

# APPLICATION FOR MATERIAL LICENSE

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

## FEDERAL AGENCIES FILE APPLICATIONS WITH:

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

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

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

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

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

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

## IF YOU ARE LOCATED IN:

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

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

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

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

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

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

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

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

- ☐ A. NEW LICENSE  
☒ B. AMENDMENT TO LICENSE NUMBER \_\_\_\_\_  
☐ C. RENEWAL OF LICENSE NUMBER \_\_\_\_\_

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

Hester Bros. Wholesale Co.  
Rt 4, Greenville Road  
LaGrange, Georgia 30240

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

Hester Bros. Wholesale Co.  
Rt 4, Greenville Road  
LaGrange, Georgia 30240

## 4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Jay Kaplan, Kaplan, Russin and Vecchi

## TELEPHONE NUMBER

202-887-0353

SUBMIT ITEMS 5 THROUGH 11 ON 8 1/2 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.

## 6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED

## 7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE

## 8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

## 9. FACILITIES AND

8801270417 870724  
REG2 LIC30  
10-23654-01E PDR

## 10. RADIATION SAFETY PROGRAM

## 11. WASTE MANA...

## 12. LICENSEE FEES (See 10 CFR 170 and Section 170.31)

FEE CATEGORY 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

*W.C. Senn*

## TYPED/PRINTED NAME

W. C. Senn

## TITLE

General Manager

## DATE

4/27/87

## A. ANNUAL RECEIPTS

< \$250K  
\$250K—\$500K  
\$500K—\$750K  
\$750K—\$1M

## B. NUMBER OF EMPLOYEES (Total for entire facility excluding outside contractors)

\$1M—3.5M  
\$3.5M—7M  
\$7M—10M  
> \$10M

## 14. VOLUNTARY ECONOMIC DATA

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION (dollar and/or staff hours)  
ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE  
PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? (NRC regulations permit  
it to protect confidential commercial or financial—proprietary—information furnished to  
the agency in confidence)

☐ YES ☐ NO

## FOR NRC USE ONLY

## TYPE OF FEE

AMD

## FEE LOG

May 870/140

## FEE CATEGORY

9A/3H

## COMMENTS

## APPROVED BY

*S. Kim*

## AMOUNT RECEIVED

\$580 + 120

## CHECK NUMBER

9737

## CHECK NUMBER

9756

020195

5/13/87

Information pursuant to application for license amendment for Hester Brothers Wholesale Company as per NRC Form 313

Item 5: Radioactive Material

- a. Hydrogen-3
- b. Gaseous form sealed in a borosilicate glass capsule
- c. Maximum amount to be possessed at any one time:
  - Previously licensed quantity - 556 Ci
  - Addition as per license amendment application - 60 Ci
  - Total - 616 Ci

Item 6: The sealed sources will be used as a source of illumination for hunting bow sights. The ML-100 illuminated sight pin is designed as a replacement part for standard hunting bow sights. The addition of a luminous element not only provides improved low-light sighting capability, but also increases hunting safety by reducing the possibility of an errant arrow because of lack of ability to aim accurately.

Items 7 - 11: As per original license application and previous amendment application

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## SECTION I. A. Description of by-product material

The ML-100 illuminated sight pin utilizes tritium (H-3) gas for bow-sight illumination. The source is identical to those contained in the previously licensed ML-200 and ML-300 gunsight systems. As for the previously licensed sights, these sight pins are manufactured by Meprolight in Israel and will be imported into the United States by Hester Brothers Wholesale Company located in LaGrange, Georgia. The sight pins contain a sealed glass capsule filled with H-3 gas. The sources for the new Meprolight sight pins will be obtained from one of the following suppliers:

Mb-Microtec AG  
CH-3172 Niederwangen/Bern  
Fresburgstrasse 624  
Switzerland

Reg. # NR-446-S-102-S

Brandhurst Company, Ltd.  
P.O. Box 70  
Wellington Road, High Wycombe  
Buckinghamshire HP 123PS, England

Reg. # NR-196-S-103-S

Saunders-Roe Developments, Inc.  
2580 Landmark Drive  
Winston-Salem, N.C.

Reg. # NC585S102S  
(North Carolina)

## SECTION I. B. Description of intended use

The ML-100 illuminated sight pin is designed as a replacement part to standard hunting bow sights, and can be mounted directly with no modification to bow or bow sight. The sight pin will be used by sportsmen to improve low-light aiming capability. The addition of a luminous element to the bow sight design provides an improved low-light level sighting capability and thereby greatly increases the hit probability for the user while, at the same time, enhancing safety by reducing the likelihood of an errant arrow.

