NRC FORM 313
(1-84)
10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires: 5-31-87

APPLICATION FOR MATERIAL LICENSE

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

FEDERAL AGENCIES FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS, IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*

[X] A. NEW LICENSE
[ ] B. AMENDMENT TO LICENSE NUMBER _____
[ ] C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip Code)*

Commander
U.S. Army Missile Command
ATTN: AMSMI-SF
Redstone Arsenal, AL 35898-5130

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED.

The licensed material shall be utilized by the Department of the Army (DA) military, civilian and contractor personnel at DA installations/activities located worldwide.

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Jay L. Henson, Radiation Protection Officer

TELEPHONE NUMBER: (205) 876-8136

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL: See Supplement A
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.
See Supplement B

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE:
See Supplement C

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.
See Supplement D

9. FACILITIES AND EQUIPMENT: See Supplement E

10. RADIATION SAFETY PROGRAM: See Supplement F

11. WASTE MANAGEMENT: See Supplement G

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY: Exempt
AMOUNT ENCLOSED $

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

SIGNATURE - CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
Larry R. Capps	LARRY R. CAPPS	Colonel, Ordnance Corps PATRIOT Project Manager	10 Jun 86

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS
[ ] <$250K
[ ] $250K-500K
[ ] $500K-750K
[ ] $750K-1M
[ ] $1M-3.5M
[ ] $3.5M-7M
[ ] $7M-10M
[ ] >$10M

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION *(Dollar and/or staff hours)* ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? *(NRC regulations permit it to protect confidential commercial or financial-proprietary-information furnished to the agency in confidence)*
[ ] YES [ ] NO

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
			FEE EXEMPT	

AMOUNT RECEIVED
8607090543 860619
REG2 LIC30
01-00126-18 PDR

DATE

PRIVACY ACT STATEMENT ON THE REVERSE

PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on NRC Form 313. This information is maintained in a system of records designated as NRC-3 and described at 40 Federal Register 45334 (October 1, 1975).

1. **AUTHORITY:** Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).

2. **PRINCIPAL PURPOSE(S):** The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30, 32, 33, 34, 35 and 40 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.

3. **ROUTINE USES:** The information may be (a) provided to State health departments for their information and use; and (b) provided to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for an NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you.

4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION:** Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed. A request that information be held from public inspection must be in accordance with the provisions of 10 CFR 2.790. Withholding from public inspection shall not affect the right, if any, of persons properly and directly concerned need to inspect the document.

5. **SYSTEM MANAGER(S) AND ADDRESS:** U.S. Nuclear Regulatory Commission
Director, Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
Washington, D.C. 20555

SUPPLEMENT A

1. Reference Item 5, NRC Form 313.

2. Radioactive Material Information

   a. Element and mass number: Krypton 85

   b. Chemical/Physical Form: Gas in a sealed spark gap (electron tube).

   c. Maximum activity per source (spark gap): 0.250 millicuries.

      Maximum activity to be possessed at any one time: 31.25 millicuries (125 spark gaps)

   d. Name of Manufacturer and Model Number:

      (1) Manufacturer is EG&G, Part No. OGP-1935R (See Attached Information)

      (2) Department of Army Supplier is Raytheon, Part No. 11436885-2

EG&G Krypton 85 Products

The products incorporating Krypton 85 are generally classified as triggered gaps. A triggered gap is a three electrode device designed to operate in an arc discharge mode, conducting moderately high peak currents for short periods. These devices are ceramic to metal heremetically sealed units. Krypton 85 in the form of a nitrogen-oxygen-helium gas mix is used for backfilling in order to improve the "dark starting" characteristic of the tube.

