NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Surry Power Station, Units 1 and 2	05000 - 280	1 OF 6

TITLE (4)
Both Auxiliary Ventilation Fans Inoperable Due to a Single Event

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									Surry Unit 2	05000 - 281
08	04	94	94	-- 008 --	00	09	06	94	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	N
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
	20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
	20.405(a)(1)(ii)		50.36(c)(2)	X	50.73(a)(2)(vii)		OTHER
	20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
	20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
D. A. Christian, Station Manager	(804) 357-3184

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On June 5, 1994, at 0243 hours, with Unit 1 at 100% power and Unit 2 shut down for a Steam Generator Chemical Cleaning (SGCC) outage, the auxiliary ventilation system was placed in service to purge Unit 2 containment through the redundant safety related charcoal filter beds. The auxiliary ventilation system is a common system used to filter potential airborne iodides from the affected spaces during design basis accidents. During the outage, both filter beds were operated. Containment purge was secured on June 21, 1994 at 1845 hours to reestablish containment integrity following completion of the SGCC outage. The SGCC process used several chemicals, including amines, to remove ferric and cuprous metal oxide deposits from the steam generators.

On June 16, 1994, a strong ammonia odor was reported in the Unit 2 Containment. Based on sampling results after the SGCC outage, both filter beds experienced similar abnormal losses in efficiency for removal of methyl iodide. The beds were replaced. The ammonia odor and outage evolutions, except for the SGCC process evolutions, have been eliminated as possible causes. This event is being reported pursuant to 10 CFR 50.73 (a) (2) (vii) (c) due to a possible single cause resulting in both filters being rendered inoperable. The filters' degraded efficiency ratings for removal of iodides were above the design basis requirements. If the filters had been needed to remove contaminants following design basis accidents, both of the filters would have performed as intended. Therefore, the health and safety of the public were not affected. A network entry is planned. Lessons learned will be incorporated into future SGCC outages.

1.0 DESCRIPTION OF THE EVENT

On June 4, 1994, with Unit 1 at 100% power, Unit 2 was shut down for a Steam Generator {EIIS-AB-SG} Chemical Cleaning (SGCC) outage. At 0243 hours on June 5, 1994, the auxiliary ventilation system (01-VS-F-58A/B) {EIIS-VF} was placed in service to purge the containment through the safety related charcoal filter beds. The auxiliary ventilation system is a common system used to filter potential airborne iodine from the affected spaces served by the primary ventilation system for both units. It ventilates the auxiliary building and safeguards during an accident and the containment and fuel building during refueling and outage activities. Containment purge was secured on June 21, 1994 at 1845 hours as part of the evolutions to reestablish containment integrity following completion of the SGCC outage.

The SGCC process involved the use of several chemicals to remove ferric and cuprous metal oxide deposits from the steam generators. In preparation for the outage, the chemical cleaning vendors were selected based on their extensive experience in chemically cleaning steam generators. Other utilities that had recently performed chemical cleaning were contacted for technical advice. This information was used to develop the process utilized at Surry and to minimize waste production. The selected vendors developed a cleaning strategy based on prior experience and the particular design of the power station. A scale mock-up was used to determine the necessary amount of chemicals needed to remove the particular loading of sludge specific to Surry. A full scale test was performed utilizing actual chemical composition in the generators. Based on the data from this test and the estimates on the total amount of sludge in the generators, the concentration of chemicals to be used was calculated. This concentration was lower than the maximum recommended concentration outlined in the qualification study on chemical cleaning performed by Electric Power Research Institute/Steam Generator Owners Group.

The SGCC process used ethylene diamine tetra-acetic acid (EDTA) as a cleaning agent and various other chemicals including ethylenediamine (EDA), hydrazine, ammonia, hydrogen peroxide, nitrogen, and CCI-801 which is a proprietary corrosion inhibitor. During the chemical cleaning, the steam generators were isolated from the containment environment and force-vented to the atmosphere through the atmospheric steam dump relief valves {EIIS-RV}. The steam generators were thoroughly rinsed to remove residual chemicals. Following the rinse, the steam generators were opened for sludge lancing of the tube sheet region.

On June 16, 1994, a strong ammonia odor was reported in the Unit 2 Containment. At 1030 hours, ammonia concentrations were conservatively measured at 30 parts per million (ppm) and hydrazine concentration was measured at 6 ppm. Personnel were evacuated from containment. A station deviation report was submitted to document the ammonia odor. At the time of the release, the chemical cleaning and rinse had been completed on Steam Generators A and C. The steam generators were vented to containment atmosphere. Based on these readings, Operations used both the 3A and 3B filters simultaneously to reduce the hydrazine and ammonia concentration with

the fans aligned to maximize containment purge at approximately 36,000 scfm. Total flow through the 3A and 3B filters was 65,000 scfm. The auxiliary ventilation system was operated in this high flow configuration on both filters for 7 hours and 54 minutes until the chemicals were dispersed.

Technical Specification (TS) 4.12 provides the surveillance requirements for the auxiliary ventilation exhaust filter trains. TS 4.12 states that charcoal samples shall be taken after 720 hours of operation and following a chemical release in any ventilation zone communicating with the system. The basis for TS 4.12 states that the requirement for sampling following chemical release provides assurance that the charcoal is tested following releases of chemicals that could contaminate the filter beds. TS 4.12 stipulates that the results of the charcoal analysis must be available within 31 days, and the charcoal must have a minimum As Left efficiency of 96%.

The charcoal supplier was contacted on June 16, 1994 to determine if the hydrazine and ammonia could affect the charcoal. The supplier indicated that the measured concentrations of hydrazine and ammonia would not affect the charcoal. Since the reported chemicals could not affect the charcoal, immediate sampling was not undertaken. The basis for Technical Specification (TS) 4.12 states "If painting, fire, or chemical release occurs such that the High Efficiency Particulate Air (HEPA) filter or charcoal absorber could become contaminated from the fumes, chemical, or foreign material, the same tests and sample analysis are performed as required for operational use." It was not believed at the time that the filters had been contaminated from the release of the hydrazine or the ammonia.

On June 28, 1994, the 3A filter was sampled. The 3A filter train had been in operation for a total of 657 hours. The laboratory results were returned on July 15, 1994. The 3A sample had a 93.4% efficiency for removal of methyl iodide which was below the TS limit in TS 4.12.B.7. Based on this result, the 3A filter was declared inoperable and its charcoal replaced. Following testing in accordance with TS 4.12, the 3A filter was returned to service. Because of the June 16 event and since both filters had been used to purge the containment following the event, a sample of the 3B filter was taken on July 28, 1994. Expedited sample analysis was performed, and the results were received on August 4, 1994. The 3B filter sample had an indicated efficiency of 90.7%. The 3B filter was also declared inoperable, replaced and tested in accordance with TS 4.12.

Since the 3A and 3B filters experienced similar abnormal losses in efficiency for removal of methyl iodide, 6.3% and 5.8% respectively, both trains were rendered inoperable as a result of the sampling that was performed following the SGCC outage. This event is being reported pursuant to 10 CFR 50.73 (a) (2) (vii) (c) due to a possible single cause resulting in two independent trains becoming inoperable in a system designed to control the release of radioactive material. The nearly identical loss of efficiency for removal of methyl iodide in both the 3A and 3B trains of the charcoal filter banks suggests that a common source contaminant is the cause of the charcoal degradation. There is no available objective evidence, however, to clearly identify the chemical that caused the loss of efficiency.

2.0 SAFETY CONSEQUENCES AND IMPLICATIONS

Each of the auxiliary ventilation filtered exhaust trains, 3A and 3B, consists of an exhaust fan, prefilters, a high efficiency particulate absolute filter, and a charcoal adsorber assembly. The purpose of the filtered exhaust trains is to provide standby capability for removal of particulate and iodine contaminants. The filter trains are capable of filtering the exhaust from the charging pump cubicles of the auxiliary building, the fuel building, the decontamination building, the safeguards building, and the containment (during shutdown).

There was no accident condition present during this event, and the auxiliary ventilation was not required to fulfill its intended function. The filters' degraded efficiency ratings for removal of the methyl iodide were above the design basis requirements. The most recently approved analysis of the Fuel Handling Accident assumes a conservative efficiency of 70% for these filters. The design basis Loss of Coolant Accident dose analysis assumes an efficiency of 90% for Emergency Core Cooling System (ECCS) leakage for the filters. (Note: Iodine released from ECCS leakage is assumed to be elemental. Also, at the tested removal efficiency of 90.7% for methyl iodide, the filter efficiency for removal of elemental iodine is expected to be approximately 99%). Our evaluation shows that if the filters had been needed to remove contaminants in the exhaust air following an accident, both of the filters would have perform as intended. Therefore, the health and safety of the public were not affected.

3.0 CAUSE

The nearly identical loss of efficiency for removal of methyl iodide in both the 3A and 3B trains of the charcoal filter banks indicates that a common source contaminant caused the charcoal degradation. There is no available objective evidence, however, to clearly identify the chemical that caused the loss of efficiency. Even with sophisticated analytical equipment, identifying the compounds which caused the degradation of the charcoal in the filters is virtually impossible per discussions with the testing and charcoal filter vendors.

The causal event was determined to be associated with the SGCC outage. A review of past outage filter operation and outage related filter testing eliminated outage evolutions other than those associated with the SGCC process as possible causes of the filter degradation. The facts indicate that volatilized chemicals from the SGCC may have remained in the steam generator air space and in associated downstream steam piping. The SGCC process used EDTA, an amine, as a cleaning agent and various other chemicals including EDA, hydrazine, ammonia, hydrogen peroxide, nitrogen, and CCI-801. These chemicals were tightly controlled, and no spills occurred during the process. Precautions were taken to ensure that the volatilized chemicals were force-vented to the outside atmosphere and residual chemicals flushed prior to sludge lancing. We believe that, when the steam generators were vented to containment during sludge lancing, residual volatilized chemicals were purged through the filters.

On June 16, 1994, the reported high level of ammonia odor could indicate that other volatilized chemicals may have also been present.

Additional contacts with the charcoal supplier and the hydrazine manufacturer confirmed that the ammonia and hydrazine would not affect the charcoal efficiency for the conditions present on June 16, 1994. The vendor also indicated that an amine will degrade charcoal efficiency. The vendor stated that airborne concentrations of amines could produce a significant reduction in filter efficiency. EDTA is a relatively odorless liquid and would be easily masked by an ammonia odor.

The painting activities that took place during the outage were evaluated. The areas that were being painted did not directly communicate with the auxiliary ventilation system. Precautions were taken so that the fumes were vented through the building roof. It was determined that the volatile part of the painting material would not have been sufficient to create the loss of efficiency that was evident in the filters.

The 0.5% difference in the reduction in filter efficiency between the 3A and 3B filter is attributed to the difference in run time for the respective filters.

The reduced efficiency of the filters has been attributed to the SGCC process chemicals and to an unanticipated effect from residual amounts of certain chemicals that remained in the air inside the steam generators when the steam generators were vented to containment atmosphere for sludge lancing.

4.0 IMMEDIATE CORRECTIVE ACTION(S)

The technical input, from the supplier of the charcoal, was that the airborne ammonia would not reduce the efficiency of activated, impregnated carbon such as that in the charcoal filters. They also stated that hydrazine has a retention of approximately 1% and that hydrazine was easily desorbed. Since the reported chemicals could not affect the charcoal, immediate sampling was not undertaken. The basis for Technical Specification (TS) 4.12 states "If painting, fire, or chemical release occurs such that the High Efficiency Particulate Air (HEPA) filter or charcoal absorber could become contaminated from the fumes, chemical, or foreign material, the same tests and sample analysis are performed as required for operational use." It was not believed at the time that the filters had been contaminated from the release of the hydrazine or the ammonia.

5.0 ADDITIONAL CORRECTIVE ACTION(S)

On June 28, 1994, the 3A filter was sampled with 657 hours of run time. The laboratory results were returned on July 15, 1994. The 3A sample had a 93.4% efficiency which was below the As Left TS standard but above the analyzed safety limit of 90.0% efficiency. The 3A filter was replaced and returned to service on July 20, 1994 following testing in accordance with TS 4.12.

On July 28, 1994, the 3B filter was sampled. The results were expedited at the laboratory. These results were returned on August 4, 1994. The 3B sample had a 90.7% efficiency which was below the As Left TS standard but above the analyzed safety limit of 90.0% efficiency. The 3B filter was replaced and returned to service on August 5, 1994 following testing in accordance with TS 4.12.

Investigations determined that controls for implementing the need to test the filters following painting, fire or chemical release in areas that communicate with the filters were inadequate. There was no specific procedural guidance in place that directed the testing to be performed. Procedures that affect the operation and testing of the filter trains have been reviewed. Changes have been made to ensure necessary instructions are in place to direct the sampling and the testing of the filters when necessary.

6.0 ACTIONS TO PREVENT RECURRENCE

Lessons learned from the Unit 2 SGCC will be incorporated into the Unit 1 SGCC.

A Network entry will be made to inform other utilities of this event.

The amine ethanolamine (ETA), that is temporarily being used in Unit 2's secondary system for pH control to reduce iron transport, will be evaluated for possible affects on the 3A and 3B filters.

7.0 SIMILAR EVENTS

None

8.0 MANUFACTURER

Charcoal Service Corporation supplied charcoal
MSA supplied filter bank