ENVIRONMENTAL RESEARCH LABORATORIES
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Breakage Tests on Low Pressure Sodium Lamps

Purpose of Work:

To determine possible fire hazard when a low pressure sodium lamp is broken.

Test Method:

Eleven low pressure sodium lamps were broken on a test jig under various conditions. The jig consisted of an axe which was pivoted so as to fall on a lamp when a latch cord was pulled by the operator.

Lamps were broken both lighted and unlighted. Broken parts were allowed to fall on four different materials, namely dry tissue paper, tissue paper soaked in gasoline, cotton balls saturated with water, and into a glass container of water.

Atmospheric conditions were a temperature of approximately 70 degrees F, a relative humidity of approximately 30%, and negligible wind.

Test Results:

The following paragraphs are numbered in accordance with the attached photographs.

1. Lighted lamp broken without any flammable material nearby. Lamp was not fully warmed up and showed both red and yellow colors, suggesting partial vaporization of sodium.
2. Part of broken lamp. Small amount of white vapor came from broken arc tube. No fire.
3. Second lamp broken. Lamp was lighted and had been burning for approximately ½ hour and therefore was assumed to be operating normally. A large amount of dry tissue paper was placed beneath the lamp, and the broken pieces allowed to fall on it.
4. Tissue paper was scorched. This appeared to be due to heat from broken arc tube glass. No evidence could be seen of fumes or fire.
5. Sodium could be seen in broken arc tube.
6. Lighted lamp broken over tissue paper.
7. Sodium could be seen smoking in arc tube. No evidence of fire.
8. As 7.
9. Gasoline was poured on the tissue paper and a lighted lamp was broken.
10. Sodium in arc tube was smoking. No evidence of fire.
11. As 10.
12. Gasoline ignited with match to indicate flammability.
13. Unlighted lamp broken over gasoline-soaked tissue paper.
14. White vapor haze could be seen after break. No fire apparent.
15. Results of a further breakage with gasoline. No evidence of fire.

16. Water saturated cotton balls were placed beneath lamp. A glass container of water was positioned so that parts of the broken lamp would fall into it. A lighted lamp was broken; no fire was created.
17. As 16, but lamp unlighted. No evidence of fire.
18. A further unlighted lamp was broken. No trace of fire.

At no time was evidence produced of fire under any of the test conditions. White vapor from the sodium could be seen after most breakages. All testing conducted under my supervision.

/signed/
Glenn A. Baker, P.E.
December 16, 1975

Transcribed from photocopy 11 June 2003 by Christian B. Luginbuhl, U.S. Naval Observatory Flagstaff Station.