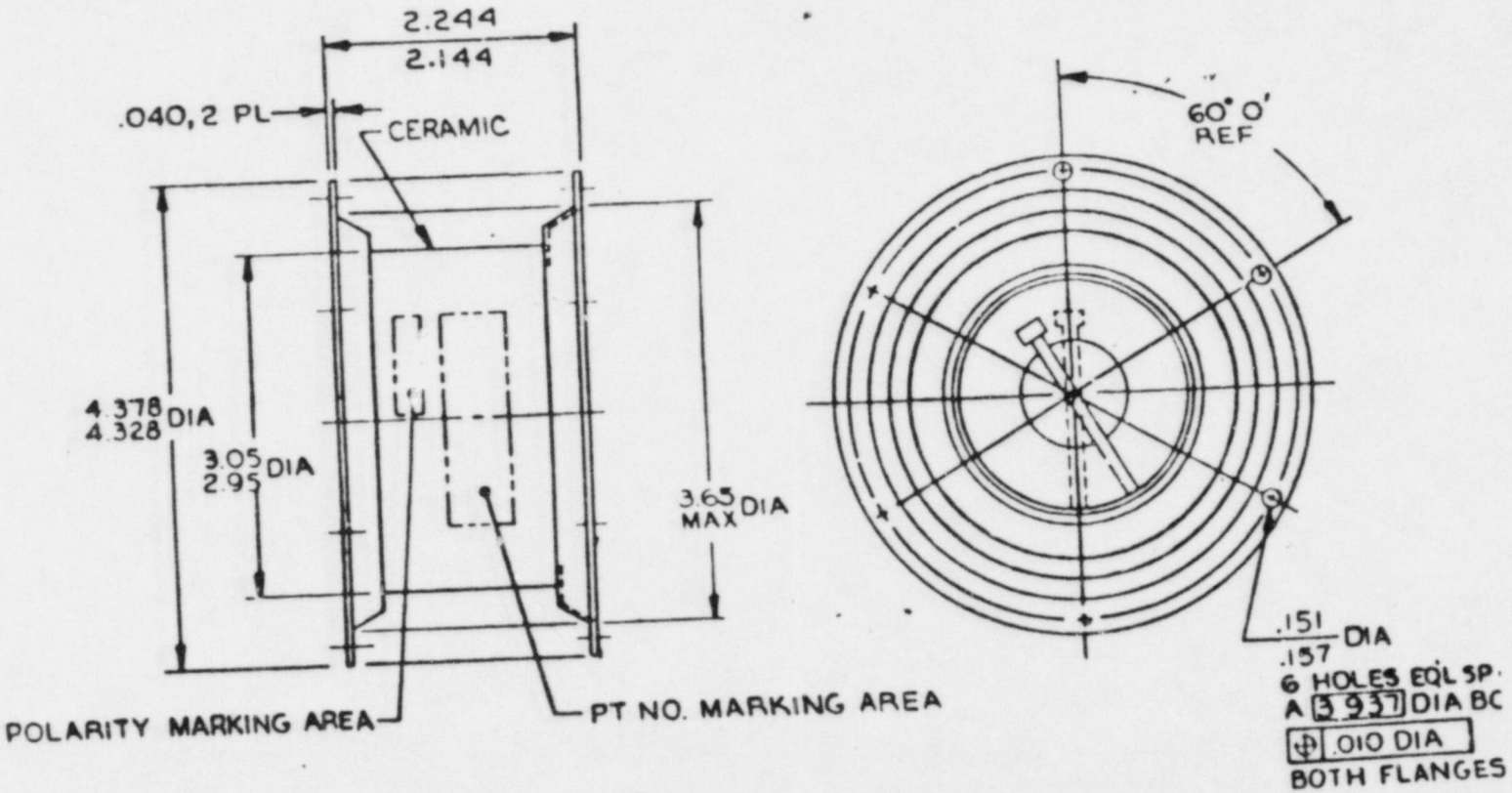
The Krypton 85 may only be released from the tube by crushing, grinding, or abrading the finished tube. In normal use, such treatment is unlikely to occur. Completed devices have been shock tested to withstand as high as 3500 G's in 0.5 millisecond pulses in each of three perpendicular planes. The gaps withstand a thermal shock of plunging from boiling water into a supercooled (-55°C) fluorinert and again into boiling water. It has also been vibration tested for ten minutes of 50 to 3000 Hz sinusoidal forcing function with a constant power spectral density of 0.6 G^2/Hz. It is unlikely that the Krypton 85 contained within the triggered gap will be released to the environment.

Each unit is visually inspected at 20X during assembly and rejected for visual defects. In addition, each device is electrically tested and aged for switching performance prior to acceptance.

Raytheon

PATRIOT

COLLECTOR SPARK GAP



Enclosure 1.0

TECHNIQUE FOR DETERMINATION OF RADIOACTIVITY LEVEL OF EG&G SPARK GAP

Raytheon Company has measured the activity level of 53 production spark gaps manufactured by EG&G. These spark gaps are Raytheon Part No. 11436885-2 and EG&G Park No. OGP-1935. The spark gaps were manufactured over a time period from 1980 through 1985. The spark gaps have a volume of 75 cc and are filled with a gas mixture to a pressure of 500 Torr. (nominal). The gas consists of 85-88% nitrogen, 4.9-5.9% oxygen 8.9 - 10% helium, and a trace of Kr85. The nominal gas composition was confirmed on 12 spark gaps via mass spectrometry at Gollob Analytical Service, Berkeley Heights, N.J.

Activity level of the 53 production spark gaps was determined by taking scintillation counts from the spark gaps and comparing to a known standard as follows:

The scintillation counts were taken using a Ludlum model 2200 Scalar Ratemeter, with a Ludlum model 44-2 1" deep by 1" diam. sodium iodide scintillation probe. Readings were taken with the probe in contact with the sidewall of the spark gap. The probe window was open (non-energy range discrimination) and counts were taken for a one minute duration. Background readings were subtracted.

Standards were obtained from two laboratories. Both were created as follows:

> An empty spark gap was first evacuated, and then was loaded with Kr85 from a known certified activity level from the National Bureau of Standards. The activity transfer accuracy was verified by ratio of scintillation counts from source container to spark gaps.

Two standards were obtained from Analytics, Inc., Atlanta, Georgia (285.7 uCI and 278.6 uCi) and one from Gollob Analytical Service (200.0 uCi). When referencing an unknown, the standards agreed to within 8%.

Of the level of 53 spark gaps whose actvity level was determined, only 3 read above 100 uCI, and only one above 200 uCI (216 uCI). Based upon this survey, we would expect all units manufactured to fall below 250 uCi activity.

