453-14

NUCLEAR REGULATORY COMMISSION LICENSE

12-00722-06

FOR TRITIUM FIRE CONTROL DEVICES

EXPIRATION DATE: 30 APRIL 1994

POINTS OF CONTACT:

WRITE: COMMANDER, U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND, ATTN: AMSMC-SES, ROCK ISLAND, IL 61299-6000

TELEPHONE: MRS. BETTY PETERSON, MR GAVIN ZIEGLER, OR MR. GARY BUCKROP, DSN 793-2965/2995/2969, COMMERCIAL (309) 782-2965/2995/2969

BML 12-00722-06
SUMMARY OF REQUIREMENTS

1. This licenses covers the tritium (H3) illuminated devices used on fire control for howitzers and mortars and the muzzle reference sensor used on tanks.

2. Tritium sources range in size for .075 Ci to 10 Ci each. License covers up to 950,000 curies total.

3. Inventories must be kept at user level by hand receipt holder, and annual physical inventories performed, per AR 710-2 and AR 740-26.

4. License covers use of items by U.S. Army, Marine Corps, and Navy.

5. Training to the user consists of warning pages in the technical manuals.

6. Maintenance is allowed in the field: replacement of modules, level vials, potted sources. Training consists of warnings and instructions in the technical manuals. There are no instruments available for detection of H3 contamination at user or Direct Support maintenance levels. When H3 sources are broken, the devices are double bagged and sent to depot for repair or rad waste disposal.

7. License also covers depot level maintenance, at Letterkenny, Anniston, Rock Island Arsenal, Marine Corps Logistics Base-Albany, and Marine Corps Logistics Base-Barstow, where the tritium modules can be repaired and tritium vials replaced.
Depot level maintenance requires radiation safety trained personnel, monthly bioassays of maintenance workers, fume hoods and surveys, and strict adherence to depot SOPs.

8. Bulk storage (more than 1,000 Ci) is allowed only at license-designated depots: Letterkenny, Anniston, Red River, Sharpe, New Cumberland, Marine Corps Logistics Base-Barstow, Marine Corps Logistics Base-Albany, and the Rock Island Arsenal. Depots require the following:

a. RPO and Alternate
b. Monthly surveys of storage areas
c. Signs posted
d. Physical inventories at depot level
e. Liquid scintillation counter and air monitors
f. Personnel training

9. Field storage limited to 1000 curies in one room.

10. Depot storage limited to 10,000 curies per room or area delineated by 10 foot aisles, with H3 air monitor.

11. AMCCOM Material Management keeps record of all procurements, and stock in depot.

24 FEB 1994

AMSMC-SFS (385-11m)

U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

Dear Sir:

This letter is written in reference to Byproduct Material License 12-00722-06. We are submitting an amendment to add one new device to the license and correct an error in a previously submitted amendment.

The U.S. Army is in the process of developing a new fire-control device, the M67 Sight Unit. The M67 is similar in configuration to the M64/M64A1 Sight Unit with the exception that the M67 Sight Unit substitutes two new source part numbers: 9356170 and 9356141. These sources correspond to the M64/M64A1 Sight Unit part numbers: 11733737 (NRO-155-S-111-S) and 11739555 (NRO-155-S-115-S), respectively. A letter requesting registration of the new sources has been sent to the Nuclear Regulatory Commission in Washington (enclosure 1). Request the following parts of the license be changed:

a. Source Drawings (enclosure 1 of license). Add two new source drawings (enclosure 2).

b. Table of Devices (enclosure 2 of license). A new listing of devices replaces the current listing (enclosure 3).

c. Device Drawings (enclosure 3 of license). Add a drawing of the M67 device (enclosure 4).

License amendment number 17 was obtained as a result of a letter dated March 28, 1990 in which information was submitted to substantiate the use of Marine Corps Logistics Base-Barstow, California, as a bulk storage location for tritium devices. The following information is presented in this regard:

a. The Marine Corps Logistics Base-Barstow Material Division Letter of Instruction P5100.12 was enclosed as part of the March 28, 1990 submission.

b. Paragraph 601.1(5) of the letter of instruction stated that the tritium air monitor would be set to alarm at 2 x 10 -7 microcurie/cc.

c. However, the setting of the tritium air monitor is specified in the By-Product Material 12-00722-06, Item 9, pages 6 and 7, paragraphs 2.d and 3.a, as 5 x 10 -6 microcurie/cc.

Request that the language of the Marine Corps Logistics Base-Barstow, Material Division Letter of Instruction P5100.12, Paragraph 601.1(5) in your possession be amended to read 5 x 10 -6 microcurie/cc. This value corresponds to a local change in the letter of instruction for the setting of the air monitor and reflects the setting now in use at that facility.

All other parts of the license remain the same.

The point of contact is Mrs. Elizabeth Peterson or Mr. Gavin Ziegler, (309) 782-2962/2995, Data Facsimile (309) 782-2289.

Sincerely,

SIGNED

Glenn S. Leach
Acting Chief, Safety Office

Enclosures

Copies Furnished:
Commander, U.S. Army Materiel Command,
Attention: AMCSF, 5001 Eisenhower Avenue,
Alexandria, Virginia 22333-0001
Commanding Officer, Marine Corps Logistics Base
Barstow, Attention: B-136 Mr. Gentry), P.O. Box
110100, Barstow, California 92311-5001

MATERIALS LICENSE

Amendment No. 27

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Department of the Army U.S. Army Armament Headquarters Munitions and Chemical Command 2. ATTN: AMSMC-SFS Rock Island, IL 61299-6000	In accordance with letter dated February 24, 1994 3. License number 12-00722-06 is amended in its entirety to read as follows: 4. Expiration date April 30, 1995 5. Docket or Reference No. 030-13027

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Hydrogen-3	A. Sealed tritium sources in glass ampoules	A. Not to exceed 958,000 curies total, not to exceed 10 curies per device
B. Hydrogen-3	B. Gas in sealed glass ampoules	B. Not to exceed 10.2 curies per source 85,000 curies total.

9. Authorized Use:

A. To be used in fire control devices containing self-luminous tritium sources as described in Tables A and B, Supplement 3 of application dated April 12, 1987, and application dated February 26, 1986, and for possession incident to maintenance and repair of these devices and installation into end products, as described in Table C, Supplement 3 of application dated April 12, 1982. Distribution for use throughout the U.S. Army, U.S. Navy, and U.S. Marine Corps.

B. For use in Muzzle Reference Sensors (MRS) on the U.S. Army and U.S. Marine Corps family of main battle tanks.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
12-00722-06

Docket or Reference number
030-13027

Amendment No. 27

CONDITIONS

10. A. Licensed material listed in Item 6.A. may be used and stored in bulk quantities at Letterkenny Army Depot, Anniston Army Depot, Red River Army Depot, Rock Island Arsenal, new Cumberland Army Depot, Sharpe Army Depot, Albany, Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistics Base. Licensed material may also be used at temporary job sites of the licensee anywhere in the United States where the Nuclear Regulatory Commission maintains jurisdiction for regulating the use of material. Ampoules containing hydrogen-3 shall not be opened or removed from fire control devices except as necessary for device repair and maintenance only at the Letterkenny Army Depot, Anniston Army Depot, Rock Island Arsenal, Albany Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistic Base.

B. Licensed material listed in Item 6.B. may be used throughout the United States at temporary job sites of the licensee. Storage and stockpile of MRS devices will be as described in the licensee's application dated December 11, 1984.

11. A. Licensed material shall be used by, or under the supervision of, David P. Skogman or Gavin Ziegler, or U.S. Army and Marine Corps. civilian and/or military personnel trained in accordance with application dated April 12, 1982.

B. Radiation Protection Officers at Army depots, maintenance facilities and its independent test laboratory may be approved by the licensee's Radiation Safety Officer as outlined in letters dated December 23, 1985 and May 29, 1986.

C. Radiation Safety Officer: David P. Skogman

D. Alternate Radiation Safety Officer: Gavin Ziegler

12. Sealed sources containing licensed material shall not be opened.

13. The licensee is authorized to transport licensed material only in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

14. In lieu of using the conventional radiation caution colors (magenta or purple on yellow background) as provided in 10 CFR 20.203(a)(1), the licensee is hereby authorized to label detector cells, containing licensed material and used in gas chromatography devices, with conspicuously etched or stamped radiation caution symbols.

15. The licensee shall conduct a physical inventory on material listed in Item 6.B every twelve (12) months to account for all sealed sources received and possessed under the license in accordance with letter dated October 21, 1985. The records of the inventories shall be maintained for two (2) years from the date of the inventory for inspection by the Commission, and shall include the quantities and kinds of byproduct material, location of sealed sources and the date of the inventory.

AMSMC-SFS (385-11m) 20 JAN 1994

MEMORANDUM THRU Commander, U.S. Army Materiel Command,
ATTN: AMCSF-P, 5001 Eisenhower Avenue,
Alexandria, VA 22333-0001

FOR Nuclear Regulatory Commission, Region III, 801 Warrenville Road, Lisle, IL 60532-4351

SUBJECT: Radiation Protection Officer Changes

1. Reference memorandum, MICOM, AMSMI-SF, 4 November 1993, subject: Request for Rescission of Appointment of Alternate Radiation Protection Officer (encl).

2. The Army's plan to reorganize the U.S. Army Armament, Munitions and Chemical Command (AMCCOM) and U.S. Army Missile Command (MICOM) into Headquarters, MACCOM has been rescinded. Request the following licenses be amended to remove Ms. Joyce Kuykendall as alternate Radiation Protection Officer (ARPO):

a. BML 12-00722-04

b. BML 12-00722-06

c. BML 12-00722-07

d. BML 12-00722-13

e. BML 12-00722-14

f. SUC 1340

2. The POC is Mrs. Betty Peterson or Mr. Gavin Ziegler, AMSMC-SFS, (309) 782-2965/2995.

SIGNED

Encl

RUSSELL D. HARTWIG
Acting Chief, Systems, Chemical, and Radiation Division

CF (wo/encls):
Commander, U.S. Army Missile Command, ATTN: AMSMI-SF, Redstone Arsenal, AL 35898-5130

303 IRN - License Amendments

NRC FORM 374
(10-89)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Amendment No. 26

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Department of the Army U.S. Army Armament Headquarters Munitions and Chemical Command 2. ATTN: AMSMC-SFS Rock Island, IL 61299-6000	In accordance with letter dated January 26, 1994 3. License number 12-00722-06 is amended in its entirety to read as follows: 4. Expiration date April 30, 1995 5. Docket or Reference No. 030-13027

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Hydrogen-3	A. Sealed tritium sources in glass ampoules	A. Not to exceed 958,000 curies total, not to exceed 10 curies per device
B. Hydrogen-3	B. Gas in sealed glass ampoules	B. Not to exceed 10.2 curies per source 85,000 curies total.

9. Authorized Use:

A. To be used in fire control devices containing self-luminous tritium sources as described in Tables A and B, Supplement 3 of application dated April 12, 1987, and application dated February 26, 1986, and for possession incident to maintenance and repair of these devices and installation into end products, as described in Table C, Supplement 3 of application dated April 12, 1982. Distribution for use throughout the U.S. Army, U.S. Navy, and U.S. Marine Corps.

B. For use in Muzzle Reference Sensors (MRS) on the U.S. Army and U.S. Marine Corps family of main battle tanks.

CONDITIONS

10. A. Licensed material listed in Item 6.A. may be used and stored in bulk quantities at Letterkenny Army Depot, Anniston Army Depot, Red River Army Depot, Rock Island Arsenal, new Cumberland Army Depot, Sharpe Army Depot, Albany, Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistics Base. Licensed material may also be used at temporary job sites of the licensee anywhere in the United States where the Nuclear Regulatory Commission maintains jurisdiction for regulating the use of material. Ampoules containing hydrogen-3 shall not be opened or removed from fire control devices except as necessary for device repair and maintenance only at the Letterkenny Army Depot, Anniston Army Depot, Rock Island Arsenal, Albany Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistic Base.

B. Licensed material listed in Item 6.B. may be used throughout the United States at temporary job sites of the licensee. Storage and stockpile of MRS devices will be as described in the licensee's application dated December 11, 1984.

11. A. Licensed material shall be used by, or under the supervision of, David P. Skogman or Gavin Ziegler, or U.S. Army and Marine Corps. civilian and/or military personnel trained in accordance with application dated April 12, 1982.

B. Radiation Protection Officers at Army depots, maintenance facilities and its independent test laboratory may be approved by the licensee's Radiation Safety Officer as outlined in letters dated December 23, 1985 and May 29, 1986.

C. Radiation Safety Officer: David P. Skogman

D. Alternate Radiation Safety Officer: Gavin Ziegler

12. Sealed sources containing licensed material shall not be opened.

13. The licensee is authorized to transport licensed material only in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

14. In lieu of using the conventional radiation caution colors (magenta or purple on yellow background) as provided in 10 CFR 20.203(a)(1), the licensee is hereby authorized to label detector cells, containing licensed material and used in gas chromatography devices, with conspicuously etched or stamped radiation caution symbols.

15. The licensee shall conduct a physical inventory on material listed in Item 6.B every twelve (12) months to account for all sealed sources received and possessed under the license in accordance with letter dated October 21, 1985. The records of the inventories shall be maintained for two (2) years from the date of the inventory for inspection by the Commission, and shall include the quantities and kinds of byproduct material, location of sealed sources and the date of the inventory.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
12-00722-06

Docket or Reference number
030-13027

Amendment No. 26

16. The licensee shall maintain records of information related to decommissioning at Headquarters, U.S. Army Armament, Munitions and Chemical Command, Rock Island, Illinois as specified in 10 CFR 30.35(g) until this license is terminated by the Commission.

17. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Applications dated April 12, 1982 (with enclosures), December 24, 1984, February 25, 1986 (with enclosures), and November 6, 1988 (with enclosures); and

B. Letters with enclosures dated June 8, 1983, August 24, 1984, October 21, 1985, December 23, 1985, May 29, 1986, April 29, 1987, September 19, 1988, March 28, 1990 (with attachment), May 10, 1990, June 22, 1990, August 16, 1990, November 19, 1992, December 13, 1993 and January 26, 1994 (with enclosures); and

C. Letter received December 19, 1990.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date FEB 1 8 1994

By Louis J. Haeter
Materials Licensing Section, Region III

COPY

13 DEC 1993

Safety Office

Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Sir:

This letter is written in reference to byproduct material licenses 12-00722-04 and 12-00722-06. We are aware that these licenses are scheduled for renewal on April 30, 1994. We regret that we cannot meet the renewal deadline due to significant reorganization of personnel within the Army and this Command. In addition, we want to ensure that the new Nuclear Regulatory Commission regulations are adequately addressed. Request that this letter constitute timely filing and that we be given a 1 year extension in the renewal of these licenses.

The point of contact is Mrs. Elizabeth Peterson or Mr. Gavin Ziegler, (309) 782-2965/2995, facsimile (309) 782-2289.

Sincerely,

SIGNED

Glenn S. Leach
Acting Chief, Safety Office

MATERIALS LICENSE

Amendment No. 25

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Department of the Army U.S. Army Armament Headquarters Munitions and Chemical Command 2. ATTN: AMSMC-SFS Rock Island, IL 61299-6000	In accordance with letter dated December 13, 1993 3. License number 12-00722-06 is amended in its entirety to read as follows:
	4. Expiration date April 30, 1995
	5. Docket or Reference No. 030-13027

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Hydrogen-3	A. Sealed tritium sources in glass ampoules	A. Not to exceed 958,000 curies total, not to exceed 10 curies per device
B. Hydrogen-3	B. Gas in sealed glass ampoules	B. Not to exceed 10.2 curies per source 85,000 curies total.

9. Authorized Use:

A. To be used in fire control devices containing self-luminous tritium sources as described in Tables A and B, Supplement 3 of application dated April 12, 1987, and application dated February 26, 1986, and for possession incident to maintenance and repair of these devices and installation into end products, as described in Table C, Supplement 3 of application dated April 12, 1982. Distribution for use throughout the U.S. Army, U.S. Navy, and U.S. Marine Corps.

B. For use in Muzzle Reference Sensors (MRS) on the U.S. Army and U.S. Marine Corps family of main battle tanks.

COPY 5

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
12-00722-06

Docket or Reference number
030-13027

Amendment No. 25

CONDITIONS

10. A. Licensed material listed in Item 6.A. may be used and stored in bulk quantities at Letterkenny Army Depot, Anniston Army Depot, Red River Army Depot, Rock Island Arsenal, new Cumberland Army Depot, Sharpe Army Depot, Albany, Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistics Base. Licensed material may also be used at temporary job sites of the licensee anywhere in the United States where the Nuclear Regulatory Commission maintains jurisdiction for regulating the use of material. Ampoules containing hydrogen-3 shall not be opened or removed from fire control devices except as necessary for device repair and maintenance only at the Letterkenny Army Depot, Anniston Army Depot, Rock Island Arsenal, Albany Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistic Base.

B. Licensed material listed in Item 6.B. may be used throughout the United States at temporary job sites of the licensee. Storage and stockpile of MRS devices will be as described in the licensee's application dated December 11, 1984.

11. A. Licensed material shall be used by, or under the supervision of, Gavin Ziegler or Joyce Kuykendall, or U.S. Army and Marine Corps civilian and/or military personnel trained in accordance with application dated April 12, 1982.

B. Radiation Protection Officers at Army depots, maintenance facilities and its independent test laboratory may be approved by the licensee's Radiation Safety Officer as outlined in letters dated December 23, 1985 and May 29, 1986.

C. Radiation Safety Officer: David P. Skogman

12. Sealed sources containing licensed material shall not be opened.

13. The licensee is authorized to transport licensed material only in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

14. In lieu of using the conventional radiation caution colors (magenta or purple on yellow background) as provided in 10 CFR 20.203(a)(1), the licensee is hereby authorized to label detector cells, containing licensed material and used in gas chromatography devices, with conspicuously etched or stamped radiation caution symbols.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number 12-00722-06

Docket or Reference number 030-13027

Amendment No. 25

15. The licensee shall conduct a physical inventory on material listed in Item 6.B every twelve (12) months to account for all sealed sources received and possessed under the license in accordance with letter dated October 21, 1985. The records of the inventories shall be maintained for two (2) years from the date of the inventory for inspection by the Commission, and shall include the quantities and kinds of byproduct material, location of sealed sources and the date of the inventory.

16. The licensee shall maintain records of information related to decommissioning at Headquarters, U.S. Army Armament, Munitions and Chemical Command, Rock Island, Illinois as specified in 10 CFR 30.35(g) until this license is terminated by the Commission.

17. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

    A. Applications dated April 12, 1982 (with enclosures), December 24, 1984, February 25, 1986 (with enclosures), and November 6, 1988 (with enclosures); and

    B. Letters with enclosures dated June 8, 1983, August 24, 1984, October 21, 1985, December 23, 1985, May 29, 1986, April 29, 1987, September 19, 1988, March 28, 1990 (with attachment), May 10, 1990, June 22, 1990, August 16, 1990, November 19, 1992, and December 13, 1993; and

    C. Letter received December 19, 1990.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date FEB 02 1994

By Louis J. Hunter
Materials Licensing Section, Region III

COPY

NRC FORM 374
(10-89)

U.S. NUCLEAR REGULATORY COMMISSION

Amendment No. 24

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Department of the Army U.S. Army Armament Headquarters Munitions and Chemical Command 2. ATTN: AMSMC-SFS Rock Island, IL 61299-6000	In accordance with letter dated November 19, 1992 3. License number 12-00722-06 is amended in its entirety to read as follows: 4. Expiration date April 30, 1994 5. Docket or Reference No. 030-13027

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Hydrogen-3	A. Sealed tritium sources in glass ampoules	A. Not to exceed 958,000 curies total, not to exceed 10 curies per device
B. Hydrogen-3	B. Gas in sealed glass ampoules	B. Not to exceed 10.2 curies per source 85,000 curies total.

9. Authorized Use:

A. To be used in fire control devices containing self-luminous tritium sources as described in Tables A and B, Supplement 3 of application dated April 12, 1987, and application dated February 26, 1986, and for possession incident to maintenance and repair of these devices and installation into end products, as described in Table C, Supplement 3 of application dated April 12, 1982. Distribution for use throughout the U.S. Army, U.S. Navy, and U.S. Marine Corps.

B. For use in Muzzle Reference Sensors (MRS) on the U.S. Army and U.S. Marine Corps family of main battle tanks.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number 12-00722-06

Docket or Reference number 030-13027

Amendment No. 24

CONDITIONS

10. A. Licensed material listed in Item 6.A. may be used and stored in bulk quantities at Letterkenny Army Depot, Anniston Army Depot, Red River Army Depot, Rock Island Arsenal, new Cumberland Army Depot, Sharpe Army Depot, Albany, Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistics Base. Licensed material may also be used at temporary job sites of the licensee anywhere in the United States where the Nuclear Regulatory Commission maintains jurisdiction for regulating the use of material. Ampoules containing hydrogen-3 shall not be opened or removed from fire control devices except as necessary for device repair and maintenance only at the Letterkenny Army Depot, Anniston Army Depot, Rock Island Arsenal, Albany Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistic Base.

B. Licensed material listed in Item 6.B. may be used throughout the United States at temporary job sites of the licensee. Storage and stockpile of MRS devices will be as described in the licensee's application dated December 11, 1984.

11. A. Licensed material shall be used by, or under the supervision of, Gavin Ziegler or Joyce Kuykendall, or U.S. Army and Marine Corps. civilian and/or military personnel trained in accordance with application dated April 12, 1982.

B. Radiation Protection Officers at Army depots, maintenance facilities and its independent test laboratory may be approved by the licensee's Radiation Safety Officer as outlined in letters dated December 23, 1985 and May 29, 1986.

C. Radiation Safety Officer: David P. Skogman

12. Sealed sources containing licensed material shall not be opened.

13. The licensee is authorized to transport licensed material only in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

14. In lieu of using the conventional radiation caution colors (magenta or purple on yellow background) as provided in 10 CFR 20.203(a)(1), the licensee is hereby authorized to label detector cells, containing licensed material and used in gas chromatography devices, with conspicuously etched or stamped radiation caution symbols.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number 12-00722-06

Docket or Reference number 030-13027

Amendment No. 24

15. The licensee shall conduct a physical inventory on material listed in Item 6.B every twelve (12) months to account for all sealed sources received and possessed under the license in accordance with letter dated October 21, 1985. The records of the inventories shall be maintained for two (2) years from the date of the inventory for inspection by the Commission, and shall include the quantities and kinds of byproduct material, location of sealed sources and the date of the inventory.

16. The licensee shall maintain records of information related to decommissioning at Headquarters, U.S. Army Armament, Munitions and Chemical Command, Rock Island, Illinois as specified in 10 CFR 30.35(g) until this license is terminated by the Commission.

17. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

    A. Applications dated April 12, 1982 (with enclosures), December 24, 1984, February 25, 1986 (with enclosures), and November 6, 1988 (with enclosures); and

    B. Letters with enclosures dated June 8, 1983, August 24, 1984, October 21, 1985, December 23, 1985, May 29, 1986, April 29, 1987, September 19, 1988, March 28, 1990 (with attachment), May 10, 1990, June 22, 1990, August 16, 1990, November 19, 1992; and

    C. Letter received December 19, 1990.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date January 8, 1993

By _____
Materials Licensing Section, Region III

COPY

NRC Form 374A (5-84) U.S. NUCLEAR REGULATORY COMMISSION

PAGE 1 OF 1 PAGES

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 12-00722-06

Docket or Reference number: 030-13027

Amendment No. 23

Department of the Army
U.S. Army Armament Headquarters
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter dated April 30, 1992, License Number 12-00722-06 is amended as follows:

Condition 11. is amended to read:

11. A. Licensed material shall be used by, or under the supervision of, Katheryn M. LaFrenz, Gavin Ziegler or Joyce Kuykendall, or U.S. Army and Marine Corps. civilian and/or military personnel trained in accordance with application dated April 12, 1982.

B. Radiation Protection Officers at Army depots, maintenance facilities and its independent test laboratory may be approved by the licensee's Radiation Safety Officer as outlined in letters dated December 23, 1985 and May 29, 1986.

C. Radiation Safety Officer: Katheryn M. LaFrenz.

For the U.S. Nuclear Regulatory Commission

Date: MAY 14 1992

By Peter J. Lee
Materials Licensing Section, Region III

NRC Form 374A (5-84)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 12-00722-06

Docket or Reference number: 030-13027

Amendment No. 22

Department of the Army
U. S. Army Armament Headquarters
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter dated August 27, 1991, License Number 12-00722-06 is amended as follows:

Items 6., 7., 8., and 9. are amended to add:

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
B. Hydrogen-3	B. Gas in sealed glass ampoules	B. Not to exceed 10.2 curies per source. 85,000 curies total.

9. Authorized Use:

. For use in Muzzle Reference Sensors (MRS) on the U.S. Army and U.S. Marine Corps family of main battle tanks.

Conditions 10. and 15. are amended to read:

10. A. Licensed material listed in Item 6.A. may be used and stored in bulk quantities at Letterkenny Army Depot, Anniston Army Depot, Red River Army Depot, Rock Island Arsenal, New Cumberland Army Depot, Sharpe Army Depot, Albany, Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistics Base. Licensed material may also be used at temporary job sites of the licensee anywhere in the United States where the Nuclear Regulatory Commission maintains jurisdiction for regulating the use of material. Ampoules containing hydrogen-3 shall not be opened or removed from fire control devices except as necessary for device repair and maintenance only at the Letterkenny Army Depot, Anniston Army Depot, Rock Island Arsenal, Albany Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistic Base.

B. Licensed material listed in Item 6.B. may be used throughout the United States at temporary job sites of the licensee. Storage and stockpile of MRS devices will be as described in the licensee's application dated December 11, 1984.

COPY

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MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 12-00722-06

Docket or Reference number: 030-13027

Amendment No. 22

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Applications dated April 12, 1982 (with enclosures), December 24, 1984, February 25, 1986 (with enclosures), and November 6, 1988 (with enclosures); and

B. Letters with enclosures dated June 8, 1983, August 24, 1984, October 21, 1985, December 23, 1985, May 29, 1986, April 29, 1987, September 19, 1988, March 28, 1990 (with attachment), May 10, 1990, June 22, 1990, August 16, 1990; and

C. Letter received December 19, 1990.

Condition 16. is added:

16. The licensee shall conduct a physical inventory of material listed in Item 6.B every twelve (12) months to account for all sealed sources received and possessed under the license in accordance with letter dated October 21, 1985. The records of the inventories shall be maintained for two (2) years from the date of the inventory for inspection by the Commission, and shall include the quantities and kinds of byproduct material, location of sealed sources and the date of the inventory.

For the U.S. Nuclear Regulatory Commission

Date: 2/14/92

By _____
Materials Licensing Section, Region III

NRC Form 374A (5-84) U.S. NUCLEAR REGULATORY COMMISSION

PAGE 1 OF 1 PAGES

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 12-00722-06

Docket or Reference number: 030-13027

Amendment No. 21

Department of the Army
U.S. Army Armament Headquarters
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter received December 19, 1990, License Number 12-00722-06 is amended as follows:

Conditions 11. and 15. are amended to read:

11. A. Licensed material shall be used by, or under the supervision of, Katheryn M. LaFrenz or Kelly Crooks, or U.S. Army and Marine Corps. civilian and/or military personnel trained in accordance with application dated April 12, 1982.

B. Radiation Protection Officers at Army depots, maintenance facilities and its independent test laboratory may be approved by the licensee's Radiation Safety Officer as outlined in letters dated December 23, 1985 and May 29, 1986.

C. Radiation Safety Officer: Katheryn M. LaFrenz.

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Applications dated April 12, 1982 (with enclosures); February 25, 1986 (with enclosures), and November 6, 1988 (with enclosures); and

B. Letters with enclosures dated June 8, 1983, August 24, 1984, December 23, 1985, May 29, 1986, April 29, 1987, March 28, 1990 (with attachment), May 10, 1990, June 22, 1990, August 16, 1990; and

C. Letter received December 19, 1990.

For the U.S. Nuclear Regulatory Commission

Date: February 1, 1991

Original Signed
By Patricia J. Pelke
Materials Licensing Section, Region III

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NRC Form 374A
(5-84)

U.S. NUCLEAR REGULATORY COMMISSION

PAGE 1 OF 1 PAGES

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
12-00722-06

Docket or Reference number
030-13027

Amendment No. 20

Department of the Army
U. S. Army Armament Headquarters
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter dated August 16, 1990, License Number 12-00722-06 is amended as follows:

Condition 15. is amended to read:

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Applications dated April 12, 1982 (with enclosures); February 25, 1986 (with enclosures), and November 6, 1988 (with enclosures); and

B. Letters with enclosures dated June 8, 1983; August 24, 1984, December 23, 1985; May 29, 1986; April 29, 1987; March 28, 1990 (with attachment); May 10, 1990; June 22, 1990 and August 16, 1990.

For the U.S. Nuclear Regulatory Commission

Date: September 6, 1990

By Deborah A. Piskura
Materials Licensing Section, Region III

NRC Form 374A (5-84) U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 12-00722-06

Docket or Reference number: 030-13027

Amendment No. 18

Department of the Army
U.S. Army Armament Headquarters
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter dated May 10, 1990, License Number 12-00722-06 is amended as follows:

Conditions 10. and 15. are amended to read:

10. Licensed material may be used and stored in bulk quantities at Letterkenny Army Depot, Anniston Army Depot, Red River Army Depot, Rock Island Arsenal, New Cumberland Army Depot, Sharpe Army Depot, Albany, Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistics Base. Licensed material may also be used at temporary job sites of the licensee anywhere in the United States where the Nuclear Regulatory Commission maintains jurisdiction for regulating the use of material. Ampoules containing hydrogen-3 shall not be opened or removed from fire control devices except as necessary for device repair and maintenance only at the Letterkenny Army Depot, Anniston Army Depot, Rock Island Arsenal, Albany Georgia Marine Corps Logistics Base and Barstow, California Marine Corps Logistics Base.

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

    A. Applications dated April 12, 1982 (with enclosures), February 25, 1986 (with enclosures), and November 6, 1988 (with enclosures); and

    B. Letters with enclosures dated June 8, 1983, August 24, 1984, December 23, 1985, May 29, 1986, April 29, 1987, March 28, 1990 (with attachment), and May 10, 1990.

Condition 16. is added:

16. The licensee shall maintain records of information important to safe and effective decommissioning at Headquarters, U.S. Army Armament, Munitions and Chemical Command, Rock Island, Illinois per the provisions of 10 CFR 30.35(g) until this license is terminated by the Commission.

For the U.S. Nuclear Regulatory Commission

COPY

Date: JUN - [illegible]

By William L. Axelson
Materials Licensing Section, Region III

NRC Form 374A
(5-84)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number
12-00722-06

Docket or Reference number
030-13027

Amendment No. 17

Department of the Army
Headquarters, U.S. Army Armament
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter dated March 28, 1990, License Number 12-00722-06 is amended as follows:

Condition(s) 10. and 15. are amended to read:

10. Licensed material may be used and stored in bulk quantities at Letterkenny Army Depot, Anniston Army Depot, Red River Army Depot, Rock Island Arsenal, New Cumberland Army Depot, Sharpe Army Depot, Albany, Georgia Marine corps Logistics Base and Barstow, California Marine Corps Logistics Base. Licensed material may also be used at temporary job sites of the licensee anywhere in the United States where the Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material. Ampoules containing hydrogen-3 shall not be opened or removed from fire control devices except as necessary for device repair and maintenance only at the Letterkenny Army Depot, Anniston Army Depot and Rock Island Arsenal.

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

    A. Applications dated April 12, 1982 (with enclosures), February 26, 1986 (with enclosures), and November 6, 1988 (with enclosures); and

    B. Letters with enclosures dated June 8, 1983, August 24, 1984, December 23, 1985, May 29, 1986, April 29, 1987 and March 28, 1990 (with attachment).

For the U.S. Nuclear Regulatory Commission

Date: APR 18 '90

By William J. Olson
Materials Licensing Section, Region III

NRC Form 374A (3-84) U.S. NUCLEAR REGULATORY COMMISSION

PAGE 1 OF 1 PAGES

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 12-00722-06

Docket or Reference number: 030-13027

Amendment No. 16

Department of the Army
HQ, U.S. Army Armament
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter dated March 29, 1989, License Number 12-00722-06 is amended as follows:

Item 9. is amended to read:

9. Authorized Use

A. To be used in fire control devices containing self-luminous tritium sources as described in Tables A & B, Supplement 3 of application dated April 12, 1987, and application dated February 26, 1986, and for possession incident to maintenance and repair of these devices and installation into end products, as described in Table C, Supplement 3 of application dated April 12, 1982. Distribution for use throughout the U.S. Army, U.S. Navy, and U.S. Marine Corps.

UNITED STATES NUCLEAR REGULATORY COMMISSION

For the U.S. Nuclear Regulatory Commission

Date: 4/11/89

By _____
Materials Licensing Section, Region VI

COPY

NRC Form 374A (5-84) U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE
SUPPLEMENTARY SHEET

PAGE 1 OF 1 PAGES

License number: 12-00722-06

Docket or Reference number: 030-13027

Amendment No. 16

Department of the Army
HQ, U.S. Army Armament
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter dated March 29, 1989, License Number 12-00722-06 is amended as follows:

Item 9. is amended to read:

9. Authorized Use

A. To be used in fire control devices containing self-luminous tritium sources as described in Tables A & B, Supplement 3 of application dated April 12, 1987, and application dated February 26, 1986, and for possession incident to maintenance and repair of these devices and installation into end products, as described in Table C, Supplement 3 of application dated April 12, 1982. Distribution for use throughout the U.S. Army, U.S. Navy, and U.S. Marine Corps.

