PROPRIETARY INFORMATION ENCLOSED UNDER 10 CFR 2.390(b)(4)

July 3, 2006

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 - GENERIC LETTER 2004-02 - REQUEST FOR ADDITIONAL INFORMATION REGARDING THE NUCLEAR REGULATORY COMMISSION STAFF AUDIT ON THE CONTAINMENT SUMP MODIFICATIONS (TAC NO. MC4730)

The purpose of this letter is to respond to NRC's request for additional information (RAI) dated May 10, 2006 concerning the subject Staff audit of the containment sump modifications. TVA coordinated an extension of this response with NRC Project Manager to July 5, 2006.

TVA's responses to NRC's questions are provided in Enclosure 1. The documents requested by NRC's RAI are provided on the enclosed Compact Discs (CD) two per set. A list of documents on the CDs is provided in the Attachment to Enclosure 1. Calculation FSDA-C-597, "RHR Pump NPSH," in response to Question 1 under Net Positive Suction Head/Loss-of-Coolant Accident and the "WBN ECCS Analysis Report" in response to Question 1 under Downstream Effects (Components) on the CD contain information proprietary to Westinghouse Electric Corporation for which withholding is being requested. Westinghouse is providing these documents for use by the NRC staff in its audit activities and requests that these documents be considered proprietary in their entirety. As such, a non-proprietary version will not be issued.

The proprietary information for which withholding is being requested is further identified in Affidavit CAW-06-2163 and CAW-06-2169 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in 10 CFR 2.390(b)(4).

Enclosure 2 contains Westinghouse authorization letters, CAW-06-2163 and CAW-06-2169, accompanying affidavits, Proprietary Information Notices, and Copyright Notices. Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavits should reference CAW-06-2163 or CAW-06-2169 and should be addressed to B.F. Maurer, Acting Manager, Regulatory Compliance and Plant Licensing, or J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P. O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

The remaining open items to respond to NRC's audit request for additional information are being tracked as part of the previous commitment to provide a supplemental response. 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 30th day of June 2006.

Sincerely,

P. L. Pace
Manager, Site Licensing
and Industrial Affairs

Enclosures
cc See page 3

Enclosures
cc (Enclosures):
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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NRC AUDIT OF CONTAINMENT SUMP MODIFICATIONS

Break Selection and Zone of Influence Analysis

QUESTION 1

Tennessee Valley Authority (TVA, the licensee) stated that because the quantity of reflective metallic insulation is not a significant contributor to head loss, and the quantity of fibrous material, Min-K, would remain relatively unchanged for each break, the bounding case for each loop is the reactor coolant system break which would destroy the most coatings. The licensee indicated that a thorough analysis showed that a break in each of the crossover legs near the steam generator nozzle yielded the most coating debris due to the size of the zone of influence (ZOI) applied in the analyses. The Nuclear Regulatory Commission (NRC) staff (the staff) determined that such an analysis was not clearly documented in the calculations and information provided for the staff's audit. Please provide the referenced analysis to verify that the limiting break is at the base of the steam generator.

RESPONSE

As a result of questions raised during the audit, ALION has revised and expanded the debris generation calculation. The revision to the debris generation calculation (Revision 2) no longer makes reference to undocumented analyses for the paint calculations. Since the ZOIs used in the debris generation analysis are large, moving locations along the primary loop piping would not have a significant impact on the debris quantities generated. The break selection considered all debris sources. The silicon coatings protecting the carbon steel shell of the steam generators were the reason to select the steam generator nozzle as well as the large amount of reflective metal insulation (RMI) on the steam generators. The new steam generators that are being installed in the Fall 2006, will not have a coating on the shell. The steam generators continue to be the largest source of RMI debris for large breaks. Also, since the crossover leg is larger than the hot and cold legs, selecting a break on the crossover leg piping is conservative because the ZOI is larger.

The revised analysis results in revised debris quantities projected for WBN. Some of the fiber quantities due to min-K and 3M fire wrap have increased with respect to that tested in WBN's strainer test. WBN is looking at several options to reduce these quantities to within the tested configuration. These include:

credit for additional jet shielding due to robust barriers and large structures, material testing under jet impingement loading to reduce the ZOI for encapsulated fiber, removal of material, and/or sump strainer re-testing. The total fiber quantities still remain low and with WBN's large strainer area, TVA is confident the WBN strainer design will have a low head loss. The final debris calculation will be provided as part of an update of the remaining open items.