Each ML-100 consists of one sight pin containing one source.

## SECTION II. A. Type and quantity of by-product material

Each ML-100 sight pin contains one (1) source of 12 mCi, H-3 gas. The gas is encapsulated in borosilicate glass. The source design is identical to that for the previously licensed items.

SECTION II. B. Annual distribution and activity stored in one location

This amendment requests the following changes to the previously licensed quantities.

1. Annual distribution - 100,000 ML-115 systems\*

20,000 ML-116 systems\*

30,000 ML-200 systems\*

5,000 ML-300A systems\*

5,000 ML-300N systems\*

20,000 ML-100 sight pins

Total activity - 4660 Ci\*\*

2. Activity stored in one location

Maximum number of units expected to be stored in one location

8,000 ML-115 systems\*

2,000 ML-116 systems\*

5,000 ML-200 systems\*

2,500 ML-300A systems\*

2,500 ML-300N systems\*

5,000 ML-100 sight pins

Total activity - 616 Ci\*\*\*

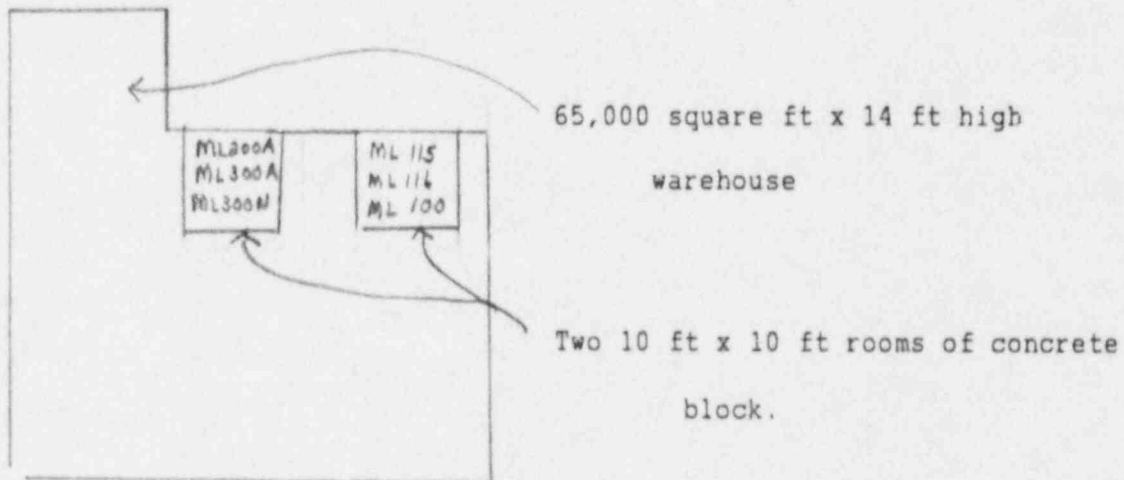
\* Previously licensed

\*\* Previously licensed quantity - 4,420 Ci

\*\*\* Previously licensed quantity - 556 Ci



3. Storage will be in the storage room described in the original license application for storage of the ML-115 and ML-116 gunsight systems. (This will raise the total activity stored from a previously licensed 266 Ci to 326 Ci, an addition of 60 Ci for the ML-100 sight pins). The room is constructed of concrete block, 10 ft x 10 ft x 14 ft in a warehouse area of 65,000 sq. ft. which contains a similar room used for the storage of tritium illuminated gunsights having a total activity of 290 Ci. The room is vented to the outside and provided with ventilation to produce a minimum air change rate of 1 air change/hour. It is under lock control and labeled as containing radioactive materials. Nine warehousemen work more or less full time in the large warehouse.



SECTION III. A. Chemical and physical form (as per previous license application)

SECTION III. B. Solubility in water and body fluids (as per previous license application)



#### SECTION IV. A. Construction and Design (See drawings, Appendix A)

The bow sight pin contains an H-3 activated light source - gaseous H-3 encapsulated in borosilicate glass which is internally coated with a phosphor. This light source is held in place and sealed into its steel housing with a gluing/sealing system which protects the sight from accidental damage as well as from unauthorized handling of the light source. The system has been designed to protect the H-3 light source and the user under field or extreme environmental conditions. The illuminated window surface is covered by a clear, hard material (patented M. V. gluing system) to prevent dirt from entering the viewing system or covering the light; and, the entire light source is protectively encapsulated by this material. Design considerations require that this material be impervious to standard cleaning solvents, trichloroethane, oils and MIL-C-372 cleaning mixture. The sight pin, installed in the bow sight, is protected from accidental damage by a metal frame which surrounds the entire assembly.