SUPPLEMENT B

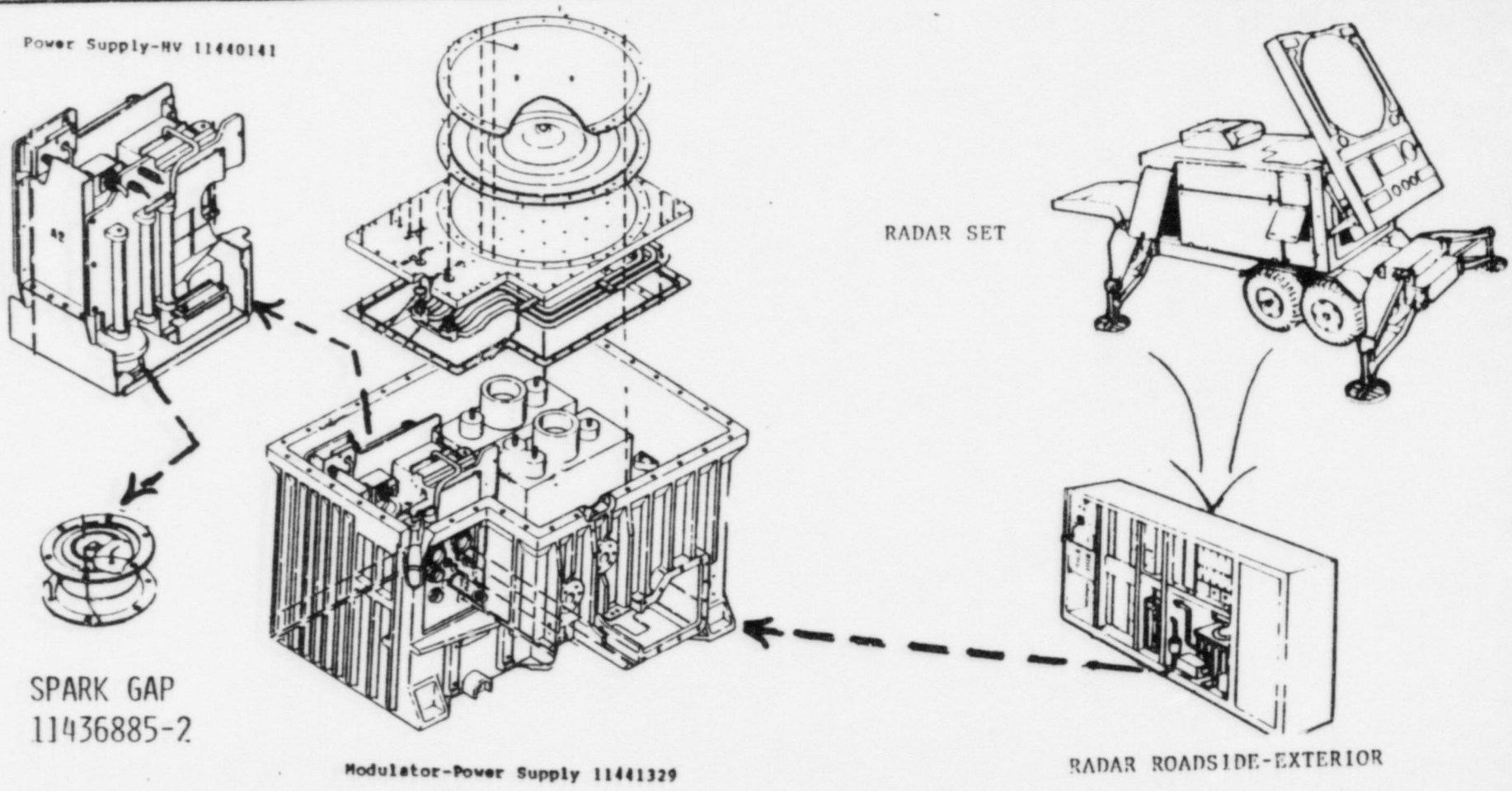
1. Reference Item 6, NRC Form 313.

2. The spark gap is installed in the high voltage power supply, #11440141, which is installed in the Modulator-Power Supply (Transmitter Driver Tank), #11441329. The Army does not procure nor receive individual spark gaps. The spark gaps are received in the Transmitter Driver Tank which is received either individually or installed in a cabinet attached to the PATRIOT Missile System Radar Set (see attached illustration). The PATRIOT System is the only US/ALLIED high altitude air defense missile system and is vital to national defense. The license is being sought for the receipt, possession, use and transfer of the spark gap.

The Transmitter Driver Tank is approximately 10 cubic feet and weighs 1200 lbs. Radar operation personnel do not perform any repair or maintenance on the Tank. Defective Tanks are returned to the manufacturer or DA "repair and return" facilities. The DA facilities will be located in El Paso, Texas and in the Federal Republic of Germany.

It is the Army's intention to remove the radioactive spark gaps from the Driver Tanks and replace them with non-radioactive spark gaps as soon as possible. This will be accomplished when the Driver Tanks are returned for repair and/or retrofit.

When received at the repair/retrofit facility, the Driver Tank is disassembled and the various sub-components are tested and retrofitted as required. The radioactive spark gap will be removed from the high voltage power supply and replaced with a non-radioactive substitute. The radioactive spark gaps will be returned to the supplier for disposal.


Power Supply-HV 11440141
RADAR SET
SPARK GAP
11436885-2
Modulator-Power Supply 11441329
RADAR ROADSIDE-EXTERIOR

SUPPLEMENT C

1. Reference Item 7, NRC Form 313.

2. Individual responsible for U.S. Army Missile Command Radiation Safety Program:

   Jay L. Henson (See attached description of training and experience).

   William. E. Baber (See attached description of training and experience).

JAY L. HENSON, Health Physicist, US Army Missile Command (MICOM), Redstone Arsenal, Alabama

a. Education:

(1) B.S. - Mercer University, Macon, Georgia - 1976. Major: Biology. Minor: Chemistry.

(2) Post Graduate Study - University of Georgia, Athens, Georgia, January 1977 - March 1978. Major Fields of Study: Physiology/Biochemistry.

b. Professional Experience:

(1) July 1978 - January 1979 - Royster Fertilizer Co., Athens, Georgia. Chemist - Analytical Chemistry Laboratory. Responsible for operating and maintaining chemical laboratory for the analysis of raw materials and final products of fertilizer manufacturing facility.

