Tennessee Valley Authority, Post Office 2000, Spring City, Tennessee 37381-2000

Mike Skaggs
Site Vice President, Watts Bar Nuclear Plant

SEP 01 2005

10 CFR 50.54(f)

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of) Docket No. 50-390
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - NRC GENERIC LETTER (GL) 2004-02: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS (PWR) - SECOND RESPONSE (TAC NO. MC4730)

The purpose of this letter is to provide TVA's response as requested by NRC GL 2004-02 for WBN. This response is provided in accordance with 10 CFR 50.54(f). TVA provided WBN's 90 day response by letter dated March 7, 2005. In addition, TVA provided response to NRC's request for additional information (RAI) on July 21, 2005.

GL 2004-02 requested that PWR licensees perform a mechanistic evaluation of the potential for the adverse effects of post-accident debris blockage and operation with debris-laden fluids to impede or prevent the recirculation functions of the emergency core cooling system (ECCS) and containment spray system (CSS) following postulated accidents for which the recirculation of these systems is required.

Enclosure 1 provides TVA's response to GL 2004-02. Enclosure 2 provides a list of regulatory commitments identified in this letter including TVA's plan to supplement this response following sump strainer vendor selection and final design.

A116

SEP 01 2005

If you have any questions concerning this matter, please call P. L. Pace at (423) 365-1824.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 1st day of September 2005.

Sincerely,

M Skaggs

Mike Skaggs
Site Vice President

Enclosures
1. Generic Letter 2004-02 Response
2. List of Commitments

cc (Enclosures):
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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02 RESPONSE

The following provides TVA's response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents," in support of resolution for Generic Safety Issue (GSI)-191, "Assessment of Debris Accumulation on PWR Sump Performance," for WBN Unit 1.

NRC REQUEST 2(a)

"Confirmation that the ECCS and CSS recirculation functions under debris loading conditions are or will be in compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of this generic letter. This submittal should address the configuration of the plant that will exist once all modifications required for regulatory compliance have been made and this licensing basis has been updated to reflect the results of the analysis described above."

Response

Actions have been identified and are planned to ensure that the emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions under debris loading conditions will be meet the requested actions in Generic Letter (GL) 2004-02 when all modifications are completed.

The containment walkdowns, debris generation calculations, debris transport calculations, initial downstream effects evaluations for blockage and long-term wear, and initial allocation of an allowance for chemical effects, have been completed. The procurement specification for new sump strainers has been issued, and the vendor selection process is underway.

The configuration of the plant that will exist once all modifications are complete is addressed in Responses 2(b) through 2(f) below.

NRC REQUEST 2(b)

"A general description of and implementation schedule for all corrective actions, including any plant modifications, that you identified while responding to this generic letter. Efforts to implement the identified actions should be initiated no later than the first refueling outage starting after April 1, 2006. All actions should be completed by December 31, 2007. Provide justification for not implementing the identified actions during the first refueling outage starting after April 1, 2006. If all corrective actions will not be completed by December 31, 2007,

describe how the regulatory requirements discussed in the Applicable Regulatory Requirements section will be met until the corrective actions are completed."

Response

Based on the results of the debris generation and transport analyses discussed in this response, TVA identified the need for modifications to the existing sump screen to meet the generic letter. Installation of a new sump strainer is planned for the WBN Unit 1 Cycle 7 Refueling Outage in the Fall of 2006. If additional corrective actions are identified in the process of designing and installing new strainers, those actions will be described in a supplement to this submittal.

TVA plans to complete all actions prior to December 31, 2007.

NRC REQUEST 2(c)

"A description of the methodology that was used to perform the analysis of the susceptibility of the ECCS and CSS recirculation functions to the adverse effects of post-accident debris blockage and operation with debris-laden fluids. The submittal may reference a guidance document (e.g., Regulatory Guide 1.82, Rev. 3, industry guidance) or other methodology previously submitted to the NRC. (The submittal may also reference the response to Item 1 of the Requested Information described above. The documents to be submitted or referenced should include the results of any supporting containment walkdown surveillance performed to identify potential debris sources and other pertinent containment characteristics.)"