The construction and design of the ML-100 sight pin are based on the identical methodology and assembly technique as that used in the ML-115 front sight for the M-16A1 and AR-15 rifles (previously licensed under 10-23564-01E). The tritium light source is inserted and glued in place in its steel housing and all surfaces and exposed areas sealed. The total activity of the ML-100 sight pin is 12 mCi in one light source. Design qualification and safety testing were accomplished under the auspices of Meprolight.

#### SECTION IV. B. External radiation levels

As stated in the previous license application, any external radiation will be due to bremsstrahlung. No significant dose is possible since H-3 is a low energy beta. The calculated dose rate at 25 cm assuming no shielding from the glass capsule is less than 0.001 mrem/hr.

#### SECTION IV. C. Degree of access

The design of the sight pin and its assembly in the bow sight assures that the tritium light source is not accessible during normal use, storage, handling or maintenance. Full protection is afforded by both the steel housing and hardened glue system which encompasses the source. In addition, the sight pin installed in the mounted bow sight is protected from accidental damage by a metal frame which surrounds the entire assembly.

#### SECTION IV. D.. Expected useful life (as per the previous application)

The expected useful life of the product is 6 years. This is the length of time in which the brightness decreases to one-half (nominal) of its initial value (Reference, British Defence Standard 62-4 Issue 3).

SECTION IV. E. Proposed method of labeling (See drawings, Appendix A)

The sight pin will be permanently marked with the Meprolight logo (EVS) and the symbol for tritium (H-3). The dimensions of the logo and of the tritium symbol will each be 2 mm x 1.5 mm. In addition, each sight pin will be purchased with instructions for installation and use which carry a notification that the sight pin contains tritium in a sealed source, the activity of the source, and the warning that no attempt should be made to disassemble the sight pin. The notification will also state that the sight pin must be returned to the authorized dealer for any corrective measures or disposal. (See instruction sheet, Appendix B).

## SECTION V. Prototype testing

1. Prototype testing to prove out the construction methodology of all the sight designs has been performed on the ML-115 sight system by the Israel Defence Forces (IDF)(Qualification and Safety Testing - Document #0204 (5520) 6063 dated 23 May 1983). The tests performed and the results obtained were summarized in the previous license application. These tests are applicable to the Model ML-100 sight pin since the same method of mounting in the sight is used.

2. In addition to the above stated testing program, similar programs have been conducted by Israel, Belgium and Singapore on sights for the M16, Galil and FNC rifles. These sight designs, from the standpoint of rigidity, light source mounting, and safety, are equivalent to that of the ML-100. (Moreover, the prototype testing was at a level far more severe (based on rifle use) than that which could be expected for a hunting bow.) The test results were acceptable, similar to those stated in Section V of the original license application. Qualification testing of the ML-100 was performed under the auspices of Meprolight with similar acceptable test results.

## SECTION VI. A. Estimated radiation dose commitments

### 1. Normal conditions

#### a. Normal use

No radiation dose commitment is anticipated during normal use of the bow sight pins. External radiation dose rate at 25 cm is estimated to be less than 0.001 mrem/hr. The tritium gas is sealed in borosilicate glass; therefore, no inhalation or ingestion of the radioactive material is expected in normal use.

#### b. Storage

Using the methodology and assumptions described in the previous application, the annual dose commitment to a warehouse worker would be less than 0.01 mrem.

Distilled water immersion tests on the sights indicated a leakage rate no greater than  $1 \text{ E-5 uCi/sight}$  in 24 hours. Assuming that 5,000 sight pins containing one (1) source each are stored in a 14ft. x 10 ft. x 10 ft. room with the previous quantity of 8,000 ML-115 and 2,000 ML-116 night sight systems (26,000 sources) in a 65,000 sq. ft. warehouse with an air exchange rate of 1 air change per hour, the calculated equilibrium concentration of tritium is as follows:

$$C = \frac{I}{\lambda V}$$

where: I = rate of influx of H-3 gas  
V = volume of the room  
 $\lambda$  = air exchange rate  
C = equilibrium H-3 gas concentration

$$I = 31,000 \text{ sources} \times 1 \text{ E-5 uCi/source-24 hr} = 1.3 \text{ E-2 uCi/hr}$$

$$V = 1400 \text{ cubic ft} \times 2.83 \text{ E4 cc/cubic foot} = 3.96 \text{ E7 cc}$$

$$C = \frac{1.3 \text{ E-2 uCi/hr}}{1 \text{ a ch/hr} \times 3.96 \text{ E7 cc}} = 3.3 \text{ E-10 uCi/cc}$$

$$C = 3.3 \text{ E-7 mCi/cubic meter}$$

This value is unchanged from the previous license amendment application.

