PHMC Lessons Learned Fluor Hanford Inc.

Caution Bulletin

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Title: Faulty Surge Protection Device Likely Cause of Mobile Office Fire

Date: May 24, 2006

Identifier: 2006-RL-HNF-0016

Lessons Learned Summary: A failed surge protection device (SPD) was the likely cause of a fire that destroyed a mobile office structure at Hanford. Surge protection devices can fail after extended use. Most SPDs have a metal oxide varistor (MOV) that provides the surge protection. Suppressing voltage spikes and transients shortens the life of an MOV. Upon failure, the MOV can reach very high temperatures and cause a fire.

Discussion of Activities: On January 27, 2006 a fire occurred in MO-304, a mobile office building in the 200 East area. A formal investigation, conducted by the Hanford Fire Department, determined that the most probable cause of the fire was a failed SPD that was located on top of a computer printer. Due to the severe damage to the suspect SPD, there is no detailed information regarding the make or model number available.

Also identified during the investigation was that at least 2 and perhaps as many as 4 power strips/SPD's were "daisy chained" together. This was not a contributor to the fire, but is not in compliance with HNF-RD-11827, Hanford Electrical Safety Program Requirements, Section 3.3, #20 and Electrical Safety Compliance Guide, ESCG-2002-001, issued December 10, 2002.

Analysis: Surge protection device**s**, or SPD, are also known as transient voltage surge suppressors (TVSS). Most SPDs have a metal oxide varistor (MOV) that provides the surge protection. MOVs wear out with use, and suppressing voltage spikes and transients shortens their life. MOVs can reach very high temperatures as they fail and can ignite the epoxy coating and start a fire. Prior to 1998, most SPDs sold had no protection to guard against a fire caused by a failing MOV in a SPD. In February, 1998, Underwriters Laboratories (UL) issued the second edition of UL Standard 1449, Transient Voltage Surge Suppressors. The second edition of UL 1449 requires that a SPD either fail in a safe manner or survive connection to twice the nominal voltage for seven hours. The easiest way for a SPD to pass this test is to employ a thermal cutout device at the MOV. The thermal cutout will interrupt power to the

SPD if the MOV overheats. This is the method now commonly used in newer SPDs. Surge protection devices should be replaced periodically, but there is no standard for expected useful life of a SPD. Using SPDs with lights that indicate surge protection is functional can help determine when a SPD should be replaced.

Power strips and/or SPDs should not be “daisy chained” together.

Recommendations: It is recommended that all facilities assess their SPDs using the following guidelines:

For existing SPDs:

1. All surge suppressors manufactured before 1998 should be removed from service and disposed of. The date may be in the form of a manufacturer’s code and contacting the manufacturer may be the only way to determine the actual date of manufacturer. If the date of manufacturer is not verified as being after 1998 the SPD should be removed from service.

2. All SPDs should be clearly marked as being tested to UL 1449 as a TVSS. Some outlet strips will include surge protection specifications, usually only the suppression voltage, and will be identified only as a Temporary Power Tap, or just Power Tap. The marking on a listed SPD will include something like “Transient Voltage Surge Suppressor,” “Listed TVSS,” “UL 1449,” or something similar. It may also say something like “Power Tap, Also Listed as TVSS.” Without such markings there is no assurance that the device has been manufactured to meet the testing requirements of UL 1449, which could result in inadequate surge protection features and non-existent thermal protection.

3. Evaluate the facility for “daisy chained” power strips/SPDs and correct as necessary.

For the procurement of new SPDs:

The primary criterion for the procurement of new SPDs is UL 1449 Listing as a TVSS. Other specifications that will provide greater protection against overheating and fire, or protection of sensitive equipment against power surges, are:

- Minimum clamping voltage: 330 volts

- Minimum energy suppression rating: 1600 joules

- Device should have indicating lights showing when power is on and surge protection is operable

This information is typically well identified on SPD boxes, spec sheets, and on-line. These recommendations are the minimum criteria that should be insisted upon. Users may wish to consider other specifications such as higher joule ratings, high maximum continuous operating voltage (MCOV), metal enclosures versus plastic, etc.

Cost Savings/Avoidance: Not evaluated

Work Function: OS&H - General

Hazards: Electrical, Fire / Smoke, Personal Injury / Exposure - Other

Keywords: surge suppressor, fire, surge protection device, transient voltage surge suppressors, daisy chain

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References: Occurrence Report EM-RL--PHMC-GPP-2006-0001

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