(2) January 1979 - July 1979 - DARCOM Field Safety Activity, Charlestown, Indiana. Safety Specialist Intern - Received formal training in all aspects of safety and occupational health in order to function as a safety specialist for the Department of the Army.

(3) July 1979 - May 1981 - Radford Army Ammunition Plant, Radford, Va. Safety Specialist - Responsible for monitoring a contractor's safety program for production of various munitions, industrial operations, and construction. Insured compliance of safety program with all applicable Army, Federal, and state safety regulations to include OSHA and NRC regulations. Reviewed non-destructive test areas for compliance with radiation protection regulations.

(4) May 1981 - June 1984 - Anniston Army Depot, Anniston, Alabama. Radiation Protection Officer/Health Physicist. Responsible for establishing, implementing, and enforcing the policies and responsibilities for the protection of personnel and the control, licensing, transportation and disposal of radioactive material as well as ionizing and non-ionizing radiation producing devices. Implemented Federal, state, and Army directives and developed local safety regulations and procedures to safeguard personnel and equipment from harmful effects of ionizing/non-ionizing radiation. Performed health physics surveys in radioactive material storage/maintenance facilities and industrial x-ray operations. Performed safety inspections of class I through class IV laser facilities. Assisted in the design of facilities for industrial x-ray and laser operations.

(5) June 1984 - Present - US Army Missile Command (MICOM), Redstone Arsenal, Alabama. Health Physicist/Radiation Protection Officer. Responsible for planning, implementing and operating a Radiological Safety Program for MICOM and other attached or assigned organizations. Health physics functions are performed for on-post operations involving radioactive materials and radiation producing devices as well as support for radioactive missile system commodities used worldwide. Prepare and review applications for DA authorizations and NRC licenses, establish and maintain radiation protection records and files.

c. Formal Training in Radiation Protection Methods, Measurements and Effects:

	Duration of Training	On-the-Job	Formal Course
(1) Radiological Safety and Health, DARCOM Field Safety Activity, IN. June, 1979	3 Days	NO	YES
(2) Radiological Safety and Health, Anniston Army Depot, Anniston, AL. June-July 1981	4 Weeks	YES	NO
(3) Radiological Safety Course Chemical School, Ft. McClellan, AL. July-Aug 1981	3 Weeks	NO	YES
(4) Basic Course in Health Physics, Louisiana State University, Baton Rouge, LA. Dec 1981	1 Week	NO	YES
(5) Laser-Microwave Hazards Workshop, US Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD. March 1982	1 Week	NO	YES
(6) Applied Health Physics Oak Ridge Assoc. Universities, Oak Ridge, TN, May-June 1983	5 Weeks	NO	YES
(7) Radiation Emergency Planning and Management, Radiation Management Corp., Ft. Belvoir, VA. January 1984	1 Week	NO	YES
(8) Health Physics Aspects of Depleted Uranium, Pacific Northwest Lab. Ft. Belvoir, VA March 1984	1 Week	NO	YES

		Duration of Training	On-the-Job	Formal Course
(9)	Transportation of Radioactive Materials, Afftrex, LTD, Fort Belvoir, VA, January 1985	1 Week	NO	YES
(10)	Radioactive Waste Packaging, Transportation, and Disposal Chem-Nuclear Systems, Inc. Columbia, S.C. 15-19 April 1985	1 week	NO	YES

d. Experience with Radiation

(1) Radioactive Material

	ISOTOPE	MAXIMUM ACTIVITY	DURATION OF EXPERIENCE	TYPE OF USE
a.	H^3	10 Ci	3 Years	For items a-d, Storage and Maintenance of radioactive commodities; health physics surveys and wipe tests (Anniston Army Depot)
b.	Ra^{226}	15 uCi	3 Years	
c.	Pm^{147}	3 mCi	3 Years	
d.	Th^{232}	4.89 mCi	3 Years	
e.	U^{238}	0.005 uCi	3 Years	For items e-j, Calibration of radiac equipment; health physics surveys and leak tests (Anniston Army Depot)
f.	Cl^{36}	0.0227 uCi	3 Years	
g.	$Sr\text{-}Y^{90}$	100 mCi	3 Years	
h.	Cs^{137}	12.0 Ci	3 Years	
i.	Co^{60}	10.0 Ci	3 Years	
j.	Pu^{239}	1.4 uCi	3 Years	
k.	Ni^{63}	15 mCi	2 Years	Electron Capture Detector health physics surveys and leak tests (Anniston Army Depot)
l.	H^3	10 Ci	June 84-Present	Calibration
m.	Co^{60}	150 Ci	June 84-Present	Radiography
n.	$Sr\text{-}Y^{90}$	200 mCi	June 84-Present	Calibration
o.	Ni^{63}	15 mCi	June 84-Present	Electron Capture Detector
p.	Po^{210}	40 mCi	June 84-Present	Static Eliminator
q.	Pu^{239}	1.4 uCi	June 84-Present	Calibration
r.	Kr^{85}	5 mCi	June 84-Present	Calibration
s.	Cs^{137}	12.0 Ci	June 84-Present	Calibration

(For Items 1-s, health physics duties, US Army Missile Command, Redstone Arsenal, AL)

(2) Ionizing Radiation Producing Devices

	SOURCE TYPE	mA	KVp	DURATION	LOCATION
a.	Industrial X-ray	3	200	3 Years	Anniston Army Depot (ANAD)
b.	Industrial X-ray	10	300	3 Years	ANAD
c.	Linear Accelerator	-	2 MeV	1 Year	ANAD
d.	X-ray Diffraction	50	60	June 84-Present	US Army Missile Command (MICOM)
e.	Industrial X-ray	1-30	140-320	June 84-Present	MICOM
f.	Betatron	-	25 MeV	June 84-Present	MICOM

WILLIAM E. BABER, Health Physicist, U.S. Army Missile Command (MICOM), Redstone Arsenal, Alabama, 35898-5130.