UNITED STATES NUCLEAR REGULATORY COMMISSION

For the U.S. Nuclear Regulatory Commission

Date: 4/11/89

By _____
Materials Licensing Section, Region VII

COPY

NRC Form 374
(5-84)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Amendment No. 15

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10 Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	In accordance with application dated November 16, 1988
1. Department of the Army HQ, U.S. Army Armament Munitions and Chemical Command 2. ATTN: AMSMC-SFS Rock Island, IL 61299-6000	3. License number 12-00722-06 is amended in its entirety to read as follows:
	4. Expiration date: April 30, 1994
	5. Docket or Reference No.: 030-13027

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Hydrogen-3	A. Sealed tritium sources in glass ampoules	A. Not to exceed 958,000 curies total, not to exceed 10 curies per device

9. Authorized Use

A. To be used in fire control devices containing self-luminous tritium soruces as decribed in Tables A & B, Supplement 3 of application dated April 12, 1982, and application dated February 26, 1986, and for possession incident to maintenance and repair of these devices and installation into end products, as described in Table C, Supplement 3 of application dated April 12, 1982. Distribution for use throughout the U.S. Army

CONDITIONS

10. Licensed material may be used and stored in bulk quantities at Letterkenny Army Depot, Anniston Army Depot, Red River Army Depot, Rock Island Arsenal, New Cumberland Army Depot, and Sharpe Army Depot. Licnesed material may also be used at temporary job sites of the licensee anywhere in the United States where the Nuclear Regulatory Commission maintains jurisdiction for reuglating the use of licensed material. Ampoules containing hydrogen-3 shall not be opended or removed from fire control devices except as necessary for device repair and maintenance only at the Letterkenny Army Depot, Anniston Army Depot and Rock Island Arsenal.

11. A. Licensed material shall be used by, or under the supervision of, Byron E. Morris, Katheryn M. LaFrenz, or David W. Nelson, or U.S. Army and Marine Corps. civilian and/or military personnel trained in accordance with application dated April 12, 1982.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number 12-00722-06

Docket or Reference number 030-13027

Amendment No. 15

11. (Continued)

B. Radiation Protection Officers at Army depots, maintenance facilities and its independent test laboratory may be approved by the licensee's Radiation Safety Officer as outlined in letters dated December 23, 1985 and May 29, 1986.

C Radiation Safety Officer: Byron E. Morris

12. Sealed sources containing licensed material shall not be opened.

13. The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material".

14. In lieu of using the conventional radiation caution colors (Magenta or purple on yellow background) as provided in Section 20.203(a)(1), Title 10, of Federal Regulations, Part 20, the licensee is hereby authoirzed to use silver or red on a black background.

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Applications dated April 12, 1982 (with enclosures), February 26, 1986 (with enclosures), and November 6, 1988 (with enclosures); and

B. Letters with enclosures dated June 8, 1983, August 24, 1984, December 23, 1985, May 29, 1986, and April 29, 1987.

For the U.S. Nuclear Regulatory Commission

Date: 2/28/89

By L R. Mach
Materials Licensing Section, Region III

NRC FORM 313
(8-87)
10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires: 8-30-90

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.

APPLICATIONS FOR DISTRIBUTION OF EXEMPT PRODUCTS 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 HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIALS SAFETY SECTION B
475 ALLENDALE ROAD
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
NUCEAR MATERIALS SAFETY 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
NUCLEAR MATERIALS SAFETY 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)*

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [X] C. RENEWAL OF LICENSE NUMBER BML 12-00722-06

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

Dept. of the Army
HQ Armament, Munitions, and Chemical Comma
ATTN: AMSMC-SF
Rock Island, Il 61299-6000

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

U.S. Army, U.S. Navy, and U.S. Marine Corps civilian and military personnel worldwide.

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

David P. Skogman, License Manager

TELEPHONE NUMBER: (309) 782-2962

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

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 B

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
	Col. Larry D. Bachelor	Colonel, GS Chief of Staff	

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY

AMOUNT RECEIVED	CHECK NUMBER		DATE

NRC Form 374A (5-84) U.S. NUCLEAR REGULATORY COMMISSION

PAGE 1 OF 1 PAGES

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 12-00722-06

Docket or Reference number: 030-13027

Amendment No. 16

Department of the Army
HQ, U.S. Army Armament
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter dated March 29, 1989, License Number 12-00722-06 is amended as follows:

Item 9. is amended to read:

9. Authorized Use

A. To be used in fire control devices containing self-luminous tritium sources as described in Tables A & B, Supplement 3 of application dated April 12, 1987, and application dated February 26, 1986, and for possession incident to maintenance and repair of these devices and installation into end products, as described in Table C, Supplement 3 of application dated April 12, 1982. Distribution for use throughout the U.S. Army, U.S. Navy, and U.S. Marine Corps.

For the U.S. Nuclear Regulatory Commission

Date: 4/11/89

By _____
Materials Licensing Section, Region VI

COPY

NRC Form 374A (5-84) U.S. NUCLEAR REGULATORY COMMISSION

PAGE 1 OF 1 PAGES

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 12-00722-06

Docket or Reference number: 030-13027

Amendment No. 13

Department of the Army
HQ, U.S. Army Armament
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter dated April 25, 1986, License Number 12-00722-06 is amended as follows:

Item 6., 7., 8. and 9. are amended to read:

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Hydrogen-3	A. Sealed tritium sources in glass ampoules	A. Not to exceed 958,000 curies total, not to exceed 10 curies per device

9. Authorized Use

A. To be used in fire control devices containing self-luminous tritium sources as described in Tables A & B, Supplement 3 of application dated April 12, 1982, and application dated February 26, 1986, and for possession incident to maintenance and repair of these devices and installation into end products, as described in Table C, Supplement 3 of application dated April 12, 1982. Distribution for use throughout the U.S. Army

Condition 15. is amended to read:

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Applications dated April 12, 1982 and February 26, 1986 (with enclosures); and

B. Letters with enclosures dated June 8, 1983, February 2, 1984, April 11, 1984, June 11, 1984, August 24, 1984, April 3, 1986, December 23, 1985, May 29, 1986, April 29, 1987, June 17, 1987, September 1, 1988 and September 2, 1988.

For the U.S. Nuclear Regulatory Commission

Original Signed
By John R. Madera
Materials Licensing Section, Region III

Date: October 25, 1988

COPY 5 (1)

NRC Form 374A (5-84) U.S. NUCLEAR REGULATORY COMMISSION

PAGE 1 OF 1 PAGES

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 12-00722-06

Docket or Reference number: 030-13027

Amendment No. 14

Department of the Army
HQ, U.S. Army Armament
Munitions and Chemical Command
ATTN: AMSMC-SFS
Rock Island, IL 61299-6000

In accordance with letter dated September 19, 1988, License Number 12-00722-06 is amended as follows:

Conditions 11.A. and 15. are amended to read:

11. A. Licensed material shall be used by, or under the supervision of, Byron E. Morris, Katheryn M. LaFrenz, David Nelson, or U.S. Army, U.S. Navy and Marine Corps civilian and/or military personnel trained in accordance with application dated April 12, 1982.

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Applications dated April 12, 1982 and February 26, 1986 (with enclosures); and

B. Letters with enclosures dated June 8, 1983, February 2, 1984, April 11, 1984, June 11, 1984, August 24, 1984, April 3, 1986, December 23, 1985, May 29, 1986, April 29, 1987, June 17, 1987, September 1, 1988, September 2, 1988 and September 19, 1988.

For the U.S. Nuclear Regulatory Commission

Date: November 18, 1988

By _____
Materials Licensing Section, Region III

(2)

NRC Form 374A (5-84) U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 12-00722-06
Docket or Reference number: 030-13027
Amendment No. 15

11. (Continued)

B. Radiation Protection Officers at Army depots, maintenance facilities and its independent test laboratory may be approved by the licensee's Radiation Safety Officer as outlined in letters dated December 23, 1985 and May 29, 1986.

C Radiation Safety Officer: Byron E. Morris

12. Sealed sources containing licensed material shall not be opened.

13. The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material".

14. In lieu of using the conventional radiation caution colors (Magenta or purple on yellow background) as provided in Section 20.203(a)(1), Title 10, of Federal Regulations, Part 20, the licensee is hereby authoirzed to use silver or red on a black background.

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Applications dated April 12, 1982 (with enclosures), February 26, 1986 (with enclosures), and November 6, 1988 (with enclosures); and

B. Letters with enclosures dated June 8, 1983, August 24, 1984, December 23, 1985, May 29, 1986, and April 29, 1987.

★ ★ ★ ★

For the U.S. Nuclear Regulatory Commission

Date: 2/26/89

By L R. Mach
Materials Licensing Section, Region III

3

NRC Form 374
(5-84)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Amendment No. 15

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Department of the Army HQ, U.S. Army Armament Munitions and Chemical Command 2. ATTN: AMSMC-SFS Rock Island, IL 61299-6000	In accordance with application dated November 16, 1988 3. License number 12-00722-06 is amended in its entirety to read as follows:
	4. Expiration date: April 30, 1994
	5. Docket or Reference No.: 030-13027

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Hydrogen-3	A. Sealed tritium sources in glass ampoules	A. Not to exceed 958,000 curies total, not to exceed 10 curies per device

9. Authorized Use

A. To be used in fire control devices containing self-luminous tritium soruces as decribed in Tables A & B, Supplement 3 of application dated April 12, 1982, and application dated February 26, 1986, and for possession incident to maintenance and repair of these devices and installation into end products, as described in Table C, Supplement 3 of application dated April 12, 1982. Distribution for use throughout the U.S. Army

CONDITIONS

10. Licensed material may be used and stored in bulk quantities at Letterkenny Army Depot, Anniston Army Depot, Red River Army Depot, Rock Island Arsenal, New Cumberland Army Depot, and Sharpe Army Depot. Licnesed material may also be used at temporary job sites of the licensee anywhere in the United States where the Nuclear Regulatory Commission maintains jurisdiction for reuglating the use of licensed material. Ampoules containing hydrogen-3 shall not be opended or removed from fire control devices except as necessary for device repair and maintenance only at the Letterkenny Army Depot, Anniston Army Depot and Rock Island Arsenal.

11. A. Licensed material shall be used by, or under the supervision of, Byron E. Morris, Katheryn M. LaFrenz, or David W. Nelson, or U.S. Army and Marine Corps. civilian and/or military personnel trained in accordance with application dated April 12, 1982.

(4)

NRC FORM 313
(8-71)
10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires 8-30-88

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.

APPLICATIONS FOR DISTRIBUTION OF EXEMPT PRODUCTS 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 HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIALS SAFETY SECTION B
475 ALLENDALE ROAD
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
NUCLEAR MATERIALS SAFETY 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
NUCLEAR MATERIALS SAFETY 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)

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [X] C. RENEWAL OF LICENSE NUMBER BMI 12-00722-06

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

Dept. of the Army
HQ Armament, Munitions, and Chemical Command
ATTN: AMSMC-SF
Rock Island, Il 61299-6000

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

U.S. Army, U.S. Navy, and U.S. Marine Corps civilian and military personnel worldwide.

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

David P. Skogman, License Manager

TELEPHONE NUMBER: (309) 782-2962

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
a. Element and mass number, b. Chemical and physical form, and c. maximum amount which will be possessed at any one time
See supplement A

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 B

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
	Col. Larry D. Bachelor	Colonel, GS Chief of Staff	

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
AMOUNT RECEIVED	CHECK NUMBER			DATE

(5)

NRC LICENSE FORM 313
SUPPLEMENTAL INFORMATION

TABLE OF CONTENTS

* Removed from working copy.

Executive Summary

Headquarters (HQ), U.S. Army Armament, Munitions, and Chemical Command (AMCCOM) submits the following application for renewal of BML 12-00722-06. This license covers a variety of devices utilizing tritium gas for illumination of level vials, telescopes, scales, etc. mounted on military equipment.

This application contains essentially the same information as the original and its subsequent amendments. The following changes are requested to be incorporated into the renewal:

a) Three new fire control devices which utilize sealed sources currently covered by this license have been added. The devices are employed on the M119 British Light Gun and were developed by the U.S. Army. These devices, the XM187 Telescope Mount and Quadrant, M90E6 Straight Telescope and M137E1 Panoramic Telescope, are to be used on the M119 in addition to the British-made L2A1, L3A1 and L7A1 devices currently covered by this license. Device drawings and research and development test results for the new devices are provided in the application.

b) A new Alternate Radiation Safety Officer is named and his resume enclosed.

c) The Radiation Protection Program has been updated.

d) Authority is given to the AMCCOM Radiation Safety Officer (RSO) or alternate to designate bulk storage facilities.

Item 5. Radioactive Material.

a. Element and mass number: Hydrogen-3.

b. Chemical and physical form: Tritium gas sealed in glass ampoules containing less than 1 percent tritium oxide. Drawings of current source configurations are at enclosure 1.

c. Maximum amount which will be possessed at any one time: 950,000 curies total possession requested subject to a maximum activity of 10 curies +/- 10% per source. A table listing the devices with the number of sources and the total curies per device is at enclosure 2.

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Item 6. Purpose for Which Licensed Material will be Used.

1. Purpose:

The byproduct material will be used as phosphor exciters contained in sealed sources as described in government drawings and specifications contained at enclosure 3. These sealed sources are used in U.S. Army Infantry and Artillery Fire Control devices to illuminate scales, counters, level vials, reticles, aiming post lights, and general illumination applications for military equipment.

2. Field Marking:

The Army requests that the radiation symbol marking on fielded items of equipment be exempted from the normal colored marking as required by 10 CFR Section 20.203(a) since this would compromise the equipment and crew under battlefield conditions. The marking is requested to be silver or red on black as illustrated at enclosure 5.

3. Inventories:

a. Physical inventories and individual records for the radioactive items covered by this license are not centrally maintained by this command. Accountability is maintained by each individual installation Accountable Property Officer for the radioactive items involved.

b. Accountability for the user is required by military regulations. Hand receipt holders must perform an annual physical inventory and perform a records reconciliation update six months later. Transaction reporting is required by property book and Base Operation Supply Systems. Transactions include receipts, issues and adjustments. Military regulations require annual inventory of radioactive items at the intermediate level by standard military system.

c. The users and intermediates file a Report of Excess, DD Form 1348, for broken, damaged, outdated, excess material, and other material to be disposed of. This form goes through their supply channels and by the National Stock Number (NSN), the report for an AMCCOM managed item is sent to this headquarters. The disposal instructions are then provided to the users and intermediates through supply channels.

d. Causative research at user and intermediate levels is required by the accountable officer prior to the approval of losses. Hand receipt holders and property book officers must initiate a report of survey for all losses to determine cause for loss and to identify negligence, willful misconduct, or theft. Approving authority for reports of survey must be of military rank 06, colonel or above.

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e. The radioactive sources, modules, and devices are coded in the commodity command Standard System Automated Data Processing Program as radioactive.

4. Contracts:

a. Contracts include requirements for Nuclear Regulatory Commission (NRC) or Agreement State licenses. A pre-award survey is required and will assure the contractor has, or is able to obtain, an appropriate NRC or Agreement State license to handle or manufacture the radioactive materials.

b. The contractor will manufacture the fire control luminous elements under a license issued to him in accordance with drawings contained in this application. No source manufacturing will be performed under this license.

(10)

Item 7. Individuals Responsible for Radiation Safety Program and their Training and Experience.

Mr. David P. Skogman is designated as License Manager. Mr. Byron E. Morris is the Radiation Safety Officer, Mrs. Katheryn M. LaFrenz and Mr. David Wm Nelson are the Alternate Radiation Safety Officers.

Resumes are at enclosure 6.

Item 8. Training for Individuals Working in or Frequenting Restricted Areas.

1. Users of AMCCOM radioactive devices are provided with published technical manuals and/or Depot Maintenance Work Requirements. These publications apprise the user of the hazards associated with these devices and specify precautions that must be taken as in the example provided at enclosure 7. This information is sufficiently broad in scope to cover the use of the device throughout the entire life cycle.

2. The user installations are authorized only possession and use of the equipment containing the tritium sources. Removal of these sources (other than modules) for any reason at this level is strictly prohibited. Procurement of replacement sources is not authorized and no orders can be filled by depot storage installations. Control of replacement sources is managed from HQ, AMCCOM, by the item manager and cannot be shipped without approval.

3. The user installations within the U.S. Army, U.S. Navy, and U.S. Marine Corps authorized to possess and use the systems or devices containing tritium radioactive sources will have either an appointed Chemical, Biological, Radiological Officer (CBR), RSO, or an accountable individual to ensure local compliance with the requirements of this license.

4. The RPOs at depots should have, as a minimum, 80 hours formal training in the following areas:

a. Principles and Practices of Radiation Protection.

b. Radioactivity Measurement Standardization and Monitoring Techniques and Instruments.

c. Mathematics and Calculations Basic to the Use and Measurement of Radioactivity.

d. Biological Effects of Radiation.

Successful completion of U.S. Army Radiological Safety Course (7K-F3) at Fort McClellan satisfies this requirement. Alternate training must be evaluated and approved by the AMCCOM RSO.

Item 9. Facilities and Equipment.

1. User Requirements

U.S. Army, U.S. Navy and U.S. Marine Corps installations and activities authorized to possess and use equipment containing modules with illumination from tritium sources covered by this application will store a maximum of 1,000 curies or 2,264 sources, whichever is reached first, per field storage area or enclosure of at least 1,000 cubic feet. Areas with personnel working, such as arms rooms, must have ventilation sufficient to provide at least 12 air changes per day. More than one such tritium storage area may be located in the same building if the storage areas do not share a common air space.

2. Bulk Storage Requirements

Installations authorized to store bulk quantities of radioactive fire control devices and tritium activated sources will have as a minimum the following facilities and equipment and follow the procedures listed below:

a. A tritium air monitor is required for each bulk storage location containing more than 1,000 curies or 2,264 sources, whichever value is reached first. Individual tritium air monitors are required for each such bulk storage area that does not share a common air space.

b. At locations other than Letterkenny Army Depot (LEAD) and New Cumberland Army Depot (NCAD), each bulk storage quantity of 10,000 curies or 56,600 sources, whichever value is reached first, will be stored with a separation distance of 10 feet. Bulk storage quantities at LEAD and NCAD will be arranged as illustrated at enclosure 8. NCAD's bin storage areas together will contain no more than 10,000 curies.

c. Each bulk storage building or each fireproof section containing more than 1,000 curies or 2,264 sources will be placarded to indicate the presence of radioactive material storage.

d. Installed tritium air monitors will be calibrated at 3-month intervals as a minimum. The air monitor will be set to alarm at no higher than 5x10-6 uCi/cc for controlled areas.

e. Each installation designated as a bulk storage facility will be equipped with a liquid scintillation system for analysis of wipes and smears.

f. All bulk storage operations and procedures will be conducted under the supervision of the installation RSO or his designate. The RSO will have the authority to immediately halt operations if he feels a safety hazard is present.

g. In the event of a fire or explosion involving a bulk storage area containing tritium, all personnel will be evacuated to a point at least 500 meters upwind from the storage area until a safe distance can be determined by the local RSO.

h. The following installations are currently designated as bulk storage facilities. However, any installation meeting the requirements for bulk storage can be designated a bulk storage facility under the terms of this license by the AMCCOM RSO.

- Anniston Army Depot
  Anniston, AL

- Letterkenny Army Depot
  Chambersburg, PA

- New Cumberland Army Depot
  New Cumberland, PA

- Red River Army Depot
  Texarkana, TX

- Rock Island Arsenal
  Rock Island, IL

- Sharpe Army Depot
  Lathrop, CA

3. Depot-Level Maintenance Requirements

Installations authorized to perform depot-level maintenance on devices or sources will have as a minimum the following facilities and equipment and will follow the procedures listed below:

a. Each maintenance building will be equipped with a continuous tritium air monitor. The air monitor will be calibrated at 3-month intervals as a minimum and will be set to alarm at no higher than 5 X 10-6 uCi/cc for radiation controlled areas.

b. Each depot-level maintenance installation will have access to a liquid scintillation system for analysis of wipes and smears.

(14)

c. All maintenance actions which require removal or replacement of a light source will be performed inside an exhaust hood which will have at least an average face velocity of 100 lfpm with the hood door in the operating position.

d. All maintenance operations and procedures will be conducted with the approval of the installation RSO or his designate. The RSO will have the authority to immediately halt operations if he feels a safety hazard is present.

e. The following installations are currently designated as depot-level maintenance facilities.

- Anniston Army Depot
- Letterkenny Army Depot
- Rock Island Arsenal

4. Radiation Detection Instruments and Calibration

Installations authorized bulk storage or depot-level maintenance will have the instrumentation listed below available at all times:

Type of Instrument	Number Available	Radiation Detection	Use
Liquid Scintillation System, Beckman Model LS-100 or equivalent	Min 1 per installation	BETA	Measuring
Air Monitor, Johnston Laboratories Model 955-B or equivalent	Min 1 per storage/ maintenance area	BETA	Monitoring

Liquid scintillation counting systems are calibrated by the combined External Standard - Channels Ratio Method using calibrated solutions with a specific degree of quenching. In this technique, external standard counts are taken in two windows and the ratio of the counts is used for quench calibration. Efficiency curves are formulated at least quarterly and quality control checked each time the system is used.

Johnston Air Monitors (Model 955-B) or equivalents are checked periodically (at least every 3 months) according to methods and a standard supplied by the manufacturer.

Item 10. Radiation Protection Program.

a. The HQ, AMCCOM Radiation Protection Program is at enclosure 10.

b. U.S. Army, U.S. Navy and U.S. Marine Corps User Installations Organizational Responsibilities.

(1) Users of devices will be required to perform continual visual checks of the fire control units. Loss of illumination will require the complete module with source being returned to the depot for replacement or disposal of the lamps.

(2) Replacement of tritium lamps by users is strictly prohibited. Spare luminous lamps are not authorized by the supply system to an activity other than the designated bulk storage and maintenance installations. However, module replacement is authorized below depot level.

(3) Users of devices containing tritium illumination devices are required to utilize and maintain each device in accordance with military regulations and technical manuals issued.

c. U.S. Army Bulk Storage Installations Organizational Responsibilities.

Local Commanders at Bulk Storage Installations will be responsible for:

(1) Ensuring that radiation safety efforts at bulk storage locations conform with the requirements of this license, military regulations, and NRC Title 10 CFR.

(2) Ensuring bulk storage areas are surveyed quarterly. Results will be furnished to the AMCCOM RSO immediately upon the discovery of any abnormal condition or upon request. Records of surveys will be kept available for NRC inspection teams.

(3) Maintenance of radiation safety records.

(4) Ensuring that inventory and computer records of radioactive material (H-3) at their installation is accurate and up-to-date.

(5) Coordination of the above tasks with the AMCCOM RSO.

d. Maintenance Installations Organizational Responsibilities.

(1) Maintenance Installation SOPs are at enclosure 11.

(10)

(2) Radiation Safety Officers at Maintenance Installations will be responsible for:

(a) Ensuring that radiation safety efforts at maintenance locations conform with the requirements of this license, maintenance procedures, military regulations, and NRC Title 10 CFR.

(b) A minimum of monthly surveys during maintenance operations of work areas. Results will be furnished to the AMCCOM RSO immediately upon the discovery of any abnormal condition or upon request and will be followed up with a written report. Records of surveys will be kept available for NRC inspection teams.

(c) Maintenance of radiation safety records.

(d) Training of shop maintenance personnel where applicable.

(e) Development and implementation of installation regulations (SOP's) to ensure compliance with license requirements and a safe operating environment.

(f) Coordination of the above tasks with the AMCCOM RSO.

Item 11. Waste Management.

1. Radioactive waste generated by military users is disposed of in accordance with current NRC and Department of Transportation (DOT) regulations. Currently, this headquarters is the program manager and issues instructions to all military users on proper packaging and marking of shipments of radioactive waste. This headquarters also conducts on-site audits of prospective radioactive waste shipments. The shipments are audited for full compliance with DOT, NRC and burial site criteria.

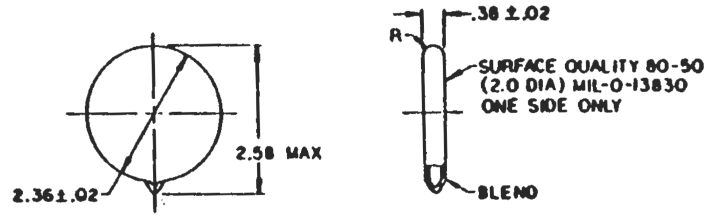
2. Unwanted devices containing tritium sources covered by this license will be packaged in containers acceptable to a commercial burial site for land burial. These containers will be shipped in accordance with DOT and NRC regulations.

ENCLOSURE 1

Source Drawings

X4		76-10-08	
-	PRODUCTION RELEASE [illegible]	[illegible]	[illegible]
A	NOR FOA 2001 81-06-05	82 05 03	[illegible]
B	NOR [illegible] 002/81-08-17	83-05-[illegible]	[illegible]

SOURCE USED ON:
M1A1 Infinity Collimator



NOTES:-

1- MARKING, LABELING AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITIES IN DOD SUPPLY SYSTEM".
2- THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LAMP TO -80°F AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.
3- AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIES.
4- VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H_3 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE, BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. 10.0 CURIES MAXIMUM.
5- COLOR OF LIGHT EMITTED: GREEN, SPECTRAL PEAK 5250 Å ± 50 Å, 1/2 PEAK WIDTH 700 Å ± 50 Å.
6- PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS FROM MANUFACTURE.
7- FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 2.5% WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 420 MICROLAMBERTS MINIMUM.
8- MATERIAL: GLASS, TYPE I, CLASS A, SPEC DD-G-541 .08 $^{+.02}_{-.04}$ THICK WALL.

9- IDENTIFICATION OF THE SUGGESTED SOURCES OF SUPPLY HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEM.
10- SUGGESTED SOURCES OF SUPPLY: SEE TABLE

SUGGESTED SOURCES OF SUPPLY

VENDOR	VENDOR PART NO.
SELF POWERED LIGHTING LTD 8 WEST CHESTER PLAZA ELMSFORD, N.Y. 10523 FSCM 25218	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE HP12-3PS ENGLAND	NOT AVAILABLE
mb-microtec inc Freiburgstrasse 624 CH-3172-Niederwangen SWITZerland	NOT AVAILABLE
SAUNDERS ROE DEVELOPMENTS LTD MILLINGTON ROAD HAYES, MIDDLESEX UB3 4NB UNITED KINGDOM	NOT AVAILABLE

APPLICABLE DOCUMENTS
SQAP - SQ10556135

SPECIFICATION CONTROL DRAWING
PART NO. 10556135

Original date of drawing	74 JUN 14
Title	LAMP RADIOLUMINOUS
Size	D
FSCM NO.	19200
Drawing No.	10556135
Scale	1/1
Next assy / Used on	10556136 / COLLIMATOR
APPLICATION	

(12)

NOTES:-

1- PREPARED IN ACCORDANCE WITH MIL-STD-100.

2- REQUIREMENTS:-

A. MARKING, LABELING AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM."

B. THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURE OR LIGHT LOSS AFTER EXPOSING THE LIGHT SOURCE TO -80°F AND +160°F FOR A PERIOD OF EIGHT HOURS AT EACH TEMPERATURE.

C. SUBSEQUENT TO SUBMERGING THE LIGHT SOURCE IN WATER FOR FOUR HOURS AT ROOM TEMPERATURE, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIE.

D. VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H3 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE, BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. 9.0 CURIE* MAXIMUM PER ORANGE LAMP, 5.0 CURIE MAXIMUM PER GREEN LAMP.

E. VIAL MATERIAL:- GLASS, TYPE I, CLASS A, SPEC DD-G-841.

F. ADVISORY!- INTERNAL PRESSURE AT 70°F SHOULD NOT EXCEED 2.6 ATM.

G. FOR COLOR OF PHOSPHOR AND MINIMUM ACCEPTABLE BRIGHTNESS IN MICROLAMBERTS SEE TABULATION.

H. PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS FROM MANUFACTURE.

I. FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM THE DATE OF MANUFACTURE BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 6.0% WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL MEET THE MINIMUM ACCEPTABLE BRIGHTNESS LEVEL SHOWN IN TABULATION.

3- SOAP-11739179 APPLIES.

4- IDENTIFICATION OF THE "SUGGESTED SOURCE(S) OF SUPPLY" HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEM(S).

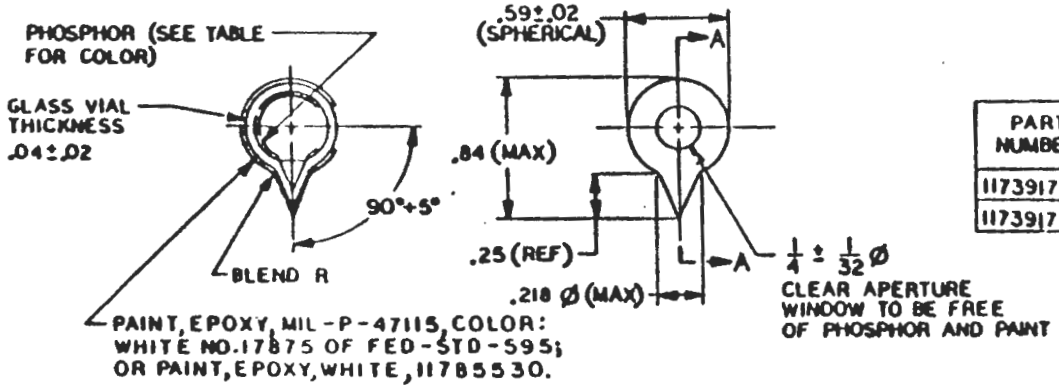
5- SUGGESTED SOURCES OF SUPPLY:-

VENDOR	VENDOR PART NO.
SELF-POWERED LIGHTING LTD 8 WEST CHESTER PLAZA ELMSFORD, NY 10523	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE, ENGLAND HP12-3PS	NOT AVAILABLE
SAUNDERS-ROE DEVELOPMENT LTD. HILLINGTON ROAD HAYES MIDDLESEX ENGLAND UB3 4NB	NOT AVAILABLE
HERC & BENTELI NUCLEAR, AG. FREIBURTSTRASSE 624 CH-3172-NIEDERWANGEN SWITZERLAND	NOT AVAILABLE

6- PREPARE SURFACE OF GLASS, AND MIX, APPLY AND CURE EPOXY PAINT IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
E	REPLACES REV D W/CHANGE NOR F9A2038	80-OH9	
F	NOR F2J2001/82-12-08	83-02-14	

SOURCE USED ON:
M58 Aim Post Light
M59 Aim Post Light



PART NUMBER	PHOSPHOR COLOR	SPECTRAL PEAK	½ PEAK WIDTH	MINIMUM ACCEPTABLE BRIGHTNESS
11739179-1	GREEN	5250Å ± 50Å	700Å ± 50Å	2500 μL
11739179-2	ORANGE	5950Å +100 −50 Å	900Å ± 100Å	2100 μL

SECTION A-A

SPECIFICATION CONTROL DRAWING
PART NO. SEE TABLE

11730975	M58 ,M59 -LT
11730976	AIMING POST
NEXT ASSY	USED ON
APPLICATION	

MECHANICAL PROPERTIES: YP, TS, EL2, RA, BH, BH

DO NOT SCALE DRAWING
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS ±
FRACTIONS ± ANGLES ±

ORIGINAL DATE OF DRAWING: 75-02-03
DRAWN: ACS | CHECKED: [illegible]
ENGR: JDF | ENGR: GD
ENGR: | ENGR:
J. D. Wiland

U S ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND
DOVER, NEW JERSEY 07801

LAMP, RADIOLUMINOUS

SIZE: C | CODE IDENT NO.: 19200 | 11739179
SCALE 2/1 | UNIT WT. | SHEET

G	NOR F9J2591 79-0-05 ECP F0J2501 80-02-20 REPLACES REV F WITH CHANGE		
H	NOR FDA-2087, 81-09-07		
J	NOR 7JA2001 82 03 05		
K	NOR 7JA2007 83030 ECP F7A2103 83 1123		
L	NOR F4J2000 840719	84-25	

NOTE:-

1- REQUIREMENTS

A-VIAL MATERIAL: GLASS, TYPE I, CLASS A, SPEC 00-G-54l.

B-COLOR OF PHOSPHER GREEN SPECTRAL PEAK 5250Å ± 50Å 1/2 PEAK WIDTH 700Å ± 50Å.

C-VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H_3 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. TOTAL CURIES ARE DEFINED FOR EACH LAMP IN TABLE.

D-THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LAMP TO -80°F AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.

E-AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIES.

F-PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS AFTER MANUFACTURE.

G-FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW DECAY IN EXCESS OF 25% WHEN MEASURED OVER ANY CONSECUTIVE 30-DAY PERIOD. THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE AS DEFINED IN TABLE.

H-MARKING LABELING, AND SHIPPING AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 RADIOACTIVE COMMODITY IN THE DOD SUPPLY SYSTEM:

J-PREPARE SURFACE OF GLASS, AND MIX, APPLY AND CURE FINISH IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION.

K-SURFACE FINISH:-

1-LACQUER, ACRYLIC, SPEC MIL-L-81352, COLOR WHITE NO. 17875 OF FED-STD-595. .005 MAX THICKNESS.

2-ALTERNATIVE FINISH: PAINT, EPOXY, MIL-P-4765, COLOR WHITE NO. 17875 OF FED-STD-595-.005 MAX THICKNESS.

3-ALTERNATIVE FINISH: EPOXY PAINT, WHITE, N785530, .005 MAX THICKNESS.

