This letter is in response to your request for additional information on our mercury vapor lamps. These lamps consist of an inner quartz arc tube enclosed in an outer envelope of heat-resistant glass. Depending on the lamp type, the envelope is either clear or coated with one of two different phosphor materials.

The phosphor used on outer envelope of "DX" type lamps consists of yttrium vanadate phosphate. This material, like most vanadium compounds, is relatively insoluble, and appears to have a much lower toxicity than vanadium pentoxide but may elicit some similar symptoms at higher exposure levels. Excessive inhalation exposure to vanadium pentoxide may result in irritation of the nasal passages and respiratory tract, cough, difficulty in breathing, and bronchitis. The yttrium vanadium phosphate from the breakage of one or a small number of lamps should not, however, result in a significant exposure.

The phosphor used on the outer envelope of the "WDX" lamps is the same as that in the "DX" lamps but with the addition of a small amount of magnesium germanate phosphor, a toxicologically relatively inert material.

The quartz arc tube contains a small amount of mercury, ranging from 20 milligrams in a 75 watt up to 250 mg in a 1000 watt lamp. The arc tube contains a small amount of the inert gas argon used as a fill gas. It also contains trace amounts of other materials, but there would be insignificant exposure from lamp breakage. The air concentration of mercury resulting from the breakage of one or a small number of lamps should result in no significant exposure to the individual. However, when breaking a large number of lamps for disposal, appropriate monitoring and controls should be implemented to control airborne levels or surface contamination. We recommend that such work be done in a well ventilated area, and local exhaust ventilation or personal protective equipment may be needed.

The quartz arc tube, when operating, generates a considerable amount of ultraviolet radiation. The UV is filtered to acceptable levels by the glass outer envelope during normal use. However if the outer envelope is broken this filtering is lost. Thus those lamps having ordering codes beginning with the letters "HR" have the following warning notice required under Federal Regulation 21 CFR 1040.30:

WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured, and the arc tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. General Electric Company has commercially available SAF-T-GARD mercury and Multi-Vapor lamps that will automatically extinquish when the outer envelope is broken.

The self-extinguishing lamps referred to above have order codes beginning with the letters "HT". If the outer glass envelope of a SAF-T-GARD lamp is broken, although the arc tube will have self-extinguished, its support structure will still be electrically connected and could present an electrical shock hazard. Therefore, regardless of the type, if the outer envelope of the lamp has been broken, the lamps should be replaced after turning the power off.

A Toxic Characteristic Leachate Test (TCLP) conducted on the lamp for lead could cause the lamp to be classified as a hazardous waste. Mercury vapor lamps use lead solder on the base of the lamp. You should review your waste handling practices to assure that you dispose of waste lamps properly.

I hope this will answer any concerns that you may have regarding these lamps. Should you have any further questions, please call me at (216) 266-3349.

A. M. Zielinski
Lighting Environmental, Health
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General Electric Company
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# SYNOPSIS OF TCLP TEST RESULTS

## Mercury

A series of tests (using both the Extraction Procedure (EP) the Toxicity Characteristic Leachate Procedure (TCLP)) were conducted on GE fluorescent, mercury and metal halide lamps to determine whether the mercury could cause the lamps to be considered a hazardous waste on disposal.

Because of the difficulties in obtaining representative samples of crushed lamps, a series of tests were conducted using the entire fluorescent lamp as the sample, properly scaling the amounts of solution used to the weight of the lamp. In the case of the mercury and metal halide lamps, since all of the mercury is in the arc tube, the arc tubes were tested, and the results were extrapolated to the weight of the entire lamp.

For the mercury and metal halide lamp types, the extrapolated concentrations were below the 0.2 part per million limit for mercury, indicating that the lamps are not hazardous waste on the basis of mercury concentration. Mercury and metal halide lamps were tested at approximately 50% of rated life. Tests run on lamps operated under different conditions or for longer periods of time may yield different results.

For fluorescent lamps, earlier data had resulted in test concentration below the 0.2 parts per million limit for mercury. More recent tests have given results both below and above the limit. A review of our data and that available from other lamp manufacturers and commercial labs indicate considerable variability in test results, making it impossible to classify the waste status of fluorescent lamps at this time.

The lamp industry has informed the EPA of this issue, and is currently working with the EPA to resolve the test protocol so that consistent results can be obtained.

## Lead

High intensity discharge lamps contain lead solder used on the base of the lamp. We have performed several tests using the TCLP procedure on some lamp types which are generally representative. For each lamp tested, regardless of type, the concentration of lead was in excess of the 5 part per million limit, indicating that the lamps could be classified as hazardous waste.

While small numbers of these lamps placed in ordinary trash should not appreciably effect the nature or method of disposal of the trash, under some circumstances disposal of large quantities may be regulated. You should review your waste handling practices to assure that you dispose of waste lamps properly.

REVISION 1

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