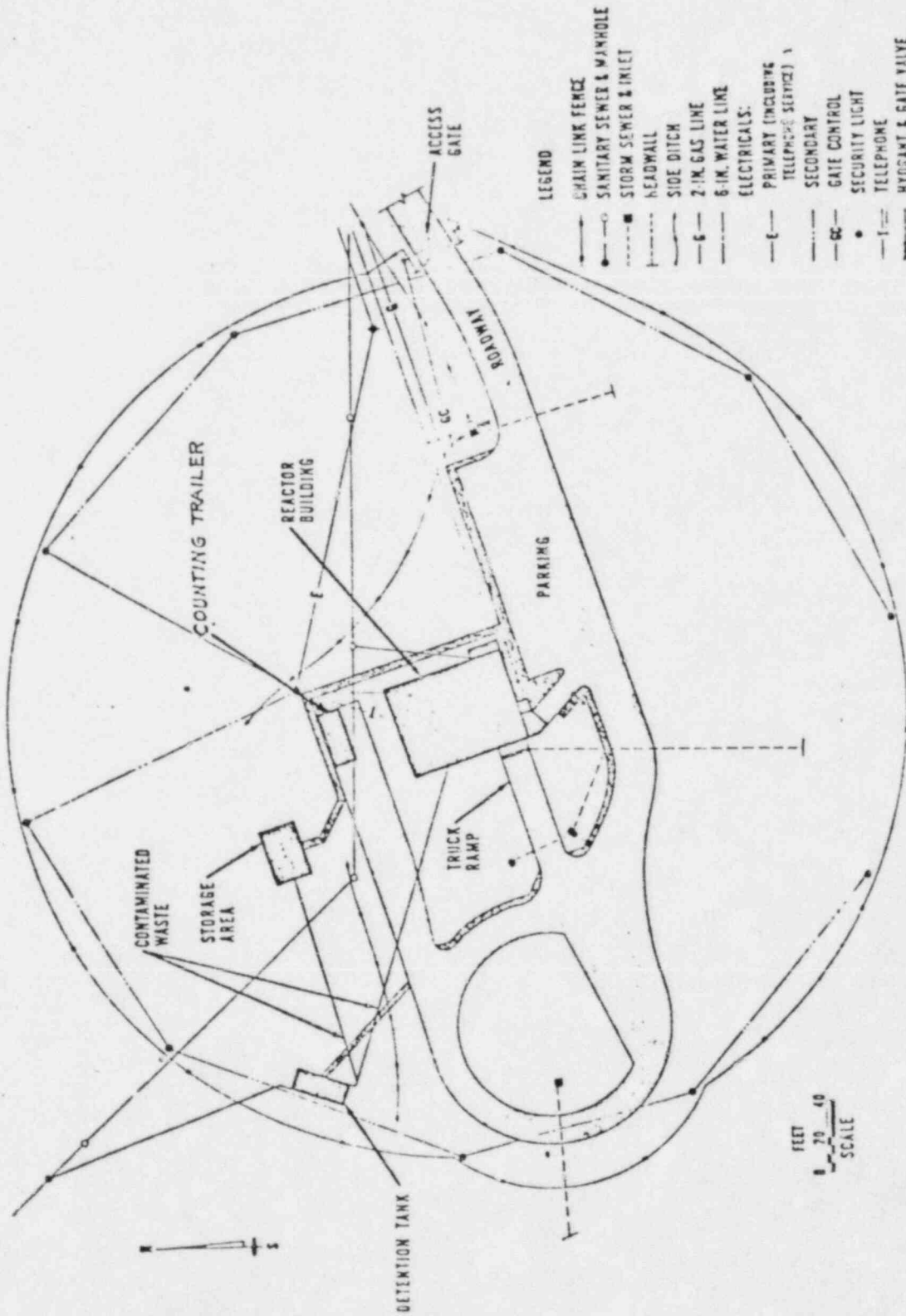
a. Equipment containing the Strontium-90 check sources will be used for monitoring purposes in conjunction with the Triga Mark F reactor at DORF.

The "Radgun" containing 5 microcuries, and Strontium-90 is a standard hand-held survey instrument. The "Remote Area Monitor" system consists of a central recording station and eight "sensing elements" (seven containing a 0.3 microcurie source and two modified elements containing 10 microcurie sources). The sensing elements are immersion proof, vapor tight, sealed cylindrical containers, each housing a sealed ionization chamber and a calibration source, all calibration provisions are wholly self-contained and push-button operated; no manual access to the detector is required. Seven of the sensing elements are located in selected spots in the reactor building. Two "spare" sensing elements containing an 0.3 microcurie check source are located in a cabinet in a limited access area.

b. Shielding. No special provisions for shielding are required.

c. Handling. The hand-held survey instrument will be used by the DORF staff. The Remote Area Monitoring System sensing elements will not be handled except for repair and leak testing.