The concentration limit set in 10CFR20 Appendix B, Table II, Column 1 for H-3 in air is  $2 \text{ E-7 uCi/ml}$ . The calculated equilibrium concentration in the storage area is less than 1% of the 10CFR20 concentration limit for a controlled area.

The annual dose commitment to a warehouse worker, working in the area for 1 hour/day, 250 days/year is as follows:

Assume:

All H-3 gas is converted to tritiated water

Total rate of absorption of tritiated water into body fluids (mCi/minute) from inhalation and skin absorption is  $3 \text{ E-2 C}$  where C is the concentration of tritiated water in air in mCi/cubic meter (ICRP 30)

Committed dose equivalent per unit intake of tritiated water is  $1.7 \text{ E-11 Sv/Bq}$   
( $6.3 \text{ E-2 rem/mCi}$ )

Annual committed dose:

$$H = 3.3 \text{ E-7 mCi/cubic meter} \times 3 \text{ E-2 mCi-cubic meter/mCi-minute} \\ \times 60 \text{ minute/hour} \times 250 \text{ hr/yr} \times 6.3 \text{ E-2 rem/mCi} = 9.4 \text{ E-6 rem/year}$$

$$H = 0.009 \text{ mrem/year}$$



A similar type calculation in NUREG/CR-0215 "Estimates of Potential Radiation Doses from Wristwatches Containing Tritium Gas" yields a committed dose of 50 mrem from exposure to  $2.5 \text{ E-5 uCi/cc}$  for 24 hours or  $8.3\text{E4 mrem-cc/uCi-hr}$ . Using that factor, the annual committed dose to a warehouse worker would be:

$$8.3\text{E4 mrem-cc/uCi-hr} \times 250 \text{ hr/yr} \times 3.3 \text{ E-10 uCi/cc} = 0.007 \text{ mrem}$$

c. Transportation

Assume a truck driver transports all sights to be stored in one room of the warehouse in a single truckload and spends a total of two hours in the trailer loading and unloading and that the truck is ventilated to produce one air change/hour.

$$V = 2.9 \text{ E7 cc} \quad (\text{NUREG/CR-0215})$$

$$I = 1.3 \text{ E-2 uCi/hr}$$

$$\lambda = 1 \text{ a ch/hr}$$

$$C = \frac{1.3 \text{ E-2 uCi/hr}}{1 \text{ a ch/hr} \times 2.9 \text{ E7 cc}} = 4.5 \text{ E-10 uCi/cc}$$

Dose comment:

$$H = 4.5 \text{ E-7 mCi/cubic meter} \times 3 \text{ E-2 mCi-cubic meters/mCi-minute} \\ \times 2 \text{ hours} \times 60 \text{ minutes/hour} \times 6.3\text{E-2 rem/mCi}$$

$$H = 1.0 \text{ E-7 rem} = 1.0 \text{ E-4 mrem}$$

d. All other situations during normal use, storage, and transportation involve smaller quantities of H-3 and/or shorter exposure times thus would result in negligible dose

commitment.

e. Disposal (as per previous license application)

The sight pins are relatively expensive items and are unlikely to be inadvertently removed from the hunting bow and disposed of. The disposal of an intact hunting bow to normal trash is unlikely. Instructions accompanying the sight pins request return of damaged or defective sight pins to the distributor. Therefore, improper or careless disposal of the units is unlikely to cause any significant radiation dose.

NUREG/CR-0215 estimates the dose commitment to the maximally exposed individual for burial of 500,000 tritium lighted wristwatches per year in landfills (20,000 in a single location) to be 0.1 mrem/yr. If the sources are burned a potential maximum dose commitment of 17 mrem/yr was estimated.

The total number of sight pins potentially disposed of in a single year would be much lower and the H-3 activity per unit also considerably lower than that postulated for watches containing H-3. Therefore, disposal of sight pins will not present a radiation hazard to the general public.

2. Accident conditions

a. Use

The maximum credible accident involving the use of the sight pin is rupture of the source and instantaneous release of the gas during shooting.

Assume

Sight pin contains a maximum of 12 mCi of H-3 gas

Sight pin is 80 cm from the user's face

Breathing zone can be represented by a cone with apex at the source and base, a 10 cm diameter circle at the user's face.