2-IDENTIFICATION OF THE SUGGESTED SOURCE OF SUPPLY HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEM

3-SUGGESTED SOURCE OF SUPPLY:-

SELF POWERED DEVELOPMENTS LTD.
8 WEST CHESTER PLAZA
ELMSFORD, NEW YORK, 10523
VENDOR PART NO. NOT AVAILABLE

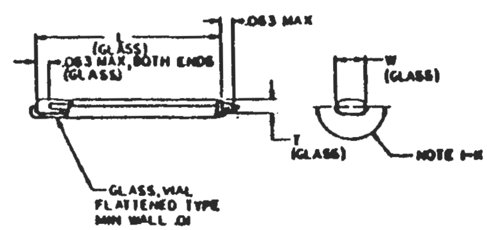
SAUNDER-ROE DEVELOPMENT LTD.
MILLINGTON ROAD
HAYES MIDDLESEX
ENGLAND UB3 4NB
VENDOR PART NO. NOT AVAILABLE

BRANDHURST CO LTD.
P.O. BOX 70
HIGH WYCOMBE BUCKINGHAM SHIRE
ENGLAND HP12 3PS
VENDOR PART NO. NOT AVAILABLE

M.B. MICROTEC AG.
FREIBURGSTRASSE 624
CH-3172 NIEDERWANGEN
SWITZERLAND
VENDOR PART NO. NOT AVAILABLE

SOURCE USED ON:

M1A2 Quad
M14A1 Quad
M17/18 Quads
M64 Sight Unit
M64A1 Sight Unit
M134A1 Mount Tel
M171 Mount Tel
XM187 Str Tel
M90E6 Mnt Tel Quad



PART NO.	ACTIVITY CURIES MAX	MINIMUM BRIGHTNESS MICROL AMBERTS	L	W	T
11729510-1	.050	100	.53-.03	.11-.03	.05-.02
11729510-2	.075	100	1.00-.03	.16-.03	.05-.02

QAP 11729510 APPLIES

11729510 | M17A1 QUAD

730312

SPECIFICATION CONTROL DRAWING
PART NO. SEE TABLE

LAMP,
RADIOLUMINOUS

SIZE	FSCM NO.	DWG NO.
F	19200	11729510

NOTE:-

1- REQUIREMENTS

A-VIAL MATERIAL: GLASS, TYPE I, CLASS A, SPEC DD-G-541.

B-COLOR OF PHOSPHER GREEN SPECTRAL PEAK 5250Å ± 50Å 1/2 PEAK WIDTH 700Å ± 50Å.

C-VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H_2 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. TOTAL CURIES ARE DEFINED FOR EACH LAMP IN TABLE.

D-THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LAMP TO -80°F AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.

E-AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIES.

F-PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS AFTER MANUFACTURE.

G-FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW DECAY IN EXCESS OF 25% WHEN MEASURED OVER ANY CONSECUTIVE 30-DAY PERIOD, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 420 MICROLAMBERTS MINIMUM.

H- MARKING LABELING, AND SHIPPING AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 RADIOACTIVE COMMODITY IN THE DOD SUPPLY SYSTEM.

J-PREPARE SURFACE OF GLASS, AND MIX, APPLY AND CURE FINISH IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION.

K- SURFACE FINISH:-

1-LACQUER, ACRYLIC, SPEC MIL-L-81352, COLOR WHITE NO. 17875 OF FED-STD-595. .005 MAX THICKNESS.

2-ALTERNATIVE FINISH: PAINT, EPOXY, MIL-P-47145, COLOR WHITE NO 17875 OF FED-STD-595. .005 MAX THICKNESS.

3-ALTERNATIVE FINISH: EPOXY PAINT, WHITE, 11785530, .005 MAX THICKNESS.

2- IDENTIFICATION OF THE SUGGESTED SOURCE OF SUPPLY HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEM

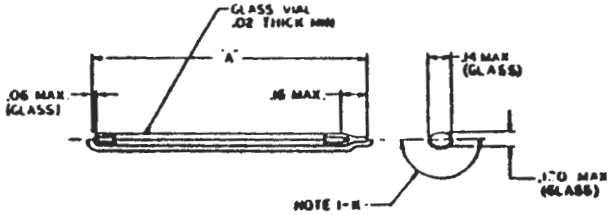
3- SUGGESTED SOURCE OF SUPPLY:-

SELF POWERED DEVELOPMENTS LTD.
8 WEST CHESTER PLAZA
ELMSFORD, NEW YORK, 10523
VENDOR PART NO. NOT AVAILABLE

SAUNDER-ROE DEVELOPMENT LTD.
MILLINGTON ROAD
HAYES MIDDLESEX
ENGLAND UB3 4NB
VENDOR PART NO. NOT AVAILABLE

BRANDHURST CO LTD.
P.O. BOX 70
HIGH WYCOMBE BUCKINGHAM SHIRE
ENGLAND HP12 3PS
VENDOR PART NO. NOT AVAILABLE

M.B. MICROTEC AG.
FREIBURGSTRASSE 624
CH-3172 NIEDERWANGEN
SWITZERLAND
VENDOR PART NO. NOT AVAILABLE



PART NUMBER	"A"	CURIES (MAX)
11730922-1	1.50 ± .05	0.4
11730922-2	1.88 ± .05	0.45
11730922-3	2.00 ± .05	0.5

SOURCE USED ON:
M113A1 Pan Tel
M14A1 Quad
M137 Pan Tel
M17/M18 Quads

M90E6 Mnt Tel Mnt
M137E1 Pan Tel

QAP 11730922 APPLIES

SPECIFICATION CONTROL DRAWING
PART NO SEE TABLE

69-07-01

LAMP,
RADIOLUMINOUS

F 19300 11730922

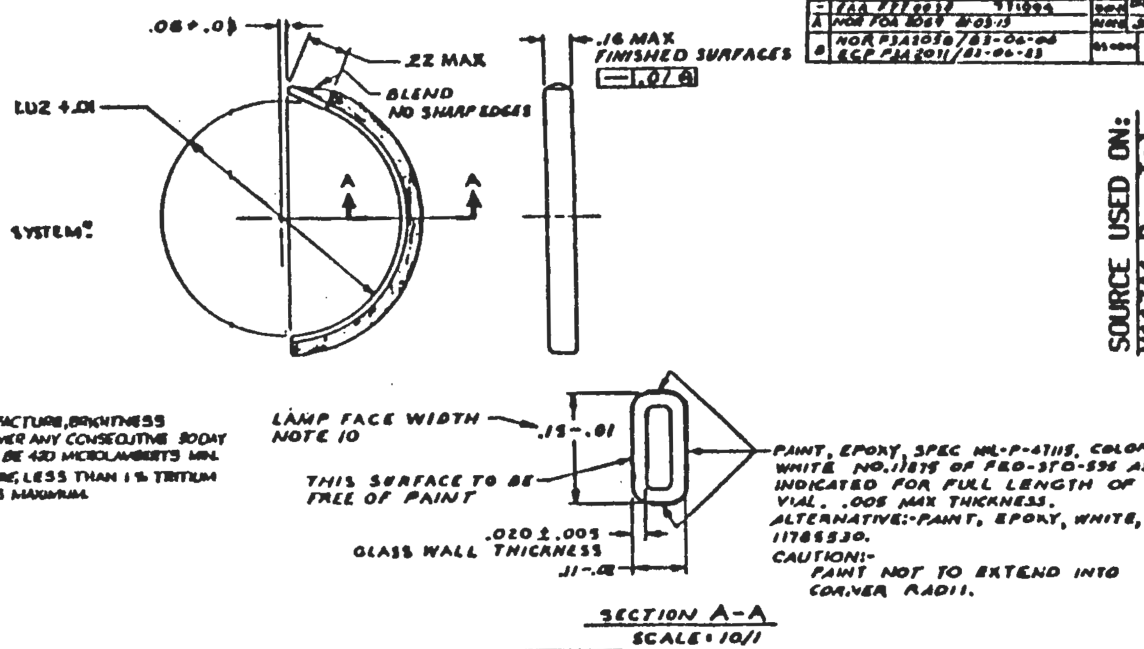
NOTES:-

REQUIREMENTS:

1- MARKING, LABELING AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM".
2- THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LIGHT SOURCE TO -80° AND +160°F FOR A PERIOD OF EIGHT HOURS AT EACH TEMPERATURE.
3- SUBSEQUENT TO SUBMERGING THE LIGHT SOURCE IN WATER FOR 4 HOURS AT ROOM TEMPERATURE, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIE.
4- PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMP SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS AFTER MANUFACTURE.
5- FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 25% WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 430 MICROLAMBERTS MIN.
6- VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H_3 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE, BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. TOTAL 0.6 CURIES MAXIMUM.
7- COLOR OF PHOSPHOR: GREEN SPECTRAL PEAK 5250 Å ± 50 Å, 1/2 PEAK WIDTH 700 Å ± 50 Å.
8- MINIMUM LIGHTED AREA: 0.17 IN².

9- THE MICROLAMBERT UNITS SHOULD BE ESTABLISHED BY A METHOD TRACEABLE TO THE ARMY METROLOGY CALIBRATION CENTER REDSTONE ARSENAL, ALABAMA.
10- BRIGHTNESS MEASUREMENT SHALL BE MADE ON THE CENTER OF THE LAMP WITH A CIRCULAR APERTURE BETWEEN 50% AND 75% OF LAMP FACE WIDTH.
11- VIAL MATERIAL:- GLASS, TYPE I, CLASS A, SPEC DD-G-541.
12- PREPARE SURFACE OF GLASS, AND MIX, APPLY AND CURE EPOXY PAINT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

IDENTIFICATION OF THE "SUGGESTED SOURCE(S) OF SUPPLY" HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEM(S).



SOURCE USED ON:
M113A1 Pan Tel
XM187 Str Tel
M90E6 Mnt Tel Quad

SUGGESTED SOURCES OF SUPPLY

VENDOR	VENDOR PART NO.
SELF-POWERED LIGHTING LTD 8 WEST CHESTER PLAZA ELMSFORD, N.Y. 10523 CODE IDENT NO. 28278	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE HP 12-3PB ENGLAND	NOT AVAILABLE
MB-MICROTEC INC FRIEBURGSTRASSE 624 CH-3172 NIEDERWANGEN SWITZERLAND	NOT AVAILABLE
SAUNDERS-ROE DEVELOPMENTS LTD MILLINGTON ROAD HAYES, MIDDLESEX UB 3 4NB UNITED KINGDOM	NOT AVAILABLE

APPLICATION DOCUMENT(S)
: SQAP-10556228

SPECIFICATION CONTROL DRAWING
PART NO. 10556228

780721

LAMP, RADIOLUMINOUS

D 19200 10556228

REQUIREMENTS:-

1- MARKING, LABELING, AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH OSAN 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM."

2- THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LIGHT SOURCE TO -80° AND +160°F FOR A PERIOD OF EIGHT HOURS AT EACH TEMPERATURE.

3- AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIES.

4- PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS AFTER MANUFACTURE.

5- FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM THE DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 6% WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 1000 MICROLAMBERTS MINIMUM.

NOTES:-

1- SPECS MIL-F-13926 AND ANSI Y10.5-1973 APPLY.

2- VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H_2 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE, BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. TOTAL 0.4 CURIES MINIMUM.

3- INTERNAL PRESSURE 2.00 ATMOSPHERES (NOMINAL) AT 70°F.

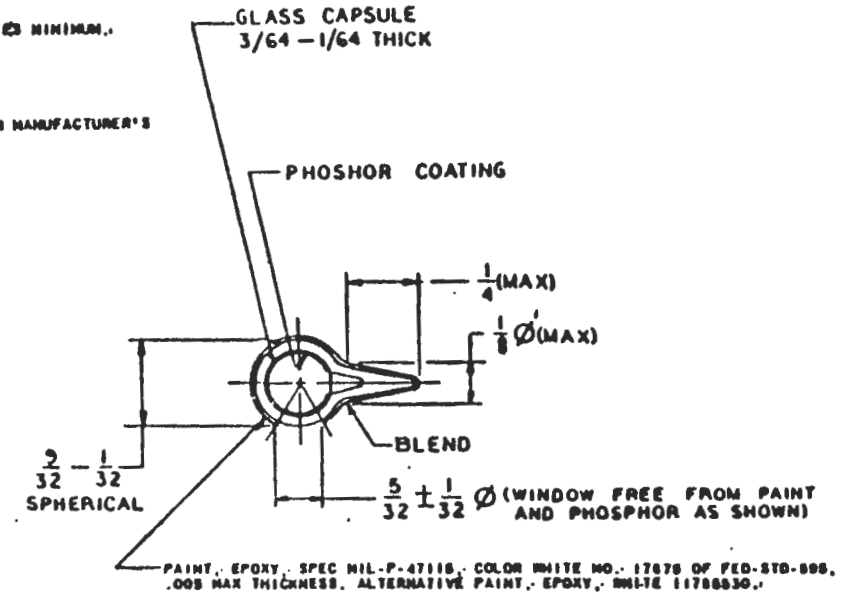
4- COLOR OF PHOSPHOR: GREEN SPECTRAL PEAK 5250 Å ± 50Å 1/2 PEAK WIDTH 700Å ± 50Å.

5- VIAL MATERIAL: GLASS, TYPE I, CLASS A, SPEC DD-G-541.

6- PREPARE SURFACE OF GLASS, AND MIX, APPLY AND CURE EPOXY PAINT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
F	REPLACES REV E WITH CHANGE NOR F3A2058/ 83-06-06 ECP F3A2071/ 83-06-23	8908	

SOURCE USED ON: M113A1 Pan Tel



SUGGESTED SOURCE OF SUPPLY	
VENDOR	VENDOR PART NO.
SELF-POWERED LIGHTING LTD. (CODE IDENT NO. 29218) 8 WESTCHESTER PLAZA ELMSFORD, N.Y. 10523	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE HP12-3PS UNITED KINGDOM	NOT AVAILABLE
SAUNDER-ROE DEVELOPMENTS LTD. HILLINGTON ROAD HAYES, MIDDLESEX UB3 4NB UNITED KINGDOM	NOT AVAILABLE
MB-MICROTEC INC. FREIBURGSTRASSE 624 CH-3172 NIEDERWANGEN/BERN SWITZERLAND	NOT AVAILABLE

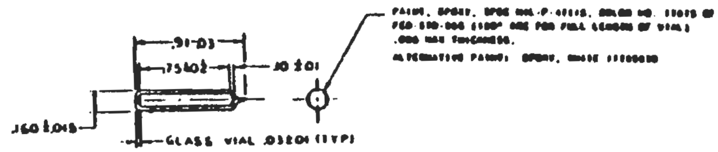
SPECIFICATION CONTROL DRAWING

PART NO. 11730273

		MECHANICAL PROPERTIES	DO NOT SCALE DRAWING UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS ± — FRACTIONS ± — ANGLES ± —	ORIGINAL DATE OF DRAWING 73-06-15	U S ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER DOVER, NEW JERSEY 07801		
		YP		DRAFTSMAN JC	CHECKER JB	LAMP, RADIOLUMINOUS	
		TS		ENGR C.E. KLUNO	ENGR DML		
		EL%		ENGR	ENGR		
		AA		Douglas M. Land		SIZE C	FSCM NO 19200	11730273
C11730274	PAN TEL	RH		J.H. Wiland		SCALE 4/1	UNIT WT.	SHEET
NEXT ASSY	USED ON	RH						
APPLICATION								

REQUIREMENTS

1. HANDLING, SHIPPING, LABELING AND DISPOSAL OF RADIOACTIVE COMMODITIES SHALL BE IN ACCORDANCE WITH [illegible] "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM".
2. THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LIGHT SOURCE TO [illegible] FOR A PERIOD OF [illegible] AT EACH TEMPERATURE.
3. AFTER IMMERSING THE LAMP IN ROOM TEMPERATURE WATER FOR [illegible] HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED [illegible] MICROCURIE.
4. PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMP SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF [illegible] DAYS AFTER MANUFACTURE.
5. FOLLOWING THE STABILIZATION PERIOD AND UP TO [illegible] DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF [illegible] WHEN MEASURED [illegible]. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT, AT TIME OF ACCEPTANCE SHALL BE [illegible] MICROLAMBERTS MINIMUM.
6. VIAL TO BE FILLED WITH PRODUCTION GRADE [illegible] MINIMUM [illegible] PURE, LESS THAN [illegible] [illegible]. SOURCE [illegible] CURIES MAXIMUM.
7. COLOR OF PHOSPHOR, GREEN, SPECTRAL PEAK [illegible]
8. INTERNAL PRESSURE [illegible] ATMOSPHERES NOMINAL AT [illegible]°F.
9. PREPARE SURFACE OF GLASS, AND [illegible] APPLY AND CURE EPOXY PAINT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.



SUGGESTED SOURCE(S) OF SUPPLY	
VENDOR	VENDOR PART NO.
SAUNDERS-ROE DEVELOPMENT LTD MILLINGTON ROAD HAYES MIDDLESEX UB3 4NB UNITED KINGDOM	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE HP-12-3PS ENGLAND	NOT AVAILABLE
MB-MICROTEC INC. FREIBURGSTRASSE 624 CH-3173 NIEDERWANGEN SWITZERLAND	NOT AVAILABLE
SELF-POWERED LIGHTING LTD (CODE IDENT. NO. 20716) 8 WESTCHESTER PLAZA ELMSFORD, N.Y. 10523	NOT AVAILABLE

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
F	REPLACES REV E W/CHANGE NOR F3A2032[illegible]	[illegible]	

SOURCE USED ON:
M114A1 Elbow Tel

SOURCE CONTROL DRAWING

PART NO. 11729519

U.S. ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER

DO NOT SCALE DRAWING

73 10 04

LAMP RADIOLUMINOUS

SIZE D FSCM NO. 19200 11729519

APPLICATION: NEXT ASSY 11729491 — USED ON M.SCP ELB

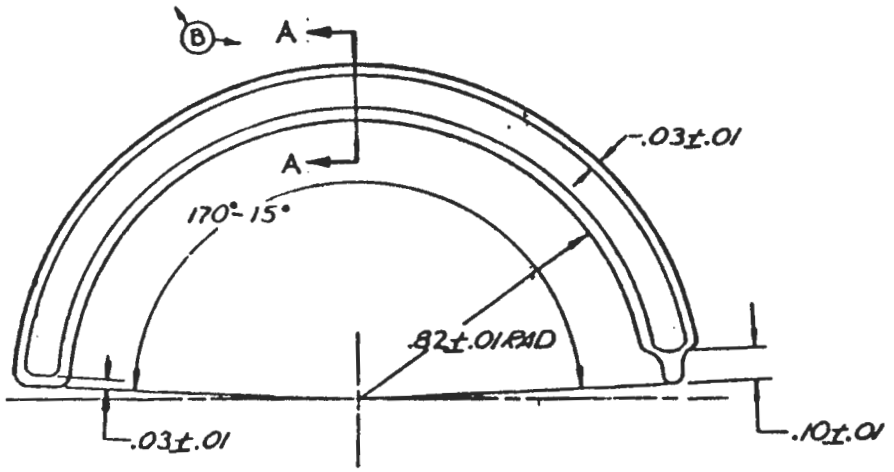
SUGGESTED SOURCE(S) OF SUPPLY

VENDOR	VENDOR PART NO.	VENDOR	VENDOR PART NO.
SAUNDERS-ROE DEVELOPMENTS LTD. MILLINGTON ROAD HAYES MIDDLESEX VB3 4NB UNITED KINGDOM	NOT AVAILABLE	SELF-POWERED LIGHTING LTD (CODE IDENT No. 29216 8 WEST CHESTER PLAZA ELMSFORD, N.Y. 10523	NOT AVAILABLE
BRANDHURST CO. LTD. PO BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE HP 12-3PS ENGLAND	NOT AVAILABLE	MB-MICROTEC, INC. FRIEBURGSTRASSE 62A CH-3172-NIEDERWANGEN SWITZERLAND	NOT AVAILABLE

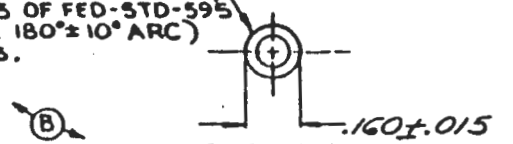
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
XO	PROTOTYPE RELEASE ONLY FROOOS		
—	PRODUCTION RELEASE ERR FRAF 30637	73-04-11	T.Z
A	SEE ERR FRA F40868	74-03-08	
B	SEE ERR FRA F40884	74-06-26	
C	SEE ERR FRA FC0143	76-04-23	
D	NOR FBX2003 TROSIO	790721	
E	NORFOA2018 81-03-06	81-03-24	

REQUIREMENTS

1. HANDLING, SHIPPING, LABELING AND DISPOSAL OF RADIOACTIVE COMMODITIES SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM." (C)
2. THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LIGHT SOURCE TO -80° AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.
3. AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIES.
4. PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMP SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS AFTER MANUFACTURE. (C)
5. FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 2.5% WHEN MEASURED OVER ANY CONSECUTIVE 30-DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT THE TIME OF ACCEPTANCE SHALL BE 500 MICROLAMBERTS MINIMUM.
6. VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM (H_3) MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE, BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. TOTAL 2.2 CURIES (A) MAXIMUM.
7. COLOR OF PHOSPHOR: GREEN - SPECTRAL PEAK 5250Å ± 50Å 1/2 PEAK WIDTH 700Å ± 50Å
8. VIAL MATERIAL: GLASS, TYPE I, CLASS A, SPEC DD-G-541.



LACQUER, ACRYLIC, SPEC MIL-L-81352, COLOR WHITE NO. 17875 OF FED-STD-595 (FULL LENGTH OF VIAL 180°±10° ARC) .008 MAX THICKNESS.



SECTION A-A

PART No. 11729517

SOURCE USED ON: M114A1 Elbow Tel

APPLICABLE DOCUMENT(S)
SQAP-11729517

C11728868	TLSCP ELB	ORIGINAL DATE 72 OCT 4		U S ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND DOVER, NEW JERSEY 07801	
APPLICATION		DEPT 18	CHK T.Z	LAMP, RADIOLUMINOUS	
		ENGR MGR	ENGR	SIZE C	CAGE DRAW NO. 19200
		SUBMITTED		DRAWING NO. 11729517	
		APPROVED		SCALE 4/1	SHT 1 OF 1

NOTE:-

1- REQUIREMENTS

A-VIAL MATERIAL: GLASS, TYPE I, CLASS A, SPEC DD-G-541.

B-COLOR OF PHOSPHER GREEN SPECTRAL PEAK 5250Å ± 50Å 1/2 PEAK WIDTH 700Å ± 50Å.

C-VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H3 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. TOTAL 0.6 CURIES MAXIMUM.

D-THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LAMP TO -80°F AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.

E-AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIES.

F-PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS AFTER MANUFACTURE.

G-FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW DECAY IN EXCESS OF 25% WHEN MEASURED OVER ANY CONSECUTIVE 30-DAY PERIOD. THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 800 MICROLAMBERTS MINIMUM.

H-MARKING, LABELING, AND SHIPPING AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITY IN THE DOD SUPPLY SYSTEM".

J-PREPARE SURFACE OF GLASS, AND MIX, APPLY AND CURE FINISH IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION.

K-SURFACE FINISH:-

1-LACQUER, ACRYLIC, SPEC MIL-L-81352, COLOR WHITE NO. 17875 OF FED-STD-595. .005 MAX THICKNESS.

2-ALTERNATIVE FINISH: PAINT, EPOXY, MIL-P-47115, COLOR WHITE NO. 17875 OF FED-STD-595. .005 MAX THICKNESS.

3-ALTERNATIVE FINISH: EPOXY PAINT, WHITE, H785530, .005 MAX THICKNESS.

2-IDENTIFICATION OF THE SUGGESTED SOURCE OF SUPPLY HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEM

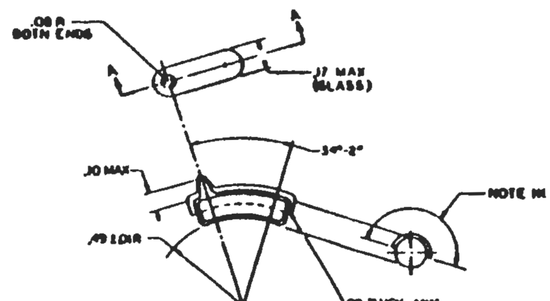
3-SUGGESTED SOURCE OF SUPPLY:-

SELF POWERED DEVELOPMENTS LTD.
8 WEST CHESTER PLAZA
ELMSFORD, NEW YORK, 10523
VENDOR PART NO. NOT AVAILABLE

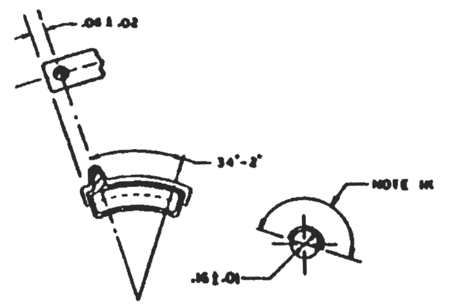
SAUNDER-ROE DEVELOPMENT LTD.
MILLINGTON ROAD
HAYES MIDDLESEX
ENGLAND UB3 4NB
VENDOR PART NO. NOT AVAILABLE

BRANDHURST CO LTD.
P.O. BOX 70
HIGH WYCOMBE BUCKINGHAM SHIRE
ENGLAND HP12 3PS
VENDOR PART NO. NOT AVAILABLE

M.B. MICROTEC AG.
FREIBURGSTRASSE 624
CH-3172 NIEDERWANGEN
SWITZERLAND
VENDOR PART NO. NOT AVAILABLE



SECTION A-A



ALTERNATIVE METHOD

QAP 11729514 APPLIES

SPECIFICATION CONTROL DRAWING
PART NO. 11729514

LAMP, RADIOLUMINOUS

72-11-07

F 19200 11729514

SOURCE USED ON:
M137 Pan Tel
M137E1 Pan Tel

28

NOTES:-

1- REQUIREMENTS

A-VIAL MATERIAL: GLASS, TYPE I, CLASS A, SPEC DD-G-541.

B-COLOR OF PHOSPHER: GREEN SPECTRAL PEAK 5250Å ± 50Å W/2 PEAK WIDTH 700Å ± 50Å.

C-VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H3 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE, BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. TOTAL 2.2 CURIES MAXIMUM.

D-THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LAMP TO -80°F AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.

E-AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIES.

F-PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMP SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS AFTER MANUFACTURE.

G-FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 25% WHEN MEASURED OVER ANY CONSECUTIVE 30-DAY PERIOD. THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 420 MICROLAMBERTS MINIMUM.

H-MARKING LABELING, AND SHIPPING OF PACKAGES AND CONTAINER SHALL BE IN ACCORDANCE WITH DSAM 4145.8 RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM.

J-PREPARE SURFACE OF GLASS, AND MIL APPLY AND CURE FINISH IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION.

K-SURFACE FINISH:-

1-LACQUER, ACRYLIC, SPEC MIL-L-81352, COLOR WHITE NO. 17875 OF FED-STD-595. .005 MAX THICKNESS

2-ALTERNATIVE FINISH: PAINT, EPOXY, MIL-P-47145, COLOR WHITE NO. 17875 OF FED-STD-595. .005 MAX THICKNESS.

3 ALTERNATIVE FINISH: EPOXY PAINT, WHITE, 11785530, .005 MAX THICKNESS.

2- IDENTIFICATION OF THE SUGGESTED SOURCE OF SUPPLY HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEM.

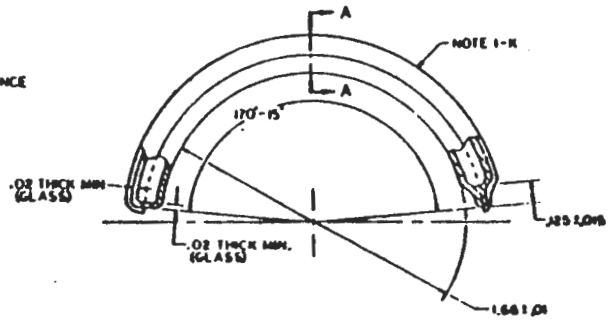
3- SUGGESTED SOURCE OF SUPPLY:-

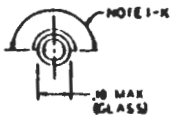
SELF POWERED LIGHTING LTD.
8 WEST CHESTER PLAZA
ELMSFORD, NEW YORK, 10523
VENDOR PART NO. NOT AVAILABLE

SAUNDERS-ROE DEVELOPMENTS LTD.
WELLINGTON ROAD
HAYES
MIDDLESEX UB3 4HB ENGLAND
VENDOR PART NO. NOT AVAILABLE

BRANDHURST CO LTD.
P.O. BOX 70
WELLINGTON ROAD,
HIGH WYCOMBE
BUCKS HP12 3AS ENGLAND
VENDOR PART NO. NOT AVAILABLE

M.B. MICROTEC AG.
CH-3172 NIEDERWANGEN
FREIBURGSTRASSE 624
SWITZERLAND
VENDOR PART NO. NOT AVAILABLE





SECTION A-A

SOURCE USED ON:
M138 Elbow Tel

QAP 11748012 APPLIES

SPECIFICATION CONTROL DRAWING
PART NO 11748012

		75-03-15	LAMP, RADIOLUMINOUS
			F 19200 11748012

REV	DESCRIPTION	DATE	APPROVAL
E	[illegible]	[illegible]	
F	NOR F2A0017 820712 ECP F4A2041 840905	841214	

NOTES:-

1-REQUIREMENTS:-

A-MARKING, LABELING AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM".

B-THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LIGHT SOURCE TO -80° F AND + 160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.

C-AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIE.

D-PRIOR TO MARKING BRIGHTNESS MEASUREMENTS, LAMP SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS AFTER MANUFACTURE.

E-FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 2.5% WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 300 MICROLAMBERTS MINIMUM.

F-VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H_3 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE, BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. TOTAL 3.0 CURIES MAXIMUM

G-COLOR OF PHOSPHOR-GREEN SPECTRAL PEAK 5250A° ± 50A° 1/2 PEAK WIDTH 700A° ± 50A°.

H-VIAL MATERIAL:- GLASS, TYPE I, CLASS A, SPEC DD-G-541.

2-IDENTIFICATION OF THE "SUGGESTED SOURCE OF SUPPLY" HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEM.

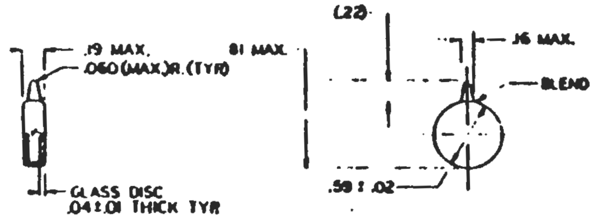
3-SUGGESTED SOURCE OF SUPPLY:-

SELF POWERED LIGHTING LTD
8 WEST CHESTER PLAZA
ELMSFORD NEW YORK, 10523
FSCM NO. 29218
VENDOR PT. NO. NOT AVAILABLE

SAUNDERS-ROE DEVELOPMENTS LTD.
MILLINGTON ROAD
HAYES MIDDLESEX UB3 4NB
UNITED KINGDOM
FSCM NO. N/A
VENDOR PT. NO. NOT AVAILABLE

BRANDHURST CO. LTD.
P.O. BOX 70
HIGH WYCOMBE
BUCKINGHAMSHIRE HP 12-3PS
ENGLAND
FSCM NO. N/A
VENDOR PT. NO. NOT AVAILABLE

M B MICROTEC, INC
FREIBURGSTRASSE 624
CH-3172 NIEDERWANGEN
SWITZERLAND
FSCM NO. N/A
VENDOR PT. NO. NOT AVAILABLE



SOURCE USED ON:
M139 Align Device
M140 Align Device
Zone Charge Setter

SPECIFICATION CONTROL DRAWING
PART NO. 10544463

NEXT ASSY / USED ON	10544463 / ALIGN DEVICE
	APPLICATION
DO NOT SCALE DRAWING	APPLY IDENTIFICATION PER MIL-STD-130
DATE	72-11-07
TITLE	LAMP, RADIOLUMINOUS
SIZE	D
FSCM NO	19200
DWG NO	10544463

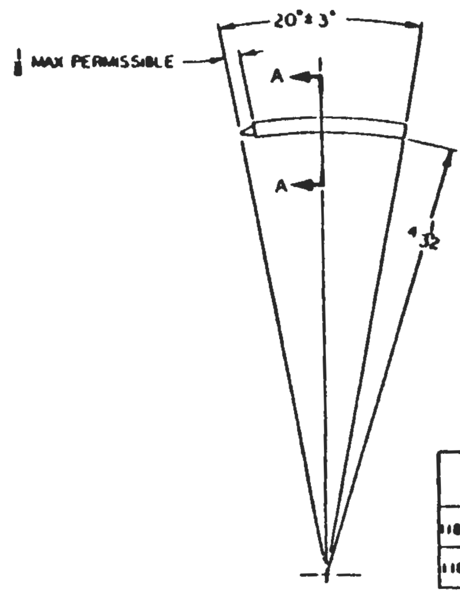
(15)

-	SEE ENR F972500	
A	NOR F0J2500, 600812	

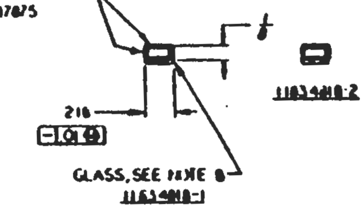
SOURCE USED ON:
M224 Mortar Range Ind

REQUIREMENTS

1. MARKING, LABELING AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM".
2. THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LIGHT SOURCE TO -80° AND +160° F FOR A PERIOD OF EIGHT HOURS AT EACH TEMPERATURE.
3. SUBSEQUENT TO SUBMERGING THE LIGHT SOURCE IN WATER FOR 4 HOURS AT ROOM TEMPERATURE, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIE.
4. PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS FROM MANUFACTURE.
5. FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 2.5% WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 520 MICROLAMBERTS MINIMUM.
6. VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H3 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE, BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. 0.60 CURIE MAX.
7. COLOR OF PHOSPHOR: SEE TABULATION.
8. VIAL MATERIAL: GLASS, TYPE I, CLASS A, .020 MIN WALL THICKNESS, SPEC DD-G-541.