QUESTION 2

As discussed in Sections 3.1 - 3.4 of Watts Bar calculation ALION-CAL-TVA-2739-03, the licensee credits the reactor annulus and refueling canal as robust barriers in the analysis. As stated, the licensee's analysis showing that a break in each of the crossover legs near the steam generator nozzle yielded the most coating debris was not clearly documented in the calculations and information provided for the staff's audit. Therefore, Watts Bar calculation ALION-CAL-TVA-2739-03 does not clearly show the extent to which the licensee credited truncation due to robust barriers. Using the response to question 1 above, please show the extent to which truncation is credited.

RESPONSE

The revised debris generation calculation (Revision 2) now shows the shielding that is currently credited and includes appendices to clearly document which of the line items from the insulation spreadsheet that were included as debris for each break location. The revised analysis will be provided to NRC in the supplemental report. Follow-up work may be required as described in the response to Question 1 above.

QUESTION 3

Steam line breaks in the debris generation calculation are ruled out because recirculation is not required for cooling the core following a steam line break. However, recirculation using spray flow for environmental qualification of equipment is required. Please explain why this scenario was not analyzed.

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RESPONSE

A main steam line break (MSLB) in the lower compartment would result in a smaller ZOI volume compared to the reactor coolant system (RCS) line break since the main steam pressure is less than half of the RCS pressure. A loss-of-coolant accident (LOCA) was considered to be bounding to a MSLB since ECCS recirculation is not required for decay heat removal following a postulated MLSB. Recirculation using spray flow for environmental qualification of equipment is required long term following a MSLB. The ice condenser ice melt depletion is bounded by the LOCA and occurs later in time due to less energy release for the MSLB. Eventually the ice is depleted, even for the MSLB, and containment spray in conjunction with air flow from the lower compartment coolers is used to maintain the containment temperature in the long term. However, operators are not required to restart the lower compartment cooler fans to recirculate air throughout the lower compartment and the dead-ended spaces to prevent hot spots from developing for at least 1.5 hours after the event. In addition, the containment spray is only required to remove ambient heat loss from the RCS. Periodic use of one train of spray is needed. Therefore, there would be less flow to transport debris, less debris to transport, and intermittent flow to move the debris. Thus, it was determined that a MSLB was bounded by a Large Break LOCA and was not required to be analyzed.

Debris Generation

QUESTION 1

Please provide the complete walk-down report, "Report on Watts Bar Unit 1 Containment Building Walkdowns for Emergency Sump Strainer Issues," TVAW001-RPT-001, Revision 0.

RESPONSE

A compact disc (CD) is enclosed with the requested information in electronic format.

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
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Chemical Effects

QUESTION 1

Please provide the amounts of various Watts Bar containment materials (I) submerged and (ii) in the containment spray zone for the following materials: aluminum, zinc (from galvanized steel and inorganic zinc (IOZ) coatings), copper, carbon steel, and uncoated concrete. These amounts should include any scaffolding material or metallic-based paints (e.g., aluminum-based paints used on pressure vessels).

RESPONSE

The material amounts requested were provided in TVA's response dated April 11, 2006 in response to NRC's Request for Additional Information dated February 10, 2006 under Plant Materials, Question 2. The quantities provided included scaffolding stored inside the crane wall that would be subject to spray or submergence. WBN controls this material to minimize quantities. There is no other metallic based paint other than those listed in the April 11, 2006 response.

QUESTION 2

Provide a discussion concerning the post loss-of-coolant accident (LOCA) containment pool pH, including the range of pH values possible. The values discussed by the licensee at the audit meeting were more refined than the licensee's response to the NRC Generic Letter (GL) 2004-02. Please clarify.

RESPONSE

The expected sump pH is 7.8 to 8.2 for a LOCA at any time during the fuel cycle. The sump pH range includes conditions for the beginning and end of core life, the minimum and maximum quantities of boron and buffering agent in the RCS, the accumulators, the refueling water storage tank (RWST), and in the ice condenser. The range also includes the maximum and minimum water and ice volumes. The temperature variation of the RWST and accumulators was included in developing this range.

