

Jim McKnight  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555-0001

September 22, 1995

**NRC INFORMATION NOTICE 95-41: DEGRADATION OF VENTILATION SYSTEM CHARCOAL  
RESULTING FROM CHEMICAL CLEANING OF STEAM  
GENERATORS**

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to the potential degradation of ventilation system charcoal as a result of the charcoal's exposure to chemicals during the chemical cleaning of steam generators. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

On June 5, 1994, a chemical cleaning of the secondary sides of the steam generators at Surry Unit 2 was begun. During this cleaning, containment purge was established using train A of the auxiliary ventilation system, which contains a safety-grade charcoal adsorber. The chemical cleaning process involves the use of ethylene diamine tetraacetic acid (EDTA) as the cleaning agent and of various other chemicals such as ethylenediamine (EDA), hydrazine, ammonia, hydrogen peroxide, nitrogen, and CCl-801, a proprietary corrosion inhibitor. During the chemical cleaning the steam generators were isolated from the containment atmosphere and force-vented to the outdoor atmosphere through the atmospheric steam dump relief valves. The steam generators were rinsed to remove residual chemicals. After the rinse, the steam generators were opened for sludge lancing of the tube sheet region.

On June 16, 1994, a strong odor of ammonia was reported in the Unit 2 containment. Concentrations were measured at 30 ppm (parts per million) ammonia and 6 ppm hydrazine. Consequently, personnel were evacuated from the containment. At the time of the evacuation, the chemical cleaning and rinse had been completed on steam generators A and C and the steam generators were vented to the containment. Because of the elevated levels of hydrazine and ammonia in the containment, train B of the auxiliary ventilation system was started to assist train A in reducing the airborne concentrations. Both trains operated approximately 8 hours until chemical concentrations in the containment were reduced.

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updated on  
9/28/95

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As a result of the exposure of the charcoal to the chemicals, in accordance with the technical specifications (TS), a sample of train A charcoal was taken and a laboratory test of a sample of the sample was performed. The results of the laboratory test showed a methyl iodide removal efficiency of 93.4 percent, which was below the TS limit. The charcoal was replaced. A sample from train B was tested and the results of the laboratory test of that sample showed a methyl iodide removal efficiency of 90.7 percent. This value was also below the TS limit, and the train B charcoal was replaced.

The failure of these samples was a surprise to the licensee. At the time the charcoal was determined to have failed, train A had operated for 657 hours, while the train B had operated for 360 hours. In addition, the licensee had held discussions with the charcoal supplier during which the supplier had indicated that exposure of the charcoal to hydrazine and ammonia in the above noted concentrations should not have resulted in its degradation.

As a result of the experience at Unit 2, when the steam generators at Unit 1 were chemically cleaned, the licensee arranged for the containment flow to be diverted to a non-safety-grade system containing charcoal. When the licensee completed the cleaning operation, laboratory testing of the charcoal in the non-safety-grade system showed that the adsorber efficiency was 3.3 percent less than its efficiency before the chemical cleaning. On the basis of these two experiences, the licensee concluded that discharging the air involved in steam generator cleaning operations through systems containing charcoal was likely to degrade the charcoal.

The licensee's laboratory tests of the charcoal were performed at 30°C [86°F] and a relative humidity of 95 percent with a face velocity of 24.4 meters per minute [80 feet per minute]. The laboratory tests were conducted using the 1979 version of American Society for Testing and Materials (ASTM) D3803, "Standard Test Method for Nuclear-Grade Activated Carbon." The licensee did not attempt to determine the chemical compound responsible for the degradation of the charcoal. However, it and its charcoal supplier believe that the probable culprits were EDA and EDTA.