APPLY LACQUER, ACRYLIC, COLOR WHITE NO.17875, SPEC MIL-L-81352 FULL LENGTH OF VIAL .005 MAX THICKNESS AS SHOWN.
NOTE:- CLEAN SURFACE PRIOR TO APPLICATION.
ALTERNATIVE:-
PAINT, EPOXY, MIL-P-47115, TYPE I, COLOR WHITE NO 17875 OF FED STD 595.



SECTION A-A

IDENTIFICATION OF THE "SUGGESTED SOURCE(S) OF SUPPLY" HERE ON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS SOURCE OF SUPPLY FOR THE ITEM(S).

PART NO	CURIES MAX	INTERNAL PRESSURE AT 70 F	COLOR OF PHOSPHOR	SPECTRAL PEAK	1/2 PEAK WIDTH
11834818-1	0.8	2.50	GREEN	5250Å ± 50	700Å ± 50
11834818-2	0.8	2.50	GREEN	5250Å ± 50	700Å ± 50

SUGGESTED SOURCES OF SUPPLY

VENDOR	VENDOR PART NO.
SELF-POWERED LIGHTING LTD 8 WEST CHESTER PLAZA ELMSFORD, N.Y. 10523 CODE IDENT NO 29218	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE HP12-3PS ENGLAND	NOT AVAILABLE
MERC & PENTELI NUCLEAR AG FREIBURTSTRASSE 624 CH-3172-NIEDERWANGEN SWITZERLAND	NOT AVAILABLE
SAUNDERS-ROE DEVELOPMENTS LTD WESTLAND GROUP NORTH HYDE RD HAYES, MIDDLESEX UB34NB UNITED KINGDOM	NOT AVAILABLE

APPLICABLE DOCUMENTS
SQAPS-11834818

PART No. SEE TABULATION

13 FEB 1979
CWW

LAMP RADIOLUMINOUS

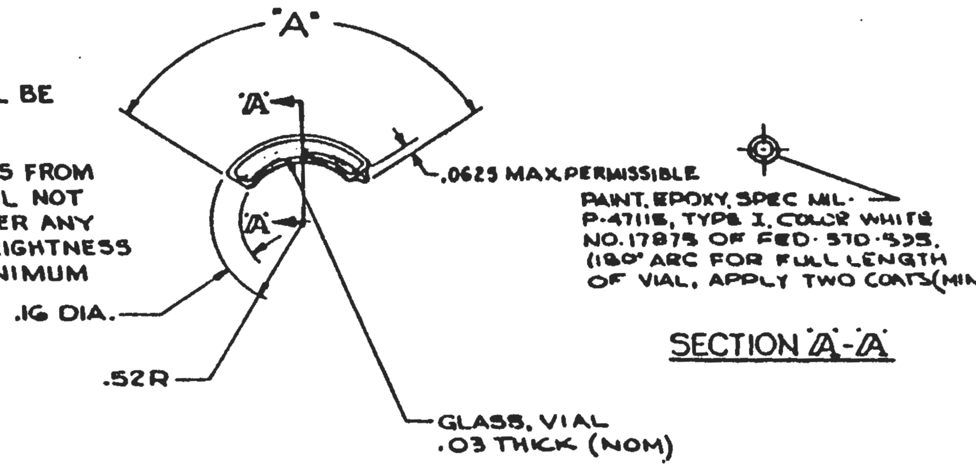
D 19200 11834818

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
X1	REPLACES REV XO WITH CHANGE, ERR FRAFX6032	76-12-30	
—	PRODUCTION RELEASE ERR FRAF60188	77-02-04	
A	NOR F8A5038, 790109 (ECP F8A5039, 790109)	800530	
B	NOR F9J2515, 79-1106 (ECP F0J2501, 80-02-20)	80-08-08	
C	NOR F4J2001/840320	860711	MR

SOURCE USED ON:
M64 Sight Unit
M64A1 Sight Unit

REQUIREMENTS:

1. MARKING, LABELING AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM."
2. THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LAMP TO -80°F AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.
3. AFTER SUBMERGING LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIE.
4. VIAL TO BE FILLED WITH TRITIUM (H_3) OF 94% -96% PURITY.
5. PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS FROM MANUFACTURE.
6. FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 2.5% WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE A MINIMUM OF (SEE TABULATION).
7. COLOR OF PHOSPHOR: GREEN SPECTRAL PEAK 5250Å ± 50Å, ½ PEAK WIDTH 700Å ± 50Å.



SECTION A-A

SUGGESTED SOURCE(S) OF SUPPLY	
VENDOR	VENDOR PART NO.
SELF POWERED LIGHTING LTD CODE IDENT NO. 29218 8 WESTCHESTER PLAZA ELMSFORD, N.Y. 10523	NOT AVAILABLE
SAUNDERS-ROE DEVELOPMENTS LTD. MILLINGTON ROAD HAYES MIDDLESEX UB3 4NB ENGLAND	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE HP12-3PS ENGLAND	NOT AVAILABLE
M.B. MICROTEC AG FREIBURGSTRASSE 624 CH-3172-NIEDERWANGEN SWITZERLAND	NOT AVAILABLE

PART NO.	ACTIVITY CURIES MAX	BRIGHTNESS MICROLAMBERTS	INTERNAL PRESSURE AT +70°F	"A" ± 5°
11733744-1	0.7	400 MIN	2.50 ATM (NOM)	113°
11733744-2	1.0	500 MIN	2.50 ATM (NOM)	174°

SPECIFICATION CONTROL DRAWING

U S ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER
DOVER, NEW JERSEY 07801

PART No. (SEE TABULATION)

APPLICABLE DOCUMENTS
SQAP 11733744

NEXT ASSY	USED ON
C11733745	MT. TLSCP
C11733748	MT. TLSCP

APPLICATION

DO NOT APPLY IDENTIFICATION PER MIL-STD-130

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS ±.01
MATERIAL
HEAT TREAT
PROTECTIVE FINISH

ORIGINAL DATE 74 MAR 11

U. S. ARMY

LAMP, RADIOLUMINOUS

SIZE	FSCM NO.	DRAWING NO.
C	19200	11733744

SCALE 2:1 SHEET 1 OF 1

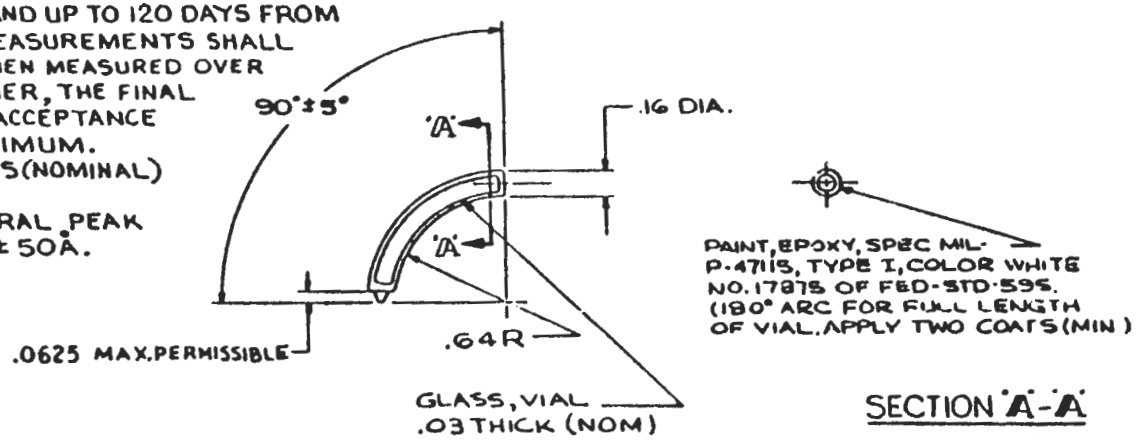
(23)

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
XI	REPLACES REV XO WITH CHANGE, ERR FRAFX6030	76-12-30	[illegible]
—	PRODUCTION RELEASE ERR FRAFC0188	77-08-04	[illegible]
A	NOR F8A5041, 790109	800530	[illegible]
B	NOR F9J2515, 79-11-06 (ECP F0J2501, 80-02-20)	80-08-08	[illegible]
C	NOR F4J2001/840320 (ECP F4J2002/840321)	860711	MR

SOURCE USED ON:
M64 Sight Unit
M64A1 Sight Unit

REQUIREMENTS:

1. MARKING, LABELING AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM."
2. THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LAMP TO -80°F AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.
3. AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIE.
4. VIAL TO BE FILLED WITH TRITIUM (H_3) OF 94%-96% PURITY. TOTAL 10 CURIES MAXIMUM.
5. PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS FROM MANUFACTURE.
6. FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 2.5% WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 600 MICROLAMBERTS MINIMUM.
7. INTERNAL PRESSURE 2.50 ATMOSPHERES (NOMINAL) AT +70°F.
8. COLOR OF PHOSPHOR: GREEN SPECTRAL PEAK 5250Å ± 50Å, ½ PEAK WIDTH 700Å ± 50Å.



SECTION 'A-A'

SUGGESTED SOURCE(S) OF SUPPLY	
VENDOR	VENDOR PART NO.
SELF POWERED LIGHTING LTD CODE IDENT NO. 29218 8 WESTCHESTER PLAZA ELMSFORD, N.Y. 10523	NOT AVAILABLE
SAUNDERS-ROE DEVELOPMENTS LTD. MILLINGTON ROAD HAYES MIDDLESEX UB3 4NB ENGLAND	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE HP12-3PS ENGLAND	NOT AVAILABLE
M.B. MICROTEC AG FREIBURGSTRASSE 624 CH-3172-NIEDERWANGEN SWITZERLAND	NOT AVAILABLE

APPLICABLE DOCUMENTS
SQAP 11733736

SPECIFICATION CONTROL DRAWING
U.S. ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND
DOVER, NEW JERSEY 07801
PART No. 11733736

MECHANICAL PROPERTIES		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	ORIGINAL DATE 74 MAR 11
	C11733741 MT. TLSCP	TOLERANCES ON DECIMALS ± .01 FRAC ± ANGLES ±	DRAWN LC CHK T.J.
	SEE ENGINEERING RECORDS	MATERIAL	TRACED CHK DDJ
	NEXT ASSY USED ON	HEAT TREAT	ENGR
	APPLICATION	FINISH PROTECTIVE FINISH	SUBMITTED M. R. Quarnstrom
	DO NOT APPLY IDENTIFICATION PER MIL-STD-130		APPROVED A. Polidor

U.S. ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

LAMP, RADIOLUMINOUS

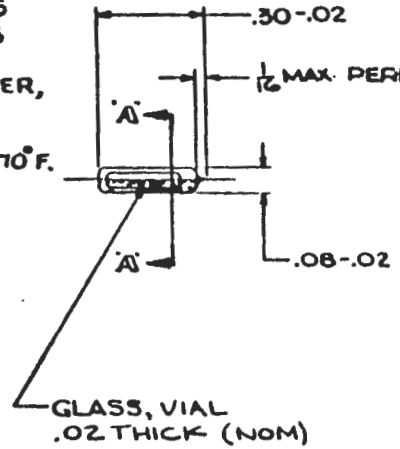
SIZE	FSCM NO.	DRAWING NO.
C	19200	11733736

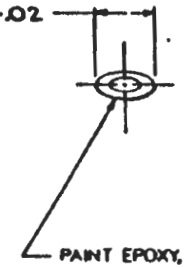
SCALE 2:1 WT. — SHEET 1 OF 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
X1	REPLACES REV X0 WITH CHANGE, ERR FBA FX 6037	76-12-30	
—	PRODUCTION RELEASE FOR FEAT 60188	77-05-04	
A	NOR FBA3040, 790109	800530	
B	NOR F0J2502, 800212	800718	
C	NOR F4J2001/840320 (ECP F4J2002/840321)	860711	MR

REQUIREMENTS:

1. MARKING, LABELING AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM."
2. THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LAMP TO -80°F AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.
3. AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIE.
4. VIAL TO BE FILLED WITH TRITIUM (H_3) OF 94%-96% PURITY. TOTAL 0.03 CURIES MAXIMUM.
5. PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS FROM MANUFACTURE.
6. FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 2.5 % WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 325 MICROLAMBERTS MINIMUM.
7. INTERNAL PRESSURE 2.50 ATMOSPHERES (NOMINAL) AT +70°F.
8. COLOR OF PHOSPHOR: GREEN SPECTRAL PEAK 5250Å ± 50Å, ½ PEAK WIDTH 700Å ± 50Å.





SECTION 'A-A'

SUGGESTED SOURCE(S) OF SUPPLY	
VENDOR	VENDOR PART NO.
M. B. MICROTEC AG FREIBURGSTRASSE 624 CH-3172-NIEDERWANGEN SWITZERLAND	NOT AVAILABLE
SELF POWERED LIGHTING LTD. (CODE IDENT NO. 29218) 6 WESTCHESTER PLAZA ELMSFORD, N.Y. 10523	NOT AVAILABLE
SAUNDERS-ROE DEVELOPMENTS LTD. MILLINGTON ROAD HAYES MIDDLESEX UB3 4NB ENGLAND	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE HP12-3PS ENGLAND	NOT AVAILABLE

APPLICABLE DOCUMENTS
SQAP 11733738

SOURCE USED ON:
M64 Sight Unit
M64A1 Sight Unit

U S ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER
DOVER, NEW JERSEY 07801

PART No. 11733738

MIL MECHANICAL PROPERTIES	
MATERIAL	C11748093 MT. TLSCP
HEAT TREAT	
PROTECTIVE FINISH	
NEXT ASSY	USED ON
APPLICATION	
DO NOT USE FOR NEW DESIGN	APPLY IDENTIFICATION PER MIL-STD-130
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	
TOLERANCES ON DECIMALS ±	FRAC ± ANGLES ±
ORIGINAL DATE	74 MAR 11
DRAFT	CHK T.Z.
TRACER	CHK
ENGR	ENGR
SUBMITTED	M. L. Quammen
APPROVED	L. Polidor

LAMP, RADIOLUMINOUS

SIZE	FSCM NO.	DRAWING NO.
C	19200	11733738

SCALE 4:1 WT. — SHEET 1 OF 1

B	NOR F9J2515, 73-11-06 ECP F0J2501, 80-02-20 REPLACES REV A WITH CHANGE	80 08 [illegible]	
C	NOR F4J2001	840320	

REQUIREMENTS

1 - MARKING, LABELING AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM."

2 - THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LIGHT SOURCE TO -80°F AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.

3 - AFTER SUBMERGING THE LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS, RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIE.

4 - VIAL TO BE FILLED WITH PRODUCTION GRADE TRITIUM H_3 MINIMUM 94% PURE, LESS THAN 1% TRITIUM OXIDE, BALANCE OF CONSTITUENTS TO BE CHEMICALLY INERT. TOTAL .08 CURIES MAXIMUM.

5 - PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS FROM MANUFACTURE.

6 - FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 2.5% WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 430 MICROLAMBERTS MINIMUM.

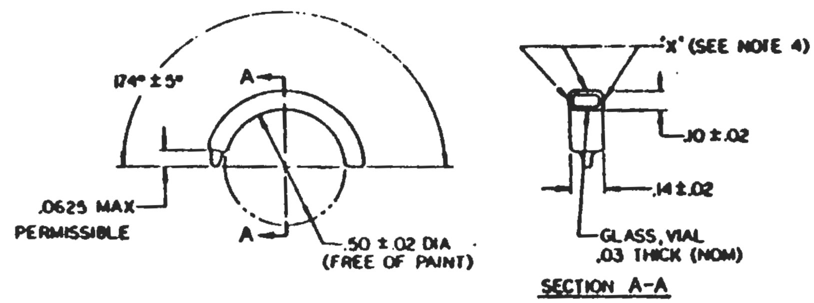
7 - INTERNAL PRESSURE 2.50 ATMOSPHERES NOMINAL AT +70°F.

8 - COLOR OF PHOSPHOR: GREEN, SPECTRAL PEAK 5250Å ± 50Å, 1/2 PEAK WIDTH 700Å ± 50Å.

9 - SURFACES MARKED "X": PAINT, EPOXY, MIL-P-47115, TYPE I, COLOR WHITE NO. 17875 OF FED-STD-595, FULL LENGTH OF VIAL, APPLY TWO COATS (MIN).

SUGGESTED SOURCE OF SUPPLY	
VENDOR	VENDOR PART NO
SELF POWERED LIGHTING LTD CODE IDENT NO 29218 8 WESTCHESTER PLAZA ELMSFORD, N.Y. 10523	NOT AVAILABLE
SAUNDER-ROE DEVELOPMENTS LTD MILLINGTON ROAD HAYES MIDDLESEX UB3 4NB ENGLAND	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE HP12-3PS ENGLAND	NOT AVAILABLE
M.B. MICROTEC AG FREIBURGSTRASSE 624 CH-3172-NIEDERWANGEN SWITZERLAND	NOT AVAILABLE

SOURCE USED ON:
M64 Sight Unit
M64A1 Sight Unit



APPLICABLE DOCUMENTS
SQAP 11739555

SPECIFICATION CONTROL DRAWING
PART NO. 11739555

C11739561 | TLSCP ELB

APPLICATION

760810

LAMP
RADIOLUMINOUS

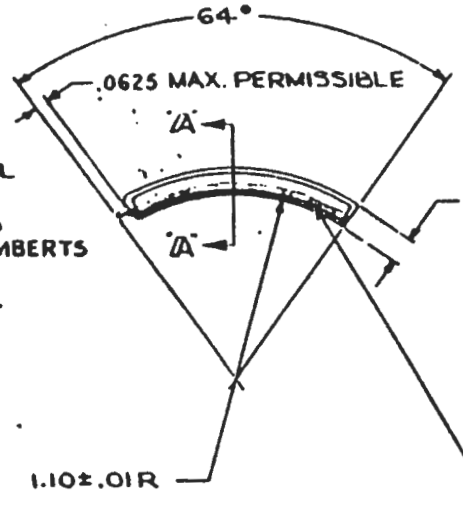
D 19200 11739555 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
X1	REPLACES REV X0 WITH CHANGE. ERR FRA FX 6030	76-12-30	
—	PRODUCTION RELEASE ERR FRAF 60188	77-03-04	
A	NOR F0J2505, 800212 (ECP F8A5042, 790109) (ECP F9J5005, 800212)	800530	
B	NOR F9J2515, 79-11-06 (ECP F0J2501, 80-02-20)	80-08-08	
C	NOR F4J2001/840320 (ECP F4J2002/840321)	860711	MR

SOURCE USED ON:
M64 Sight Unit
M64A1 Sight Unit

REQUIREMENTS:

1. MARKING, LABELING AND SHIPPING OF PACKAGES AND CONTAINERS SHALL BE IN ACCORDANCE WITH DSAM 4145.8. "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM."
2. THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LAMP TO -80°F AND +160°F FOR A PERIOD OF 8 HOURS AT EACH TEMPERATURE.
3. AFTER SUBMERGING LAMP IN ROOM TEMPERATURE WATER FOR 4 HOURS RADIOACTIVE CONTENT OF THE WATER SHALL NOT EXCEED .005 MICROCURIE.
4. VIAL TO BE FILLED WITH TRITIUM (H_3) OF 94%-96% PURITY. TOTAL 12 CURIES MAXIMUM.
5. PRIOR TO MAKING BRIGHTNESS MEASUREMENTS, LAMPS SHALL BE ALLOWED TO STABILIZE FOR A PERIOD OF 25 DAYS FROM MANUFACTURE.
6. FOLLOWING THE STABILIZATION PERIOD AND UP TO 120 DAYS FROM DATE OF MANUFACTURE, BRIGHTNESS MEASUREMENTS SHALL NOT SHOW A DECAY IN EXCESS OF 2.5% WHEN MEASURED OVER ANY CONSECUTIVE 30 DAY PERIOD. FURTHER, THE FINAL BRIGHTNESS MEASUREMENT AT TIME OF ACCEPTANCE SHALL BE 600 MICROLAMBERTS MINIMUM.
7. INTERNAL PRESSURE 2.50 ATMOSPHERES (NOMINAL) AT +70°F.
8. COLOR OF PHOSPHOR: GREEN SPECTRAL PEAK 5250Å ± 50Å, ½ PEAK WIDTH 700Å ± 50Å.



PAINT, EPOXY, SPEC MIL-P-47115, TYPE I, COLOR WHITE NO. 17875 OF FED-STD-595. (180° ARC FOR FULL LENGTH OF VIAL, APPLY TWO COATS (MIN))

SECTION A-A

SUGGESTED SOURCE(S) OF SUPPLY	
VENDOR	VENDOR PART NO.
SELF POWERED LIGHTING LTD CODE IDENT NO. 29218 8 WESTCHESTER PLAZA ELMSFORD, N.Y. 10523	NOT AVAILABLE
SAUNDERS-ROE DEVELOPMENTS LTD. MILLINGTON ROAD HAYES MIDDLESEX UB3 4NB ENGLAND	NOT AVAILABLE
BRANDHURST CO. LTD. P.O. BOX 70 HIGH WYCOMBE BUCKINGHAMSHIRE-HP12-3PS ENGLAND	NOT AVAILABLE
M.B. MICROTEC AG FREIBURGSTRASSE 624 CH-3172-NIEDERWANGEN SWITZERLAND	NOT AVAILABLE

APPLICABLE DOCUMENTS
SQAP 11733737

SPECIFICATION CONTROL DRAWING

U S ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER
DOVER, NEW JERSEY 07801

PART No. 11733737

MIN MECHANICAL PROPERTIES		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	ORIGINAL DATE 74 MAR 11
	C11733751 MT TLSCP	TOLERANCES ON DECIMALS ± .01 FRAC ± 1/— ANGLES ± 5°	DRAWN LC CHK T.Z.
	SEE ENGINEERING RECORDS	MATERIAL	TRACED CHK DDZ
	NEXT ASSY USED ON	FINISH	STRESS CHK
	APPLICATION	NEXT MATERIAL	SUBMITTED M. S. Quammen
DO NOT SCALE	APPLY IDENTIFICATION PER MIL-STD-130	PROTECTIVE FINISH	APPROVED L. Polidor

LAMP, RADIOLUMINOUS

SIZE	FSCM NO.	DRAWING NO.
C	19200	11733737

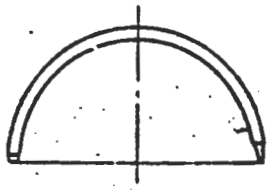
SCALE 2:1 WEIGHT — SHEET 1 OF 1

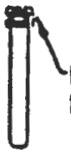
CLASSIFICATION

THIRD ANGLE PROJECTION

USED ON
0S86008
0S86021
0S87661
0S87662

FOR EXPLANATION OF DIMENSIONING ETC., SEE BS 308.
UNLESS OTHERWISE STATED:- (1) ALL BURRS & SHARP EDGES TO BE REMOVED (2) A RADIUS OR CHAMFER OF -02(MAX) IS PERMITTED IN THE CORNERS OF BLINDHOLES, RECESSES & STEPS. (3) REFERENCES TO SDM, SSM, & SPECS. INFER LATEST ISSUE.





REFLECTING PAINT

LAMP TO BE MANUFACTURED TO
DEF STAN 62-4. PATTERN
REFERENCE D C
NATO STOCK NO. 6269-99-995-9499
PAINT LAMP AS DETAILED ABOVE

NOTE:-
LAMP TO FIT OVER A
50-0 DIA GLASS DISC

D.O.APPROVED

CHECKED

RETRACED
F CRYMBLE
A77
CHKD S.WT

DRAWN
D J e

MATERIAL	PROTECTIVE FINISH				
		SEALED			
		ALL DIMENSIONS DELETED AND NOTES REVISED (INCT 9/173)	MA INSTS 7/173 A42	3	6-12-76
SURFACE ROUGHNESS	DIM'S. IN mm (INS)	SEALED		—	25-8-72
	SCALE 1/1	CHANGE	MOD. No.	ISS:	DATE
TOLERANCES ±		CERTIFIED(QAD(W) RETRACE 13-1-77)		1	13-4-72
UNLESS OTHERWISE STATED		EST. WT.	SERVICE LETTERS		
CONTRACTOR: RANK PRECISION INDUSTRIES LTD.		CLASSIFICATION			
ROYAL ARMAMENT RESEARCH AND DEVELOPMENT EST. MOD		CONTRACTORS DRG. REF. SS 21-B 112			
TITLE: LAMP, NUCLEAR		DRAWING No. WP 18242			

DEF 33A SIZE A

SOURCE USED ON:
L2A1 Elbow Tel

CLASSIFICATION

THIRD ANGLE PROJECTION

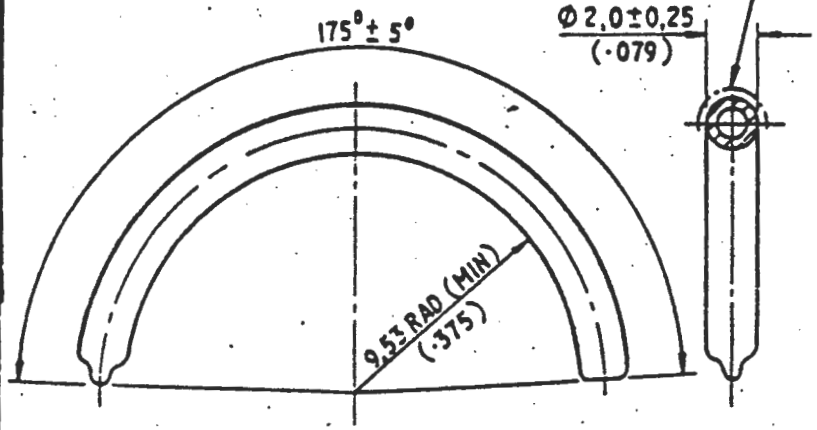
USED ON
OS85944

FOR EXPLANATION OF DIMENSIONING ETC., SEE BS. 308.
UNLESS OTHERWISE STATED:- (1) ALL BURRS & SHARP EDGES TO BE REMOVED. (2) A RADIUS OR CHAMFER OF .02 (MAX) IS PERMITTED IN THE CORNERS OF BLINDHOLES, RECESSES & STEPS. (3) REFERENCES TO SDM, SSM, & SPECS. INFER LATEST ISSUE.

MANUFACTURE, MATERIALS, PACKAGING
TO DEF STAN 62-4

SEALED AMMO/4506 amdt 2.11 22/8/77 for DQA(W1)

REFLECTING PAINT WHITE
HUMBROL GLOSS OR SIMILAR



NOTE:- LAMP TO BE A CLOSE FIT OVER A 19·0 DIA. GLASS DISC

WALL THICKNESS OF TUBE : 0,25

MINIMUM INITIAL LUMINANCE : 250 MICROLAMBERTS
COLOUR OF LIGHT : GREEN

D.O. APPROVED

CHECKED

TRACED
S.E. ROBERTS
P 77
CHKD

DRAWN
B.P.G

ACTUAL SIZE

NATO STOCK NO.
6260-99-965-4933

MATERIAL	PROTECTIVE FINISH				
		ADDITIONS:- TOL. TO Ø 2.0; NOTE RE DEF STAN 62-4 & NATO STOCK NUMBER. PRESSURE DELETED, LUMINANCE VALUE WAS 80. NOTE RE LAMP... REVISED. (INSTR 3/197)	X41 M A. AP1495 III 2	3	28-4-77
SURFACE ROUGHNESS	DIM'S IN MM (INS)	SEALED			
	SCALE: 3/1	CHANGE	MOD. No.	ISS.	DATE
TOLERANCES ±		CERTD (B.A.B (W) RETA'D. 17-8-77) for DRAWING		1	3-3-72
UNLESS OTHERWISE STATED		EST. WT.	SERVICE LETTERS		

CONTRACTOR HILGER & WATTS LTD.	CLASSIFICATION
ROYAL ARMAMENT RESEARCH & DEVELOPMENT ESTABLISHMENT. M OF D.	CONTRACTOR'S DRG. REF. SS22-A106
TITLE LAMP, NUCLEAR	DRAWING No. WP18182

DEF 33 A SIZE A

SOURCE USED ON:
L7A1 Dial Sight

38

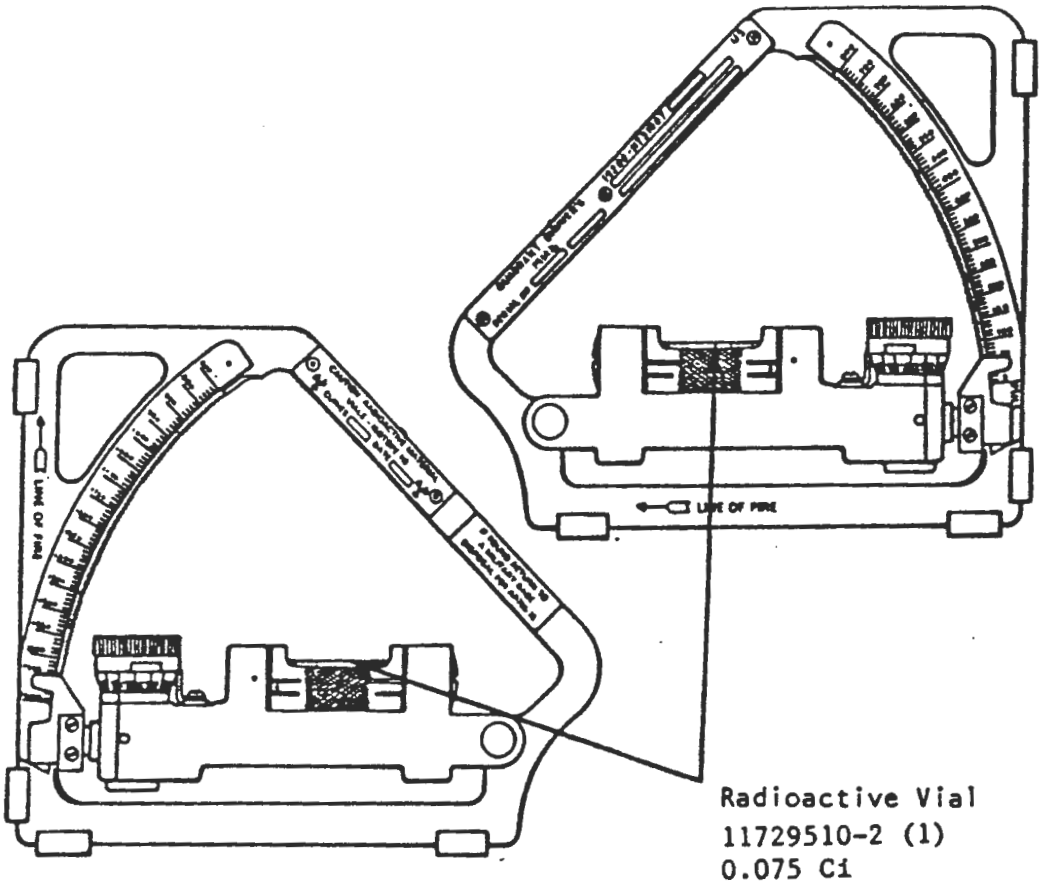
ENCLOSURE 2

Table of Devices

DEVICE	SOURCES PER DEVICE	CURIES PER DEVICE
M1A1 Collimator	1	10.0
M1A2 Gunners Quadrant	1	0.075
M14A1 Quadrant	6	2.15
M17 Quadrant	5	1.875
M18 Quadrant	6	1.95
M58 Aiming Post Light	1	9.0
M59 Aiming Post Light	1	9.0
M64/M64A1 Sight Unit	12	6.69
M113A1 Panoramic Telescope	8	4.6
M114A1 Elbow Telescope	4	5.6
M134A1 Mount Telescope	2	0.15
M137 Panoramic Telescope	10	5.1
M138 Elbow Telescope	2	4.4
M139 Alignment Device	1	3.0
M140 Alignment Device	1	3.0
M171 Mount Telescope	2	0.15
Range Indicator	4	3.2
Zone Charge Setter	1	3.0
L2A1 Elbow Telescope	2	2.2
L3A1 Dial Sight Carrier	4	2.12
L7A1 Dial Sight	6	2.42
XM187 Telescope Mount and Quadrant	6	2.65
M90E6 Straight Telescope	2	1.60
M137E1 Panoramic Telescope	10	5.10