All H-3 is converted to tritiated water instantly

Effective half-time for tritiated water = 10 days

Total absorption of inhaled tritium in body fluids

Mass of soft tissue = 63,000 g (ICRP 30)

Fraction of gas released in the direction of the breathing zone:

$$F = \frac{\pi r^2}{4\pi R^2} \quad \text{where } r = \text{radius of the base of the cone}$$

$$R = \text{distance from source to nose}$$

$$F = \frac{3.14 \times 5 \times 5 \text{ sq cm}}{4 \times 3.14 \times 80 \times 80 \text{ sq cm}} = 0.001$$

Maximum estimated dose commitment to user assuming all H-3 gas is converted to tritiated water

$$H = 12 \text{ mCi} \times 0.001 \times 6.3 \text{ E-2 rem/mCi} \times 1\text{E3 mrem/rem} = 0.7 \text{ mrem}$$

For such an accidental instantaneous release, most of the gas would remain as elemental H-3. The dose commitment from H-3 gas would be approximately 1000 times less. The total estimated dose commitment would be 2% of the calculated value since up to 2% of the gas originally in the glass capsule could be in the form of tritiated water.

#### b. Storage

The maximum credible accident involving storage of the

units would involve a fire in the storage area which ruptures some of the borosilicate glass capsules. (A massive fire which would rupture all sources would be likely to result in immediate dispersion of the H-3 gas and dilution with outside air, thus reducing the concentrations of H-3 gas in the storage area.

Assume:

50% of the sources in a single storage room rupture  
 Immediate dispersion of the gas within the storage area  
 Conversion of all H-3 gas to tritiated water  
 Total rate of absorption of tritiated water into body fluids (mCi/minute) from inhalation and skin absorption is  $3 \times 10^{-2} C$  where C is the concentration of tritiated water in air in mCi/cubic meter (ICRP 30)

$$C = \frac{326 \text{ Ci} \times 0.50}{3.96 \times 10^7 \text{ cc}} = 4.1 \times 10^{-6} \text{ Ci/cc} = 4.1 \times 10^3 \text{ mCi/cubic meter}$$

Dose commitment:

$$H = 4.1 \times 10^3 \text{ mCi/cubic meter} \times 3 \times 10^{-2} \text{ mCi-cubic meter/mCi-min} \times 6.3 \times 10^{-2} \text{ rem /mCi}$$

$$H = 8 \text{ rem/minute}$$

Dose commitment to occupant remaining in enclosed area for 1 minute = 8 rem

Dose commitment to fireman remaining in enclosed area without respiratory protection for 2 minutes for purpose of rescue = 15 rem

This calculation greatly overestimates the true dose commitments in this situation. Air currents would disperse the gas very rapidly in the case of a fire, particularly one of such severity as to rupture 50% of the sources instantaneously. In addition, only a small fraction of the H-3 gas is likely to be converted to tritiated water before venting to the outside.

A more reasonable estimate of the dose commitment would be obtained using the maximum fraction of tritiated water in the source, 0.02. If this value is used the dose commitments become  $1.5E2$  mrem for the occupant and  $3.1E2$  mrem for the fireman.

c. Ingestion or inhalation of the entire H-3 content of a sight pin (12 mCi).

$$H = 12 \text{ mCi} \times 6.3 \text{ E-2 rem/mCi} = 0.8 \text{ rem}$$

The calculation assumes the entire 12 mCi H-3 gas in the sight pin Model ML 100 is converted to tritiated water. H-3 gas is not absorbed readily in body fluids thus produces negligible dose. This postulated accident would require that an individual remove the sources from the sight pin without damaging it, swallow it, and have the source rupture while in the digestive tract. Each of these conditions is highly improbable. The combination of all three occurring is nearly impossible.



## SECTION VI. B. Compliance with 10CFR32.23 and 32.24

## 1. Normal use and storage

No radiation dose commitment is expected in normal use of the ML-100 sight pins. The maximum expected dose commitment to workers in the storage area is less than 1 mrem/year. This is within the limit set in Column II, Table 32.24.

## 2. Accidental release of the tritium gas

a. Under maximum credible conditions of use of the equipment, the dose commitment to an individual would not exceed 1 mrem, within the limits set in Column III, Table 32.24. In the highly improbable case where an individual ingested the contents of an entire source, the estimated dose commitment is 0.8 rem. This is within the limits set in Column IV, Table 32.24.

b. Under extreme fire conditions in the storage area, the estimated maximum dose commitment to an occupant of the area is 8 rem; to a fireman in the process of rescue, 15 rem. More reasonable values based on 2% of the H-3 gas being oxidized and remaining in the storage room are 0.2 rem and 0.3 rem respectively. However, even under the extreme conditions the dose commitments would be within the values in Table 32.24.