Response

Walkdown Methodology

Containment walkdowns were performed at WBN to support the analysis of debris blockage as identified in the generic letter. The walkdowns and assessments were performed by personnel from Enercon, Westinghouse Electric Corporation (WEC), Alion Science and Technology, and Transco in consultation with TVA personnel using the guidelines provided in Nuclear Energy Institute (NEI) 02-01, "Condition Assessment Guidelines, Debris Sources inside Containment," Revision 1.

Debris Generation Methodology

The methodologies that were used to determine the types, quantities, and locations of debris generated during a loss-of-coolant-accident (LOCA) in which the plant enters the recirculation mode are those of the NEI Guidance Report NEI 04-07, "Pressurized Water Reactor Sump Performance Evaluation Methodology," with additional consideration of NRC's, "Safety Evaluation by The Office of Nuclear Reactor Regulation Related to NRC Generic Letter 2004-02, Nuclear Energy Institute Guidance Report (Proposed Document Number NEI 04-07), 'Pressurized Water Reactor Sump Performance Evaluation Methodology'."

The zone of influence (ZOI) radius for qualified coatings is 10 times the break diameter. The ZOI for other materials is based on the destruction pressures established for the plant specific materials, which is an acceptable analytical refinement over the baseline evaluation approach that is presented in NEI 04-07, Section 4.2.2.1.1. In determining debris generation, credit is not taken for shadowing effects arising from large components/equipment within a given ZOI.

Debris from qualified coatings was determined using the approach described in NEI 04-07. Inside the ZOI, the qualified coatings are assumed to fail to pigment-sized particles. All coatings were conservatively assumed to fail as a 10 micron particulate in the debris generation analysis for WBN. Outside the ZOI, qualified coatings are assumed to remain intact.

Debris from unqualified coatings was determined using the approach described in NEI 04-07. All unqualified coatings in containment are assumed to fail.

Debris Transport Methodology

The methodology used in this analysis is based on the NEI 04-07 guidance report for refined analyses and considers NRC's safety evaluation, including the refined methodologies in Appendices III, IV, and VI. The specific effect of each mode of transport was analyzed for each type of debris generated, and a logic tree was developed to determine the total transport to the sump strainers.

Chemical Effects Methodology

A comparison of the NRC Industry integrated chemical effects test program (ICET) Test 5 and the WBN Unit 1 plant specific parameters has been performed. The evaluation concluded that the critical parameters in the ICET Test 5 bound the plant parameters. Margin will be added to the strainer area requirements to account for chemical effects. If vendor data is available on the impact of chemical effects on head loss for specific strainer designs, that data will be used to establish margin.

Downstream Effects Methodology

The methodologies in WEC Topical Report, WCAP-16406-P, "Evaluation of Downstream Sump Debris Effects in Support of GSI-191," were used to evaluate the downstream effects of debris passed by the sump strainer.

Analyses Performed By Contractors

TVA contracted with WEC, Enercon, and Alion to perform the evaluations necessary to respond to the generic letter. These evaluations were integrated with the containment walkdowns that were performed by Enercon with a team of personnel that included WEC and Alion as well as independent industry consultants. Alion developed the containment computer aided design model and the computation fluid dynamics model. Alion also performed the debris generation and head loss calculations. Downstream effects were evaluated by WEC as the original equipment manufacturer supplier for most of the components including the fuel.

NRC REQUEST 2(d)

"The submittal should include, at a minimum, the following information:"

NRC Requested Information 2(d)i

"The minimum available NPSH margin for the ECCS and CSS pumps with an unblocked sump screen".