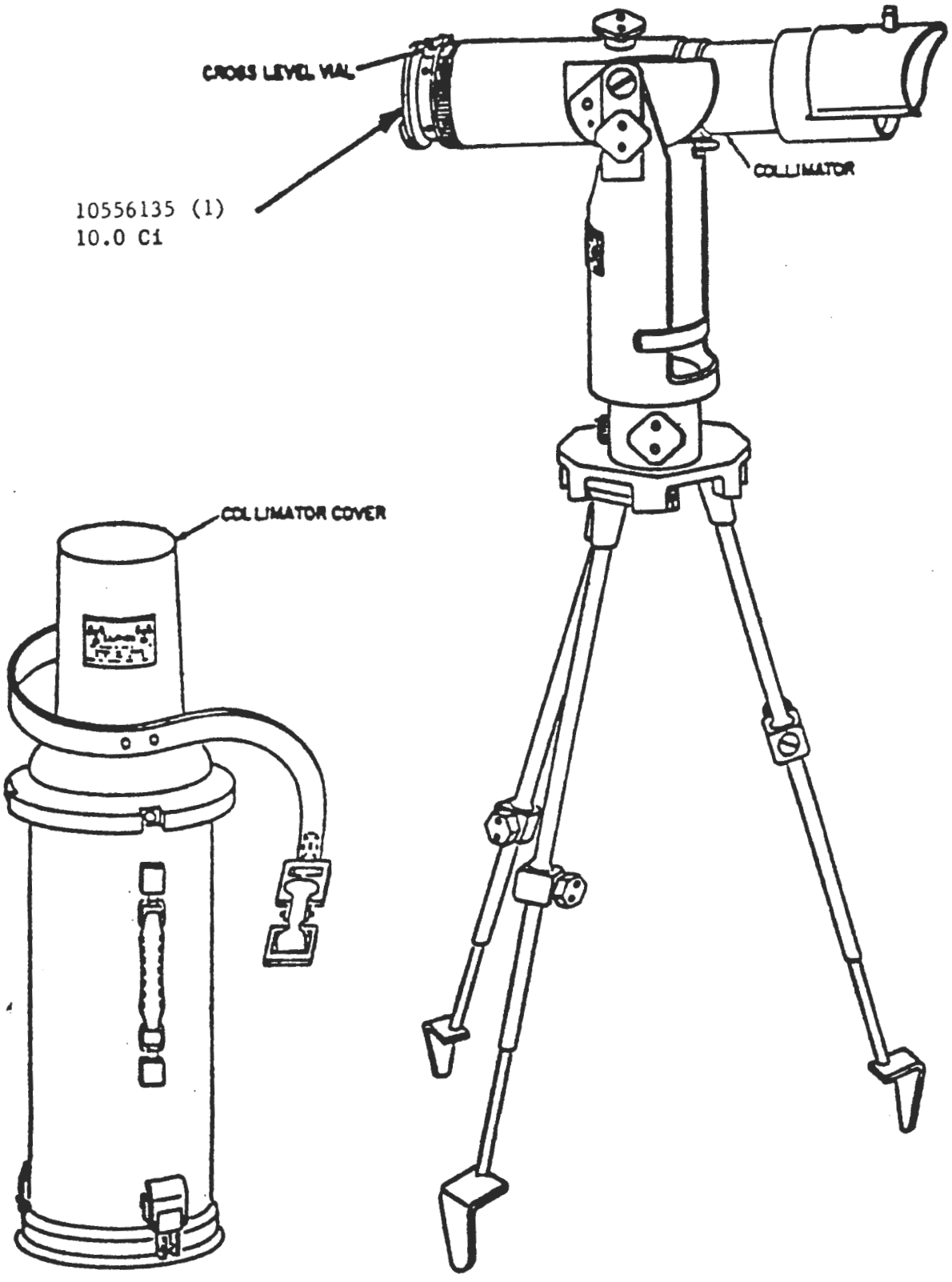
ENCLOSURE 3

Device Drawings



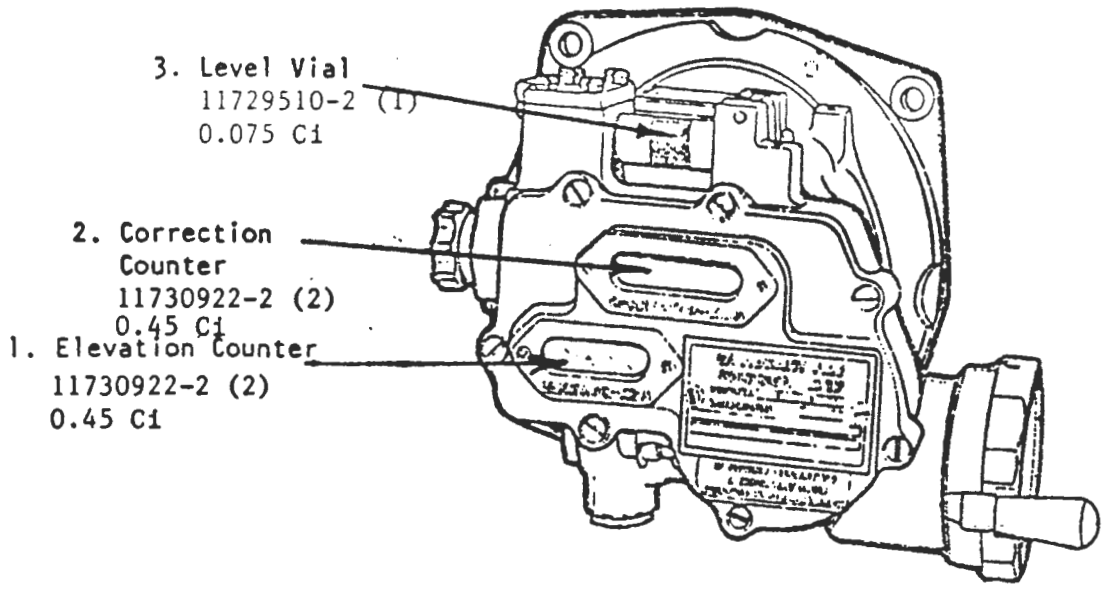
Radioactive Component of the M1A2 Gunner's Quadrant

Total Activity 0.075 Ci

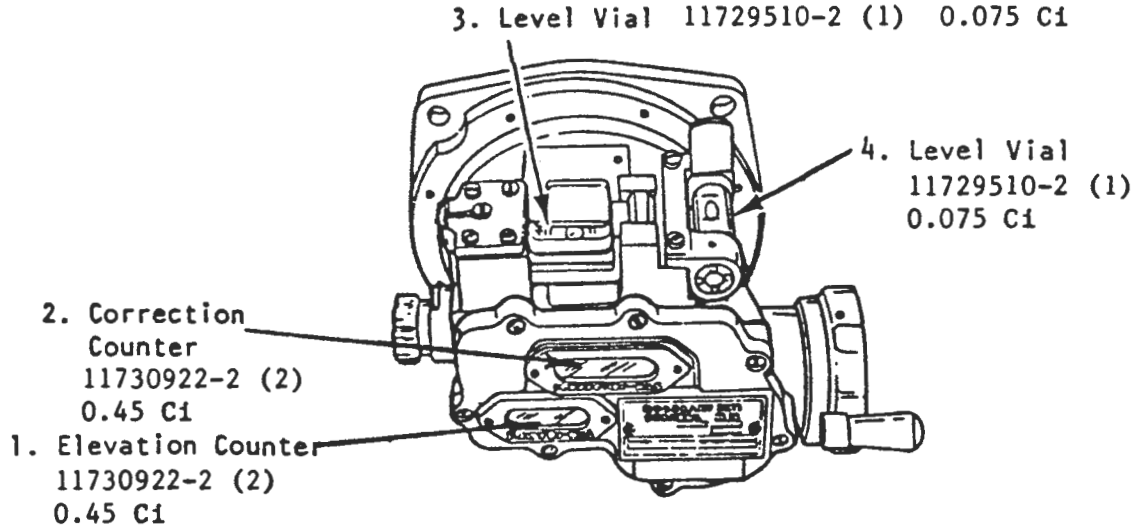


M1A1 Collimator
Total Activity 10.0 Ci

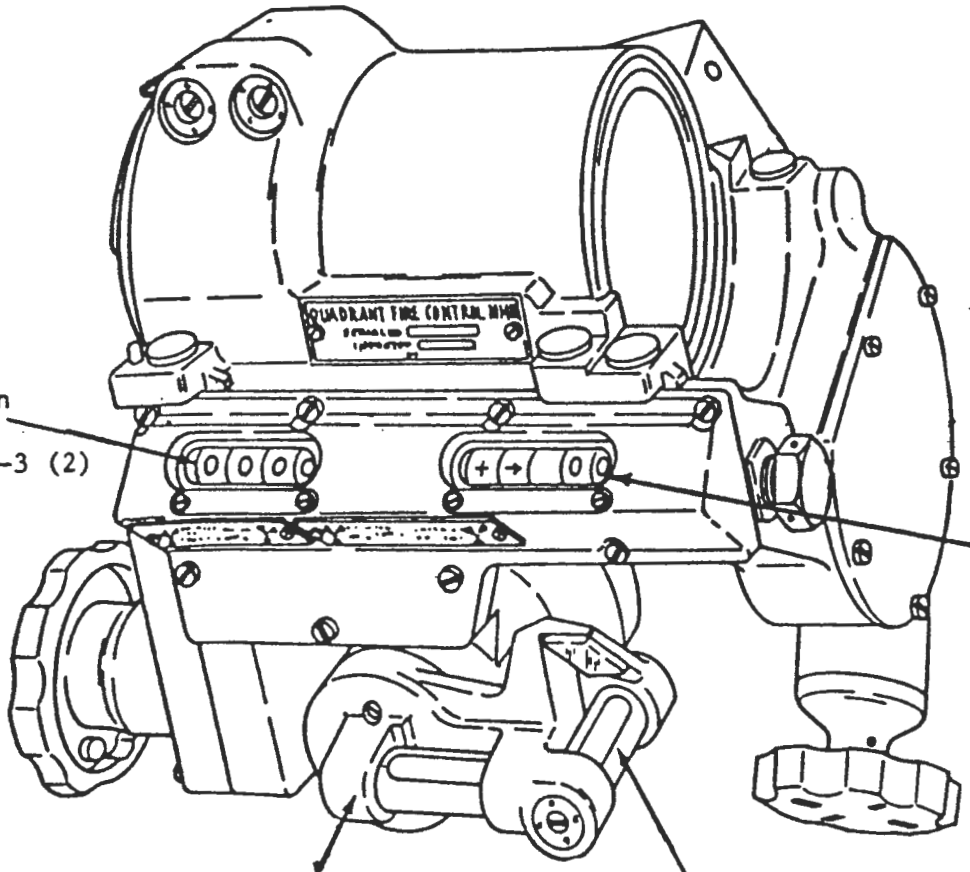
13



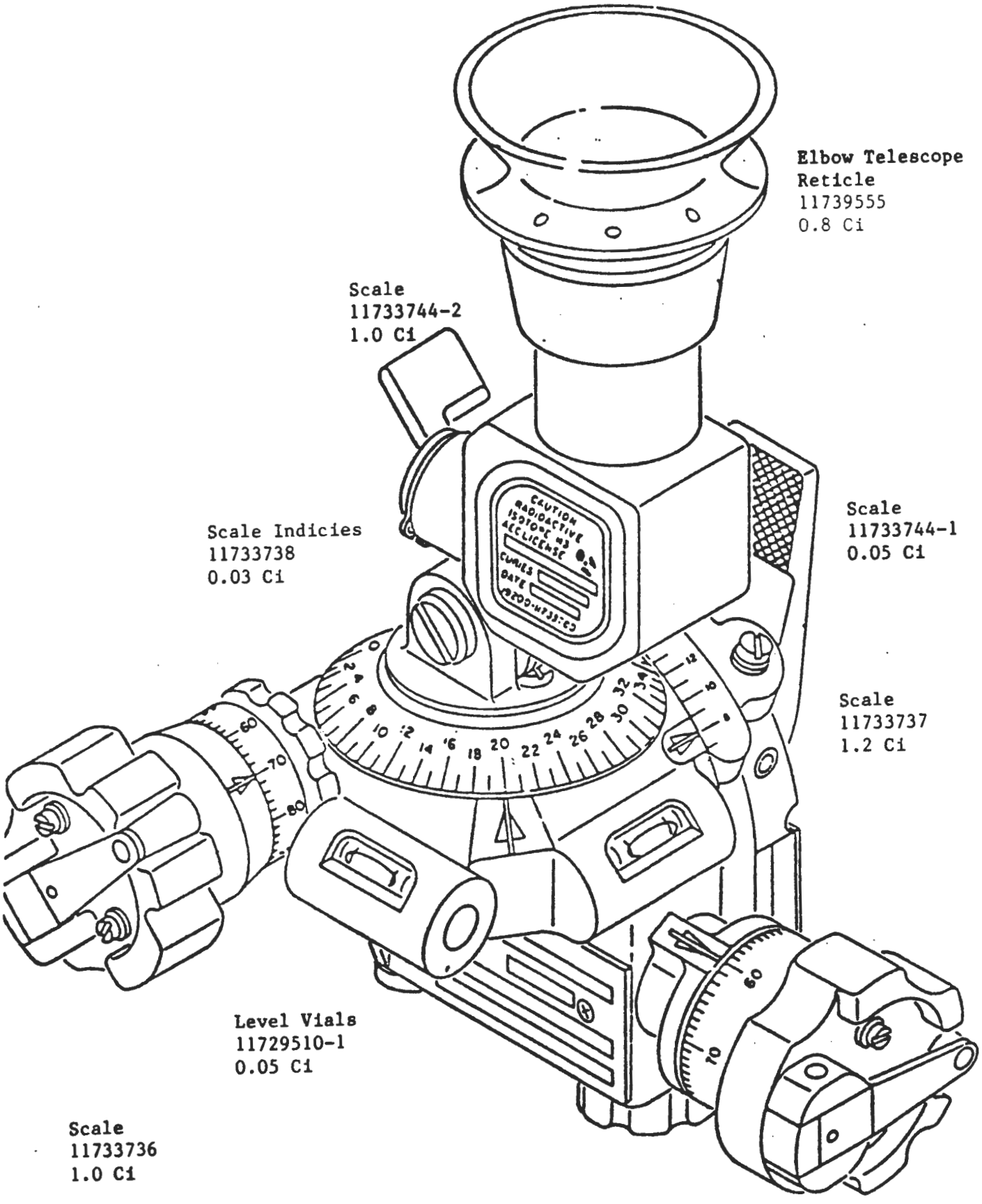
Radioactive Elements of the M17 Fire Control Quadrant
Total Activity 1.875 Ci



Radioactive Elements of the M18 Fire Control Quadrant
Total Activity 1.95 Ci

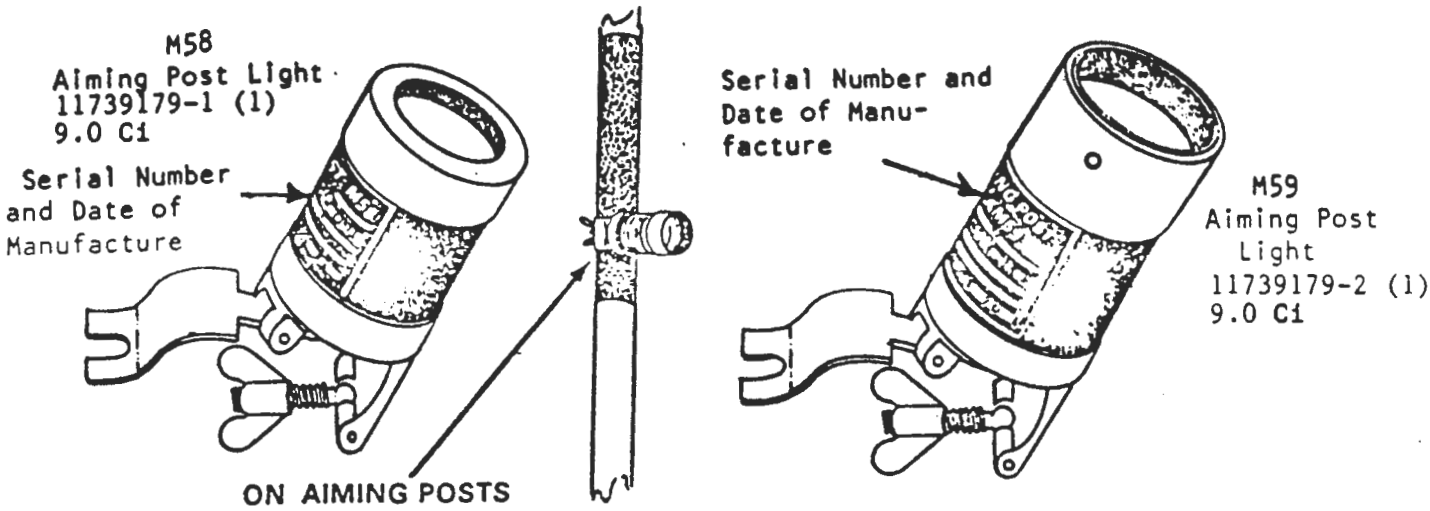


Radioactive Components of M14A1 Fire Control Quadrant
Total Activity 2.15 Ci

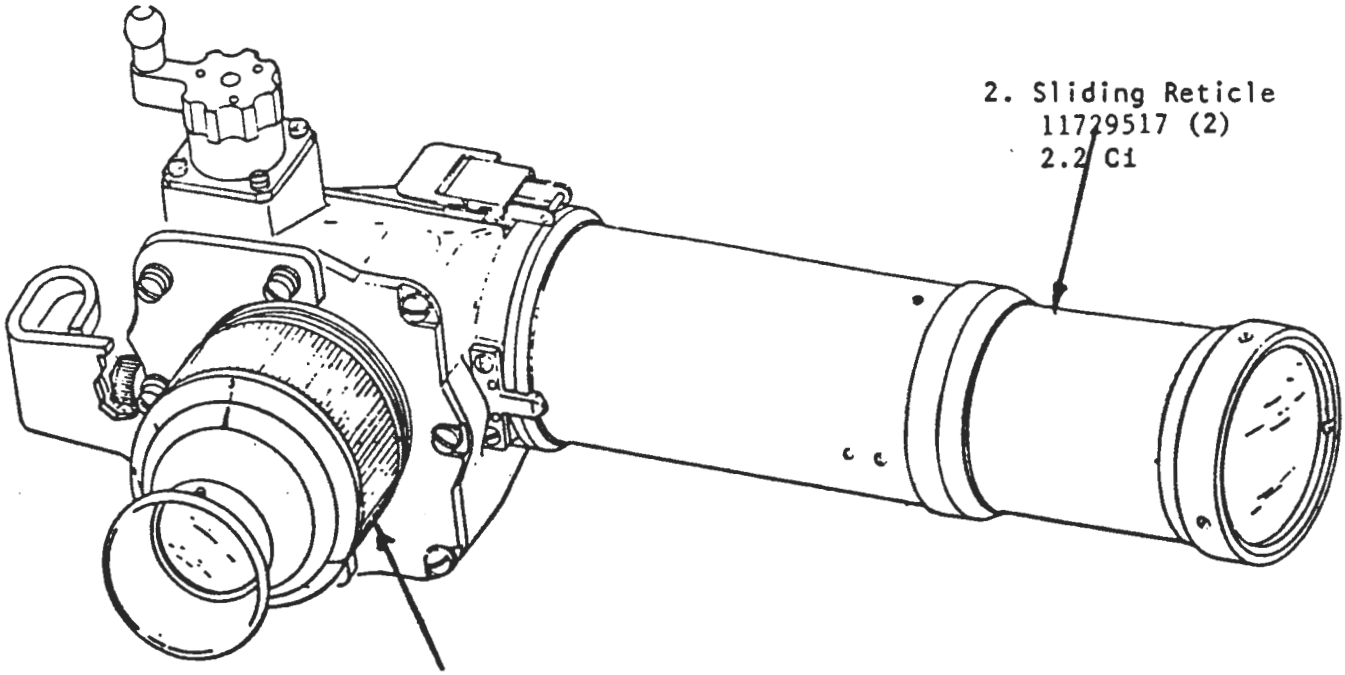


M64/M64A1 Sight Unit
Total Activity 6.69 Ci

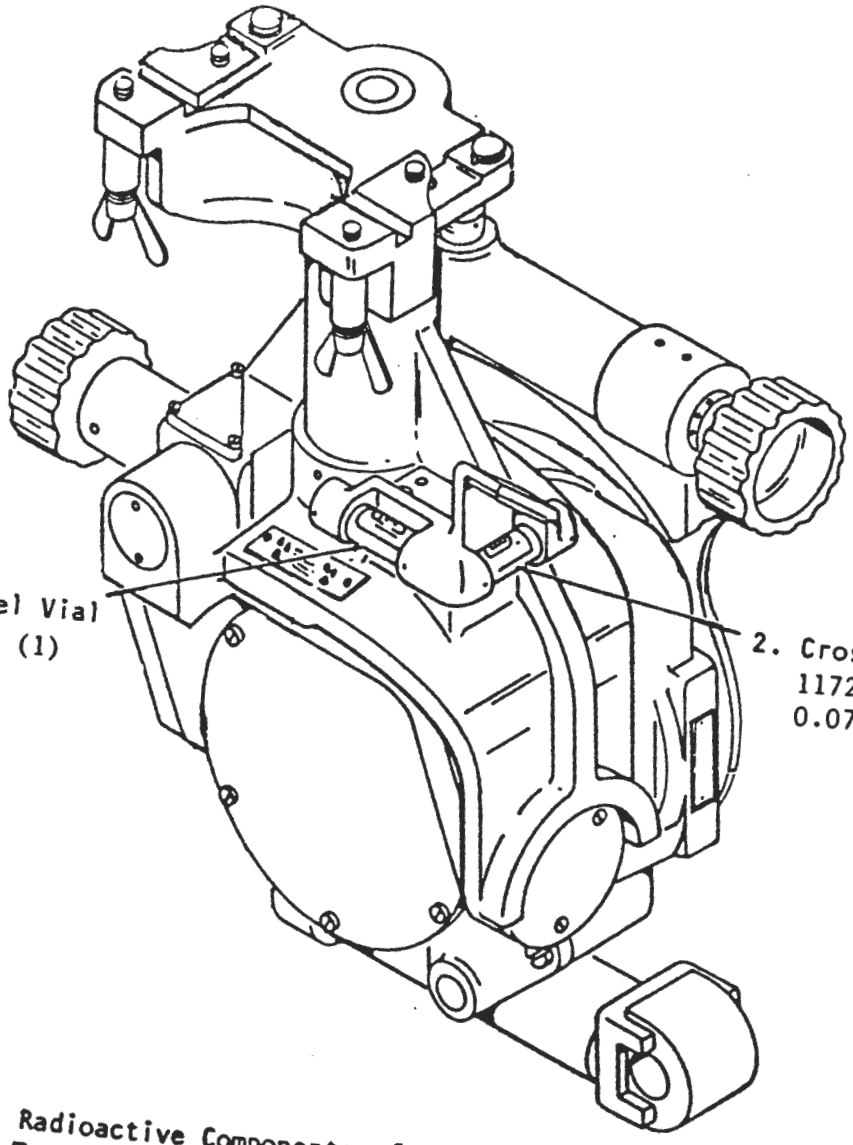
46



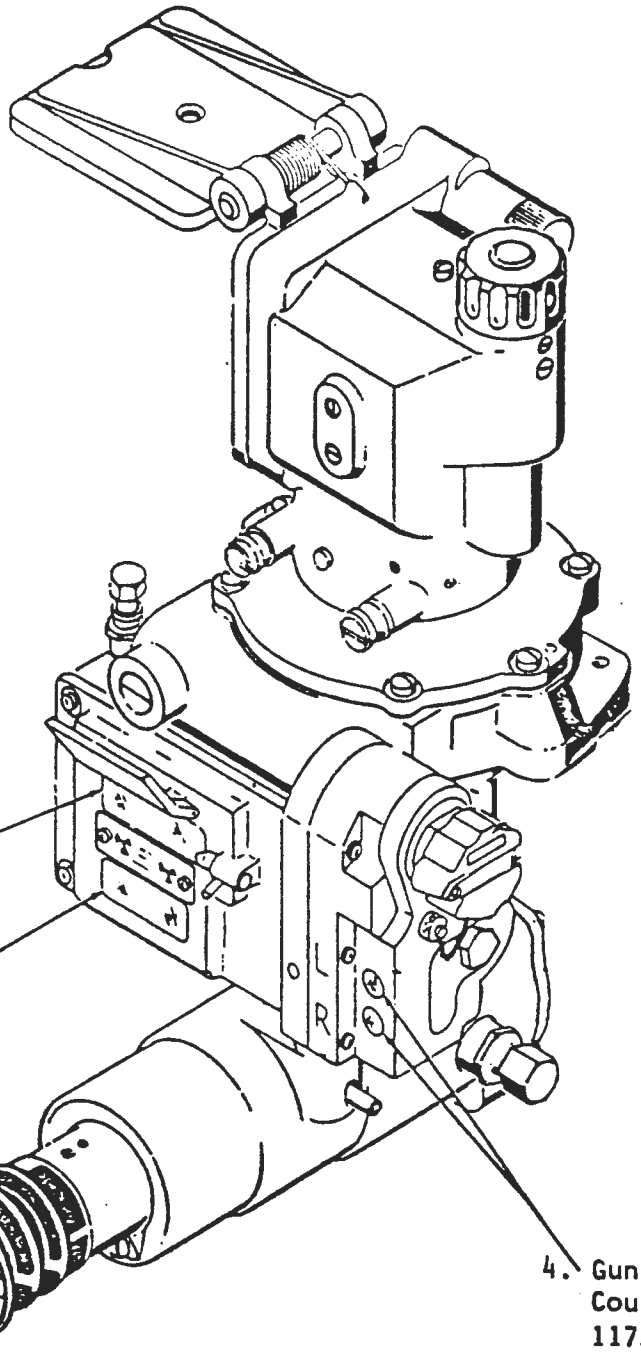
M58 and M59 Aiming Post Lights
Total Activity 9.0 Ci each



Radioactive Components of the M114A1 Elbow Telescope
Total Activity 5.6 Ci



Radioactive Components of M134A1 Mount Telescope
Total Activity 0.15 Ci



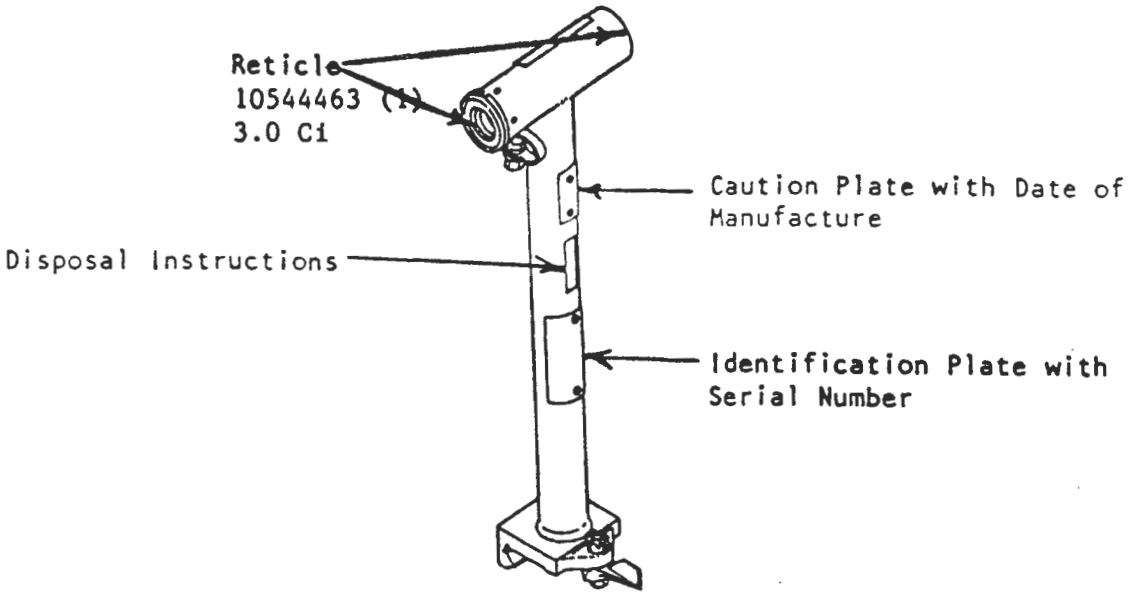
3. Azimuth Dial
11730922-3 (2)
0.5 Ci

2. Reset Dial
11730922-3 (2)
0.5 Ci

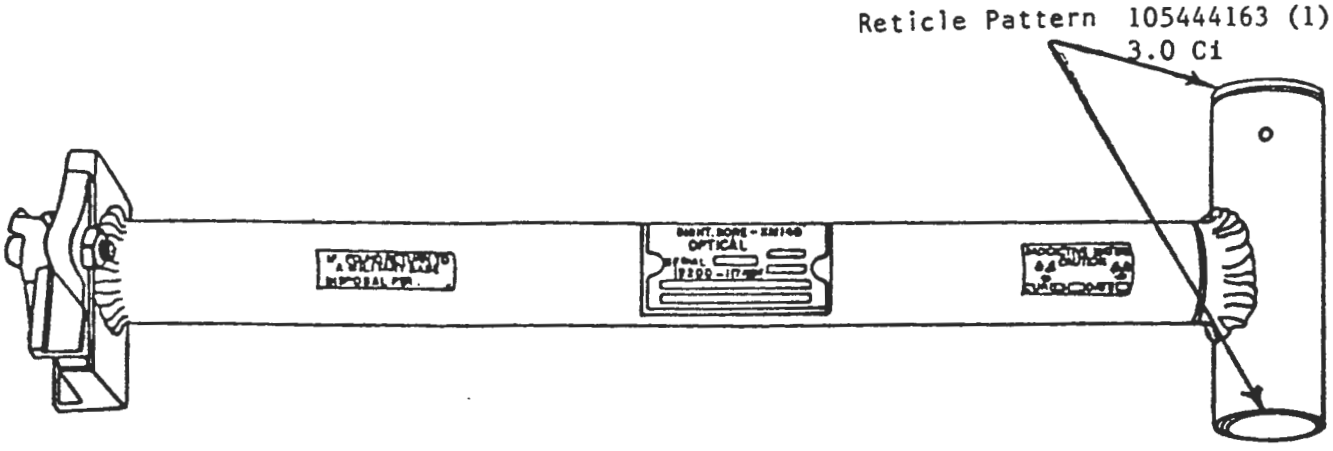
1. Reticle
10556228 (2)
0.6 Ci

4. Gunner's Aid (correction)
Counter dials
11730273 (2) 0.4 Ci

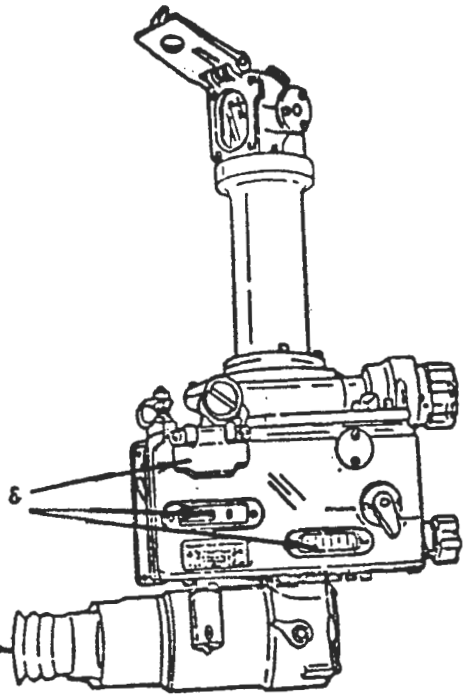
Radioactive Components of M113A1 Panoramic Telescope
Total Activity 4.6 Ci



M139 Alignment Device with Radioactive Reticle
Total Activity 3.0 Ci



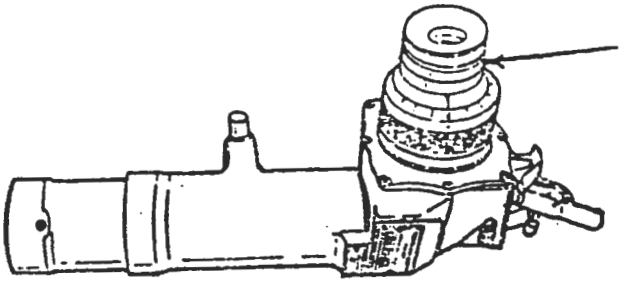
M140 Alignment Device
Total Activity 3.0 Ci



2. Azimuth, Deflection & Correction Counters
   11730922-2 (6)
   0.45 Ci

1. Reticle Pattern
   11729514 (4)
   0.6 Ci

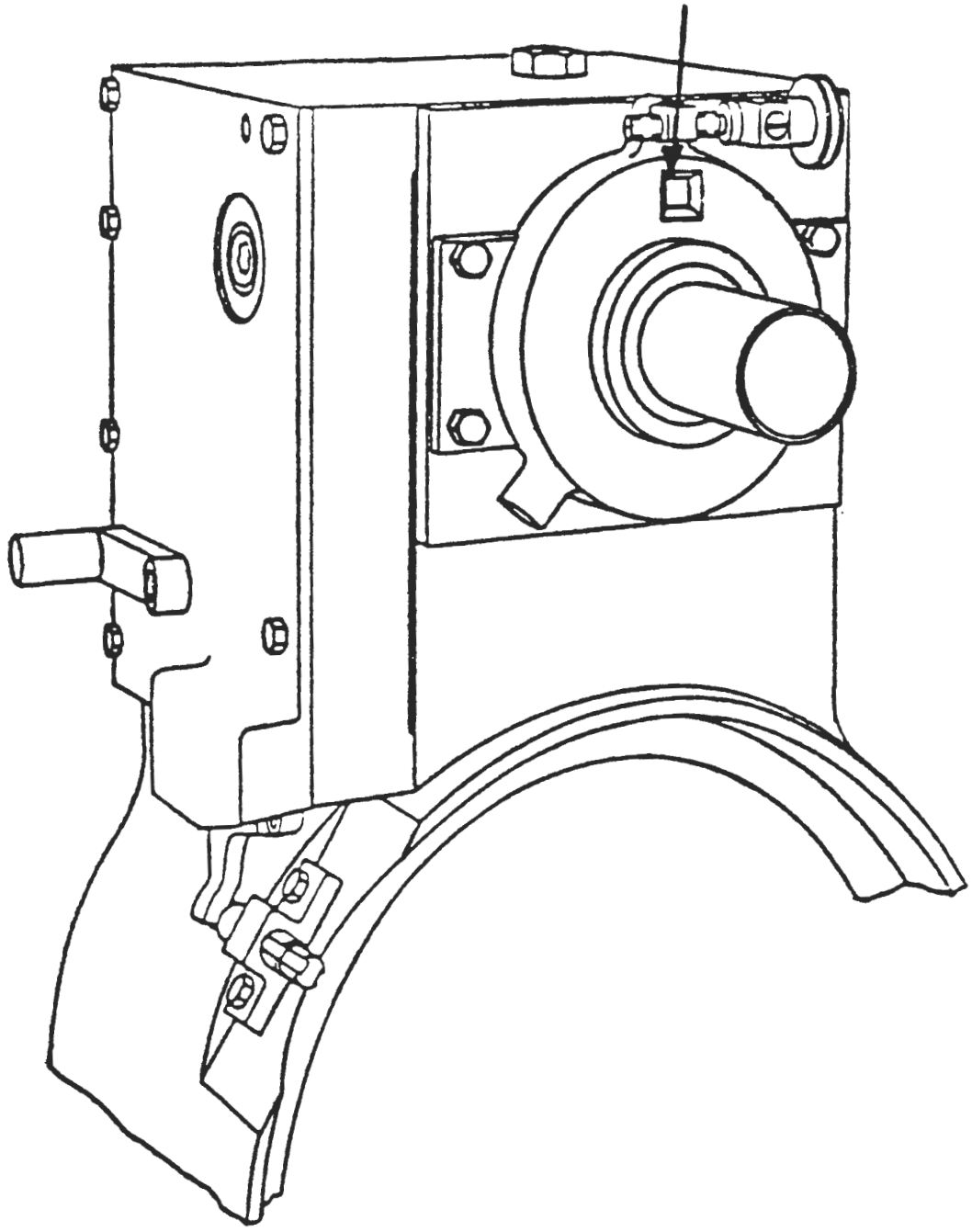
Radioactive Components of M137 Panoramic Telescope
Total Activity 5.1 Ci