A. EDUCATION:

(1) B.S. - Eastern Kentucky University, Richmond, KY. Major: Mathematics

(2) M.A. - Eastern Kentucky University, Richmond, KY, Guidance and Counseling

B. PROFESSIONAL EXPERIENCE:

(1) February 1982 - October 1982, U.S. Army Ionizing Radiation Dosimetry Center, Lexington, KY, Worked as Technician in the U.S. Army Film Badge and TLD dosimetry program.

(2) October 1982 - July 1985, Health Physicist, Lexington - Blue Grass Army Depot, Lexington, KY. Served as Radiation Protection Officer. Responsible for development and implementation of the local Radiation Protection Program in accordance with Federal and Army directives.

(3) July 1985 - Present, Health Physicist, U.S. Army Missile Command, Redstone Arsenal, Alabama. Responsible for assisting in planning, implementing and operating a Radiological Safety Program for MICOM and other attached or assigned organizations. Serve as Alternate Radiation Protection Officer and Alternate MICOM Laser Safety Officer.

C. SPECIALIZED TRAINING IN RADIATION PROTECTION METHODS, MEASUREMENTS AND EFFECTS:

(1) U.S. Army Ionizing Radiation Dosimetry Center, Lexington, KY, On-The-Job Training, 1982-83.

(2) Basic Radiological Health, University of Texas Health Science Center, San Antonio, TX, 1 week, 1982.

(3) Radiological Safety, U.S. Army Chemical School, Ft. McClellan, AL, 3 weeks, 1983.

(4) Radiological Safety I, Army Institute for Professional Development, 13 Correspondence hours, 1983.

(5) Radiological Hygiene, Eastern Kentucky University, Richmond, KY, 8 hours, 1983.

(6) Industrial Hygiene Aspects of the OSH Act, Field Safety Activity, Charlestown, IN, in 1 week, 1983.

(7) Laser and Microwave Workshop, Edgewood Arsenal, Aberdeen Proving Ground, MD, 1 week, 1983.

(8) Emergency Planning & Control, Management Corp., Ft. Belvoir, VA, 1 week, 1984.

(9) Applied Health Physics, Oak Ridge Associated Universities, Oak Ridge, TN, 5 week, 1985.

(10) Radioactive Materials Transportation Course, Ft. Belvoir, VA, 1 week, 1985.

(11) Regulatory Awareness - Radioactive Waste Packaging, Transportation and Disposal Course, Chem-Nuclear Systems, Inc., Columbia, SC, 1 week, 1985.

D. EXPERIENCE WITH RADIATION:

(1) Isotope	Amount	Duration of Experience	Use
(a) Co 60	130mCi-10Ci	3 yrs	Source exchange, leak testing, shipping, receiving and storage.
(b) Kr 85	5mCi	3 yrs	Shipping, receiving, storage
(c) Pu 239	1.4uCi-50.21uCi	3 yrs	Leak testing, calibration, shipping, receiving & storage.
(d) Sr-Y 90	200mCi	3 yrs	Maintenance, calibration, leak testing, shipping, receiving-storage.
(e) Cs 137	0.01uCi-120Ci	3 yrs	Storage, leak testing.
(f) Ra 226	Various	3 yrs	Shipping, receiving, storage.
(g) Th 230, 232	Various	3 yrs	Shipping, receiving, storage.
(h) Po 210	40mCi	2 yrs	Shipping.
(i) Co 60	150Ci	July 85 to Present	Leak testing.
(j) Ni 63	15mCi	July 85 to Present	Leak testing,

(2) Ionizing Radiation Producing Devices

Source Type	mA	KVp	Duration	Location
(a) X-Ray Diffraction	50	60	July 85 to Present	MICOM
(b) Industrial X-ray	1-30	140-320	July 85 to Present	MICOM
(c) Betatron	--	25 MeV	July 85 to Present	MICOM

(3) Radioactive waste shipment - 25 drums

(4) Supervision of refurbishment project involving 284 ea. AN/UDM-2 Sr-Y90 calibrators.

(5) Performed M1A1 Co 60 source exchanges in the M3A1 calibrator.

SUPPLEMENT D

1. Reference Item 8, NRC Form 313.

2. Technical Manuals (TM's) issued with the PATRIOT System for personnel involved with the operation or repair of the radar and the Driver Tank will contain warnings which alert these personnel to the presence of the radioactive material. An example of the warning to be included in the TM's is at Enclosure 1.

In addition to the warnings in the TM's, each Driver Tank will be labeled with a "CAUTION RADIOACTIVE MATERIAL" label. A description of this label is at Enclosure 2.

A "Safety-Of-Use" message will be transmitted to all DA elements to inform them of the presence of the radioactive spark gaps that have already been fielded, (see Enclosure 3). Additional messages will be forwarded to the field that will provide the user with more radiological safety procedures to be followed in the use and handling of the spark gap and the associated equipment.