Response

The minimum available net positive suction head (NPSH) margin for the ECCS and CSS pumps with an unblocked sump strainer is not available as the selection of a strainer vendor and final design is in progress. The available NPSH margin will be provided in the supplemental response to this letter. The minimum NPSH margin for WBN is 3.76 feet (ft). Given that the existing screen has an area of approximately 200 ft^2, a new larger strainer should maintain an equivalent or an improved margin. Containment overpressure is not considered in establishing the NPSH margins. An additional five feet of margin is available at the time the containment spray pumps are switched to sump recirculation. This occurs due to the increase in sump pool level due to the water injected from the refueling water storage tank by the spray pumps after the ECCS pumps have been realigned to the sump.

***NRC Requested Information* 2(d)ii**

"The submerged area of the sump screen at this time and the percent of submergence of the sump screen (i.e., partial or full) at the time of the switchover to sump recirculation."

Response

WBN is currently evaluating strainer areas ranging from 2,000 to 6,000 ft^2. The strainer will be fully submerged at the time of the switchover to sump recirculation. The submerged area will be provided in the supplemental response to this letter.

***NRC Requested Information* 2(d)iii**

"The maximum head loss postulated from debris accumulation on the submerged sump screen, and a description of the primary constituents of the debris bed that result in this head loss. In addition to debris generated by jet forces from the pipe rupture, debris created by the resulting containment environment (thermal and chemical) and CSS washdown should be considered in the analyses. Examples of this type of debris are disbonded coatings in the form of chips and particulates and chemical precipitants caused by chemical reactions in the pool..."

Response

TVA performed comprehensive evaluations of the ECCS and the CSS recirculation function due to debris generation and transport in a post-accident containment environment for WBN.

WBN is an ice condenser plant with a free standing steel containment (Reference Updated Final Safety Analysis Report [UFSAR] Figures 1.2-11, 1.2-12, and 1.2-13). There are four distinct regions within the containment. The lower compartment contains the reactor coolant system (RCS) and the LOCA boundary. The perimeter of the lower compartment is the containment floor, the right circular cylinder concrete crane wall, and the divider barrier at the top. The emergency sump is in the lower compartment. The dead ended compartments are outside the crane wall and extend to the containment shell. The divider barrier forms the top of the dead-ended compartments. The ice condenser is located outside the crane wall and provides a flow path for steam and non-condensable gases between the lower compartment and the upper compartment. The upper compartment is an open volume that serves as a reservoir for non-condensable gases during a high energy line break in the lower compartment. The containment spray system discharges into the upper compartment. The spray flow is returned to the lower compartment through two drains in the floor of the refueling canal. There are no high energy pipes in the upper compartment or in the ice condenser. The containment sump is located in the lower compartment under the refueling canal. The sump is a pit in the containment floor. The ECCS/CSS suction piping is located approximately 10 feet below the floor elevation within the sump. The penetrations in the crane wall have been sealed to an elevation of thirteen feet above the containment floor.

During a LOCA, water fills the sump from the refueling water storage tank by injection, from the ECCS system and CSS system, and from water due to ice melt. The lower compartment fills first. After the water level reaches just over thirteen feet, water begins to flow into the dead ended regions. Once this water enters the dead ended region, it no longer actively communicates with the lower compartment sump. Thus any debris generated in or carried into the dead ended regions will not contribute to sump blockage or downstream effects.

Stainless steel reflective metallic insulation (RMI) is used on the RCS and primarily on other insulated piping in the lower compartment. Non-metallic tape, tags and labels in the upper, lower, and ice condenser compartment are a post-LOCA debris source. It is conservatively assumed that there are 1000 ft^2 of this type material. The actual amount will be quantified prior to the end of the WBN Unit 1 Cycle 7 refueling outage. All unqualified coatings in containment have been assumed to fail as have qualified coatings within the ZOI of high energy jets. These debris sources were determined from a review of design documents and a detailed walkdown of WBN Unit 1. A case is being considered assuming all coatings failed. A quantitative latent debris walkdown has not been performed. TVA plans to perform a quantitative latent debris walkdown during the outage that the new strainer is installed. Tags, tapes, and labels are assumed to fail regardless of break size and location.