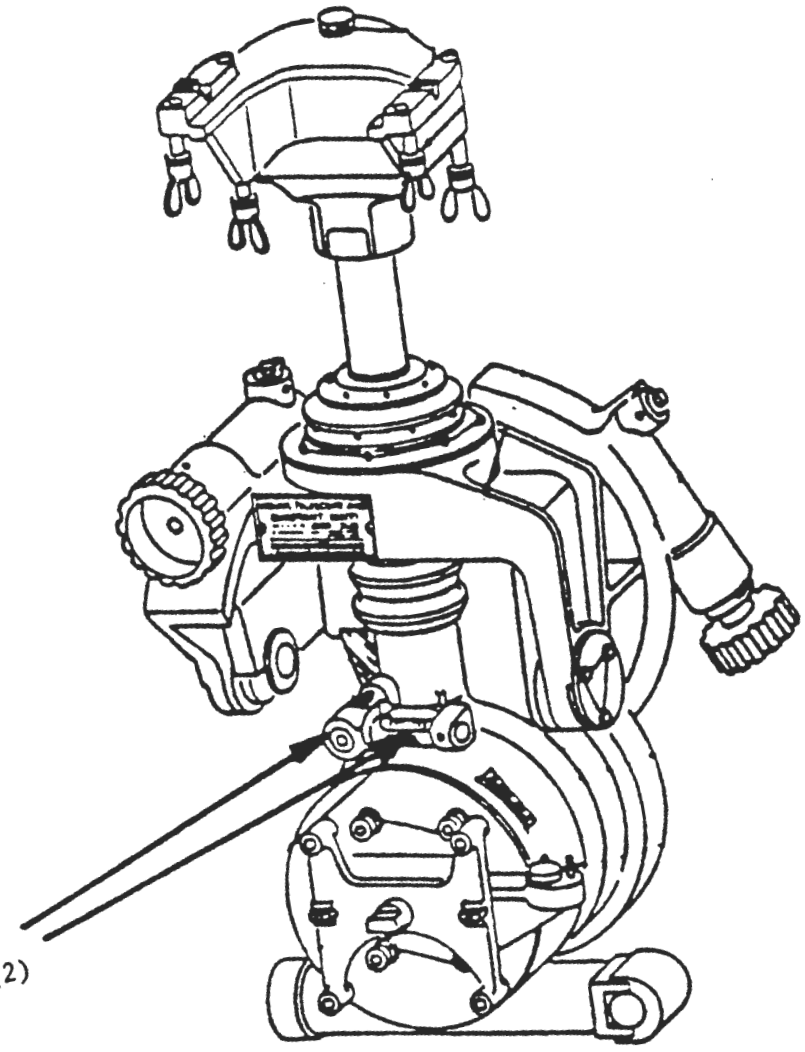
Reticle
11748012 (2)
2.2 Ci

M138 Elbow Telescope with Radioactive Reticle
Total Activity 4.4 Ci

10544463 (1) 3.0 Ci

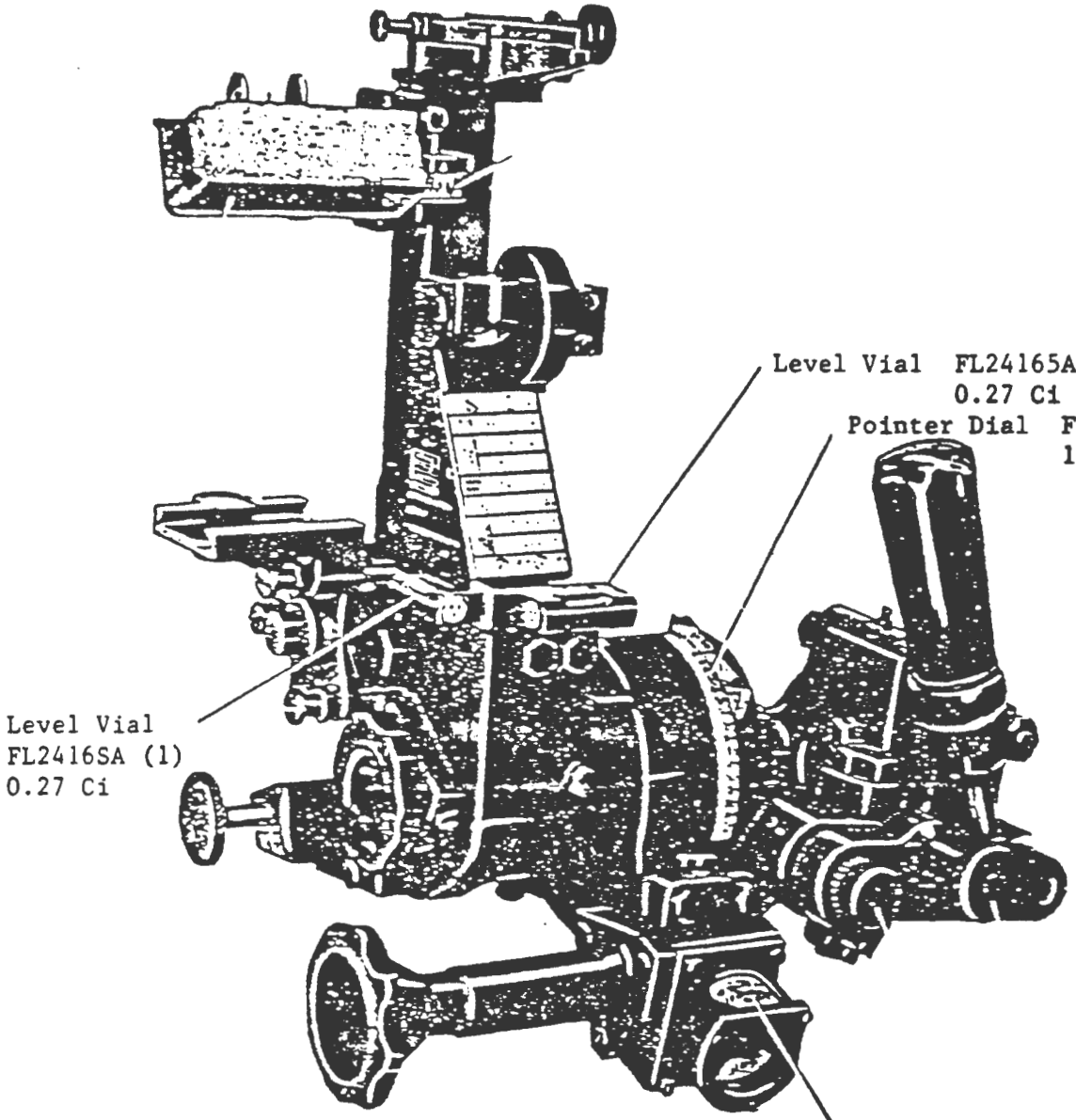


Zone/Charge Setter
Total Activity 3.0 Ci

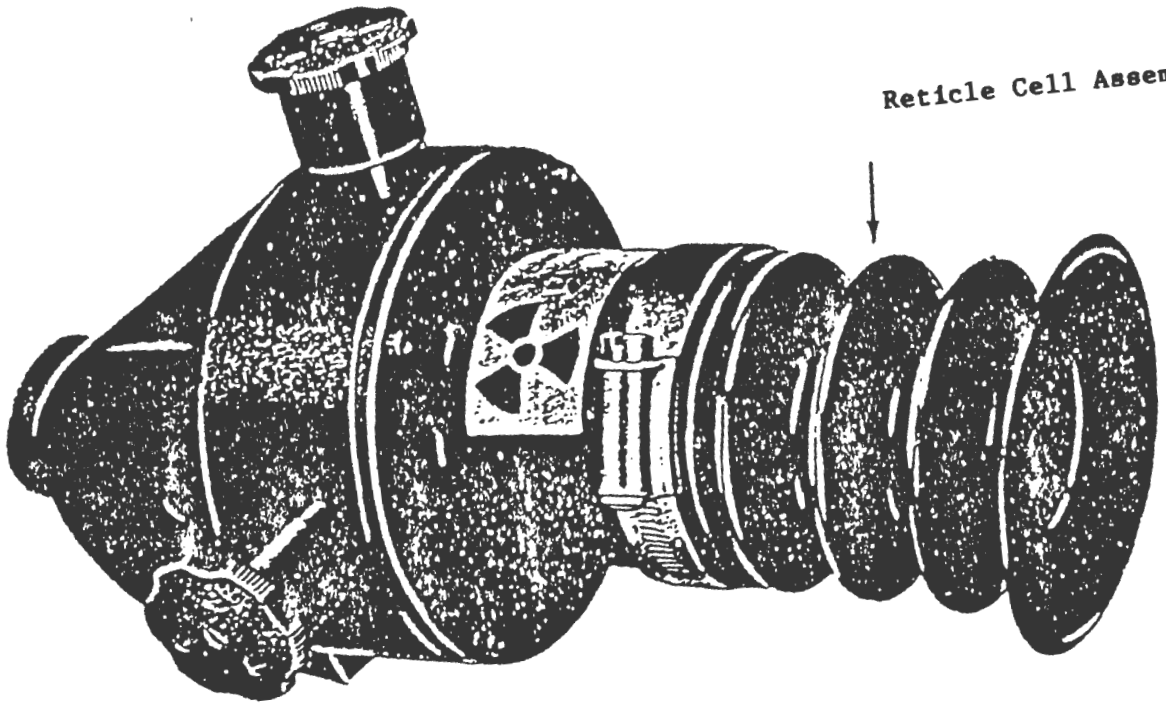


Level Vials
11729510-2 (2)
0.075 Ci

M171 Mount Telescope
Total Activity 0.15 Ci

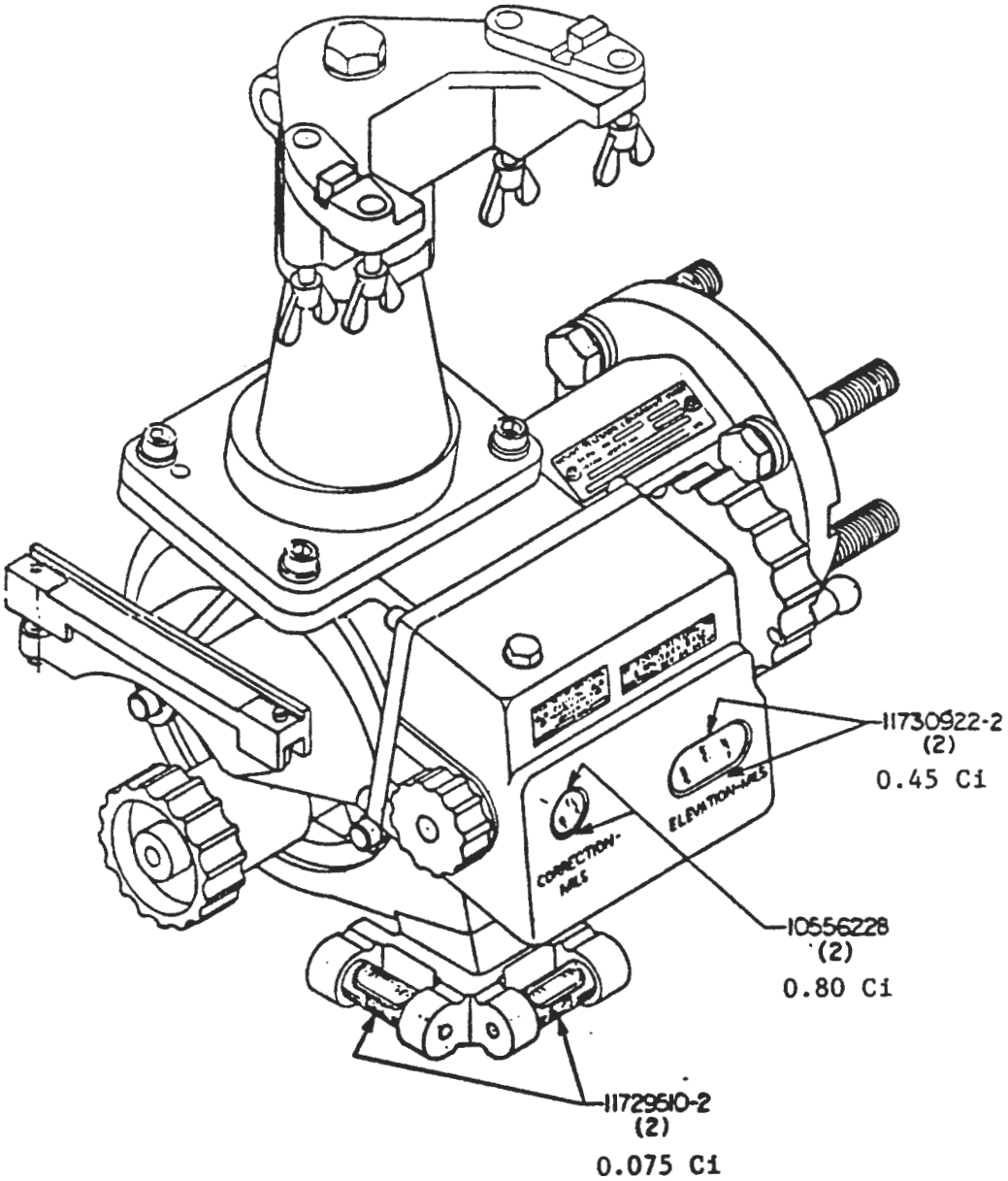


L3A1 Dial Sight
Total Activity 2.02 Ci



Reticle Cell Assemblies 0586008 (1)
1.1 Ci
0586021 (1)
1.1 Ci

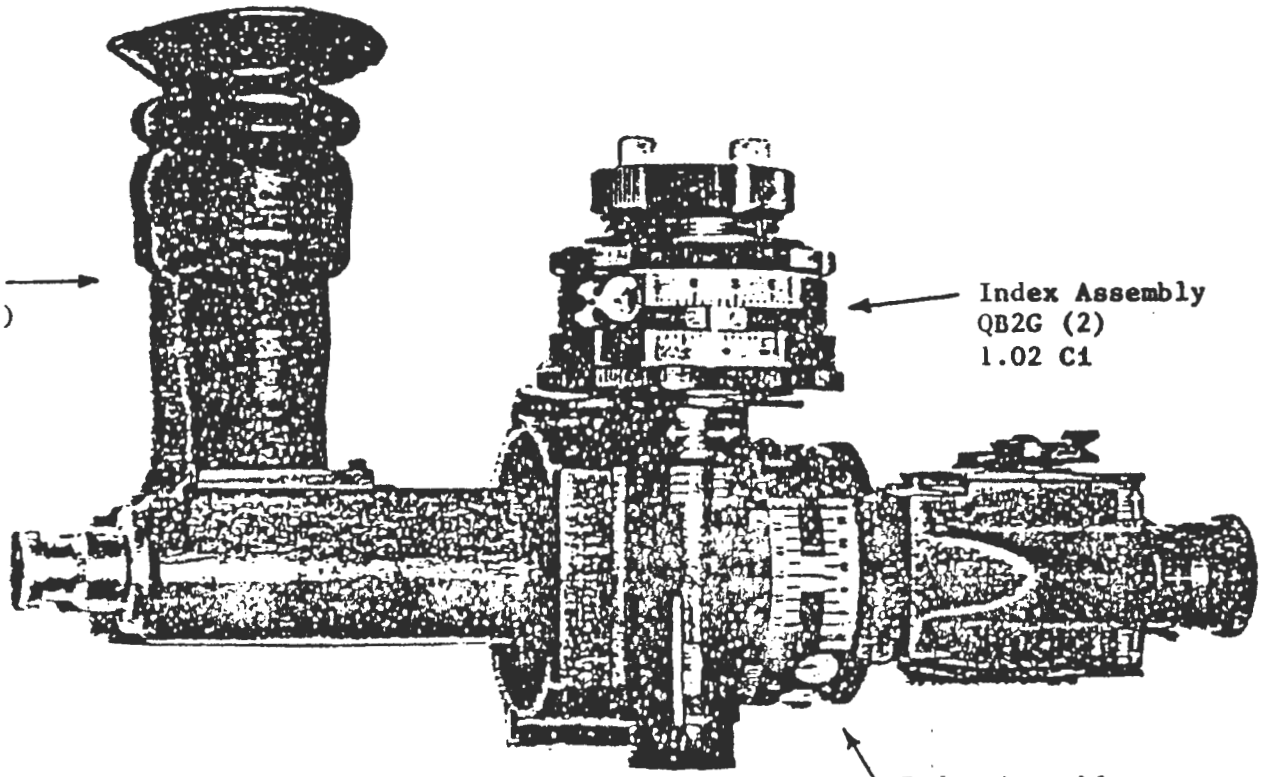
L2A1 Elbow Telescope
Total Activity 2.2 Ci



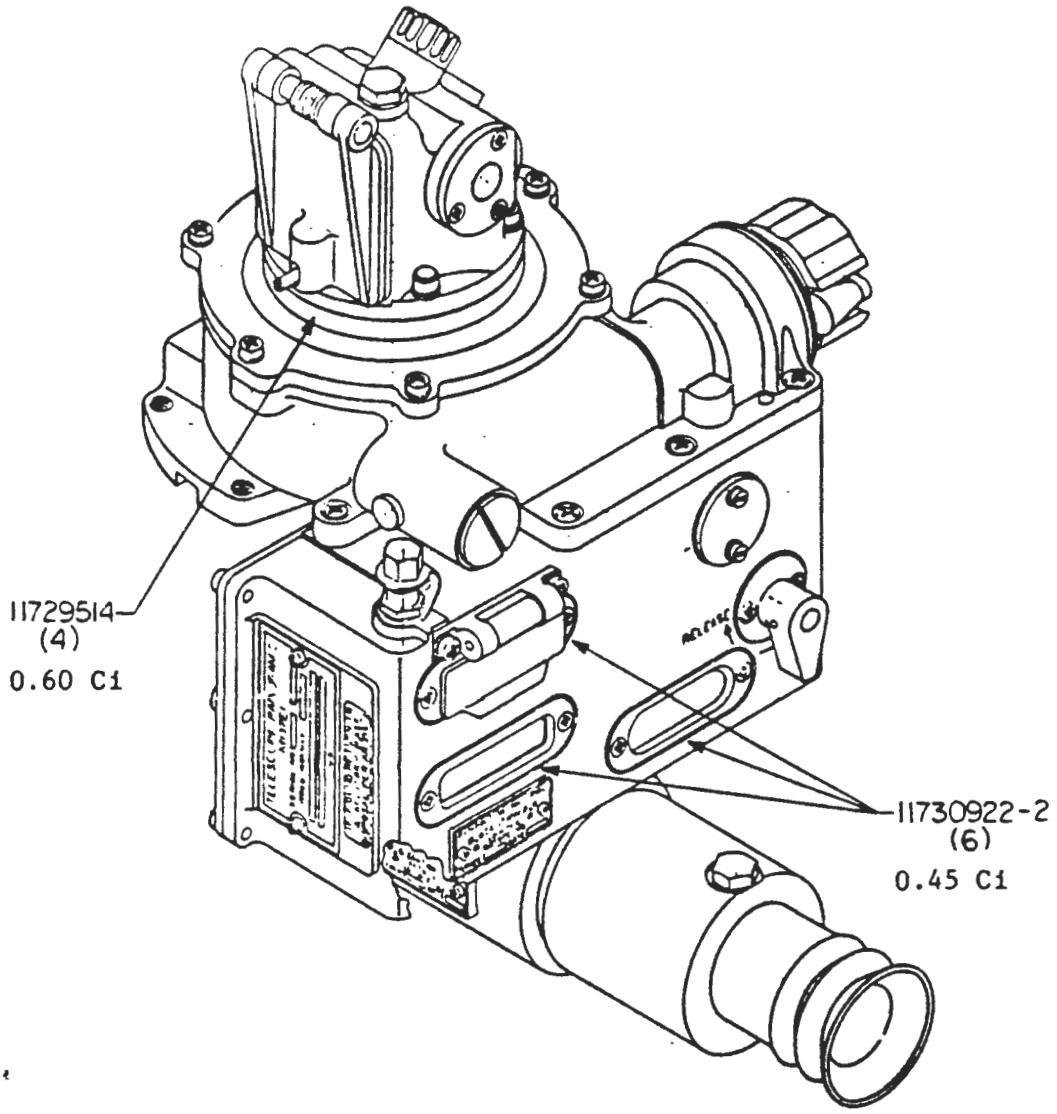
XM187

MOUNT, TELESCOPE, AND QUADRANT PN-12599166

Total Activity 2.65 Ci



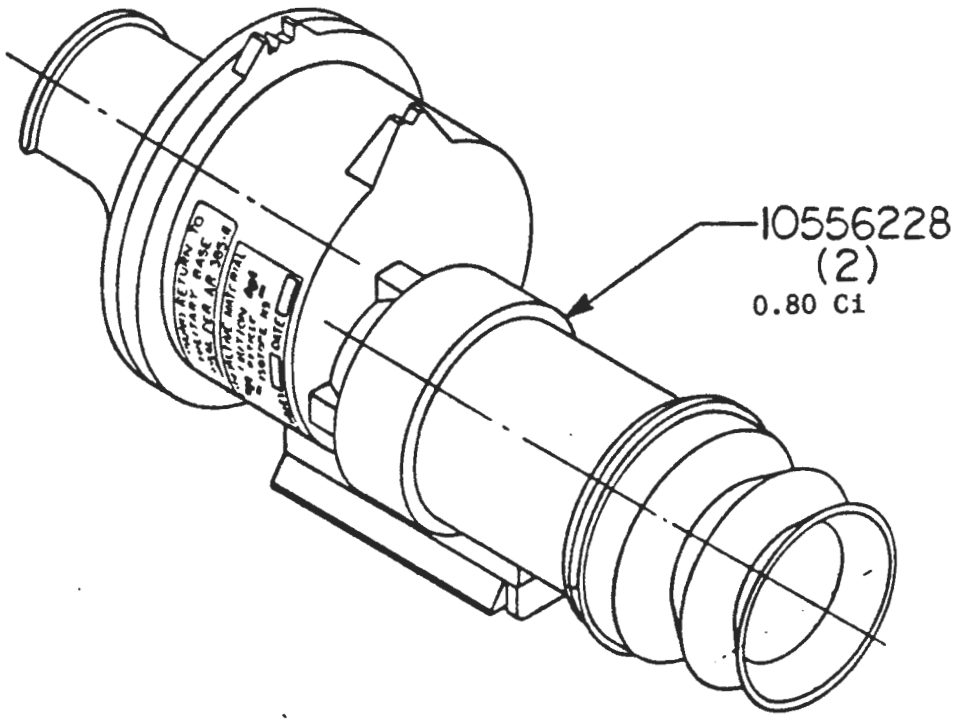
L7A1 Dial Sight
Total Activity 2.42 Ci



M137E1

TELESCOPE, PANORAMIC: PN-12599167

Total Activity 5.10 Ci



M90E6

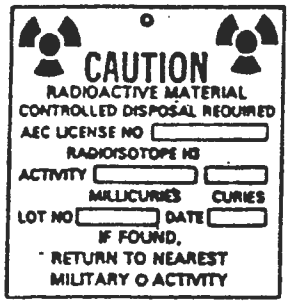
TELESCOPE, STRAIGHT: PN 12599180

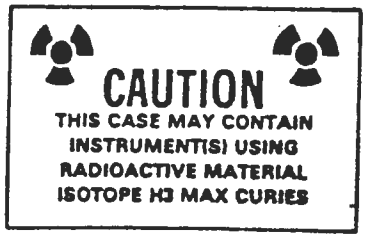
Total Activity 1.60 Ci

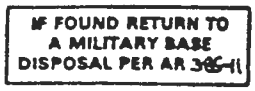
59

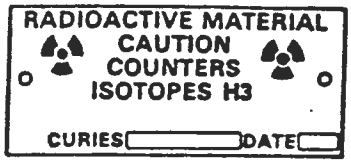
ENCLOSURE 5

Radiation Caution Plate









Radiation Caution Plates

ENCLOSURE 7

Technical Manual Warning Statement

RADIATION HAZARD

RULES AND REGULATIONS

Copies of the following rules and regulations are maintained at HQ, AMCCOM, Rock Island, IL 61299-6000. Copies may be requested or information obtained by contacting the AMCCOM Radiological Protection Officer (RPO), AUTOVON 793-2964 or Commercial (309) 782-2964.

10CFR Part 19 - Notices, Instructions and Reports to Workers; Inspections.

10CFR Part 20 - Standards for Protection Against Radiation.

NRC License, license conditions and license application.

SAFETY PRECAUTIONS

The radiation material used in this instrument is tritium gas (H-3) sealed in pyrex tubes. It poses no significant hazard to the repairmen when intact. These sources illuminate the instrumentation for night operations. Tampering with or removal of the sources in the field is prohibited by Federal law. In the event there is no illumination, notify the local radiological protection officer. Do not attempt to repair or replace the instrument in the field. If skin contact is made with any area contaminated with tritium, wash immediately with non-abarasive soap and water.

IDENTIFICATION

Radioactive self-luminous sources are identified by means of radioactive warning labels (as above). These labels should not be defaced or removed and should be replaced immediately when necessary. Refer to the local RPO or the AMCCOM RPO for instructions on handling, storage, or disposal.

WARNING

STORAGE

When radioactively illuminated instruments are defective, notify organizational maintenance. These items must be placed in a plastic bag and packaged in the shipping container. Spare equipment must be stored in the shipping container as received, until installed on the weapon. Storage of these items is recommended to be in an outdoor shed-type storage or unoccupied building.

Inside pages

WARNING
When using radioactively illuminated fire control equipment, follow radiation procedures in the front of this manual.

ENCLOSURE 9

Storage Limitation Calculations

Tritium Storage Limitations

1. Storage of Tritium Gas Sources.

The procurement specifications (Government drawings) permit a leak rate of 0.030 uCi/day per source.

Maximum Permissible Concentration (MPC) for Tritium from 10 CFR 20:

Unrestricted area:	2×10^{-7} uCi/ml	air
Restricted area:	5×10^{-6} uCi/ml	air

Air changes taking place under average conditions, exclusive of air provided for ventilation, in a room with no windows or exterior doors*: 1/2 air changes per hour (12 changes/day).

Allowed number of sources (storage) per 1,000 cubic feet

Unrestricted area:

$$\frac{\text{MPC} \times \text{conversion factor ml/ft}^3 \times \text{N air changes/day}}{\text{Permissible leak rate/source/day (from procurement drawings)}}$$

$$= \frac{2 \times 10^{-7} \text{ uCi/ml} \times 2.83 \times 10^{7} \text{ ml/1,000 ft}^3 \times 12 \text{ air chg/day}}{0.03 \text{ uCi/source/day}}$$

$$= 2{,}264 \text{ Sources/1,000 ft}^3$$

Allowed number of sources (storage) per 1,000 cubit feet

Restricted area:

$$\frac{5 \times 10^{-6} \text{ uCi/ml} \times 2.83 \times 10^{7} \text{ ml/1,000 ft}^3 \times 12 \text{ air chg/day}}{0.03 \text{ uCi/source/day}}$$

$$= 56{,}600 \text{ sources/1,000 ft}^3$$

The above quantities exceed maximum storage of sources installed in fire control components at any one installation due to physical restrictions.

*ASHRAE Guide and Data Book, Fundamentals and Equipment American Society of Heating, Refrigerating, and Air-Conditioning Engineers 1963, p432.

(d9)

ENCLOSURE 10

HQ, AMCOM SOP

DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
Rock Island, Illinois 61299-6000

AMCCOM REGULATION
No. 385-3

27 October 1987

Safety

RADIATION SAFETY FOR COMMODITIES

Supplementation of this regulation requires prior approval from HQ, AMCCOM (AMSMC-SFS), Rock Island, IL 61299-6000.

1. Purpose.

This regulation establishes the Ionizing Radiation Safety Program as described in AR 385-11, AR 700-64, and AMCR 385-25.

2. Applicability.

This regulation applies to U.S. Army Armament Research, Development and Engineering Center (ARDEC); U.S. Army Chemical Research, Development and Engineering Center (CRDEC); and the following elements of Headquarters, U.S. Army Armament, Munitions and Chemical Command (HQ, AMCCOM):

Safety Office (AMSMC-SF)
Staff Surgeon (AMSMC-SG)
Maintenance Directorate (AMSMC-MA)
Materiel Management Directorate (AMSMC-MM)
Procurement Directorate (AMSMC-PC (R))
Production Directorate (AMSMC-PD)
Product Assurance Directorate (AMSMC-QA)
Weapon Systems Management Directorate (AMSMC-AS)
International Logistics Directorate (AMSMC-IL)
Installation Support Directorate (AMSMC-IS)
Chief Counsel for Procurement and Readiness (AMSMC-GC (R))
Defense Ammunition Directorate (AMSMC-DS)
Transportation and Traffic Management Directorate (AMSMC-TM)

3. Explanation of Terms.

Definitions of technical terms in AR 385-11 and AR 700-64 will apply to this regulation.

4. Policy.

All AMCCOM directorates and organizations involved in the procurement, storage, distribution, and use of AMCCOM radioactive commodities will ensure Nuclear Regulatory Commission (NRC) license conditions and applicable Federal, State, and Army radiation safety requirements are met for AMCCOM radioactive commodities.

5. Responsibilities.

a. The Chief, Safety Office, HQ, AMCCOM, will:

(1) Exercise staff supervision of the AMCCOM Ionizing Radiation Safety Program.

(2) In coordination with the Procurement Directorate, Quality Assurance Directorate, and Production Directorate, prepare safety requirements to be included in the Procurement/Work Directives, solicitations, and contracts for radioactive commodities.

(3) Incorporate safety-related instructions, cautions, and warnings, based on hazards involved and regulatory requirements, into technical literature.

b. The NRC License Manager will:

(1) Coordinate, obtain, administer, review, amend, and maintain necessary NRC licenses for radioactive commodities managed by AMCCOM.

(2) Provide information and guidance to the AMCCOM Commanding General (CG) with respect to limitations, constraints, and conditions which affect each radioactive commodity.

(3) Assure licensed material is not transferred to unauthorized persons or organizations.

(4) Chair the HQ, AMCCOM, Ionizing Radiation Control Committee (IRCC).

c. The HQ, AMCCOM, Radiological Protection Officer (RPO) will:

(1) Provide the AMCCOM CG, the IRCC, and users of radioactive material with advice and assistance in all matters pertaining to the radioactive commodities.

(2) Implement the radiation safety program for the AMCCOM radioactive commodities.

(3) Review existing and proposed radiological operations and procedures, field reports, test results, and surveys to ensure compliance with radiation safety regulations.

(4) Ensure the required radiation surveys are performed. The accuracy of such surveys, if performed by others, remains the responsibility of the RPO.

(5) Act as the point of contact on all matters pertaining to the NRC license and conditions imposed by the license during the life cycle of radioactive commodities.

(6) Monitor the life cycle of radioactive commodities to ensure NRC license conditions are met.

(7) Initiate the action necessary to correct any deviation from license conditions and requirements of the NRC, Department of the Army, U.S. Army Materiel Command, and AMCCOM on radioactive materials.

(8) Provide technical support for the radioactive waste program.

d. The Staff Surgeon, HQ, AMCCOM, will provide medical information concerning potential health hazards of ionizing radioactive material as used in AMCCOM commodities.

e. The Director, Maintenance Directorate, HQ, AMCCOM, will:

(1) Ensure specific instructions on handling, storing, and disposal of radioactive commodities are incorporated in the technical publications and instructions to the field.

(2) Provide training, as required, to other Army agencies for maintenance, rebuild, and rework of AMCCOM radioactive commodities.

(3) Obtain concurrence of AMCCOM RPO on above actions.

f. The Director, Materiel Management Directorate, HQ, AMCCOM, will:

Maintain records of total quantities of radioactive commodities procured.

g. The Director, Procurement Directorate, and the Director, Production Directorate, HQ, AMCCOM, will:

(1) Ensure the contract for purchase of radioactive commodity is identified as a hazardous material contract. Ensure a preaward safety survey is performed.

(2) Ensure clauses for safety, transportation, and product assurance acceptance procedures are included in the solicitation.

