

appropriate cautions will be added to alert operations personnel. This administrative barrier is the only factor preventing similar events from occurring when using this model of equipment.

2) NUCON will modify all model *F-1000-DG-F* units utilized at WVNS to change the heater block controller temperature setpoint to 625 degrees Fahrenheit (+/- 25 degrees Fahrenheit). Appropriate warnings and cautions will be incorporated into the WVNS operating procedures to verify this operating range prior to initiating liquid flow. (The vendor can be contacted to discuss why operation within these temperature parameters is safe.)

3) NUCON will modify all model *F-1000-DG-F* units utilized at WVNS to have vapor adjust control valves that always maintain minimal air flow (carrier air), even if the valve is in the closed position. This modification will assure that the event does not recur, regardless of the implementation or success of the other newly instituted barriers.

4) NUCON will revise advertising literature and the model *F-1000-DG-F* manual to indicate that this unit is compatible with PAO applications WITH MODIFICATIONS.

ANALYSIS: West Valley Nuclear Services (WVNS) began using PAO as the challenge aerosol-testing medium for high-efficiency particulate air (HEPA) filters. Previously, the site had used Di (2-ethylhexyl) phthalate (DEHP, commonly referred to as DOP) for this purpose and these aerosols were supposed to be interchangeable. The equipment being utilized was a Nuclear Consulting Services Inc. (NUCON) model *F-1000-DG-F* Generator. The chemical aerosol utilized was manufactured by the Henkel Corporation, Emery Group, with the product name of *Emery 3004 Synthetic Hydrocarbon 4 CST Fluid,* referred to as polyalphaolefin or PAO, which is a synthetic aliphatic hydrocarbon. When performing PAO testing, the inter-relationship between four variables have serious implications. First, the generator heater block controller setpoint must be evaluated. Currently, all NUCON Model *F-1000-DG-F* production units have a heater block temperature that is regulated at 725 degrees Fahrenheit (+/- 25 degrees Fahrenheit). Second, the auto-ignition temperature of DOP is approximately 735 degrees Fahrenheit and the auto-ignition temperature of PAO is 649 degrees Fahrenheit. Third, the flow rate of the liquid becomes more critical to the equation as higher flow rates of PAO are introduced through the heater block of the generator (utilized in larger capacity systems of 25,000 cfm airflow and larger). The greater the amount of PAO flowing through the heater, the greater the chance that some of the PAO fluid will not completely vaporize in the heater and possibly ignite at the discharge port. Lastly, the carrier air valve (vapor control valve) must have air flowing through the heater block before the liquid (PAO) flow is established.

RECOMMENDED ACTIONS: Review in-place HEPA filter penetration testing that utilizes PAO in conjunction with thermal generators; it is necessary to fully understand the inter-relationship between the different components commercially available. Evaluate current procedures and equipment to assure product compatibility and personnel safety. Also verify that temperature settings plus equipment tolerance do not place personnel in a hazardous condition.

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