A 3-dimensional (3D) computational fluid dynamics (CFD) analysis of the WBN containment was performed to determine flow direction, velocity, and turbulence in the sump pool. The analysis was performed using the FLOW 3D computer code. Debris source terms were generated for breaks in the four coolant loops. Assumptions made with respect to unqualified coatings and other non-break generated debris in conjunction with the use of very large ZOI indicates that different break locations within a given RCS loop results in the same debris generation for a given size pipe. The crossover leg is the largest RCS pipe and has an internal diameter of 31 inches. Based on the debris produced and position relative to the sump, two break locations were modeled. One break was taken in the crossover leg on RCS Loop 3. A break was also taken in Loop 1. These double-ended breaks are limiting as these breaks generate the greatest amount of debris.

After the RCS piping, the next largest line is the 14-inch pressurizer surge line. This is also a double-ended rupture. Other lines connected to the RCS are single ended only. A spherical ZOI with a radius of 28.6 times the diameter (D) was used for the RMI and 10 times D for the qualified coatings. The definition of D is the diameter of the high energy source. The volume of the RMI ZOI is 1,690,000 ft^3. The entire volume of the lower compartment is approximately 250,000 ft^3. Thus, the RMI ZOI does not have a physical meaning. The ZOI volume for the paint is 72,200 ft^3. The amount of debris generated by the large RCS breaks is much more challenging for strainer blockage than any attached piping break. Attached piping breaks will not result in a different debris type than the RCS main loop breaks. As such, only the large breaks were numerically evaluated for debris generation and transport. Water levels in the sump at the time of switchover are based on minimum available for any RCS break in the range of 2 to 31 inches in diameter. The ECCS and CSS flowrates used in the CFD and transport analyses were based on two trains of maximum flow. Fire barrier, 3M-M20C, is the limiting debris type for determining sump strainer area size required. The table below shows the quantities of debris produced by the case for a break in RCS Loop 2 in which the largest amount of fibrous debris and coatings was produced. In addition, the limiting amount of Min-K from a break in RCS Loop 1 was applied to be conservative. The combination of fibrous debris with microporous Min-K debris and the large amount of particulate debris is expected to result in the highest head losses at the sump.

Debris Types	Total Quantity	Quantity at Sump
Insulation		
Transco & Mirror SS RMI	172,186 ft^2	82,649 ft^2
Min-K	51.2 lb	51.2 lb
Fire Barrier		
3M-M20C	148.7 ft^3	148.7 ft^3
Coatings		
Phenolic	958 lb	958 lb
IOZ	614 lb	614 lb
Alkyds	44 lb	44 lb
Silicone	182 lb	182 lb
Latent Debris		
Latent fiber	12.5 ft^3	12.5 ft^3
Dirt & Dust	170 lbm	170 lbm
Labels, Placards, etc -	1000 ft^2	1000 ft^2

The values shown in this table are based on conservative assumptions and calculations of pool turbulence, particularly, the treatment of water from the ice condenser drains. Sensitivity studies are ongoing including a more appropriate treatment of water addition from the ice condenser. These studies may reduce the quantities of material that will be transported to the sump. The latent debris source terms were taken from the NEI guidance document and will be quantified during the WBN Unit 1 Cycle 7 refueling outage. TVA is also evaluating the removal of the 3M fire barrier material. This is the most limiting material with respect to sump strainer blockage. The sump strainer area required depends on the design decisions related to the size and associated engineering considerations of the strainer that can be installed versus the technical and regulatory acceptability of removing or replacing the fire barrier material. Upon final determination of the debris load, the most limiting case will be evaluated to ensure head loss across the sump strainer meets the requirements. TVA will include the maximum head loss in the supplemental response.