(3) Ensure the technical data package and the solicitation have been coordinated with AMSMC-SF.

h. The Director, Procurement Directorate, HQ, AMCCOM, will:

(1) Administer and keep records of the Army radioactive waste program, including radioactive material, isotope, quantity, where generated, and where and when disposed.

(2) Obtain AMSMC-SF and AMSMC-TM concurrence prior to authorizing shipments of radioactive waste.

i. The Director, Product Assurance Directorate, HQ, AMCCOM, will:

(1) Provide adequate and proper inspection and test requirements for AMCCOM radioactive commodities when involved in specifications and technical Quality Assurance Provisions (QAPs).

(2) Implement the specifications and technical QAPs for AMCCOM radioactive commodities throughout the life cycle.

(3) Ensure that during acceptance inspection, the Government inspector rejects the lot of material represented by the sample if any defect is encountered regarding the radioactive material.

(4) Implement a surveillance program for verification of the integrity of the radioactive material, both in use and storage, for the entire life cycle of the radioactive commodity, with analysis performed by an independent test laboratory.

(5) Make available to the AMCCOM RPO all records of testing, inspection, and pertinent information.

j. The Commanders of ARDEC and CRDEC will provide Technical Data Packages (TDPs)/drawings and will coordinate research and development activities with the AMCCOM RPO, for systems under their management, to ensure input is provided for timely preparation of the commodity NRC licenses.

k. The Director, Weapon Systems Management Directorate, HQ, AMCCOM, will:

(1) Coordinate and manage all activities for level II systems, as necessary, to ensure that input is provided to the AMCCOM RPO for timely preparation of NRC license applications.

(2) Provide guidance and assistance to the AMCCOM RPO regarding enforcement and compliance with NRC license conditions.

l. The Director, International Logistics Directorate, HQ, AMCCOM, will staff all foreign military sales cases involving the sale of radioactive material through the AMCCOM RPO.

m. The Director, Installation Support Directorate, HQ, AMCCOM, will provide guidance in the development of environmental documentation for NRC license applications.

n. The Chief Counsel for Procurement and Readiness, HQ, AMCCOM, will provide legal interpretations and guidance for all matters pertaining to radioactive licensing.

o. The Director, Defense Ammunition Directorate, HQ, AMCCOM, will maintain records of total quantities of radioactive commodities managed within the wholesale system, excluding level I and II managed items.

p. The Director, Transportation and Traffic Management Directorate, HQ, AMCCOM, will provide guidance on all matters concerning transportation of radioactive commodities and radioactive waste.

The proponent of this publication is the HQ, AMCCOM, Safety Office. Users are invited to send comments to Commander, AMCCOM, ATTN: AMSMC-SFS, Rock Island, IL 61299-6000.

FOR THE COMMANDER:

OFFICIAL:

LARRY D. BACHELOR
Colonel, GS
Chief of Staff

DAVID MONTGOMERY
1LT, GS
Adjutant

DISTRIBUTION:
A and B-6
AMSMC-SFS (5)

ENCLOSURE 11

Maintenance Installation SOPs

LETTERKENNY army DEPOT
CHAMBERSBURG, PA 17201-4150

DIRECTORATE FOR MAINTENANCE SOP No. 385-36 — 24 October 1986

Safety

STORAGE, HANDLING, DECONTAMINATION AND DISPOSAL OF RADIOACTIVE MATERIALS AND FIRE CONTROL COMPONENTS CONTAINING SELF-LUMINOUS ITEMS

*This SOP supersedes DM SOP 385-36, 5 April 1983 including Change 1, 2, and 3.

CHAPTER 1

INTRODUCTION

1-1. Purpose. To provide information, establish responsibilities and procedures for storage, handling, decontamination and disposal of radioactive materials and self-luminous fire control components.

1-2. Scope. This procedure is applicable to all Directorate for Maintenance activities.

1-3. Definitions.

a. Radioactive Material - Any material or combination of materials that spontaneously emits ionizing radiation, or which is suspected of being radioactive.

b. Radiation - Energy propagated through space.

c. Radioactive Contamination - The deposit and/or absorption of radioactive material on and by structures, areas, personnel or objects.

d. Radiation Controlled Area - Access controlled areas for the purpose of protecting individuals from exposure to radiation and radioactive material.

e. Radiation Hazard - Any situation where personnel may be exposed to radiation in excess of one-fourth of the maximum permissable exposure (MPE) for the type of radiation involved.

f. Radioactive Waste - This is excess, surplus and/or damaged unwanted radioactive material contaminated with radioactive isotopes.

g. Radioactive Waste Container - An air tight metal container or drum with a sealable lock cover, painted yellow and marked "Caution: Radioactive Materials".

h. Radioactive Self-Luminous Source - Consists of pyrex glass tube coated on the inside with phosphor and filled with radioactive tritium gas. The interaction between the phosphor and tritium gas produces light.

i. Self-Luminous Fire Control Components - A fire control component utilizing radioactive self-luminous paint or radioactive self-luminous sources, which consists of a sealed pyrex glass tube coated with a phosphor on the inside surface and filled with purity tritium gas to a maximum pressure of 2.5 atmospheres. These glass vial sources are mounted in an acrylic holder and securely fastened to the interior surfaces of the fire control equipment.

j. Tritium Gas - Gas used in the fire control components is radioactive hydrogen gas. Hydrogen is the only element for which a special nomenclature has been devised for different isotopes, and tritium is the name applied to radioactive hydrogen (H^3). Tritium emits low level beta radiation.

k. Radiological Protection Officer (RPO) - An individual qualified in radiation protection, appointed by the Commander, who is resonsible for the development and implementation of the Radiation Protection Program as reviewed and approved by the Ionizing Radiation Control Committee and directed by the Commander.

l. Assistant Radiological Protection Officer (ARPO) - An individual appointed by the Commander and qualified in radiation protection applicable to NRC BML #12-00722-06 operations.

m. Ionizing Radiation Control Committee (IRCC) - Group of knowledgeable individuals appointed by the Commander who is competent to review the total radiation program from all safety and health aspects and advise the Commander on policy and required actions.

n. Decontamination - Process of reducing hazards caused by radioactive contamination sufficiently to allow the mission accomplishments without danger to personnel. Radioactive contamination cannot be rendered harmless or destroyed; therefore, decontamination must be accomplished by removal of the radioisotopes.

o. Decontamination Kit - Container with items needed to perform decontamination. Kit consists of a can of RADCON, towels, coveralls, gloves, shoe covers, warning signs, rope, aluminum foil/Mil-B-131 Barrier Material container for defective source or contaminated parts and waste. Contents must be replaced when used.

1-4. Policies.

a. No radioactive material shall be disposed of except in accordance with this procedure.

b. All personnel working with radioactive materials shall receive instructions by the RPO in the recognition, handling and disposition of materials known to be or suspected of being radioactive. This instruction shall be included in new employee orientation and repeated at least annually or when employee laxity is noted by supervisors, safety committees or Safety Office personnel. Instruction shall include potential hazards, precautions to minimize exposure and safe operating procedures. Complete training records shall be maintained for each employee involved with radioactive operations. (Missile and Electronics personnel.)

c. Every effort should be made to identify all sources of radioactive contamination. Identification can be made from equipment, TMs, and other pertinent publications including radioactive tube lists, letters from NICPs and NMPs and tube cartons. Radioactive markings and symbols on equipment provide identification. Employees and supervisors at all levels are responsible for reporting suspected sources of radioactivity.

d. Repair work on broken dials, gages and indicators containing radioactive luminous materials will not be performed without prior approval of the RPO.

e. Current listing of Decontamination Team members and all Fire Control Section, Tritium Unit employees who have received the eight hour block of instruction on Tritium Training will be posted on the Bulletin Board, Center, Building 14; Tritium Installation Room and Tritium Instrument Repair Area, South end, Building 14.

f. Building 14 personnel will apply radioactive material tag at time of receipt of instrument and at installation of sources. Tag will remain with instrument throughout processing.

g. Storage Limitations:

(1) No more than 10,000 curies will be accumulated in Building 14 Tritium Instrument Repair Area, Tritium Installation and Outside Storage Area.

(2) Quantity will not exceed the allowable quantities listed for items in TB 43-0197, Appendix A. For Storage Limitations, kits will be considered as items.

h. Radioactive self-luminous fire control components must be identified by a radioactive material label.

i. Prior to initial operations, employees who are designated to work with sources will receive an eight-hour radiological safety orientation from the RPO/ARPO and a four-hour refresher course every 18 months. (Fire Control personnel.)

j. When viewing sources, weak illumination or no illumination indicates an unserviceable tritium light source and components must be treated as contaminated until designated safe by LEAD RPO/ARPO or Decontamination Team Member.

k. Unauthorized disassembly or assembly of fire control instruments, in which radioactive sources are installed, is prohibited.

l. All operations involving installation of radioactive sources into subassemblies and unpacking of individual radioactive sources must be conducted in the Tritium Installation room within isotope fume hood with hood ventilation turned on. Disposable gloves and smocks will be worn by employees working in the Tritium Installation Room.

m. Storage of or use of eating, drinking, chewing, smoking or cosmetic materials and clothing, except work clothes, are prohibited and will not be allowed on persons in the immediate area where radioactive material is stored.

n. Unassembled sources must be stored in marked containers and protected against pilferage or loss. If a source is lost or stolen, a search to effect a recovery will be made and corrective action will be taken to prevent a recurrence. This action will be reported immediately to the National Inventory Control Point (NICP) of lost or stolen sources.

o. All radioactive waste must be disposed of through radioactive waste disposal (reference AR 385-11, dtd 1 May 80, Ionizing Radiation Protection; and LEAD Supplement 1 to AR 385-11, dtd 25 May 84, Ionizing Radiation Protection).

p. Personnel will wear rubber/plastic gloves and smocks when handling unmounted self-luminous tritium sources and instruments contaminated or suspected to be contaminated. This work will be performed in Tritium Installation Room.

q. Tools used to assemble and disassemble radioactive items in the Tritium Installation Room will be marked by a purple and yellow line. These tools will not be removed from the Tritium Installation Room until cleared by the RPO/ARPO.

r. All employees, who work with self-luminous tritium sources, must have a radiological medical examination:

(1) Before starting work in Building 14.

(2) Every three years for all employees in the Fire Control Section.

(3) Upon termination of work in Building 14.

s. Disposal of uncontamined containers after radioactive source has been removed will be accomplished as follows:

(1) Remove radioactive label.

(2) Place in dumpsters designated for normal trash.

t. Personnel with open skin cuts or abrasions will not be permitted to work in Tritium Installation Room.

u. Tritium Installation Room.

(1) Tritium Installation Toom involved with handling unmounted sources (tritium filled, bare or silicone encapsulated glass capsules) or contaminated equipment will be separate from other shop operations and shall be considered a restricted area. (Tritium Installation Room - Tritium Air Monitor and Hooded Ventilation required.)

(2) Uncontaminated instrument assemblies and subassemblies containing intact sources can be serviced in Tritium Instrument Repair Area with proper ventilation. (Tritium Air Monitor required.)

(3) Hooded ventilation is not required for shop operations involving handling/servicing of assemblies or subassemblies containing intact mounted sources. (Tritium Air Monitor required.)

v. Emergency procedures shall be planned, rehearsed and available in writing.

w. Combustable waste will be separated from non-combustable waste.

1-5. General Information.

a. Intact self-luminous sources pose no hazard. This is due to the extremely low energy of their radiation which cannot penetrate the glass wall of the tube. There is no measurable radiation associated with the instruments utilizing tritium sources providing the sources remain intact.

b. In the event of a source breakage, the gas will immediately dissipate and dilute in the atmosphere and will result in a loss of illumination from the source; however, a slow leak is possible and loss of illumination from the source may be gradual over a period of several days.

c. Movement and number of personnel in the work and storage area where radioactive materials are present will be kept to a minimum at all times.

d. Radioactive tritium sources are used to illuminate various components of the fire control instruments, such as reticles, counters, and level vials for night operation.

e. The RPO, located in the Safety Office, Building 2, is available for consultation to anyone affected by this regulation and to assist in the evaluation of operations involving the use of radiation producing devices.

f. Tritium Installation Room must be monitored by a Tritium Air Monitor. All areas that are involved in the direct overhaul of tritium instruments in Building 14 will be monitored by a Tritium Air Monitor.

g. Personnel who are in direct contact with radioactive materials will frequently wash hands and exposed parts of the body as a matter of routine.

h. All monitors should be checked by responsible persons.

1-6. References.

a. NRC Regulation Title 10, Parts 19, 20, 21.

b. AR 40-14.

c. DARCOM-R 385-25.

d. AR 385-11.

e. LEAD Supplement 1 to AR 385-11.

f. AR 385-30.

g. TB 43-0197.

h. TB 43-0116.

i. NRC Application for Renewal to BML 12-00722-06.

j. Regulatory Guide 8.13.

k. TB 700-3.

l. TM 3-261.

m. TB 43-0122.

CHAPTER 3

PROCEDURES FOR FIRE CONTROL ITEMS

Section I. TRITIUM AREA

3-1. Chief, Fire Control Section will ensure that appropriate warning signs and notices are posted.

3-2. Employees assigned the responsibilities of opening Tritium Repair Work Area will:

a. Turn on the overhead ventilation system for approximately five minutes prior to entering the Tritium Installation Room at the beginning of each day.

b. Open wall vents when overhead fan or fume hoods are operating. Fume hoods or overhead fan will be in operation while personnel are working in area.

c. Periodically flush the Tritium Installation Room by turning fume hoods on and open double doors.

d. Flushing operations should be not less than 10 minutes. Elapsed time of all flushing operations are to be recorded.

3-3. Employee Safety.

a. Extreme cleanliness will be enforced to prevent the risk of contamination to personnel or work area.

b. No eating, drinking, chewing, smoking, storing of food, or personal articles are allowed in Tritium Installation Room or at workbenches throughout the Tritium Reconditioning Unit.

c. All surfaces will facilitate decontamination.

d. Smocks will be worn while working the Tritium Installation Room and removed when leaving room.

e. Hand dryers/disposable paper towels shall be available for use in Tritium Installatin Room.

f. A Tritium Air Monitor will continuously monitor the air within the repair room.

g. Area will be designated with Radioactive Material signs.

h. Use safety equipment properly.

i. Work the necessary precautions to ensure that tritium light sources are not broken.

j. Know and follow SOPs, DMWRs, TMs and special instructions.

Section II. SAFE HANDLING OF SELF-LUMINOUS FIRE CONTROL INSTRUMENTS, BUILDING 14

3-4. Chief, Fire Control Section will:

a. Ensure that all SOPs, DMWRs, LEADRs and the NRC License are available and adhered to. NRC License is the governing authority, DM SOP 385-36 will supplement all DMWRs and TMs which pertain to Tritium for safety purposes.

b. Ensure that Unit Chiefs maintain a current inventory of all radioactive sources and waste by NSN for which they are responsible. Inventory will include kit, part number, quantity, curies and location. Monthly ascertain total quantities on-hand and furnish RPO file copy. Records will be maintained for at least two years.

c. Ensure that all containers containing radioactive commodities designated for return to Building 4, Directorate for Supply activities, are labeled with two Radioactive Material Tags, SDSLE Form 5132. Ensure that all instruments leaving Building 14 for packing have a radioactive material tag attached.

d. Notify the RPO/ARPO prior to movement of radioactive commodities to the Directorate for Supply activities unless instructed otherwise by the RPO/ARPO.

3-5. Supervisors responsible for radioactive materials and equipment will not be relieved of their duties until the following actions are taken:

a. Secure all material and equipment in such a manner as to preclude use or removal while not under the immediate supervision of a qualified and authorized individual; or no sources out on work benches, etc.

b. Turn over all materials and equipment to a properly qualified and authorized individual. Such an individual will have the qualifications and training required for the safe handling of the materials involved.

c. Will assure that their personnel have received adequate instruction and experience prior to using or being exposed to radioactive materials.

3-6. Employees.

a. Upon receipt, determine if items are radioactive self-luminous sources/self-luminous fire control components. If radioactive, notify supervisor.

b. Survey radioactive items for physical damage (exterior and interior containers). If containers/items are damaged, or contamination is suspected, proceed as follows:

(1) Move material to Tritium Installation Room and unpack immediately. Plastic or rubber gloves must be worn when handling damaged or defective material. Material will not be removed from Tritium Installation Room until cleared by RPO/ARPO.

(2) Contaminated boxes and other material will be put in Barrier Material containers and disposed of as radioactive waste. Packaged items will be transferred to consolidation area/storage area (Building 441).

(3) Complete Intra-Shop Material Control Document, SDSLE Form 2710, in duplicate.

(4) Coordinate transfer to Building 441 with TGWB, extension 9068.

(5) Transport radioactive waste to Building 441. (No liquid waste.)

(6) Maintain signed copy of DOD Single Line Item Release/Receipt Document, DD Form 1348-1, for record of transfer in Building 14.

c. If containers are not damaged, they will be stored in an authorized storage area.

d. All equipment used on defective material will be checked by RPO/ARPO before being moved to any location.

e. Check illumination of sources periodically on instruments being overhauled to insure that sources are intact. This can be accomplished by shading environmental light from sources or physically moving instrument to a dark area.

Section III. UNPACKING AND STORAGE OF SELF-LUMINOUS LIGHT SOURCES CONTAINING TRITIUM

3-7. Employees will:

a. Open all radioactive tritium kits and each individually wrapped tritium source in the fume hood with fan on.

b. Check for leaks/breakage by using the Tritium Air Monitor intake sniffer tube. Attach output hose to monitor and vent into fume hood.

c. Periodicaly exercise swipe tests of new sources where air monitor indicates no sign of residue.

d. Immediately reseal the package with tape if tritium kits/sources are found to be leaking or broken. Keep the defective source in the fume hood, close the fume hood and notify the supervisor/RPO/ARPO.

e. Upon obtaining a meter reading of 5uCi/M3 and higher above background, exercise the following:

(1) Sound alarm.

(2) Turn on paint booth or ventilation systems.

(3) Throw lever on air conditioning unit to outside air.

(4) Open double doors, southeast corner of Building 14.

(5) Post all doors with "Radioactive Tritium Breakage" signs.

(6) Wait five minutes and check Tritium Air Monitors to determine if monitor is reading at a safe level.

(7) Notify Decontamination Team, RPO/ARPO, and supervisor.

(8) Two persons should perform this operation.

NOTE: Many sources will accumulate a level that when first opened will activate the air monitor to a reading of five or higher above background; however, allow the source to sit two to three minutes and recheck with air monitor; if air monitor reading is still above a reading of five or higher above background; immediately reseal the package and notify supervisor/RPO/ ARPO. Swipe tests will be conducted on these items.

f. Ensure storage holding area is properly maintained:

(1) Keep ventilation ducts clear.

(2) Padlock when not in use.

(3) Correctly labeled by "RADIOACTIVE MATERIAL" signs.

(4) Posted with "Authorized Personnel Only" sign.

Section IV. BROKEN RADIOACTIVE SELF-LUMINOUS SOURCES CONTAINING TRITIUM UNDER VENTILATION HOOD

3-8. Chief, Fire Control Section will report to RPO/ARPO any accident, unusual incident, personnel injury, however slight, suspected over-exposure and/or suspected internal exposure, as soon as possible after occurrence. All incidents will be documented by MFR.

3-9. Employees will:

a. Upon breakage of tritium source or finding broken/leaking source (loss of illumination) immediately sound the Tritium Alarm Buzzer (continuous ring).

b. If Tritium Installation Room Air Monitor Alarm sounds, room will be evacuated and steps in paragraph 3-10 below will be followed. If only air monitor alarm in fume hood sounds, fume hood will be closed and steps in paragraph 3-9c-g will be followed.

c. In all cases, wash hands, and exposed parts of body.

d. Notify RPO/ARPO, extension 5253/5324; other than normal working hours, phone (717) 532-3581 (Robert Hamsher), LEAD RPO; or (717) 264-1735 (C. Robert Whitaker), LEAD ARPO.

e. After five minutes, if air monitor indicates no air contamination, Decontamination Team will perform decontamination work.

f. Do not use ventilation hood until cleared by RPO/ARPO. Work can be performed in other hood at this time.

g. Report to Director, U.S. Army Health Clinic, for urinalysis (Bioassay) if performing work in ventilated fume hood.

Section V. BREAKAGE OF SOURCES IN TRITIUM REPAIR AREA

3-10. Employee will:

a. Give an audible alarm and buzzer alarm when air monitor alarm sounds or when worker suspects or knows a source is broken.

b. Evacuate area.

c. If involved in the break or leak assist Decontamination Team with information relative to the break, tools involved, etc.

d. Notify RPO, extension 5253/5324, other than normal working hours phone (717) 532-3581 (Robert Hamsher) LEAD RPO, or (717) 264-1735 (C. Robert Whitaker) LEAD ARPO.

e. Not re-enter room until directed by RPO/ARPO and air monitor indicates safe level (if not assigned to Decontamination Team).

f. Report to Director, U.S. Army Health Clinic for Tritium urinalysis if performing work in area.

g. Not allow material contamined by radioactivity to come in contact with any part of the body at any time. Rubber or synthetic gloves and smocks will be worn at all times when the handling or radioactive wastes and broken radioactive parts are involved.

h. Immediately after leaving the contaminated area, and having handled broken device containing radioactive material in any way, wash hands and exposed parts of the body. All contaminated clothing will be removed and disposition will be taken by RPO/ARPO. Hands and arms will be washed thoroughly with soap and water, especially before eating, drinking or smoking.

Section VI. DECONTAMINATION AND URINALYSIS

3-11. Chief, Fire Control Section will:

a. Assign Radioactive Decontamination Team to perform clean-up in case of accident or incident involving radioactive material.

b. Ensure that Decontamination Kit is available at all times and at least two members of Decontamination Team are present at all times.

c. Prepare a Disposition Form (DF) to Director, U.S. Army Health Clinic, requesting that the Decontamination Team/Radiation Worker is scheduled for a radiological medical examination. The RPO will be furnished a copy of this DF. This examination will include background urine tritium analysis.

3-12. Team Members will:

a. Immediately open double doors to Final Area and external shipping doors.

b. Start Paint Booth, LEAD #252.

c. Throw lever on air conditioning unit to outside air.

d. Post all doors with Tritium Breakage signs.

e. Five minutes after breakage, check sources. If breakage or leak is confirmed, proceed as follows:

(1) Put on rubber or synthetic gloves, coveralls and shoe covers.

(2) Move Radioactive Decontamination Kit into the area.

(3) If possible, place device containing broken source in air-tight bag and seal with heat sealer or tape.

(4) Pick up large fragments with forceps and place in air-tight bag and seal.

(5) Remove gloves, coveralls and shoe covers. Place in air-tight bags and seal. Put on new gloves, coveralls and shoe covers.

(6) Move air-tight bags to Tritium Installation Room and place in vented hood.

(7) Wet a cloth or paper shop towel with RADCON or equivalent and wipe across the contaminated area. Make one wipe at a time, then fold cloth in half, using the clean side for wiping each time. When cloth becomes too small, discard cloth in container marked "Radioactive Material". Wet another cloth and continue the procedure until the area has been properly cleaned. All items will be decontaminated to the lowest possible DPMs. No item will be shipped out of Building 14 with a DPM count that exceeds 2000 DPMs.

(8) Seal debris, disposable smocks, coveralls, shoe coverings and gloves used for cleaning contaminated area into a bag marked "Radioactive Material". Seal bag with heat sealer. Place bag in radioactive waste container and annotate Radioactive Disposal Contents List, SDSLE Form 2802. These forms will be furnished by RPO as required.

(9) All tools will be monitored by RPO/ARPO and decontaminated, if necessary.

(10) Rope off area within six feet of breakage and will remain roped off until cleared by RPO/ARPO.

(11) Prepare and maintain Intra-Shop Material Control Document, SDSLE Form 2710, in duplicate, in accordance with procedures in paragraph 3-16d-f.

f. Determine if any employees are injured, and if so proceed as follows:

(1) Wash minor wounds immediately under running water while spreading the edges of the wound.

(2) Report injury, regardless of how minor, to the dispensary for medical attention.

(3) Personnel with minor wounds will be decontaminated, before leaving the contaminated area. If the wounds are of a serious nature, the injured individual will be wrapped in a blanket to prevent the further spread of contamination, and immediately be removed to the nearest medical facility. Persons accompanying the individual will warn the medical personnel that there is a possibility that the injured is contaminated.

(4) Report all radiation accidents, such as over-exposure, wounds, ingestion, inhalation, any personnel involved, to the supervisor, Director, U.S. Army Health Clinic, and the RPO/ARPO immediately.

(5) Permit no person involved in radiation injury to return to work without the approval of the attending physician and the RPO/ARPO.

3-13. Contaminated employees will have urinalysis completed as follows:

a. Wait four hours before taking sample.

b. If urinalysis cannot be collected during normal tour of duty on day of breakage, it will be collected at the beginning of the next workday.

c. If breakage occurs on Friday and procedures described in paragraph a above cannot be followed, notify Director, U.S. Army Health Clinic of breakage and proceed with urinalysis as directed.

d. Director, U.S. Army Health Clinic, will collect one urine sample from each exposed person per day or as directed.

Section VII. CHECK OF VALIDITY READING

3-14. Employees will:

a. Position Air Monitor so plastic hose can be connected to inlet through hole in wall to pick-up outside air.

b. Turn range knob to "ZERO" position.

c. Adjust meter to zero, reposition range knob to X1 position.

d. Note "noise" reading on meter dial. Add five digits (5 UC/M^3) to outside air meter reading. Adjust red alarm dial accordingly. (Example: If outside air noise reading is "2" on the meter, adjust red alarm dial to "7" on the meter.)

e. Cease operations and notify immediate supervisor if meter reading (noise) is exceptionally high (5 or more). Air Monitor may have a malfunction.

Section VIII. MAINTENANCE OF TRITIUM AIR MONITORS

3-15. Employees will:

a. Check Silica Jell at least monthly through viewing hold located in Electrometer on right side of Air Monitor; if not blue in color, change it.

b. Replace front filter when discolored and make sure porous side of filter is out. Return "O" ring to proper place.

c. Clean Electrometer with methanol alcohol and heat dry (hair dryer can be used). Tritium chambers can be removed and cleaned by any good soap detergent. Flush out gamma cylinder with air; can use sniffer tube. NOTE: Turn power off.

d. Check noise factor, using slow setting, 6% to 8%. Fast setting is 11% to 13% (need reader for fast setting). Noise is caused by moisture build-up, dirt, etc.

e. Eliminate moisture in air by checking machine with Drierite cannister. Run air into cannister, then into machine. Need special tape to seal Electrometer.

Section IX. DISPOSAL OF RADIOACTIVE WASTE

3-16. Decontamination Team Members will:

a. Handle all radioactive materials with special caution to prevent contamination of shop areas, tools, equipment or personnel.

b. Wear rubber or synthetic gloves when handling damaged self-luminous tritium sources.

c. Storage in shop:

(1) Place broken, leaking or unserviceable self-luminous tritium sources in air-tight bags and seal bags with heat sealer. Monitor bag for leaks prior to storage.

(2) Attach radioactive material label to each bag.

(3) Keep bags in radioactive waste container.

(4) Attach SDSLE Label 5132 to each bag.

(5) Attach Radioactive Disposal Contents List, SDSLE Form 2802, to container. This list will be updated each time radioactive material is placed in container.

(6) Protect container bearing radioactive disposable material against loss or pilferage.

d. Prepare, in duplicate, Intra-Shop Material Control Document, SDSLE Form 2710. Form shall be annotated in accordance with established turn-in procedures except for the following:

(1) The words "Radioactive Materials" shall be printed across the top of the form.

(2) Inspector's stamp or signature is necessary.

(3) DD Form 1348-1 will be prepared by Requisition and Support Branch, Production Planning and Control Division, Building 1.

e. Transfer packaged items to consolidation area/storage area (Building 441). (NOTE: No liquid waste will be sent to Building 441.) Coordinate transfer to Building 441 with TGWB, extension 9068, in accordance with AR 385-11, Ionizing Radiation Protection, and LEAD Supplement 1 to AR 385-11, Ionizing Radiation Protection.

f. Maintain a signed copy of DD Form 1348-1 for record of transfer in Building 14.

g. Special Instruments: Radioactive (H-3) sources can be removed from instrument(s), sealed in air-tight bag(s) and packaged for disposal (shipment to Building 441). Package must show NSN and quantity for instrument(s). Also note on package "Bulk of this item disposed of separately". Other parts (heavy metals) may be disposed of through normal procedures after wipe tested to assure contamination levels below 100 DPM's/100CM2.

Section X. FIRE AND EXPLOSION EMERGENCIES

3-17. Chief, Fire Control Section will:

a. Notify the local Radiological Protection Officer/Assistant Radiological Protection Officer.

b. Ensure that all persons in the emergency area and those engaged in combating the emergency report to the Health Clinic for urinalysis and treatment.

3-18. Radiological Protection Officer will:

a. Advise emergency personnel of fire or explosion upon their arrival.

b. Advise key emergency personnel such as Provost Marshal and Fire Chief of where material is stored and amount stored.

c. After the fire has been extinguished, monitor personnel, the fire fighting equipment, and the area to be decontaminated, if necessary. Priority should be given to the Fire Department personnel to enable them to respond to other emergencies.

d. Give approval for return to work.

3-19. Employees will:

a. Attempt to extinguish a small fire.

b. Immediately notify the Fire Department and Security (Dial 17) giving location of fire/explosion.

c. Notify all personnel to evacuate the area and to remain 100 yards upwind of the fire.

d. Turn off all ventilation equipment.

e. Close all doors and windows.

f. Prepare complete history of the emergency and action taken to remain in facility records.

g. Report to Health Clinic for urinalysis.

NOTE: A fire or explosion might release radioactive material from the assembled fire control instruments or the unassembled sources. The tritium will be dissipated into the air and will flow along with the smoke; therefore, fire fighters should not take places downwind to fight the fire unless they are equipped with a self-contained breathing apparatus.

The proponent activity of this publication is Letterkenny Army Depot, Directorate for Maintenance, Maintenance Management and Analysis Office. Users are invited to send comments to Chief, Maintenance Management and Analysis Office, ATTN: SDSLE-MA, Chambersburg, PA 17201-4150.

FOR THE COMMANDER:

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Director for Maintenance

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Reviewed 5 Mar 87

ENGINEERING DIRECTORATE
Rock Island Arsenal
Rock Island, Illinois 61299-5000

STANDING OPERATING PROCEDURE
No. 700-EN-025 (Rev 2)*

25 April 1985

HANDLING MATERIAL CONTAINING TRITIUM IN THE INDEPENDENT TESTING LABORATORY (ITL)

1. Purpose. Establish by applicable regulations, information, responsibilities, and procedures for safe handling of self-luminous fire control components and rifle sights for the testing, storage, or maintenance of these items in the Independent Testing Laboratory (ITL) at Rock Island Arsenal.

2. Scope. This procedure applies to all personnel working in the ITL.

3. Definitions.

3.1. Tritium. A radioactive isotope of hydrogen with an atomic weight of three.

3.2. Radioactive Self-luminous Source. The source consists of a sealed pyrex glass tube (vial) coated on the inside with a phosphor and filled with tritium to a maximum pressure of 2.5 atmospheres. The radioactive tritium gas excites the phosphor to emit light.

3.3. Self-luminous Fire Control Components. A fire control component using radioactive self-luminous sources. The glass vial sources are mounted in an acrylic holder and securely fastened to the interior surface of fire control components.

3.4. Self-luminous M16A1 Rifle Sights. An item using a radioactive self-luminous source. The glass vial source is mounted in the sight using a silicone adhesive.

*This procedure supersedes SOP 700-EN-25 (Rev 1), undated.

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3.5. Decontamination. Process of sufficiently reducing hazards caused by radioactive contamination to allow mission accomplishment without danger to personnel. Radiosotopes cannot be rendered harmless or destroyed; therefore, decontamination must be accomplished by their removal.

3.6. Radioactive Material. Any substance that undergoes spontaneous disintegration in which energy is liberated by the emission of ionizing radiation.

3.7. Independent Testing Laboratory (ITL). The ITL is located in Building 110, N. Wing, basement and consists of the following rooms:

3.7.1. Laboratory Room - equipped with a stainless steel radiochemical fume hood, stainless steel bench tops, and tritium air monitor.

3.7.2. Counting Room - equipped with liquid scintillation counter and other radiation detection equipment.

3.7.3. Dark Room - equipped with luminosity measuring equipment.

3.7.4. Isotope Storage Area - a locked area for storage of isotopes which are not in use in other ITL rooms.

3.8. Swipe Test - Wiping of a 100 square centimeter section (if possible) of a possibly contaminated area with a water moistened membrane filter and determining the amount of contamination using a scintillation counting system.

4. General.

4.1. Unbroken self-luminous sources pose no hazard because the extremely low energy radiation within the source cannot penetrate the glass wall of the vial. There is no measurable radiation associated with the fire control and sights using tritium sources provided the sources remain intact.

4.2. The ITL ventilation system is designed so that operation of the hood creates negative air pressure in the ITL rooms compared to the surrounding halls. The air movement is from the halls through the ITL rooms to the hood and finally through the exhaust stack for discharge to the atmosphere above the roof line. This air movement assures that if there is a release of tritium, the gas will be rapidly withdrawn from the ITL and diluted below a hazardous concentration before discharge in the atmosphere.

4.3. The tritium air monitor is equipped with a visual readout of tritium concentration, and both a visual and audible alarm system which is activated if the tritium concentration approaches the maximum permissible level. The monitor is located in the counting room where the readout can be easily seen from the doorway between the laboratory and the counting room. Air is drawn through a tube from the laboratory room into the air monitor for testing. An exhaust tube returns the tested air to the laboratory room.

