

AUG 3 1971

Note to Files

EYEPiece LENS OF ARMY STARLITE SCOPE FOUND TO CONTAIN THORIUM

*July 29*  
The following representatives from the Army organizations specified visited the office to discuss Army equipment which has been found to contain thorium in the eyepiece of a night sight optical system used on rifles by combat troops:

|                      |   |
|----------------------|---|
| Mr. Darwin Taras     | Hq., Army Materiel Command<br>Pentagon                      |
| Mr. Myron Klein      | Night Vision Laboratory<br>Ft. Belvoir, Virginia            |
| Dr. Walter S. McAfee | Army Electronic Systems Command<br>Ft. Monmouth, New Jersey |
| Mr. Merrill Rutman   | Army Electronic Systems Command<br>Ft. Monmouth, New Jersey |

The following AEC representatives were present:

|                   |  |
|-------------------|--|
| Cecil R. Buchanan | Division of Materials Licensing                          |
| Gen Roy           | Division of Compliance                                   |
| Robert Barker     | Division of Radiological and<br>Environmental Protection |
| James Henry       | Division of Radiological and<br>Environmental Protection |

The Army representatives showed us samples of an optical device called a Starlight Scope which has been found to contain thorium in the lens of the eyepiece. Finished optical lenses containing  $\leq 30\%$  thorium are exempt under 10 CFR 40, Section 40.13 (C)(7) except for contact lenses, spectacles, or eyepieces in binoculars or other optical instruments. Since

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the thorium was found in the eyepiece, the optical system would not qualify under the exemption. Also, there is an additional problem of Compliance with regulations in the manufacture of the eyepieces of the optical system and what suppliers are responsible.

The Starlight Scope was developed in 1962 and distributed to troops in 1965 and later. In 1969, the Army started a survey of various devices to learn about potential radiation exposure to users of equipment utilizing X-rays, lasers, and radioactivity. A few months ago the night sight equipment was tested and found to contain thorium in the eyepiece. The label on the sight shown as a sample contained the following information:

Night Vision Sight Sub Assembly  
MX-7833A/PVS-2  
Contract No. DAAB 07-69-C-0258  
Manufacturer: VARO, Inc., Garland, Texas

The Army representatives explained that the image intensifier eyepiece lenses require a high index of refraction and the manufacturers of the equipment apparently used thorium to obtain the required quality. The image intensifier eyepiece contains a set of 5 lenses and lens Nos. 1, 3, and 5 have been found to contain thorium. The No. 1 lens is located 1 3/4 inches from the surface of the eye when the instrument is used. Some equipment contains no thorium and it is not essential to the equipment according to the Army representatives. The Army supply agency specifically ordered non-thorium glass for the equipment.

Range of radiation levels at eyepiece:

|       |                    |
|-------|--------------------|
| Beta  | 0.005 - 0.25 mr/hr |
| Gamma | 0.04 - 0.09 mr/hr  |

We were informed that the scopes tested contained an average of 16.7% of thorium. 29,000 of the devices have been distributed within the Army system and to Army units over the world. From their analysis, approximately 1,000 lbs. of thorium could be contained in the units distributed.

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The composition of the thorium glass by weight is:

|         |      |         |                   |           |       |
|---------|------|---------|-------------------|-----------|-------|
| Calcium | 7.4% | Thorium | 16.7( $\pm 5\%$ ) |           |       |
| Silicon | 3.6% | Oxygen  | 50.6%             | Lanthanum | 21.7% |

Analysis was made by electron beam microprobe.

The requirements for filing an application for a specific license to cover existing sights were discussed. The applicant will be Department of the Army, Headquarters, Electronic Command, Ft. Monmouth, New Jersey and the application is to contain:

1. A description of the device including model numbers and sketches or diagrams of the unit, how it is used, the radiation levels, and the expected eye exposure during use.
2. The total amount of thorium contained in the lenses and the number of eyepieces.
3. The method of controlling the item in the Army supply system and the procedures for maintenance, replacement, and disposal of the eyepiece lenses. (The thorium lenses are to be disposed as radioactive waste through the Army waste channels.) The No. 1 thorium lens of the eyepiece is to be replaced when the device is serviced or repaired. The latter will be accomplished at Sacramento Army Depot in California.
4. A full description of the maintenance and service operations (i.e., polishing or grinding, if any,) to be performed on the device including an explanation of the safety equipment (glove boxes, ventilation) available and procedures to be used.
5. The length of time needed to replace the items containing a thorium lens as No. 1 lens. (We do not expect the Army to have a license for the items indefinitely.)
6. A listing of all suppliers of the equipment by name and address, particularly those responsible for supplying the lenses and assembling them into the finished device. (Compliance will investigate why such lenses are appearing in eyepieces of optical equipment in non-compliance with 10 CFR 40.)

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The Army representatives will request an interpretation of 10 CFR 40 with respect to a definition for "eyepiece." The Army feels the term should only apply to the No. 1 lens which causes the exposure to the eye and not to the other 4 lenses in the device.

Original Signed by  
Cecil R. Buchanan

Cecil R. Buchanan  
Assistant Chief  
Materials Branch  
Division of Materials Licensing

bcc: St. Br. Dist.  
GRoy, C  
RBarker, REP  
DML

|           |                                     |  |  |  |  |  |
|-----------|-------------------------------------|--|--|--|--|--|
| OFFICE ▶  | DML:MB                              |  |  |  |  |  |
| SURNAME ▶ | <i>C Buchanan</i><br>CRBuchanan:clh |  |  |  |  |  |
| DATE ▶    | 8/2/71                              |  |  |  |  |  |



UNITED STATES  
ATOMIC ENERGY COMMISSION

WASHINGTON, D.C. 20545

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