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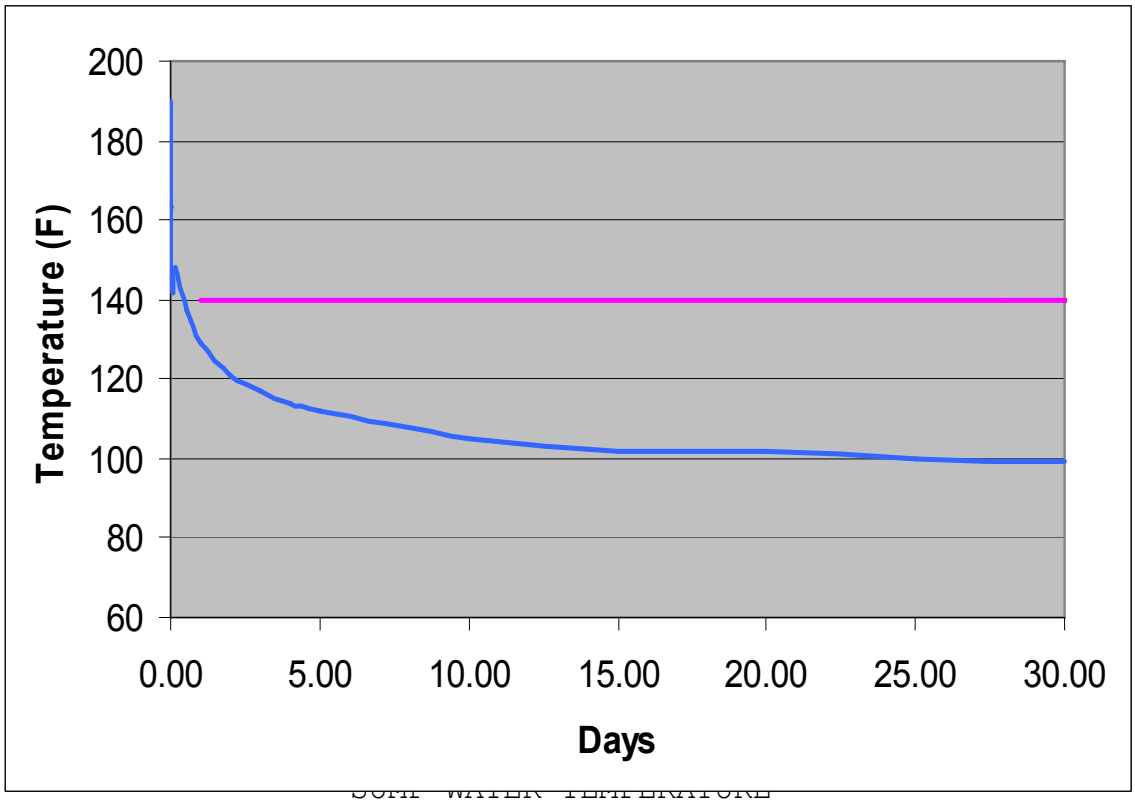
QUESTION 3

If possible, provide the containment pool temperatures as a function of time during the emergency core cooling system (ECCS) mission time for the limiting combination of conditions that would produce (i) the highest pool temperatures with time, and (ii) the lowest pool temperatures with time.

RESPONSE



SUMP WATER TEMPERATURE

The figure above shows the sump temperature for the limiting large break LOCA. The analysis is based on one train of ECCS and containment spray which minimizes containment heat removal. The analysis also assumed an ultimate heat sink temperature of 88 degrees Fahrenheit (F) which is higher than the current technical specification limit of 85 degrees F. It also assumes that river stays at this temperature for the entire 30 day period. This is a very conservative assumption. It should be noted that TVA has submitted a Proposed License Amendment Request (WBN-TS-06-09) dated May 8, 2006, to increase the design basis ultimate heat sink temperature to 88 degrees F. The RWST temperature was

assumed at the technical specification maximum of 105 degrees F. The amount of ice in the ice condenser was assumed to be at the minimum safety limit value. It should also be noted that the maximum pH used to evaluate chemical effects was based on the maximum amount of ice in the ice bed. Using this ice mass in the containment analysis would have resulted in a lower sump temperature and a higher water level for net positive suction head (NPSH).

A similar analysis for minimum sump temperature has not been performed. A sensitivity study on the amounts of chemical precipitants was performed assuming that sump temperature was lowered considerably. This sensitivity study showed that the amount of corrosion products produced was lower than in the high temperature case. As such, the high temperature case is limiting and there is not a need for a detailed formal analysis of minimum sump temperature.

QUESTION 4

Provide the Watts Bar plant-specific chemical effects analysis. Indicate if any more chemical effects related testing is planned.