The WBN design basis includes recirculation of sump fluid following a main steam line break. The CSS is used periodically to recirculate fluid to maintain Reactor Building air temperatures low for long term equipment qualification. Since the primary system is not breached for this event, the recirculation of fluid is not required for core cooling. The containment design pressure and temperature are not challenged in the long term and the recirculation is not required for containment protection. For this reason, the worst case transport for debris is generated by the large break LOCA scenario where both containment and primary systems are impacted by sump recirculation. Additionally, the flow rate through the sump will be much lower as only spray is used. The use of spray will be intermittent. There is considerable ice remaining after the faulted steam generator is isolated and mass and energy releases have been terminated. The containment rapidly depressurizes and the operators will secure both containment spray and the air return fans. The containment would then slowly pressurize. An air return fan will then be cycled. While this has not been explicitly analyzed, TVA estimates that it will take several days to completely melt out the ice bed. After ice bed melt out intermittent spray operation would be required if normal containment ventilation or purge operation was not initiated as a recovery action. Given that radiological releases are bounded by a steam line break outside containment, normal ventilation systems are available for recovery.

WBN uses sodium tetraborate as a buffering agent for the boric acid in the RCS and from the refueling water storage tank. The pH in the WBN sump post-accident ranges from 7.5 to 10. The sump pH will generally be less than the value used in the testing. The strainer material for WBN is expected to be stainless steel. Significant quantities of stainless steel debris material will exist in the sump pool post LOCA. If any precipitant plates out on stainless steel, it would do so on all stainless surfaces not just on the sump strainer. However, because of the fiber in the WBN containment, TVA will add a 50 percent margin to the strainer area to cover chemical effects unless further testing justifies a different figure.

NRC Requested Information 2(d)iv

"The basis for concluding that the water inventory required to ensure adequate ECCS or CSS recirculation would not be held up or diverted by debris blockage at choke-points in containment recirculation sump return flowpaths".

Response

Containment walkdowns were performed in accordance with the guidance of NEI 02-01. These walkdowns showed that there are three potential chokepoints that could prevent adequate water inventory from reaching the containment sump. The potential chokepoints are the two refueling canal drains and the drains in Accumulator Rooms 3 and 4. The drains in the Accumulator Rooms allow the small amount of spray flow that directly hits the air return fans to be returned inside the polar crane wall. Curbs are present in the upper compartment around the fan suction that prevents spray water on the refueling floor from spilling through the fans. Thus the only potential debris from the spray system entering the Accumulator Rooms is very small debris that has traveled through the strainers. Neither the upper compartment nor the Accumulator Rooms are subjected to high energy jets. The only potential for debris in these compartments is failed coatings. The size of the failed coatings or debris that passes through the spray pumps is small and will not block any of these drains. RMI debris (large or small) will not be present to block these drains. It is therefore concluded, that there will be no water inventory holdup or diversion due to debris blockage at choke-points.

An inspection for non-LOCA generated material that could potentially obstruct recirculating water is conducted as part of WBN's containment cleanliness inspection program prior to restart following a refueling outage. This program specifically addresses the need to assure that the containment is free of items that could be washed to the sump.

NRC Requested Information 2(d)v

"The basis for concluding that inadequate core or containment cooling would not result due to debris blockage at flow restrictions in the ECCS and CSS flowpaths downstream of the sump screen, (e.g., a HPSI throttle valve, pump bearings and seals, fuel assembly inlet debris screen, or containment spray nozzles). The discussion should consider the adequacy of the sump screen's mesh spacing and state the basis for concluding that adverse gaps or breaches are not present on the screen surface".

Response

The new sump strainer at WBN will have perforations of 1/8 inch or less. It is planned to use round holes. An evaluation of downstream effects was performed based on the debris mix present with a 1/8-inch open dimension. The debris mix included particulate (RMI, dirt, etc.), coating debris, and fiber in quantities consistent with the amounts present at the sump strainer during steady state ECCS recirculation. The evaluation also considered the expected system alignments after a LOCA.

WEC has evaluated the downstream impact of sump debris on the performance of the ECCS and CSS following a LOCA at WBN. The effects of debris ingested through the containment sump strainer during the recirculation mode of the ECCS and CSS include erosive wear, abrasion, and potential blockage of flow paths. The smallest clearance found for the WBN heat exchangers, orifices, and spray nozzles in the recirculation flow path is 0.375 inches for the containment and RHR spray nozzles; therefore, no blockage of the ECCS flow paths will occur.

The instrumentation tubing is also evaluated for potential blockage of the sensing lines. The transverse velocity past this tubing is determined to be sufficient to prevent debris settlement into these lines, so no blockage will occur. The reactor vessel level instrumentation system (RVLIS) was also evaluated. The WBN RVLIS design has been evaluated and is not affected by the debris. The WBN heat exchangers, orifices, and spray nozzles were evaluated for the effects of erosive wear for a constant debris concentration over the mission time of 30 days. The erosive wear on these components was determined to be insufficient to affect the system performance.

For pumps, the effects of debris ingestion through the sump strainer on three aspects of operability, including hydraulic performance, mechanical shaft seal assembly performance, and mechanical performance (vibration) of the pump, were evaluated. The hydraulic and mechanical performances of the pump were determined not to be affected by the recirculating sump debris.

ECCS valves except the throttle valves, have large openings and are not subjected to plugging. Valves requiring detailed evaluation for sedimentation were found to have a minimum flow velocity greater than 0.42 ft/sec, such that no sedimentation is expected to occur at WBN. ECCS valves that are closed prior to exposure to debris laden fluid did not require an explicit flow calculation. A detailed erosion evaluation was performed for each of the twelve ECCS throttle valves, crediting the time dependence of debris concentration decay due to settling. The results of these erosion evaluations showed acceptable 30-day erosion in all cases. An initial evaluation of the twelve WBN ECCS throttle valves has been performed and showed sensitivity to strainer size selection. An updated evaluation will be performed following final selection of strainer design. The conclusions will be provided in a supplemental response.

Evaluations of the reactor vessel internals showed no potential blockage issues. The final fuel assembly evaluations are not complete. The results will be provided in a supplemental response.

Adverse gaps or breaches in the sump strainer are prohibited by TVA criteria. This requires that there shall be no spaces or gaps in the final installation that would allow passage of any particles larger than the perforation size.

Plant Technical Specifications require that the sump screens be inspected at least once per 18 months. The inspection procedure requires verification that there are no unacceptable holes or gaps in the screens or between the screens and adjacent structures and components.

NRC Requested Information 2(d)vi

"Verification that close-tolerance subcomponents in pumps, valves and other ECCS and CSS components are not susceptible to plugging or excessive wear due to extended post-accident operation with debris-laden fluids."

Response

Pump bearings and seals were evaluated and will not become plugged. The bearings, seals, and impellers were evaluated for wear and it was determined that for a 30-day service any wear would be within acceptable limits. The evaluation was consistent with the WEC Standard methodology in WCAP-16406-P.

***NRC Requested Information* 2(d)vii**

"Verification that the strength of the trash racks is adequate to protect the debris screens from missiles and other large debris. The submittal should also provide verification that the trash racks and sump screens are capable of withstanding the loads imposed by expanding jets, missiles, the accumulation of debris, and pressure differentials caused by post-LOCA blockage under predicted flow conditions".

Response

The sump strainer design requirements ensure that it will be capable of withstanding the force of the analyzed post-LOCA debris loading, in conjunction with applicable design basis conditions, without collapse or structural damage. The design requirements also ensure that it will be capable of withstanding the hydrodynamic loads and inertial effects of water without loss of structural integrity. The new sump strainers and supports will be designed as Seismic Category I. The assumption of a seismic event after a LOCA is not part of the WBN design basis.

***NRC Requested Information* 2(d)viii**

"If an active approach (e.g., backflushing, powered screens) is selected in lieu of or in addition to a passive approach to mitigate the effects of the debris blockage, describe the approach and associated analyses."

Response

The specifications for new passive sump strainers have been issued, and the vendor selection process is underway. TVA does not plan to install an active strainer design.

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02 RESPONSE

NRC REQUEST 2(e)

"A general description of and planned schedule for any changes to the plant licensing bases resulting from any analysis or plant modifications made to ensure compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of this generic letter. Any licensing actions or exemption requests needed to support changes to the plant licensing basis should be included".

Response

The licensing basis for the new sump strainers will be updated in accordance with TVA's design change process to reflect the supporting analyses as installed. Removal of the 3M fire barrier material may require NRC review and approval in accordance with License Condition 2.F. The licensing evaluations needed to make this determination have not been completed at this time.

NRC REQUEST 2(f)

"A description of the existing or planned programmatic controls that will ensure that potential sources of debris introduced into containment (e.g., insulations, signs, coatings, and foreign materials) will be assessed for potential adverse effects on the ECCS and CSS recirculation functions. Addressees may reference their responses to GL 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment," to the extent that their responses address these specific foreign material control issues".

Response

TVA ensures that potential quantities of post-accident debris are maintained within the bounds of the analyses and design bases that support ECCS and CSS recirculation functions.

The following is a summary of the procedures and engineering specifications which constitute the present containment material control and inspection requirements that pertain to ensuring operability of the WBN containment sump:

1. Standard Programs and Processes (SPP)-10.7, Revision 1, "Housekeeping/Temporary Equipment Control" - Delineates controls for housekeeping, material condition, and temporary

equipment at TVA Nuclear (TVAN) sites. This encompasses housekeeping responsibilities for all workers to preserve the quality of the work environment and the material condition of the plant.

2. SPP-6.0, Revision 2, "Maintenance and Modifications" - The maintenance and modification process ensures that conduct of maintenance activities and the physical implementation of design changes support safe operation of the station.

3. SPP-6.5, Revision 10, "Foreign Material Control" - This procedure provides the requirements for maintaining cleanliness by preventing the uncontrolled introduction of foreign material such as maintenance residue, dirt, debris, or tools into open systems or components, and recovery from intrusion of foreign material.

4. SPP-9.3, Revision 12, "Plant Modifications and Engineering Change Control" - This procedure establishes a uniform process of administrative controls and regulatory/quality requirements for plant modifications and changes to engineering documents. It includes consideration of materials introduced into the containment that could contribute to sump strainer blockage.

5. SPP-9.5, Revision 7, "Temporary Alterations" - This procedure provides the requirements for controlling temporary alterations to systems, structures, and components (SSCs) of TVA's 10 CFR 50 and 10 CFR 72 facilities in a manner which ensures operator awareness, conformance with design basis and operability requirements, and preservation of plant safety and reliability.

6. General Engineering Specification G-55, Revision 14, "Technical and Programmatic Requirements for Protective Coating Program at TVA Nuclear Plants" - This specification provides the technical and programmatic requirements for the protective coating programs at TVA nuclear plants.

7. Technical Instruction (TI)-12.07, Revision 3, "Containment Access" - Provides documentation of containment entry/exit and cleanliness (housekeeping) requirements when in MODES 1 - 4 and during MODE 5 as directed by the Shift Manager. Performance ensures no loose debris (rags, trash, clothing, failed protective coatings, tools, etc.) is present in containment, specifically debris that could impact RHR and ECCS operability due to adverse impact on the containment sump.

8. TI-12.14, Revision 4, "Replacement and Upgrade of Plant Component Identification Tagging and Labeling" - Provides guidelines for establishing and maintaining an accurate, effective program for control of plant labels, signs and tags. Ensures that labels are designed to withstand the environment to which they are exposed and each label is evaluated on an individual basis. Specifies that labels used inside containment shall conform to G-29, IEEE 323-74 and G-55 requirements.

9. TI-61.003, Revision 4, "Ice Condenser Debris Log" - Provides the steps to record, track, and evaluate any debris in the Ice Condenser.

10. TI-209, Revision 1, "Plant Labeling" - Supplement to TI-12.14 to provide detailed guidelines necessary to label WBN with clear, consistent, permanent plant labels, and to maintain the labels through the life of the plant

11. TI-276, Revision 1, "Temporary Equipment Control" - Delineates technical requirements for placement of temporary equipment at Watts Bar Nuclear Plant and ensures that the placement of temporary equipment does not challenge the operability of safety related SSC.

12. Modification/Addition Instruction (MAI)-5.3, Revision 15, "Protective Coatings" - Covers the technical and verification requirements to implement a protective coating program at WBN which meets TVA's commitments as defined in Engineering Spec G-55.

13. Periodic Instruction, 0-PI-OPS-11.0, Revision 6, "Housekeeping/Temporary Equipment Control Review Verification" - Ensures housekeeping/temporary equipment control is reviewed monthly.

14. Surveillance Instruction, 1-SI-61-3, Revision 8, "18 Month Ice Condenser Flow Passages Inspection" - Provides detailed steps to visually inspect Ice Condenser flow passages between ice baskets, lattice frames, and wall panels for ice accumulation and debris to determine blockage. The inspection also includes the turning vanes and lower support structure to ensure no gross blockage exists that would preclude steam flow from reaching the ice bed during a LOCA.

15. Surveillance Instruction, 1-SI-61-5, Revision 9, "18 Month Ice Condenser Lower Inlet Doors Inspection" - Includes a

visual inspection of lower inlet doors to determine if there is any restriction due to ice, frost, or debris.

16. Surveillance Instruction, 1-SI-61-6, Revision 5, "Weekly Ice Condenser Intermediate Deck Doors Visual Inspection" - Includes a visual inspection of intermediate deck doors to determine if there is any restriction due to ice, frost, or debris.

17. Surveillance Instruction, 1-SI-61-8, Revision 2, "92 Day Ice Condenser Top Deck Doors Visual Inspection" - Includes a visual inspection of top deck doors to ensure no restrictions on the door opening.

18. Surveillance Instruction, 1-SI-61-9, Revision 6, "18 Month Ice Condenser Floor Drains Visual Inspection" - Verifies that each ice condenser drain line and associated valves are free from ice, frost and debris.

19. Surveillance Instruction, 1-SI-304-2, Revision 4, "18 Month ECCS Containment Sump Inspection" - Verifies the integrity and cleanliness of the ECCS containment sump, trash racks, Containment Spray suction piping, RHR suction piping, associated screened area and floor drains in Accumulator Rooms 3 and 4.

Collectively, these documents provide the technical and programmatic controls necessary to ensure that design change, maintenance, and modification activities are conducted in a manner that assures operability of the containment sump.

These procedures will be reviewed under the design change control process to install the new strainer and may be revised based on the design of the new sump strainers.

ENCLOSURE 2

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02 RESPONSE

COMMITMENT LIST

The following provides a list of commitments in this submittal which are being tracked by TVA's commitment process.

1. Based on the results of the debris generation and transport analyses discussed in this response, TVA identified the need for modifications to the existing sump screen to meet the generic letter. Installation of new sump strainer is planned for the WBN Unit 1 Cycle 7 Refueling Outage in the Fall of 2006.

2. TVA will provide a supplemental response to this submittal to include:
   - additional actions, if needed, identified in the process of designing and installing new strainers,
   - available NPSH margin with an unblocked sump strainer,
   - submerged area of the sump strainer,
   - the maximum head loss,
   - final conclusions of the evaluation of the twelve WBN ECCS throttle valves,
   - final results of the fuel assembly evaluations.

3. TVA plans to perform a quantitative latent debris walkdown during WBN Unit 1 Cycle 7 refueling outage.

4. TVA will add a 50 percent margin to the strainer area to cover chemical effects unless further testing justifies a different figure.