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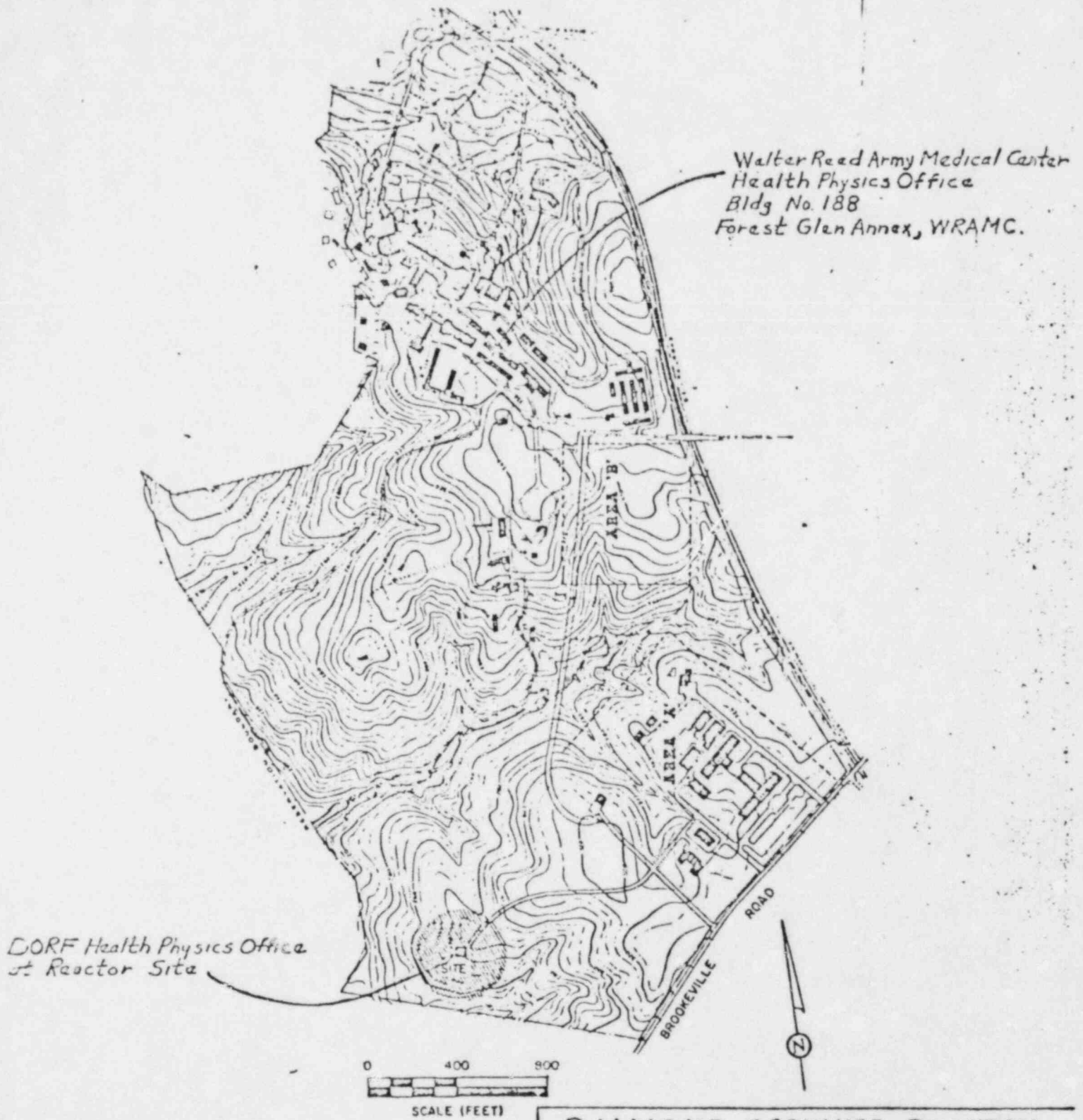
- LEGEND
- CHAIN LINK FENCE
  - SANITARY SEWER & MANHOLE
  - STORM SEWER & INLET
  - HEADWALL
  - SIDE DITCH
  - 2 IN. GAS LINE
  - 6 IN. WATER LINE
  - ELECTRICALS:
  - PRIMARY (INCLUDING TELEPHONE SERVICE) A
  - SECONDARY
  - GATE CONTROL
  - SECURITY LIGHT
  - TELEPHONE
  - HYDRANT & GATE VALVE

DIAMOND ORDNANCE RADIATION  
FACILITY TRIGA MARK-F REACTOR

DONF SITE

Figure 2

FEET  
0 20 40  
SCALE



DIAMOND ORDNANCE RADIATION  
FACILITY TRIGA MARK-F REACTOR  
MAP OF FOREST GLEN SITE FOR DORF

Figure 1

SUPPLEMENT #6

Item 14. Radiation Protection Program

General

Per agreement between the Chief of Ordnance and the Surgeon General, on site Health Physics service at the Facility is provided by personnel from the Walter Reed Army Medical Center under the direction of the WRAMC Health Physics Officer. The WRAMC Health Physicist on duty at the DORF reactor is known as the DORF Health Physicist. At least one Health Physicist will be on duty at DORF during all operating hours.

A complete Health Physics Office is maintained at the DORF Reactor. Various Beta-Gamma, Neutron, and Alpha radiation detection instruments are available. Specific instruments which are of particular value for monitoring in conjunction with the requested material have been listed in item 10.

Leak testing will be done by either the HPL Radiation Protection Officer or by the DORF Health Physicist. Because the DORF Health Physicist is a member of the U. S. Army and is subject to transfer on short notice, it is not feasible to include any one individual's name, experience and training in this application. However, the position of DORF Health Physicist will be kept filled per the referenced agreement between the Chief of Ordnance and the Surgeon General. The actual assignment of personnel will be made by the WRAMC Health Physics Officer.

In case a source is found leaking it will be returned to the supplier for repair or disposal or transferred to another licensee whose license authorizes him to receive such material.

Sources will be leak tested at intervals not to exceed 6 months.

Leak testing will be done in the following ways:

- a. The source will be wiped with a filter paper and the filter paper will be counted in an internal gas-flow proportional counter.
- b. The source will be swabbed with a piece of cotton, with a suitable solvent, and the swab will be counted in an internal gas-flow proportional counter.

Item 15. Waste Disposal

Waste disposal will be handled by the U.S. Army Edgewood Arsenal Depot Operations Division - AEC License No. 19-1826-6.