CAUTION

RADIOACTIVE MATERIAL

The following equipment contains radioactive material.

Nomenclature	Part No.	Isotope	Activity Level (Not more than)
Electron Tube (Spark Gap)	11436885-2	Krypton^{85} gas	250 micro Curies (μCi)

Electron tube 11436885-2 is a sealed source and is contained in Modulator Power Supply, P/N 11441329, located in the Radar Set.

Activity level, not more than 250 micro Curies, was determined 29 May 1986. No testing is required.

Controlled disposal is required. Modulator Power Supply 11441329 shall be opened only at a licensed remove/replace facility and never at the organizational level. When disposal is required, Electron Tube 11436885-2 shall be labelled as on the Modulator Power Supply 11441329 and returned to Raytheon Company. Packaging, shipping and handling shall be in accordance with TM 38-250. When an Electron Tube containing Krypton^{85} is removed and replaced with a non-radioactive tube, the **CAUTION** label located on top of Modulator Power Supply 11441329 is to be removed.

The receipt, possession, use, and transfer of the Electron Tube Part No. 11436885-2 are subject to a specific license or the equivalent and the regulations of the U.S. NRC or of a state with which the NRC has entered into an agreement for the exercise of regulatory authority.

Personnel Considerations:

1. The radioactivity level in the Electron Tube 11436885-2 is considered to be non-hazardous to personnel.

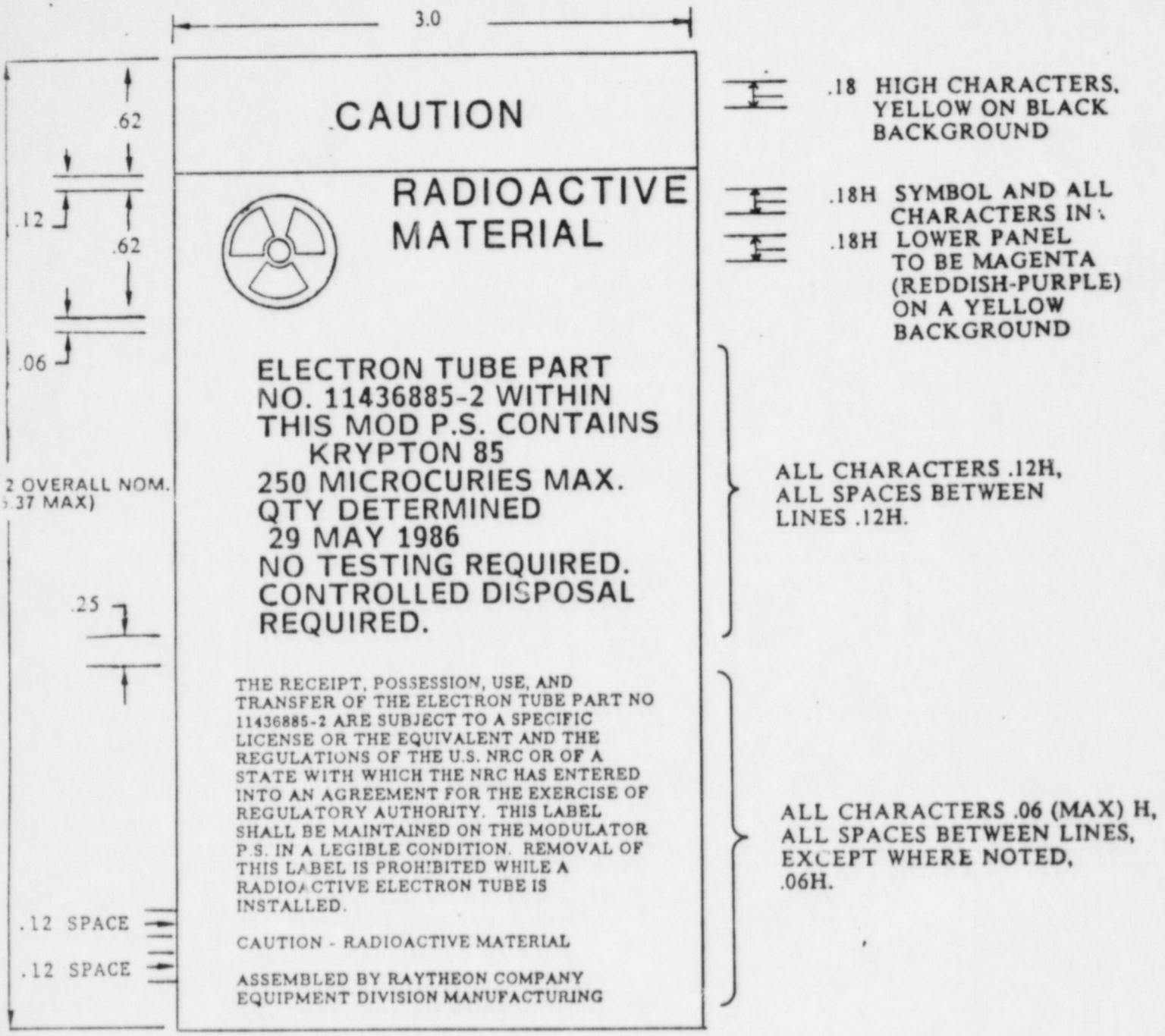
2. This part will be handled only at authorized repair depot and not at the organizational level. At the organizational level, radioactivity above normal background cannot be detected at the surface of Modulator Power Supply P/N 11441329.

3. Exposure above background can occur only by crushing, grinding or abrading the Electron Tube. If an Electron Tube is broken, the Krypton^{85} gas will dissipate into the air.