#### SECTION VI. C. Disposal of units

No significant radiation dose commitment is expected to result from disposal of the sight pins since dispersion and dilution with the atmosphere would rapidly reduce tritium concentrations in air to background levels.

Users of the devices are instructed to return defective units and unwanted units to the distributor for disposal. The cost of this product is such that inadvertant or careless disposal is unlikely.

SECTION VII. Quality control procedures - Receipt of imported sources  
and manufacture of units (as per previous license  
application)

1. As described in previous submissions, all safety and quality control procedures have been designed to comply with the requirements of the Israel Ministry of Defence and the Israel Atomic Energy Commission (License Number 6004, renewed 4/3/85, allowing Mepro to manufacture with tritium sources and to have in-house, at any given time, up to 5,000 Ci of H-3).

2. Light sources for the ML-100 sight pins are purchased only from the three producers already qualified by the U.S. Military: Saunders-Roe and Brandhurst in Great Britain; Mb-Microtec in Switzerland. In addition to dimensional characteristics, the lights are procured with quality requirements for tritium purity, activity, brightness and color; and, they are supplied with a certificate of conformance.

Receiving inspection is performed at Meprolight including the following steps in the order listed:

- Visual examination of packaging for any signs of external damage
- Batch swipe test to check for gross leakage problems
- 100% inspection in dark-room
- Photometric brightness measurement of dimmest samples
- Sample subjected to dimensional inspection

Only after satisfactory completion of receiving inspection can the sources be placed into storage or released for production.

3. All manufacturing is performed in accordance with the safety and health requirements of the Israel Atomic Energy Commission. During manufacture, all work is performed under vented hoods. Work areas are checked for cleanliness with daily swipe tests counted in a Packard Tri-Carb Model 4430 Liquid Scintillation Counter.

In addition to in-process inspections and final inspections for damage, workmanship and completeness of assembly, samples are taken at random from each day's overall production (all sights) for scintillation counting to assure that there are no health hazards. These soak tests, to determine if there is any leakage, require that the samples be submerged in distilled water for 24 hours at room temperature and the water or an aliquot then counted.

Batch wipe or immersion tests of all products are performed (counted for beta activity with the Tri-Carb) to check for any removeable contamination. All scintillation counting results must indicate no detectable activity (less than  $1\text{E-}5$  uCi/sq. cm).

4. Lot acceptance tests on the completed sight pins are performed as stated below:

- Sampling in accordance with MIL-STD-105D for inspection of dimensional characteristics affecting fit, function or interface; visual defects; workmanship
- 100% testing in a dark room for comparative brightness, coupled with photometric brightness measurement of the dimmest units (to assure a 6 year useful life).
- 100% batch wipe or immersion test to assure less than  $1\text{E-}5$  uCi/sq. cm removeable activity per sight

5. To afford protection from shipping or handling damage, the sight pins will be individually packaged in a blister pack and then placed in containers of 10 blister packs each. These will then be case packed in total lots of 1000 sight systems.

6. Upon receipt, Hester Brothers Wholesale Company will inspect the packaging for any signs of obvious external damage. Then, after unpacking, Hester Brothers will inspect 100% of the sight pins in a dark room before release for storage and distribution. In addition, Hester Brothers will assure that each shipment received is accompanied by a certificate of conformance attesting to the acceptability of the sight pins.