The NRC staff held telephone conversations with charcoal suppliers and testing laboratory representatives. Based upon these conversations, the parties concluded that, although the ammonia did not contribute to the degradation of the charcoal, the breakdown of hydrazine in the charcoal may have contributed additional moisture to the charcoal resulting in its degradation. These discussions also confirmed that both EDA and EDTA could degrade the charcoal. The staff also noted that, had the licensee performed the laboratory tests in accordance with the guidance in NRC Information Notice 87-32, "Deficiencies in the Testing of Nuclear-Grade Activated Charcoal," (Accession No. 8707070003) or in accordance with the 1989 version of ASTM D3803, the measured degradation of the charcoal would have been greater than that identified by the licensee.

Exposure of charcoal to chemical compounds can result in its degradation. With such degradation, in the event of an accident, the charcoal may perform at an efficiency less than that assumed in the staff's safety evaluation. Therefore, if licensees divert air flow through charcoal adsorbers in their ventilation systems during and/or after chemical cleaning, they may find it appropriate to perform a laboratory test of the charcoal to ensure that the charcoal has not degraded below its TS surveillance requirements limit.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

  
Dennis M. Crutchfield, Director  
Division of Reactor Program Management  
Office of Nuclear Reactor Regulation

Technical contact: John J. Hayes, NRR  
(301) 415-3167

Attachments:

1. Referenced Codes and Standards
2. List of Recently Issued NRC Information Notices

*Attachment filed in Jacket*

**Referenced Codes and Standards**

American Society for Testing and Materials, ASTM D3803, "Standard Test Method for Nuclear-Grade Activated Carbon," Philadelphia, Pennsylvania.

LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
95-40	Supplemental Information to Generic Letter 95-03, "Circumferential Cracking of Steam Generator Tubes"	09/20/95	All holders of OLs or CPs for nuclear power reactors.
95-39	Brachytherapy Incidents Involving Treatment Planning Errors	09/19/95	All U.S. Nuclear Regulatory Commission Medical Licensees.
95-38	Degradation of Boraflex Neutron Absorber in Spent Fuel Storage Racks	09/08/95	All holders of OLs or CPs for nuclear power reactors.
95-37	Inadequate Offsite Power System Voltages during Design-Basis Events	09/07/95	All holders of OLs or CPs for nuclear power reactors.
95-36	Potential Problems with Post-Fire Emergency Lighting	08/29/95	All holders of OLs or CPs for nuclear power reactors.
95-35	Degraded Ability of Steam Generators to Remove Decay Heat by Natural Circulation	08/28/95	All holders of OLs or CPs for pressurized water reactors (PWRs).
95-34	Air Actuator and Supply Air Regulator Problems in Copes-Vulcan Pressurizer Power-Operated Relief Valves	08/25/95	All holders of OLs or CPs for nuclear power reactors.
93-83, Supp. 1	Potential Loss of Spent Fuel Pool Cooling After a Loss-of-Coolant Accident or a Loss of Offsite Power	08/24/95	All holders of OLs or CPs for nuclear power reactors.
95-33	Switchgear Fire and Partial Loss of Offsite Power at Waterford Generating Station, Unit 3	08/23/95	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
 CP = Construction Permit

Exposure of charcoal to chemical compounds can result in a degradation of the charcoal. With such degradation, in the event of an accident, the charcoal may perform at an efficiency less than that assumed in the staff's safety evaluation. Therefore, if licensees divert air flow through charcoal adsorbers in their ventilation systems during and/or following chemical cleaning, they may find it appropriate to perform a laboratory test of the charcoal to ensure that the charcoal has not degraded below its TS surveillance requirements limit.

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orig /s/'d by DMCrutchfield

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DOCUMENT NAME: 95-41.IN

\*See previous concurrence

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NAME	JJHayes*		Tech Ed/MMejac*		RABenedict*		RLEmch*		CLMiller*	
DATE	05/02/95		05/10/95		05/02/95		05/02/95		05/02/95	
OFFICE	SC/OECB:DOPS	N	PECB:DRPM	E	C/PECB:DRPM	N	D/DRPM			
NAME	EFGoodwin*		RKiesel*		AEChaffee*		DMCrutchfield			
DATE	05/15/95		09/13/95		09/14/95		09/20/95			

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