4. If an Electron Tube is broken, exposure can be minimized:

   a) avoid direct inhalation

   b) Use available ventilation for 10 minutes to disperse and remove any Krypton^{85} in the air.



NOTES:

1. MATERIAL TO BE ADHESIVE-BACKED MYLAR OR SETON "MARPRUF DECAL" OR EQUIVALENT.
2. LABEL IS INTENDED TO COMPLY WITH NRC REGULATIONS CONTAINED IN 10 CFR AND OSHA REGULATIONS, 29 CFR. ANY INTERPRETIVE CHANGES MUST BE CONSISTENT WITH THESE.
3. GENERAL LABEL STANDARD IS ANSI Z35.1-1972.
4. LABEL TO BE COLORFAST IN TRANSFORMER OIL.

PATRIOT MODULATOR P.S. RADIATION LABEL

A.E. STOREY 2 JUNE 1986

UNCLASSIFIED

01 02 281700Z 05 A6 RR UUUU AT ZYUW

NO

FROM CDR MICOM REDSTONE ARSENAL AL//AMSMI-LC-ME-APG//

TO CDR AMC ALEX VA//AMCSF/AMCSM/AMCQA/AMCDE//

CINC USAREUR HEIDELBERG GE//AEAGA-S//

CDR 32D AADCOM DARMSTADT GE//AETL-GD-MA/AETL-FMD/

AETL-GC//

CDR 10TH ADA BDE DARMSTADT GE//AETL-GM//

CDR 2ND BN 43D ADA GE//

CDR 4TH BN 3D ADA GEISSEN GE//

CDR USAADS FT BLISS TX//ATSA-C/ATSA-TSM-P/

AMCPM-PA-AS-FB//

CDR 1ST BN 43D ADA FT BLISS TX//

DA WASH DC//ODCSLOG/ODCSRDA/DCSOPS/OCAR {DAAR-LOG}/

ODCSPER SAFETY OFFICE/OASA {IL AND FM}//

CDR USASC FT RUCKER AL//PESC-S//

CDR AMC FSA CHARLESTON IN//AMCOS-PE//

CDR MICOM REDSTONE ARSENAL AL//AMCPM-PA-PT/

AMCPM-PA-AP/AMCPM-PA-AS-LM/AMSMI-SF//

SUBJECT: SAFETY-OF-USE MESSAGE {OPERATIONAL}, PATRIOT RADAR SET {RS}

AN/MPQ-53 DRIVER TANK, APN 11441329.

DONALD E. GRUNDT, GEN ENG
AMCPM-PA-PT 895-4241

VERNON O. CHANCE, C, PRODUCT ASSURANCE
AND TEST DIVISION, PATRIOT PROJ OFF 895-3655

UNCLASSIFIED

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NO

1. REQUEST THIS INFORMATION BE GIVEN WIDEST POSSIBLE DISSEMINATION AMONG ELEMENTS OF YOUR COMMAND.

2. THIS SAFETY-OF-USE MESSAGE (OPERATIONAL) IS ISSUED TO ALERT THE USER THAT THE DRIVER TANK CONTAINS A COMPONENT WITH A RADIOACTIVE SOURCE WHICH EXCEEDS EXEMPT ALLOWANCE LIMITS. A SPARK GAP IN THE DRIVER TANK CONTAINS KRYPTON - 85 GAS AT CONCENTRATIONS ABOVE THAT ALLOWED BY THE NUCLEAR REGULATORY COMMISSION (NRC). THE DRIVER TANK IS NOT A FIELD REPAIRABLE UNIT AND NO ATTEMPT SHOULD BE MADE TO REPAIR THIS ITEM.

3. THE SMALL QUANTITY OF KRYPTON - 85 GAS USED IN THE SPARK GAP DOES NOT CONSTITUTE A HEALTH HAZARD, BUT DOES EXCEED NRC ALLOWABLE LIMITS.

4. IN ORDER TO PREVENT POSSIBLE EQUIPMENT DAMAGE OR PERSONNEL INJURY, IT IS REITERATED THAT THE DRIVER TANK WILL NOT BE REPAIRED IN THE FIELD.

5. WHEN THIS PROBLEM IS RESOLVED, A MESSAGE WILL BE TRANSMITTED DESCRIBING THE APPROPRIATE ACTION/SOLUTION TO TAKE.

6. POC THIS COMMAND IS MR. D. GRUNDT, AMCPM-PA-PT, AUTOVON 742-4241.

SUPPLEMENT E

1. Reference Item 9, NRC Form 313

2. Facilities where the PATRIOT Radar and the Driver Tank spares will be used and stored are on military bases or will be in areas under the direct supervision of Army personnel. These areas will be secured against the entry of unauthorized personnel.

The PATRIOT Field Army Support Center at Fort Bliss in El Paso, Texas and the Mainz Army Depot in Mainz, Germany will perform repair/retrofit procedures on the Driver Tank. When removed from the Driver Tank, the radioactive spark gaps will be labeled and returned to the supplier for disposal. Temporary storage of the spark gaps prior to their return will be in a secure facility.

SUPPLEMENT F

1. Reference Item 10, NRC Form 313.

2. Regulatory guidance for control of radioactive materials/commodities has been established by DA governing the management process, possession and use of radioactive materials, to include specific reporting procedures for incidences involving loss, theft and misuse, control of personnel radiation exposure, safe storage, handling, maintenance, transportation and disposal of the items.