RESPONSE

Chemical effects were evaluated using a correlation developed by Westinghouse from separate effects precipitation test data (WCAP-16530-NP, *Evaluation of Post-Accident Chemical Effects in Containment Sump Fluids to Support GSI-191*) and considering the results of the integrated chemical effects tests (ICET). The evaluation using the WCAP correlation showed a total of 10 milli-grams per liter (mg/l) for the precipitants based on the total weight of the precipitants. The total weight of precipitants for the base case was less than 45 pounds. The precipitants predicted by the Westinghouse correlations were composed principally of $NaAlSi_3O_8$ (aluminum silicate) with a small amount of AlOOH (aluminum oxide hydroxide). This result was obtained using the sump temperature profile discussed in response to Question 3 above and the maximum sump pH was reached at about 30 minutes into the event. The maximum pH will not occur until ice bed melt out at just over an hour into the event.

Temperature and pH sensitivities were run using the Westinghouse correlations. Lower temperatures and lower pH result in lower concentrations and total quantities. A case was run with a

maximum sump pH of 7.8 corresponding to a minimum ice case with somewhat lower long term sump temperatures. The amount of precipitant was just over 23 pounds. Using the same temperature profile with a maximum sump pH of 8.2, results in a total precipitant weight of less than 28 pounds. Aluminum silicate and aluminum oxide hydroxide were the only precipitants in all cases.

ICET 5 is the test most representative of the WBN environment of the ICET series of tests. The boron concentration in the test is 2800 parts per million (ppm) versus a maximum WBN concentration of 3300 ppm. The buffer is sodium tetraborate contained in the ice of the ice condenser. A concentration for the sodium tetraborate is not calculated. The solution used to form the ice is sampled and has to have a boron concentration of 1800 to 2000 ppm and the pH is required to be between 9.0 and 9.5. The ICET 5 test pH range is 8.0 to 8.5 and the WBN sump pH is between 7.8 and 8.2 as discussed in the response to Question 2 above. The amount of aluminum evaluated in ICET 5 is much higher than is present in the plant. Since aluminum is the predominant precipitant, this difference is significant. The other significant difference is the ICET temperature is much higher than is present in the plant. ICET 5 showed concentrations of dissolved aluminum of 55 milligrams per liter (mg/l) and calcium of 35 mg/l.

Given the very low quantities of chemical precipitants, TVA does not plan further chemical testing.

QUESTION 5

During the integrated chemical effects testing (ICET), in certain chemical environments such as sodium tetraborate, precipitates formed as the solution cooled from the 140°F test temperature. These products could interact with other downstream debris to cause clogging in narrow passages of downstream components such as valves and pump internals, or affect internal surfaces of heat exchangers or the reactor vessel. Describe your evaluation of potential downstream effects related to interaction with chemical products and the criteria used to determine that performance of downstream components is acceptable for your plant-specific chemical products and debris combination.

RESPONSE

The chemical analyses showed that the quantity of precipitants formed would be less than 45 pounds. These formed over the course of the 30 day mission time not instantaneously. The precipitants would initially form as small particles. If the precipitants were to agglomerate, it would be more likely to occur in the general sump pool as opposed to in piping where the flow rates are much higher. Larger particles would be more likely to settle out and be removed as a potential problem for down stream effects. TVA has included chemical precipitants in the evaluated particulate load for downstream wear and plugging. The total quantity of chemical precipitants is so small that there would be no noticeable effect on heat transfer in the RHR and containment spray heat exchangers. The chemical load is less than two percent of the total particulate load and as such does not appreciably affect wear. The strainer hole size was selected to be the smallest opening in the ECCS flow path when fuel bottom nozzle changes are complete. The size of the strainer holes was chosen to preclude plugging.

QUESTION 6

If all the coatings are assumed to fail, justify why this large additional debris loading would not increase the analyzed amount of chemical effects, or add another unanalyzed chemical product.

RESPONSE

The principal coating materials in the containment are inorganic zinc and phenolic topcoat. The chemical testing has established that there are no noteworthy precipitants associated with the zinc. Amounts of zinc in excess of the amount present in WBN were considered in the ICET tests. The cured phenolic is not chemically active in alkali and acid solutions per manufacturer's data. The silicon coatings on the steam generator do not need further consideration as the replacement steam generators do not have a coating. WBN has not removed the contribution of this coating from head loss used to design the new strainer. This becomes margin, therefore, chemical considerations from these coatings do not need further consideration. The other coating type in containment is alkyds. This paint does not have a high resistance to acidic or alkali solutions. While this is the case, the sump pH is moderately acidic at the start of an accident but the pH rapidly rises to a mild alkali. This would

limit chemical effects as would the low sump temperature. The total amount of alkyd paint in containment is 44 pounds. This small amount in conjunction with low quantity of fiber and the large strainer area is sized to prevent the formation of a uniform fiber bed. There will be no measurable effect on head loss due to alkyd based chemical effects. The alkyd coatings are already assumed to be a debris source as are the other coatings. As such, these coatings are accounted for in both head loss and downstream effects considerations. If the coatings were assumed to stay on the equipment or structure which the coatings were applied and were not a debris source, the chemical material could add to the debris loading as is the case with aluminum, where absent the chemical consideration there would not be an aluminum debris term. Given the low quantity and the fact all of the alkyd coatings are considered as debris, further considerations from a chemical effects standpoint are not needed.

Net Positive Suction Head / Loss-of-Coolant Accident

QUESTION 1

Section 2.3 of ALION-REP-TVA-2739-02, Revision 0, notes that the maximum containment sump temperature used to establish the available net positive suction head (NPSH) for the containment spray pumps during the recirculation phase was 190°F. Please provide the temperature used to establish the available NPSH for the residual heat removal (RHR) pumps during the recirculation phase, and justify if it is different from that used for the spray pumps during recirculation.

RESPONSE

The Westinghouse calculation FSDA-C-597, "RHR Pump NPSH," dated November 16, 1994 is provided on the enclosed CD. Note that 190 degrees F was used in the analysis. Please note this document is considered *"Proprietary Information"* as classified by Westinghouse Electric company, LLC for which withholding is being requested under 10 CFR 2.390(b)(4). Enclosure 2 to this letter provides the required Affidavit (CAW-06-2163).

ENCLOSURE 1

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QUESTION 2

Please summarize the methodology and assumptions used to determine the maximum sump pool water temperature at the initiation of sump recirculation. Please justify if there is a deviation of this temperature from the calculated maximum containment temperature following a LOCA. If such calculation assumptions were used to maximize containment pressure, please explain the effect of such assumptions on containment temperature.

RESPONSE

The maximum sump temperature at recirculation was determined from the containment analysis performed for the replacement steam generator project. This analysis maximizes initial conditions to determine the worst case containment pressure for the ultimate heat sink worst case summer conditions. Some of the assumptions which maximize containment and sump temperature include:

- Single train containment spray,
- Conservative core decay heat,
- Minimum technical specification ice mass,
- Single train RHR core cooling,
- Large break LOCA maximizing initial energy release,
- Single air return fan operation,
- Minimum RWST level and Maximum RWST temperature,
- Conservatively low heat sink area and mass,
- Maximum steam generator water inventory (includes uncertainty),
- Conservative RHR and Containment Spray heat exchanger coeffient, [UA], assumptions.

These assumptions are described in TVA's letter to NRC dated June 7, 2006, "Watts Bar Nuclear Plant (WBN) - Unit 1 - Technical Specification (TS) Change No. WBN-TS-05-09 - Ice Condenser Ice Weight Increase Due to Replacement Steam Generators - Supplemental Information - (TAC No. MC 9270)"

The containment sump liquid temperature is not in equilibrium with the containment atmosphere temperature at the time of switchover to sump recirculation. This is due in part to the ice condenser design where ice melt water mixes with the break discharge and the containment spray drainage in the lower compartment and active sump region. Maximum containment

atmosphere temperatures are approximately 240 degrees F reducing to 200 degrees F at approximately 800 seconds whereas maximum containment sump liquid temperature is approximately 190 degrees F reducing to approximately 165 degrees F at 800 seconds. The cold ice melt water exits the ice condenser and falls through the lower compartment picking up energy and cooling the air/steam mixture but does not attain full equilibrium prior to reaching the sump. The efficacy of this process is based on NRC approved Westinghouse ice condenser containment analysis models including scale test results.

For WBN recirculation occurs around 1600 seconds. The assumptions for NPSH are based on sump temperatures at the beginning of the event (190 degrees F) which is nearly identical to the lower compartment temperature at 1600 seconds (191 degrees F). At the same time the predicted sump temperature is less than 165 degrees F. Therefore, it can be concluded that a conservative temperature is used when comparing to actual sump temperature at recirculation or it can be concluded that a consistent temperature is used when comparing to lower compartment temperature at sump recirculation.

In summary, the analysis is based on one train of ECCS and containment spray which minimizes containment heat removal. The analysis assumes that the ultimate heat sink (river) stays at the technical specification maximum temperature for the entire 30 day period. This is a very conservative assumption because it also minimizes containment heat removal. The RWST temperature was at the technical specification maximum of 105 degrees F. The amount of ice in the ice condenser was assumed to be at the minimum safety limit value. The assumptions were set to produce the maximum containment pressure. Other assumptions made were that ECCS spill water is at the injection temperature and there is limited heating of the ice melt water. Changing these last two assumptions would increase sump temperature. Because of the ice condenser containment design these assumptions have a minimal impact on sump temperature at the initiation of sump recirculation. The containment spray in the upper compartment is not condensing steam. The spray flow does not provide heat removal from the containment as long as ice is present. This water enters the sump at the RWST temperature. The ice condenser melt water even with different assumptions enters the sump pool at a temperature below 100 degrees F. These are the two largest sources of water prior to sump recirculation. The NPSH calculations were performed assuming a sump temperature of 190 degrees F. The sump temperature at the time of switchover is

less than 190 degrees F and is decreasing. Containment temperature at this time is approximately 190 degrees F.

QUESTION 3

Please provide copies of the following calculation reports referenced in Section 2.5 of ALION-REP-TVA-2739-02, Revision 0:

- *N2-72-4001, R-15 - Containment Spray System*
- *N3-74-4001, R12 - RHR System*
- *Watts Bar calculation EPM-RCP-120291 Revision 2, Containment Spray Pump Net Positive Head (NPSH) Calculation.*
- *Westinghouse calculation FSDA-C-597 dated 11/6/94 - RHR Pump NPSH.*

RESPONSE

The requested information is provided on the enclosed CD. Note that the containment spray system description (N3-72-4001) is at a higher revision level than requested. The changes are noted in the revision log.

Debris Transport

QUESTION 1

Please provide ALION's FLOW-3D Version 9 executable and the corresponding input deck for the Watts Bar analysis.

RESPONSE

This executable was separately provided for NRC use by ALION. It is TVA's understanding that ALION considers this information to be proprietary.

ENCLOSURE 1

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Downstream Effects (Core)

These questions refer to the Watts Bar downstream effects calculations found in calculation CN-CSA-05-36, Fuel Evaluation:

QUESTION 1

Page 5 states that a fiber bed of less than 0.125 inch at the core inlet is acceptable. Page 40 states that a 7-foot head loss is predicted for a 1/8-inch fiber bed. What head loss would be produced at the core inlet following a large cold leg break? Please explain and justify whether adequate flow to the core would be provided with this head loss.

RESPONSE

The 1/8-inch fiber bed is a pass/fail criterion based, in part, on NRC calculations of head loss in the Safety Evaluation of Nuclear Energy Institute (NEI) 04-07, *Pressurized Water Reactor Sump Performance Evaluation Methodology*. The 7-foot head loss approximates the maximum water head in the downcomer for a cold leg break. No attempt was made to calculate the head loss associated with the 1/8-inch fiber bed.

QUESTION 2

Page 7 states that 95 percent of fibrous material would be trapped in the bottom fuel nozzle and that the remaining 5 percent is assumed to be returned to the sump. This assumption is stated to be based on the similarity of the dimensions of the flow path through the sump screen and the dimensions through the screen at the bottom of the fuel.

a. Please provide drawings of the fuel element inlet screens showing the dimensions of the flow path into the fuel.

b. Provide comparisons of the dimensions of the sump screen holes to the debris screen at the inlet at the fuel elements.

RESPONSE

Drawings of the fuel design are shown in the Updated Final Safety Analysis Report (UFSAR), Section 4.2. Detailed drawings of the

fuel are considered proprietary to the fuel vendor and have been separately discussed with NRC staff on behalf of WBN on June 8-9, 2006. It is TVA's understanding that information was sufficient to disposition this RAI question.

QUESTION 3

Page 10 lists the volume concentration for 3M fiberglass passing through the sump screens as 2.351e-3 and the total fibrous concentration to be 2.559e-3. Page 5 of calculation CN-CSA-05-14 lists the fibrous concentration passing through the sump screens as 5 parts per million. Please relate these quantities.

RESPONSE

The volume concentration on page 10 is an initial concentration value used in the fuel evaluation, and is the ratio of fiber volume to sump pool volume assuming no sump screen filtering has occurred.

The mass concentration on page 5 of CN-CSA-05-14 is used in the wear and abrasion calculations, and is the ratio of fibrous mass to sump pool water mass assuming that the entire fiber load has passed through the sump screen one time. Therefore, the fiber mass is multiplied by 0.05, and then divided by the sump pool water mass.

QUESTION 4

Page 10 states that decay heat is based on American Nuclear Society (ANS) Standards 79 with 2σ Since this is a LOCA calculation, please explain why the decay heat was not calculated using ANS Standard 71 + 20 percent to be consistent with Appendix K to Title 10 Code of Federal Regulations Part 50.

RESPONSE

The evaluation method employed is based on the decay heat rate at the time of ECCS switchover from RWST injection to containment sump recirculation and maintains the decay heat as a constant for the time period considered in the calculation. While the American Nuclear Standard (ANS) 1979 + 2 sigma decay heat curve may slightly under-predict the head load for a cold leg break at the time of switchover from RWST injection to sump recirculation,

the use of constant decay heat at time of switchover is conservative for the overall calculation.

QUESTION 5

Page 17 shows that following a hot leg break, the fiber bed at the core inlet will exceed the 1/8-inch acceptance criterion within the first hour of recirculation. Please explain the effect of this condition on the core. Describe alternate flow paths for water to reach the core. Describe the transport and deposition of debris through these alternate flow paths.

RESPONSE

Alternate flow paths are currently being considered generically under a PWR Owners Group program. Calculations such as those suggested by NRC have not been performed at this time.

QUESTION 6

The staff plans to perform audit calculations using the TRACE code to evaluate flow of water to the core through alternate flow paths in the event that the core inlet becomes blocked. Please provide the staff with the location and dimensions of any alternate flow paths through which water could reach the core under these circumstances. Provide the height of flow holes above the bottom of the core as well as their radial distribution about the core periphery.

RESPONSE

This information was also provided to NRC by Westinghouse in a separate audit meeting on June 8-9, 2006, on behalf of WBN. It is TVA's understanding that Westinghouse considers this information to be proprietary.

QUESTION 7

Pages 18 and 19 show the depletion of fibrous material in the recirculating water for hot and cold leg breaks. A range of 97 percent to 95 percent depletion on the sump screens and a range of 95 percent to 50 percent depletion on the fuel screens is assumed. The depletion fraction is assumed to remain constant

with time for each cycle as the recirculating water passes the screens. Please explain whether a fiber so short or a particle so small that it can pass through the sump screen and the fuel inlet screens once, will also pass through the sump screens and fuel inlet screens for sequent recirculation passes. Please justify your assumptions.

RESPONSE

As previously noted, in the NRC's safety evaluation for NEI 04-07, debris that is larger than the sump screen holes may pass through the sump screens. This may be due to orientation of the debris as it passes through the screen, or due to deformation of debris enabling it to pass through the screen. Thus, not all debris that passes through the sump screen is "too small" to be collected on subsequent passes. Therefore, this debris may be filtered in subsequent passes. This approach provides for a conservative estimation of the collection of fibrous debris.

QUESTION 8

Pages 36 and 37 state that the fuel assembly support grids typically have flow dimensions of 0.04 to 0.115 inches. How do these dimensions compare with those of the Watts Bar fuel? Page 37 further states that the support grids may cause a fiber bed to form across a given elevation to resemble a bed forming across a flat plate. Please explain how the trapping of debris within the support grids and the resulting effect on core heat transfer has been evaluated for Watts Bar. In particular, consider the possibility that a layer of debris and steam forms between a fuel rod and the adjacent support grid so as to prevent water from contacting the fuel rod surface within the support grid. Please explain whether excessive local temperatures would be encountered in this scenario.

RESPONSE

With a 95 percent capture efficiency at the fuel bottom nozzle, this location became limiting with respect to potential blockage. An assumed capture efficiency of 95 percent for the sump screen allows only 5 percent of the debris reaching the screen to pass through it. If fuel nozzle is taken to be 95 percent efficient at capturing debris, then only 0.25 percent of the debris that reaches the sump screen is available to the fuel. With the 50

percent to 95 percent capture of fibrous debris on the fuel bottom nozzle, only 0.125 percent to 0.0125 percent of the fiber reaching the sump screen was available to the first support grid of the fuel. This amount of fibrous debris available for collection along the active length of the fuel is very small compared to the amount of fibrous debris that might be collected on the fuel bottom nozzle. With the large depletion of fibrous debris at the sump screen and the bottom nozzle, there was insufficient remaining fibrous debris to evaluate blockage higher in the fuel. As noted above, the effects of potential debris collection behind spacer grids is currently being considered generically under a PWR Owners Group program.

QUESTION 9

Pages 43 through 47 evaluate the potential of particulate material such as reflective metal fragments, concrete, latent containment debris and paint chips to flow into the core. It is generally concluded that this material will not reach the core, but will settle out in the lower plenum of the reactor vessel. Please provide an evaluation of the potential to clog the core inlet due to filling the lower reactor vessel with a volume of debris.