5. Policies.

5.1. All work done in the ITL shall be under the direction of the RIA Radiological Protection Officer (RPO) or Alternate Radiological Protection Officer (Alt. RPO).

5.2. No one will be permitted to work with radioactive sources in the ITL without appropriate training.

5.3. No eating, drinking, smoking, chewing, or the application of cosmetics will be permitted in the ITL during testing or when radioactive materials are present.

5.4. Extreme cleanliness will be enforced to prevent the risk of contamination to personnel or work areas. Hands will be checked for contamination at the end of each work session with a swipe test.

5.5. The ITL will be used to conduct swipe testing of assembled fire control equipment and water soak testing of rifle sights, which contain tritium, to satisfy quality assurance provisions or NRC Licenses 12-00722-06 and 12-00722-04.

5.6. The ITL may also be used to remove and replace self-luminous sources in fire control at the request of the U.S. Army Armament, Munitions and Chemical Command, Maintenance Directorate. Because of special precautions required when working with unmounted sources:

5.6.1. Unauthorized personnel shall be prohibited from entering the laboratory room during the handling of unmounted sources.

5.6.2. Handling of unmounted sources shall be done in the hood whenever possible.

5.6.3. Tools used in assembly or disassembly work will be checked for contamination before their return to normal use.

5.6.4. Unmounted sources may not be left unattended in the laboratory room.

5.7. Fire control items and rifle sights will be stored in the isotope storage area when not undergoing testing.

5.8. Decontamination shall be performed under the direction of the RPO or Alt. RPO.

5.9. Any radioactive waste generated during testing, maintenance, or decontamination shall be placed in the radioactive waste container in the isotope storage area until there is sufficient quantity for disposal by AR 385-11.

5.10. All radiation accidents, such as over-exposure, wounds, ingestion, or inhalation shall be reported immediately, by the personnel involved, to the RPO or Alt. RPO and to the Safety Office.

5.11. In the event of suspected exposure to tritium by personnel, emergency treatment will be provided by the Health Clinic and a urine specimen for titium assay shall be taken.

5.12. A complete history of an emergency and action taken shall be prepared for the installation records by the RPO or at his direction.

6. Responsibilities.

6.1. RPO and Alt. RPO.

6.1.1. The RPO or Alt. RPO is responsible for the safe operation of the ITL. This will be accomplished by suitable supervision and training of all personnel working in the ITL.

6.1.2. The RPO or Alt. RPO shall insure that items suitable for effecting decontamination of the ITL are on hand. These items shall include forceps, wash bottles filled with water, cloth or paper towels, plastic screw top container, air tight bags to contain contamination waste, sealing tape, and rubber or plastic gloves. The decontamination equipment will be located in the storage cabinet in the counting room.

6.1.3. The RPO or Alt. RPO shall after testing, hold fire control and rifle sights in the isotope storage area until the U.S. Army Armament, Munitions and Chemical Command, Product Assurance Directorate requests their release for shipment.

6.2. Personnel. Personnel working in the ITL shall be responsible for working with necessary precautions to insure that self-luminous sources are not broken, and shall know and follow this SOP and any special instructions given them.

7. Procedures.

7.1. General Procedures.

7.1.1. Shipping boxes containing fire control or rifle sights shall be stored in the isotope storage area upon receipt and after testing.

7.1.2. The tritium air monitor shall be calibrated quarterly by the procedures outlined in the Johnston Laboratories, Inc., manual on the tritium air monitor paragraph 05 page 8.

7.1.3. To establish proper air flow in the TTL, the hood shall be turned on for a minimum of two minutes before entry into the storage area or the beginning of any work in the hood or laboratory room.

7.1.4. Quality assurance testing shall be conducted as required by DRSAR-QA.

7.1.5. Decontaminate material or laboratory surfaces as follows:

(a) Put on rubber or plastic gloves.

(b) Pick up large broken vial fragments with forceps and place in a plastic screw top container marked "Radioactive Waste."

(c) Use a wash bottle to wet a cloth or paper towel with water. Wipe once across the contaminated area then fold the towel in half. Using a clean side, wipe once again. Continue wiping and folding until the towel becomes too small to use. Discard the towel in the plastic bag marked "Radioactive Waste." Wet another towel and continue the procedure until the area has been properly cleaned (i.e., swipe of area does not give counts above background counts when checked in the liquid scintillation counter).

(d) Using swipe testing procedures, monitor all tools used and gloves worn and decontaminate as necessary.

(e) Place the screw top plastic container in a plastic bag containing other waste material and seal. Store the bag in the isotope storage area for disposal. See paragraph 5.9 above.

7.1.6. Upon notification of the breakage of a self-luminous source, the RPO or Alt. RPO shall determine if any personnel are injured and if so, proceed as follows:

(a) Immediately wash minor wounds under running water while spreading the edges of the wound.

(b) Report injury, regardless of how minor, to the Health Clinic for medical attention.

(c) Before leaving the contaminated area, personnel with minor wounds shall wash contaminated areas with soap and water until a swipe test of the area does not give counts above background counts when checked in the liquid scintillation counter. If the wounds are of a serious nature, wrap the injured individual in a blanket to prevent further spread of contamination, and move the individual immediately to the Health Clinic. Persons accompanying the individual shall warn the medical personnel that there is a possibility that the injured is contaminated..

7.2. Emergency Procedures.

7.2.1. Breakage of radioactive self-luminous source in the hood.

(a) Immediately step away from the hood.

(b) Notify the RPO or Alt. RPO of breakage.

(c) The RPO or Alt. RPO shall initiate clean up and decontamination. See paragraphs 7.1.5 and 7.1.6 above.

7.2.2. Breakage of radioactive self-luminous source outside of hood.

(a) Hold breath.

(b) Proceed to counting room door via a route which will not pass between the broken source and the hood.

(c) Open counting room door approximately six inches, breathe air being drawn into laboratory room and observe reading on tritium air monitor.

(d) If reading is below preset alarm level, personally notify RPO or Alt. RPO of breakage.

(e) If reading is above preset alarm level, enter counting room, close door to laboratory room, proceed to counting room hall door, open slightly and tell first available person to contact RPO or Alt. RPO.

(f) RPO or Alt. RPO shall use the tritium air monitor to determine when safe radiation level is attained in the laboratory room and shall start clean up and decontamination. See paragraph 7.1.5 and 7.1.6 above.

7.2.3. Fire.

(a) A fire may release radioactive material from the fire control components or rifle sights by rupturing the glass vial. The tritium will dissipate into the air and flow along with the smoke; therefore, fire fighters should not fight the fire from downwind locations unless they are equipped with self-contained breathing equipment.

(b) If the fire is small, attempt to extinguish the fire with extinguishers on hand.

(c) Notify all personnel to evacuate the area, to remain upwind of the fire, and, if possible, close all doors and windows.

(d) Notify the Fire Department (fire phone number is 117) and give location of fire.

(e) If not already present, notify the RPO or Alt. RPO, who will advise and assist the emergency personnel.

(f) After the fire has been extinguished, monitor personnel, the fire fighting equipment, and fire area and if necessary, decontaminate. Priority should be given to Fire Department personnel to enable them to respond to other emergencies.

(g) Work in the affected area shall not resume until approval is given by the RPO or Alt. RPO.

8. References.

8.1. AR 385-11; Ionizing Radiation Protection.

8.2. AR 700-64; Radioactive Commodities in the DoD Supply System.

8.3. AMCR 385-25; Radiation Protection.

8.4. Nuclear Regulatory Commission By-product Material License No. 12-00722-04, M16A1 Radioactive Rifle Sight.

8.5. Nuclear Regulatory Commission By-product Material License No. 12-00722-06, Radioluminous Tritium Devices, Infantry and Towed Artillery.

CONCURRENCE:

William F. Garland 30 May 85
WILLIAM F. CARLAND
Radiological Protection Officer

William C. Brown 6/10/85
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Director, Engineering Directorate

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DIRECTORATE FOR MAINTENANCE *SD SOP #20
ANNISTON ARMY DEPOT
ANNISTON, ALABAMA 36201 23 Mar 87

Handling Devices Containing Tritium Gas

1. Reference:

a. ANADR 385-1.

b. NRC Regulation, Title 10, CFR.

c. DARCOMR 385-25.

d. AR 385-30.

e. NRC Liscense 12-00-722-06.

2. Purpose: This standing operating procedure (SOP) prescribes policies, responsibilities, and procedures for the safe handling of self-luminous devices and components which contain tritium gas.

3. Scope: This SOP applies to Shops Division.

4. Policy: a. This SOP will be posted at each applicable work and storage area.

b. Radiation workers will be given a medical examination prior to assignment of duties, once every three years, thereafter, at the discretion of the Medical Officer, and upon termination of employment. This examination will include background urine tritium analysis.

c. New employees assigned radiation related duties will be scheduled for the radiation safety orientation prior to start of duties.

*This SOP supersedes SD SOP #20 dated, 18 May 84.

d. Unauthorized disassembly or assembly of devices in which radioactive sources are installed is prohibited.

e. Protective clothing must be provided all workers when their work might result in contamination of their personal clothing, skin, or hair. Employees will wear rubber/plastic gloves, and aprons/disposable coveralls when handling unmounted self-luminous tritium sources and instruments contaminated or suspected to be contaminated. This work will be performed in the Tritium Instrument Repair Room.

f. All radiological usage, facilities, equipment, personnel, training and operational procedure will be under the guidance of the Radiological Protection Officer (RPO).

5. Definitions:

a. Tritium Gas: Radioactive hydrogen gas that emits weak beta particles. It can be detected by air monitor or analysis of smear samples by a liquid scintillation detector.

b. Radioactivity: The number of nuclear transformations occuring in a given quantity of material per unit time. The unit of measure is the curie (ci).

c. Curie (ci): A measurement unit of radioactivity. One ci equals 3.7×10^{10} nuclear transformations per second.

d. Radioactive Contamination: Disposition of radioactive material in the wrong place, particularly in any place where it can be harmful.

e. Decontamination: The process of removing radioactive contamination from facilities and personnel.

f. Occupational Exposure: Exposure to ionizing radiation that is incurred as a result of an employee's duties which require use of materiels or machinery capable of producing ionizing radiation.

g. Ionizing Radiation: Electromagnetic or special radiation capable of producing ions, directly or indirectly, in it's passage through matter. Alpha and beta particles, gamma rays, X-rays and neutrons are examples of ionizing radiation.

h. Ionizing Radiation Control Committee: A group of qualified personnel officially appointed by the Commander to establish local policy and to guide the radiation protection program.

i. Radiation Protection Officer (RPO): A person appointed by the Commander to give advice on the hazards of ionizing radiation and to supply effective ways to control these hazards.

j. Radiation Hazard: A condition under which a person might receive radiation in excess of the maximum permissible dose; or where radiation may cause damage to materiels.

k. Radiation Sources: Materiels or devices that produce or are capable of producing ionizing radiation.

l. Radioactive Self-Luminous Source: Consists of pyrex glass tube coated on the inside with phosphor material and filled with radioactive tritium gas.

m. Radiation Waste:

(1) Property contaminated to the extent that decontamination is economically unsound.

(2) Surplus radioactive materiel whose sale, transfer, or donation is prohibited.

(3) Surplus radioactive materiel that is determined to be unwanted after being advertised as surplus.

(4) Waste that is radioactive due to production, or use of radioactive material.

6. General Requirements:

a. Eating, drinking, chewing, smoking and cosmetic items will be prohibited in the radiation controlled areas.

b. Operations and facilities involving radioactive materials should be planned to limit the spread of radioactive material, by accomplishing the following:

(1) Work areas will be designated, marked and monitored.

(2) Movement of personnel and radioactive materiel at work locations will be minimized.

(3) The amount of radioactive materiel at work locations will be minimized.

c. Radioactive materiel should be stored in fireproof or fire resistant, well ventilated sites that provide proper security.

d. Radioactive self-luminous devices will be identified by means of a radiation warning label. These labels or decals must be replaced immediately when defaced or missing.

e. Personnel exposure to airborne tritium will be kept as low as achievable.

f. Personnel with open skin cuts or abrasions will not be permitted to work in radiation-controlled areas.

g. Personnel whose training or experience are not adequate are prohibited from handling tritium sources until training and experience is gained by working under supervision.

h. Movement and number of personnel in the work and storage areas where radioactive materiel is present will be kept to minimum at all times.

7. Chief, Shops Division is responsible for:

a. Enforcing the provisions in this SOP.

b. Ensuring that radiation workers are provided adequate training and given medical examinations in accordance with para 4 above.

c. Providing waste containers with self closing lids, in radiation controlled areas for contaminated waste.

8. Procedures:

a. Supervisors will:

(1) Notify the RPO, Safety Office, of employees requiring training.

(2) Submit a disposition form (DF) through internal channels to the RPO requesting that new radiation workers be scheduled for a radiological medical examination.

(3) Ensure that waste containers with self closing lids are provided, and that the containers are lined with polyethylene bags, in the radiation controlled areas for contaminated waste.

(4) Maintain a current inventory of all sources of radiation for which they are responsible.

(5) Know the exact location of all sources of radiation for which they are responsible.

(6) Post appropriate warning signs and notices.

(7) Ensure that their personnel have received adequate instructions and experience prior to using or being exposed to radiation.

(8) Control contamination.

(9) Ensure tritium sources are secured against unauthorized use.

(10) Enforce this SOP and all necessary precautions.

(11) Report to the RPO any accident, unusual incident, personnel injury, suspected over-exposure, and/or suspected internal exposure, as soon as possible.

(12) Ensure that equipment, instruments, and the tools used in radiation controlled areas are marked with the radiation emblem or purple (Magenta) paint.

b. **Employees will:**

(1) Know and follow the provisions of this SOP.

(2) Take all necessary precautions to ensure that tritium light sources are not broken.

(3) Check illumination of sources periodically and at the end of the day on instruments being overhauled to ensure that sources are intact. This can be accomplished by shading environmental light from sources or physically moving instrument to a dark area.

(4) Use safety equipment properly, including the wearing of protective clothing as required.

(5) Report to the supervisor any accident, unusual incident, personal injury, suspected over-exposure and/or suspected internal exposure, as soon as possible after the occurrence.

(6) Thoroughly clean the work area at the end of each shift.

(7) Place only contaminated waste in containers designated for contaminated waste.

(8) Place a polyethylene liner in receptacles for contaminated waste before placing any waste in them.

c. **Safe handling of self-luminous devices:**

(1) Areas involved with handling unmounted sources (tritium filled, bare or silicone encapsulated glass capsules) or contaminated equipment will be separate from other shop

operations and shall be considered a restricted area (Tritium Instrument Repair Room-Tritium Air Monitor required).

(2) Uncontaminated instrument assemblies and subassemblies containing intact sources can be serviced in an unrestricted shop area with normal ventilation (Tritium Air Monitor is not required).

(3) Hooded ventilation is not required for shop operations involving handling/servicing of assemblies or subassemblies containing intact mounted sources (Tritium Air Monitor is not required).

(4) Radioactive self-luminous devices must be identified by a radioactive material label.

(5) If an item is broken or becomes unsealed, immediately notify the RPO. Avoid personal contact with the item. Use forceps or gloves made of rubber or polyethylene to pick up broken material. Place the material and the gloves in a sealed plastic bag. Avoid excessive dust disturbance and ingestion of material during clean up.

(6) All operations involving installation of radioactive sources into subassemblies and unpacking of individual radioactive sources must be conducted in the Tritium Instrument Repair Room within the ventilation hood with the system in operation. The exhaust hood will have a minimum average face velocity of 100fpm with the hood door in the operating position.

(7) Tools used to assemble and disassemble radioactive items will be marked by purple (Magenta) paint. These tools will not be removed from the Tritium Instrument Repair Room.

(8) No items will be removed from a radiation contolled area until verified as free from contamination by the RPO.

(9) Disposal of uncontaminated containers after the radioactive source has been removed will be accomplished as follows:

(a) Remove radioactive label.

(b) Place in dumpsters designated for normal trash.

(10) The Tritium Instrument Repair Room must be continously monitored by a Tritium Air Monitor.

(11) Personnel who are in direct contact with radioactive materials will frequently wash their hands and exposed parts of the body as a matter of routine and always before breaks, eating and leaving work.

(12) When unserviceable radioactive items are replaced, they must be disposed of in accordance with AR 385-11 as radioactive waste.

(13) All defective sources will be disposed of immediately from the work areas into a suitable radioactive waste container. The defective sources should be placed in a plastic bag prior to placing them into the waste container.

(14) All restricted work areas surfaces should be of such nature that they are replaceable or easily decontaminated if they become contaminated. The covering of work surfaces with plastic or strippable paint will minimize contamination of permanent facilities.

(15) The supervisor will be notified immediately upon the receipt of devices which may contain radioactive material. A survey for physical damage will be conducted on exterior and interior of containers if damage is noticed, or if materiel is received in plastic containers:

(a) Materiel will be moved to Tritium Instrument Repair Rooms and unpacked immediately. Plastic or rubber gloves must be worn when handling damaged or defective materiel. Materiel will not be removed from the Tritium Room until cleared by the RPO.

(b) Contaminated boxes and other material will be put in plastic containers and disposed of as radioactive waste.

(16) If containers are not damaged, they will be stored in an authorized storage area.

d. Requirements for the Tritium Instrument Repair Room:

(1) Prior to entering the Tritium Instrument Repair Room at the beginning of each work day, the overhead ventilation system will be turned on for approximately five minutes.

(2) Extreme cleanliness will be enforced to prevent the risk of contamination to employees or work areas.

(3) No eating, drinking, chewing, smoking, storing of food, or personal articles will be allowed in the repair room.

(4) All surfaces (walls, floors, chairs, tables, etc), will be kept free from contamination.

(5) Protective apparel will be worn while working in the repair room and removed when leaving the room.

(6) The restricted area will be designated with radioactive material warning signs.

e. Storage of Self-Luminous Devices.

(1) Designated areas will be set aside for the secure storage of radioactive materiel. These areas will be used for this purpose only. The storage areas will be as free as possible from the danger of flooding, fire, or explosions.

(2) Bulk storage buildings will be limited to 10,000 Curies or 56,600 sources. These buildings will be placarded to indicate radioactive material storage.

(3) Each individual bulk storage building will be equipped with a continuous air monitor. The air monitor will be calibrated at 3-month intervals and after each maintenance action.

(4) Ventilation, (a minimum of 12 air changes per day), must be provided in all areas where radioactive luminous materials are stored.

(5) Access to radioactive material storage areas will be restricted.

(6) Radioactive self-luminous devices will remain packaged and identified by a radioactive material label while in depot storage. Unassembled sources must be stored in marked containers and protected against pilferage or loss.

(7) Employees will not tamper with radioactive items or expose the radioactive materials in any way.

f. Disposal of Self-Luminous Devices.

(1) All damaged or obsolete self-luminous sources will be placed in air-tight plastic bags sealed with tape. Contaminated materials will also be placed in sealed, plastic bags for disposal.

(2) A radioactive material label will be placed on each bag of contaminated waste material. All bags will be kept in radioactive waste containers. These containers must be protected from loss or pilferage.

(3) The RPO, Safety Office, will be notified when waste bags are filled and sealed. Radioactive material awaiting disposition for ultimate disposal will be stored locally under the guidance of the RPO.

(4) Radioactive waste tritium shall be disposed of in accordance with AR 385-11 and TB 43-0197.

g. Emergency Procedures:

(1) Source Breakage:

(a) When it is suspected or known that a source is broken, an audible alarm will be given so all personnel will evacuate the area. Ventilation of the area will be increased as much as possible.

(b) Secure the suspected contaminated area from unauthorized entry immediately.

(c) Notify the RPO, as soon as possible.

(d) If an air monitor is in the area and it indicates a safe air concentration, the area may be entered after five minutes for decontamination. If an air monitor is not available, the area must be ventilated for thirty minutes prior to entry for decontamination.

(e) The RPO will survey the area with smear tests and will direct decontamination efforts where needed.

(f) All employees involved in both the incident and decontamination procedure will be monitored by collecting urine specimens for tritium analysis.

(g) Personnel will not be permitted to return to work until a survey of the area is made and approval of the RPO is obtained.

(h) Contaminated material will not be allowed to come in contact with any part of the body at any time. Protective equipment such as rubber or synthetic gloves and disposable

coveralls will be worn at all times when handling radioactive wastes and broken radioactive parts.

(i) Immediately after leaving the contaminated area, employees handling broken radioactive devices or contaminated material in any way will wash their hands and other exposed parts of the body. Hands and arms will be thoroughly washed with soap and water, especially before eating, drinking, or smoking. All contaminated clothing will be removed and placed in sealed plastic bags. The RPO will be contacted for disposition instructions.

(2) Urinalysis of Exposed Individuals:

(a) Urinalysis sample cannot be taken until four hours have elapsed.

(b) Chief, Health Clinic, will collect one urine sample from each exposed person per day until it has been confirmed that no overexposure has occurred.

(c) The RPO will be notified when urine samples are available for analysis.

(3) Air Monitor Alarm:

(a) Employees will evacuate the area when the alarm is sounded.

(b) The RPO will be immediately notified and must determine the cause for the alarm before employees are allowed to enter the area.

(c) If contamination is detected, decontamination procedures directed by the RPO will be initiated.

(4) Fires and Other Major Emergencies:

(a) Notify all employees to evacuate the area or building and to remain upwind of the fire, turn off all ventilation equipment, and if possible, close all doors and windows.

(b) Immediately, notify the Fire Department, RPO, and other emergency personnel and give the location of the fire.

(c) Attempt to extinguish the fire if the fire is very small and a radiation hazard is not immediately present.

(d) After the fire has been extinguished, monitor employees, the fire fighting equipment, and the area to be decontaminated.

(e) All employees who were in the emergency area and those engaged in combating the emergency will report to the Health Clinic for urinalysis.

(f) Work in the area will not resume until a survey has been conducted and approval is given by the RPO.

(g) A complete history of the emergency and action taken will be prepared for installation records.

8. Security of Self-Luminous Devices:

a. Serviceable tritium illuminated devices displaying approved radiation labels are subject to NRC regulations which require securing of licensing material against unauthorized removal.

b. All subassemblies containing tritium sources shall be secured against unauthorized usage and removal from the facility. Special care will be taken to secure all unmounted tritium sources as these items are not labeled as to their potential hazard. If a tritium source is lost or stolen, action shall be taken to recover the source and prevent recurrence of same. This action will be reported to the Commander, US Army Armament Materiel Readiness Command, ATTN: Commodity Radiological Protection Office, DRSAR-SFD, Rock Island, IL 61201. All restricted areas will be posted with appropriate warning signs.

9. Questions/Recommendations should be directed to Maintenance Management and Analysis Division.

FRANK R. BIBB
Chief, Shops Division

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ENCLOSURE 12

Hazard Analysis

HAZARD ANALYSIS AND STORAGE CRITERIA

1. HQ, AMCCOM, as the requesting authority for this license, is fully cognizant of the NRC concept of "as low as reasonably achieveable (ALARA)." This command will conduct operations relating to this licensce within the concept of ALARA. Our procedures are not based on the allowance of any exposures or releases of radioactivity. The numbers cited in the following hazard calculations as maximum requirements are so stated because of Title 10, CFR. To date, we know of no instances where any personnel have been exposed to as much as 10 percent of the permissible levels by tritium sources currently licensed to this headquarters, nor have we released any effluents to unrestricted areas in excess of 1 percent of the MPC.

2. The calculations on the following pages are not intended to present situations which we feel are likely to occur. In fact, we have never experienced a problem as severe as these situations in connection with the tritium lamps currently used by the Army. These assessments are made only with the intent of demonstrating the relatively low degree of hazard associated with tritium-sealed sources in the amounts and size requested by this application.

Hazard Assessment of a Fire Involving Breakage of Tritium Gas Sources

The maximum credible accident which could occur would involve a storage area fire and result in the release of all of the tritium in a short period of time. An estimate of the hazard may be obtained using Sutton's equation:

$$\bar{X}(x,y) = \frac{2Qe^{-\left[\left(\frac{1}{C^2}x^{2-n}\right)(y^2+h^2)\right]}}{\pi C^2 u x^{2-n}}$$

where

$\bar{X}$ = volumetric concentration of the contaminant mCi per M3

Q = emission rate, mCi/sec

x,y = coordinates of point of measurement from point of release, meters

u = means wind speed, meters per second

C = virtual diffusion coefficients in lateral and vertical directions

n = dimensionless parameter determined by the atmospheric stability

h = effective chimney height, meters

At any distance from the point of release, the ground level concentration will be a maximum when the center line of the plume is at ground level, y = o. Assuming that the release occurs at ground level, and neglecting the effects of the heated air, the above equation becomes:

$$X(x,0) = \frac{2Q}{\pi C^2 u x^{2-n}}$$

Assume that 1,000 Ci of tritium gas is released during 1 hour. Thus Q = 1,000 Ci/60 min = 16.67 Ci/min = 277.8 mCi/sec.

From Smith and Singer* for a lapse metrological condition

n = 0.24 and C = 0.4.

*M. E. Smith and I. A. Singer, Am Ind Hyg. Assoc, Quart. 18, 319 (1957)

Assuming a mean wind speed of 10 meters per minute, the resulting concentration of tritium at ranges, of 100, 500, and 1,000 meters would be as follows:

Range (Meters)	Concentration of H-3 (mCi/M^3)
100	2
500	0.12
1,000	0.03

The maximum hazard to man would result only in the unlikely event of the fire converting all of the tritium oxide. The standard man, while performing light work, breaths 1,200 liters (1.2 cubic meters) of air per hour, thus, the maximum tritium intake at the above ranges for a 1-hour stay time would be as follows:

Range (Meters)	H-3 Intake for a Standard Man (mCi)
100	2
500	0.12
1,000	0.03

Standard practices in SOPs used by all Army activities require evaluation of personnel to an upwind area in case of fire involving radioactive materials.

Based on the preceding calculations, the maximum quantity of material permitted in any field storage area or any storage area not equipped with equipment to monitor for tritium will be 1,000 curies or 2,264 sources, whichever limit is reached first.

At bulk storage locations, available instrumentation to detect tritium is sufficient to allow storage of a maximum of 10,000 curies or 56,500 sources, which-ever limit is reached first, to be stored in each storage area. bulk storage buildings will each be equipped with an air monitor. Forced air ventilation will be provided when required to prevent buildup of tritium gas. The air monitors will be set to alarm at no higher than 5×10^{-6} uCi/cc for controlled areas.

Hazard Assessment of Accidental Breakage of One or More Tritium Sources

1. Postulated accident: The accidental breakage of three of the largest H-3 sources simultaneously by a user as follows:

a. Three - 9 curie sources for total of 27 curies H-3.

b. Less than 1 percent of H-3 is tritiated H_2O; therefore, 0.27 curies tritiated H_2O released in 1 minute.

c. Standard man breathes 20 liters per minutes.

d. Maximum permissible body burden = 2×10^3 uCi.

e. Ten-minute exposure time.

2. Assumption: The concentration of tritium gas following the breakage is of the form of a time dependent gradient with respect to distance from source. Assume the average concentration a user is exposed to is equivalent to having the activity uniformaly dispersed in a spherical volume of radius 10 feet; i.e.:

$$\text{Concentration} = \frac{2.7 \times 10^5 \text{ uCi}}{\frac{(4\pi)}{3}(10)^3(12)^3(2.54)^3(10^{-3}) \text{ liter}}$$

Concentration = 2.27 uCi/liter

3. Exposure: Assuming even an unlikely 10-minute exposure, a man would inhale and retain the following amounts of tritiated water:

$$\text{Intake} = 2.27 \text{ uCi/liter} \times 20 \frac{\text{liters}}{\text{min}} \times 10 \text{ min}$$

Intake = 454 uCi tritiated water.

Intake = 1/4 Maximum permissible body burden for continuous exposure.

APPENDIX A

Record of Environmental Consideration

RECORD OF ENVIRONMENTAL CONSIDERATION

TITLE: Renewal of Nuclear Regulatory Commission License BML 12-00722-06

DESCRIPTION OF PROPOSED ACTION: Renewal of license BML 12-00722-06 is required for continued use and possession of fire control devices containing tritium gas sealed in glass ampoules.

ANTICIPATED DATE AND/OR DURATION OR PROPOSED ACTION: June 1988
June 1993

It has been determined that the action qualifies for categorical exclusion #28, AR 200-2, appendix A, and no extraordinary circumstances exist as defined in AR 200-2, paragraph 4-3.

Signed David P. Skogman Date 2/22/88
David P. Skogman
Ch, Systems, Chemical, & Radiation Div

Signed Ronald T. Shinbori Date 3/18/88
Ronald T. Shinbori
HQ, AMCCOM, Environmental Coordinator

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DRSAR-SF

08 JUN 1983

SUBJECT: Nuclear Regulatory Commission (NRC) Request for Additional Information in Support of Renewal Application for By-Product Material License 12-00722-06

Commander
US Army Materiel Development
and Readiness Command
ATTN: DRCSF-P

1. Reference letter, DRCSF-P, HQ, DARCOM, 8 April 1983, SAB.

2. The following replies are provided to the request from NRC, 31 March 1983, with Control Number 12383.

a. Request 1: Clarify the type of periodic radiation surveys that will be conducted in the maintenance and bulk storage facilities. Please confirm that these surveys will consist of instrument and smear testing surveys. Please specify the contamination limits that are acceptable under the smear survey program. Please refer to Regulatory Guide 8.21 (copy enclosed). You may state the criteria given in Tables 1 and 2 of this guide will be followed. Please confirm your safety instructions will be modified to include this criteria.

Response: Army Regulation (AR 700-64) requires monitoring at bulk storage locations to consist of quarterly surveys using appropriate instruments and the taking of random smears and evaluating them. Under the present 12-00722-06 license smears are taken in bulk storage locations monthly and evaluated by liquid scintillation counting for tritium. Action level is 400 dpm/100cm^2.

b. Request 2: Provide a copy of the instructions to personnel picking up, receiving, and opening packages of radioactive materials and confirm that you will follow the procedures given in 20.205 of 10 CFR Part 20.

Response: Army Regulation 700-64, para 5-6, Radioactive Commodities in the DOD Supply Systems (Encl 1), and AR 385-11, para 1-22, Ionizing Radiations Protection (Encl 2), define responsibilities for pickup, receipt, and opening of packages containing radioactive materials. This information

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is usually further supplemented by a local standard operating procedure at the particular Army installation. ARRCOM health physicists annually inspect bulk storage locations which store tritium devices under the 12-0072-04, 06, and 09 license. During these inspections the adequacy of fulfilling the above regulations is determined and corrective measures instituted as required. The Army regulations follow the procedures given in 20.205, 10 CFR Part 20.

c. Request 3. Under your proposed bioassay program, please clarify the conditions under which the Army will conduct tritium bioassays.

Response: The Army conducts tritium bioassays at those depots and Rock Island Arsenal which are designated locations for rework of equipment which contain the vials. Personnel who work with tritium have a baseline urinalysis taken at start of work and monthly thereafter. If an incident with tritium occurs, urinalysis for tritium is done at that time.

d. Request 4: With respect to the quality assurance program for contamination testing of the radioactive sources and related subassemblies, please clarify the wipe test contamination limit acceptable to the Army in terms of dis./min./cm2 of area tested (please specify).

Response:

(a) The present limit stated on drawings of sources submitted for the license is "removable radiological contamination by wiping shall be less than 1,000 dpms." This limit of removable contamination has been applied as 1,000 dpms per source regardless of the exact size of the source. The surface area of some sources is under 100 cm^2.

(b) The limit of 1,000 dpms removable contamination per source, where the source has a smaller surface area than 100 cm^2 is still far below the allowable contamination level. The total body burden for tritium is 2mCi (IRCP handbook). 2mCi = 4.44×10^9 dpm. If a worker were to ingest the maximum allowable contamination of 1,000 dpm per source per minute, it would take 1,850 40-hour work weeks or 9,250 8-hour work days to reach the tritium body burden. This assumes maximum allowable contamination and a constant ingestion rate of 1,000 dpm per minute. This does not take into account the biological half-life of tritium, i.e., 16-18 days. It is apparent that the 1,000 dpm limit per source will not present a hazard to the user in excess of allowable limits.

(c) Additionally, we requested in a letter dated 14 May 1982 and hand carried to the NRC, that the removable contamination level be set at 2,000 dpm/100 cm^2 for surfaces of equipment in which sources are installed. Using the same justification as above, if 2,000 dpm were ingested per minute constantly, it would take 925 40-hour work weeks to reach the maximum tritium

DRSAR-SF

08 JUN 1983

SUBJECT: Nuclear Regulatory Commission (NRC) Request for Additional Information in Support of Renewal Application for By-Product Material License 12-00722-06

body burden. This is not taking into account the biological half-life of tritium, i.e., 10-18 days. We request that the contamination level be raised to a maximum 2,000 dpm/100 cm^2 for surfaces in which sources are installed. This limit is required to prevent losses of expensive equipment which cannot be reasonably decontaminated below the prestated limit.

(d) Use of equipment decontaminated to the 2,000/100 cm^2 level will be controlled to field use within the DOD. Equipment planned for release outside the DOD will be decontaminated to 100 dpm/100 cm^2 as stated in the license application.

3. Anniston Army Depot had been listed on the 12-00722-06 license as a bulk storage and depot level maintenance facility. However, the renewal request for the 12-00722-06 license listed Anniston only as a bulk storage facility. Request Anniston be listed as BOTH a bulk storage area and depot level maintenance facility. Attached are the Depot SOP for Handling Tritium, Resume for the RPO, and Repair Room Layout (Encl 3, 4, and 5).

4. Point of contact at this office are Mrs. Betty Peterson and Mrs. Kathy LaFrenz, AUTOVON 793-3482/FTS 367-3482.

FOR THE COMMANDER:

5 Encl
as

LAWRENCE E. SMITH
Chief, Safety Office