SECTION VIII. A. Record keeping

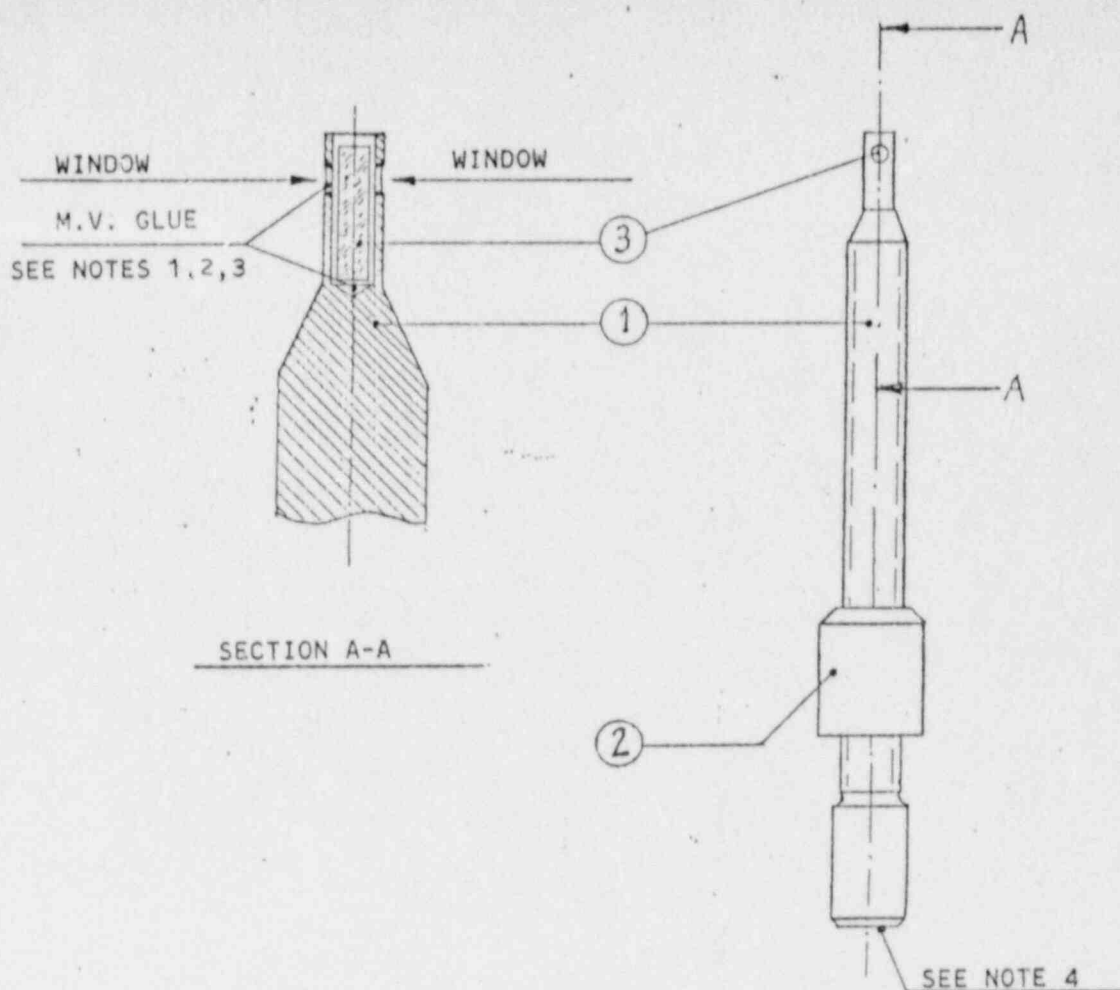
All records will be kept in accordance with the requirements of 10CFR32.25 and the Georgia "Rules and Regulations for Radioactive Materials"

1. Records will be kept of the number of units of each type, ML-115, ML-116, ML 200A, ML 300A, ML 300N and ML 100 and the total quantity of byproduct material transferred.


2. Reports will be filed with the U.S. N.R.C. as required by 10CFR32.25(c)(2) and as required by the State of Georgia.

3. The U.S. N.R.C. will be notified if Hester Brothers discontinues the activities covered by this license application.





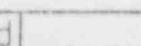
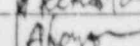
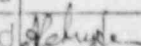


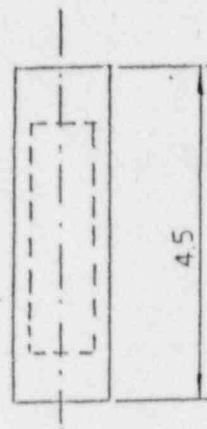
NOTES:

1. INSERT TRITIUM LIGHT SOURCE (3) INTO HOUSING (1) AND FIX WITH M.V. GLUE.
2. FILL WINDOW SURFACES WITH M.V. GLUE.
3. FILL INTERNAL DRILL HOLE WITH M.V. GLUE.
4. MARKING TO BE PERMANENTLY STAMPED AS FOLLOWS:  H3

4		M.V. GLUE		MP0011
3	013204.451	TRITIUM LIGHT SOURCE	1	4CT13204
2	001112.117	LOCKING NUT	1	1SB01112
1	101111.117	HOUSING, THREADED	1	1SB01111
Item No	Drawing No	Name/Description	Qty.	Catalogue No

UNLESS OTHERWISE SPECIFIED

All dimensions are in:	Material & Heat Treatment:	View Projection
General tolerance : $\pm 0.1$		
Angular tolerance : $\pm 1^\circ$		
Name: SIGHT PIN	Size: A 4	Drawing no: 00111.17
CATALOGUE NO: SB0111	Scale: 2:1 / 4:1	Sheet 1 of 1
MEPRO HAGOSHRIM	USED ON: ML100	
MEPRO LIGHT DIVISION	Design:  24.03.87	Checked: 
	Drawn:  25.03.87	Approved: 



NOTES:

1. Tritium content: 12 mCi
  2. Brightness : 200  $\mu$ L
  3. Color : Green
- Peak wavelength 510-530 nm

Name: TRITIUM LIGHT SOURCE	Size: A 4	Drawing no: 013204.451
CATALOG No: 4CT 13204	Scale: 10:1	Sheet 1 of 1
USED ON: ML100, ML200, ML300		
MEPRO HAGOSHRIM	Design	Checked
MEPRO LIGHT DIVISION	Drawn Alireza	3005.96
	Approved	2.12.86

## MEPROLIGHT™ ILLUMINATED SIGHT PIN ML-100

### FIVE YEAR WARRANTY

Should the illumination of the sighting pin fail within five years, the ML-100 will be replaced free of charge. In addition, there is a one year warranty against any defects in workmanship or material on the complete sighting pin.

**WARNING:** The ML-100 sight pin contains a small quantity – 12 millicuries – of radioactive tritium in gaseous form. No attempt must be made to disassemble the sight pin proper. If the sight pin is defective, or is no longer wanted, it must be returned to HESCO for corrective measures or disposal.

- NO BATTERY REQUIRED
- NO LOSS OF POWER IN COLD WEATHER
- MAINTENANCE FREE
- NO MODIFICATION NECESSARY
- MINUTES TO INSTALL
- ADDS NO WEIGHT

### Installation Instructions

**WARNING:** Don't install your new sight pin while an arrow is nocked on the bowstring.

### General

The ML-100 Illuminated Sight Pin is supplied ready for installation on a hunting sight without the use of tools.


Except for the tritium illuminated window below the tip of the pin, the ML-100 is similar to most sighting pins available commercially. Therefore, installation and sighting-in of the ML-100 are identical with the commonly accepted routine procedures.

### Adjustment

Adjust your hunting sight with the ML-100 sighting pin during daytime. Sighting-in to 20 yards is the accepted practice.

Take note of the fact that the illuminated window is located slightly below the pin's tip and make allowance for this during horizontal alignment.

After completing the desired yardage and windage adjustments, make sure that the illuminated window faces the archer.

  
**MEPROLIGHT™  
SIGHTS**

Made in Israel

*For further information  
on MEPROLIGHT™  
products, contact:*

**HESCO**  
RT GREENVILLE RD.  
LA GRANGE, GA., 30240  
TEL. 404-884-4057  
FAX. 404-882-4683

# APPLICATION FOR MATERIAL LICENSE

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

## FEDERAL AGENCIES FILE APPLICATIONS WITH:

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

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

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

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

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

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

## IF YOU ARE LOCATED IN:

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

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

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

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

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION V  
MATERIAL RADIATION PROTECTION SECTION  
1450 MARTA 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 \_\_\_\_\_

☐ C. RENEWAL OF LICENSE NUMBER \_\_\_\_\_

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

Hester Bros. Wholesale Co.  
Rt 4, Greenville Road  
LaGrange, Georgia 30240

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

Hester Bros. Wholesale Co.  
Rt 4, Greenville Road  
LaGrange, Georgia 30240

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION:

Jay Kaplan, Kaplan, Russin and Vecchi

TELEPHONE NUMBER:

202-887-0353

SUBMIT ITEMS 5 THROUGH 11 ON 8 1/2 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.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED:

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

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS:

9. FACILITIES AND EQUIPMENT:

10. RADIATION SAFETY PROGRAM:

11. WASTE MANAGEMENT:

12. LICENSEE FEES (See 10 CFR 170 and Section 170.31):  
FEE CATEGORY: \_\_\_\_\_  
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:

*W.C. Senn*

W. C. Senn

General Manager

4/27/87

## 14. ADDITIONAL RECEIPTS:

< \$250K	\$1M - 3.5M
\$250K - 500K	\$3.5M - 7M
\$500K - 750K	\$7M - 10M
\$750K - 1M	> \$10M

15. VOLUNTARY ECONOMIC DATA:  
a. NUMBER OF EMPLOYEES (Total for entire facility, excluding outside contractors): \_\_\_\_\_

b. NUMBER OF BEDS: \_\_\_\_\_

c. WOULD YOU BE WILLING TO FURNISH COST INFORMATION (Unit: and/or cost) TO THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? (NRC regulations permit it to protect confidential commercial or financial—proprietary—information furnished to the agency in confidence.)  
☐ YES ☐ NO

## FOR NRC USE ONLY

TYPE OF FEE:

FEE LOG:

FEE CATEGORY:

COMMENTS:

APPROVED BY:

AMOUNT RECEIVED:

CHECK NUMBER:

DATE: