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DUKE POWER

June 10, 1993

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

Subject: Catawba Nuclear Station, Units 1 and 2  
Docket Nos. 50-413 and 50-414  
Response to NRC Bulletin 93-02  
Debris Plugging of Emergency Core Cooling Suction Strainers

Please find attached Duke Power's response to NRC Bulletin 93-02, "Debris Plugging Of Emergency Core Cooling Suction Strainers", for Catawba Nuclear Station. The attached response discusses the actions taken at Catawba Nuclear Station as a result of this bulletin.

The attached response concludes that the controls which are employed for temporarily used or stored fibrous materials in Catawba Nuclear Station containments are sufficient to prevent degradation of the Emergency Core Cooling System (ECCS) during shutdown, prior to startup and during operation. The attached response also concludes that the fibrous air filters permanently installed in Catawba Nuclear Station containments do not pose a potential to degrade the ECCS. Therefore, no immediate compensatory actions or removal of materials are required to assure the functional capability of the ECCS.

Please contact Jeff Lowery at (803) 831-3414, if you have any questions regarding this issue.

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I declare under penalties of perjury that the statements set forth herein are true and correct to the best of my knowledge.

Very truly yours,

 for  
D.L. Rehn

D.L. Rehn  
Site Vice President  
Catawba Nuclear Station

JLL/

Attachment

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xc: S.D. Ebnetter, Region II

R.E. Martin, ONRR

R.J. Freundenberger  
Senior Resident Inspector

**Duke Power Company  
Catawba Nuclear Station  
Evaluation of NRC Bulletin No. 93-02**

**I. Introduction:**

The purpose of this evaluation is to determine the applicability of NRC Bulletin No. 93-02 to Catawba Nuclear Station (CNS).

**II. Background:**

NRC Bulletin No. 93-02, "Debris Plugging of Emergency Core Cooling Suction Strainers," raised the question of reducing post-LOCA recirculation capability due to blocking of the Emergency Core Cooling System (ECCS) sump screens. This concern was identified because of the potential to have "fibrous air filters or other temporary sources of fibrous material" in containment that is not designed to withstand the effects of a DBA-LOCA.

There are two (2) requested actions associated with this bulletin. These actions are:

- (1) identify fibrous air filters or other temporary sources of fibrous material installed or stored in containment which are not designed to withstand a DBA-LOCA, and
- (2) take appropriate actions to assure these materials do not adversely affect the functional capability of the ECCS.

**III. Scope:**

This evaluation addresses the possibility of degrading the ability of the ECCS system to cool containment during a DBA-LOCA at Catawba Nuclear Station (CNS). The degradation is due to the ECCS sump screens being blocked by fibrous air filter media or other temporary sources of fibrous material. The potential to block the screens with insulation or paint flakes has been previously analyzed and is not included in this evaluation.

**IV. Discussion:**

The containment recirculation screen structure (ECCS sump screens) consists of a low, steel enclosure covered with horizontal, vertical and slanted stainless steel mesh screens that surround the redundant ECCS suction lines. This arrangement provides a maximum available screen area with a minimum depth of water in the containment sump (floor). The potential to block the sump screens with insulation or paint flakes has been previously analyzed and shown not to be a concern at CNS. However, due to recent problems at other nuclear plants, it has become apparent that the potential to block the sump screens with fibrous materials, such as air filters, should also be analyzed. Therefore, an investigation was conducted to ascertain the potential to block the sump screens with temporary fibrous materials or with permanently installed fibrous air filter media. This investigation focused on (1) fibrous materials that could be temporarily used or stored in containment, and (2) air filters in containment that are not designed to withstand the effects of a DBA-LOCA. The three (3) types of filter units in containment at CNS that contain fibrous filter media are the Upper Containment Ventilation Units (UCVUs), the Incore Instrumentation Room Ventilation Units (IIRVUs) and the Containment Auxiliary Carbon Filter

Units (CACFUs). This evaluation addresses the potential for temporary fibrous materials and the permanently installed air filters in the UCVUs, IIRVUs and the CACFUs to migrate to the ECCS sump and adversely impact the ability to cool containment and the reactor core.

#### Temporarily Used or Stored Fibrous Materials

Temporary fibrous materials used during inspections or routine maintenance are controlled per Station Directive 3.1.2, "Access to Containment," and Site Directive 3.11.1, "Housekeeping, Cleanliness Levels, and Use of Tobacco Products." These directives include specific guidance to ensure temporary materials are not left in containment. Therefore, temporary fibrous materials associated with inspections and maintenance do not pose a sump screen blockage concern.

Fibrous materials that could be installed as part of a temporary modification are controlled by the Temporary Station Modification (TSM) process in addition to the two directives mentioned above. These station procedures assure that any materials used in a temporary modification are properly reviewed and/or analyzed prior to allowing them to be left in containment.

Since entry into containment is very restricted during operation, it would be difficult to transport a substantial quantity of fibrous material into containment. During an outage, when entry into containment is less restricted, other procedures are in place to ensure temporary materials are removed from containment. Operation Procedure PT/0/A/4200/02, "Containment Cleanliness Inspection," requires a visual inspection of all areas in containment to verify cleanliness of areas and that the ECCS sump is free of debris prior to entering Mode 4. This procedure was performed on October 12, 1992 on Unit 1, and on March 25, 1993 on Unit 2. Station Directive 3.1.30, "Unit Shutdown Configuration Control," serves to ensure that during shutdown and low power operation, the containment sump recirculation function is operable. These measures assure that materials are not inadvertently left in containment prior to mode escalation.

Regarding stored fibrous materials, these types of materials are not allowed to be stored in containment. Therefore, it is concluded that temporarily used or stored fibrous materials are not a potential ECCS sump screen blockage concern at CNS.

#### Permanently Installed Materials

Permanently installed fibrous materials used in containment consist of the air filters on the Upper Containment Ventilation Units (UCVUs), the Incore Instrumentation Room Ventilation Units (IIRVUs) and the Containment Auxiliary Carbon Filter Units (CACFUs). The scenarios that could cause these filters to dislodge from their holding frames are either a flood in containment or a pipe break. In either case, some fiberglass filter media could become dislodged and loose inside containment. The ECCS sump screens are located in the lower containment pipe tunnel outside the polar crane wall. The UCVUs are located in upper containment, the IIRVUs are located in the Incore Instrumentation Rooms and the CACFUs are located in lower containment inside the polar crane wall. The physical separation between the ECCS sump and these in-containment filter units will prevent any dislodged fibrous filter media from blocking the ECCS sump screens.

The filters used in the UCVUs are not considered to be a sump blockage concern due to their location in the upper containment. Additionally, these filters are enclosed by the metal panel sides of the UCVUs and are not directly exposed to the containment. Thus the Containment Spray (NS) System is unable to contact the UCVUs in such a manner as to dislodge the filter media and carry it to the refueling cavity drains. (These drains return water from the upper containment through the divider deck to the lower containment and are six (6) inch pipes not covered with screens which could become clogged.) Even if the filters in the UCVUs did become dislodged from their holding frames there is no reasonable mechanism to get the filters into the ECCS sump screens. Dislodged filters would most likely be trapped within the UCVU housing.

Even if the dislodged filters floated and did get out of the UCVU housing, they would not be able to reach the sump screens which are underwater. Filter media that got out of the filter unit housing and was heavier than water would sink and be caught on numerous curbs or other physical obstructions and prevented from reaching the sump screens. Therefore, the filters installed in the UCVUs are not an ECCS sump blockage concern.

The air filters used in the IIRVUs are not considered to be a sump blockage concern due to their location in the Incore Instrumentation Rooms. These rooms are isolated from pipe breaks, Containment Spray and other sources of water which could wash loose filter media into the containment sump. The filter media is also enclosed by the metal panel sides of the IIRVUs and, like the UCVUs, not directly exposed to the containment. Therefore, the filter media in the IIRVUs is not an ECCS sump blockage concern.

Both the CACFUs and the ECCS sump are located in lower containment but they are on opposite sides of the polar crane wall. The flow paths from the CACFUs to the ECCS sump are through pipe sleeves in the crane wall above floor level. There are seventy (70) 8" diameter pipe sleeves through the crane wall. If the filters were to become dislodged and free in containment, it is not credible to assume that they could migrate to the sump. If the filters floated they would be unable to reach the sump screens since the screens are underwater. If the filters sunk they would settle to the containment floor. Since all the pipe sleeves are located above the floor and because the approach velocity is low (0.24 fps as determined by Alden Research Laboratory (ARL) from sump model testing) there is no mechanism to move loose filter material through the pipe sleeves and into the sump.

Additionally, ARL determined that up to 50% screen blockage (67.5 ft<sup>2</sup> screen surface area) is acceptable without degrading ECCS performance. The scenario that would dislodge the most filters would be a pipe break that expels all of the filter media out of one of the filter units. Since the UCVUs and the IIRVUs are not subject to pipe breaks that dislodge their filters, only the CACFUs would be affected. A pipe break would be a single failure event and, since the two (2) CACFUs are located on opposite sides of the Reactor Building, could only affect one of the filter units. Each CACFU contains twelve (12) filters. Even if all these filters were expelled from the filter housing, became suspended in the water and migrated to the ECCS sump, they would only cover 36% (48 ft<sup>2</sup>) of the ECCS sump screens. This still allows for additional sump screen blockage by other analyzed materials (such as insulation, paint chips, etc.) before ECCS performance would be adversely affected.

It should also be noted that there are no filters installed in the Lower Containment Ventilation Units (LCVUs) which are the only other ventilation units in containment.

#### **V. Conclusion:**

The fibrous materials in containment identified for NRC Bulletin 93-02 are:

- (1) air filters in the UCVUs (32 ft<sup>2</sup> total area)
- (2) air filters in the IIRVUs (11ft<sup>2</sup> total area)
- (3) air filters in the CACFUs (48 ft<sup>2</sup> total area)

These filters, as well as other temporary fibrous materials in containment, do not pose a potential to degrade the ECCS system at CNS. Therefore, no immediate compensatory actions are required to assure the functional capability of the ECCS sump and no removal of materials is required. In summary, no further actions are required regarding NRC Bulletin 93-02.