The authority contained in the NRC license/DA Radiation Authorization (DARA) issued to MICOM permits DA installations and activities to acquire and use certain radioactive materials and items incorporating radioactive material without obtaining their own license/DARA for these items. This is based upon commitments made by MICOM that all Army elements will comply with conditions contained in those licenses and with pertinent Federal, DOD and Army regulations. Both NRC and DA require control of all operations involving radioactive materials to insure the safety of personnel and property. Army activities possessing licensed radioactive sources and the agencies controlling them are subject to inspection by the NRC in addition to inspection by Army elements.

Surface exposure measurements taken from the spark gap were less than 0.5 mR/hr. This low exposure rate combined with the fact that the exposure time of personnel to the spark gap will be very limited makes the use of personnel dosimetry devices unnecessary.

Since there is not a safety or health hazard associated with exposure to the spark gap, the primary issue of the radiation safety program becomes one of accountability and control.

The National Stock Numbers (NSN's) assigned to the spark gap (1430-01-210-3017) and the Driver Tank (1430-01-109-9106) have been entered in the Commodity Command Standard System (CCSS) Automated Data Processing Program. These NSN's will be assigned a Special Control Item Code (SCIC) indicating they contain radioactive material. The CCSS supports the Army Materiel Command (AMC) material readiness function by providing comprehensive management data for items contained within the Army Supply System. Information inputed into the CCSS is transmitted for incorporation into the Army Master Data File (AMDF). The AMDF is disseminated worldwide to effected Army elements in order to provide informaiton necessary for proper management/handling of the item. The SCIC is included in the AMDF. The designated National Inventory Control Point (NICP) maintains records of procurements, receipts, storage locations, shipments, using locations, and authorizes, issues, and assures adequate supply.

In addition to the standard Army control and accountability procedures, MICOM will insure that an initial inventory of each Driver Tank that contains a radioactive spark gap is established and maintained. Each Driver Tank will be tracked by individual serial number. A quarterly physical inventory will be performed to retain a tight control on the condition and location of each Driver Tank.

As the Driver Tanks are processed for repair/retrofit, the radioactive spark gap will be removed and replaced with a non-radioactive substitute which will have a different part number and NSN. In addition, the part number and NSN of the Driver Tank will be changed to indicate that it no longer contains the radioactive spark gap.

The NRC license will be cancelled when the Army inventory has been purged of the radioactive spark gaps.

The transportation of the spark gaps and the Driver Tanks will be accomplished in accordance with applicable Department of Transportation (DOT) and NRC regulations. Under the current DOT regulations, the proper shipping name for these items is

Radioactive Material, Instruments and Articles, UN2911. These items will be transported according to the conditions and requirements for this shipping name.

SUPPLEMENT G

1. Reference Item 11, NRC Form 313.

2. The spark gaps will be returned to Raytheon, the supplier, for disposal. (See the attached document.)

Raytheon Company
Missile Systems Division
350 Lowell Street
Andover MA 01810

617 475 5000
TWX 710 347 0332
Telex 94 7431

Raytheon

DGG:eea:7048:SD-86-3516

10 June 1986

Commander
U.S. Army Missile Command (MICOM)
Attn: L/Col. Laverne Gehm
AMSMI-PC-AC/PATIROT
Redstone Arsenal, AL 35898

Subject: Contract DAAH01-84-C-A041 (Buy #5)
Radioactive Material Status

Reference: Raytheon letter DGG/SD-86-3261, dated 21 May 1986,
Notification of Radioactive Material

Gentlemen:

Subsequent to the referenced notification, several meetings were held among Raytheon, MICOM, AMC and Nuclear Regulatory Commission (NRC) representatives.

Accordingly, the Government and Raytheon are proceeding to take necessary actions to resolve the referenced issue and thus allow contract performance to continue without further undue delays.

In this connection, please be assured that Raytheon Company's Equipment Division will accept receipt and dispose of the Krypton^{85} filled Spark Gaps, APN 11436885-2, received from the R & R facility at El Paso, Texas or other Army R & R Depots. In turn, Raytheon's Equipment Division will ship the returned Spark Gaps for final disposition to:

E. G. & G.
35 Congress Street
Salem, MA 01970

The above disposition action will not result in any increase in contract price.

Very truly yours,

D. G. Ganim
Sr. Contracts Administrator
PATRIOT Program

1 cy ltr
1 cy ltr to: AMCPM-PA-PM-AM/W. Childers
AMSMI-SE-AT/Field Office
DCASPRO/J. Langone, Jr.

SUPPLEMENT H

1. Reference Army Regulation No. 200-2, Environmental Effects Of Army Actions.

2. The Record Of Environmental Consideration document as required by the above reference is attached.

RECORD OF ENVIRONMENTAL CONSIDERATION

TITLE: Incorporation of a Spark Gap Tube into the PATRIOT Radar System which Contains up to 250 Microcuries of Krypton 85.

ANTICIPATED DATE OF PROPOSED ACTION: This spark gap was installed in PATRIOT radar equipment which has been fielded. When these were installed, it was not known that they contained Kr 85.

It has been determined that the action is adequately covered in the existing MX-7338/PDR-27 Radioactive Test Sample Environmental Assessment, dated November 1985. The MX-7338 source contains 5 millicuries of Krypton 85.

John C Frost

JOHN C. FROST
SAFETY ENGINEER

6/11/86

DATE

CONCURRENCE: AMS David L. Bratton

PAUL W. HANCOCK
ENVIRONMENTAL COORDINATOR LISA MICOM

6/11/86

DATE