RESPONSE

The debris ingestion evaluation determined that the total volume of particulate and coatings debris that may pass into the containment sump following switchover of the ECCS is approximately 16 cubic feet (ft^3). Based on a preliminary evaluation, the volume of the reactor vessel lower plenum below the core support plate is calculated to be approximately 612 ft^3 for Watts Bar. If all of the approximately 16 ft^3 of the debris entering the ECCS downstream of the screen is conservatively assumed to settle out in the lower plenum and assuming that the debris bed is twice the theoretical volume of the debris (i.e., 32 ft^3), the free volume of the lower plenum would not be challenged by blockage and a sufficient area would remain open to provide for continued flow into the core.

In addition, the velocity in the lower vessel plenum is higher than the velocity in the sump pool. Any material that will drop out in the reactor vessel will settle out in the sump pool and not make it to the reactor vessel.

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NRC AUDIT OF CONTAINMENT SUMP MODIFICATIONS

QUESTION 10

Page 43 refers to recent internal studies using disk-like particulates of various shapes with a specific gravity of 1.6. These studies were reported to have shown that particulates having a characteristic length of about 70 mils and thickness of 5 mils or greater would settle out in a reactor vessel lower plenum. Please provide documentation for this study describing the test apparatus and procedures. What vertical velocities were used?

RESPONSE

TVA will provide the documentation for the recent internal Westinghouse studies using disk-like particulates of various shapes in the supplemental response.

QUESTION 11

Page 47 states that coating debris no larger than 0.02 inch are expected to be transported through the fuel. Although this statement may be true for hot leg breaks, it would not be true for large cold leg breaks where the boiling process would cause this material to congregate in the core. Please provide the results of an evaluation of the effect of paint debris on core boiling heat transfer, including the effect of reaction products from the mix of chemicals which would be concentrated in the core by the boiling process following a cold leg break. The effect of the high-radiation field within the core on the chemical and physical nature of the mixture within the core needs to be considered. The potential for heat transfer loss from a chemical film that might form or be plated out by the boiling process needs to be evaluated. Please justify that adequate heat transfer will be maintained during the long-term cooling period.

RESPONSE

There is very little material in the core at the initiation of hot leg recirculation besides boron and sodium tetraborate. There are less than 1.5 pounds of chemical compounds formed at three hours into the accident. This is negligible compared to the amount of boron. This 1.5 pounds is present in the entire sump pool not just the core. Even assuming all 1.5 pounds was in

the core at time zero and dissolved in the water, it would have no effect on heat transfer. As a point of comparison, there is over 19,000 pounds of boron in the sump water. The boron is dissolved in the water not suspended solids. Boron plates out on the fuel when the water boils at the clad surface. The effect of boron was reviewed by the NRC for WBN very recently during the license amendment (Amendment 40) associated with the inclusion of the tritium production rods. The coatings are particulates in suspension not dissolved which would stay in the liquid. The inorganic zinc coating fails as a small particulate. The phenolic fails as chips. The chips will either settle out on the floor of the containment or be trapped on the sump screen. There will be virtually no phenolics in the core. The silicon coating on the steam generators is being eliminated with the installation of the replacement generators. The new generators are being installed during the Fall 2006 outage and thus this coating material is not an issue for the core. The remaining coating is an alkyd which is present in very small quantities. There is a total of 44 pounds of this material. Therefore, it is TVA's conclusion that coatings in the core in the first 3 hours are not of a concern.

Also, the following conservatisms are not directly credited but should be considered before pursuing this issue further:

1. It was assumed that all coatings failed and were available for transport to the sump strainers for evaluation of head loss. Most coatings either inside or outside of the ZOI of the break, will not fail whether qualified or not.

2. The high energy jet from a large break has a very short duration. In a fraction of a second, the RCS pressure will drop 500 pounds per square inch (psi). By ten seconds, the pressure is well below 1000 psi and by 30 seconds the RCS pressure is about 100 psi.

3. All of the RCS piping has been rigorously analyzed. While it has been assumed that a break can occur at any location, the reality is that if a break were to occur, it would be where stresses are high. These are known and stresses are going to be at welds to the reactor vessel, coolant pumps, or steam generator.

4. The piping is restrained in these locations such that if a break occurred the ends of the break will not fully offset. Much of the jet energy will be dissipated on the pipe ends

and the reactor coolant pumps, steam generators, or reactor vessel.

For large breaks, there is no sustained jet to strip coatings. In addition, the ends of the pipes will not offset to direct a jet directly at floors or walls. Small breaks that can have a sustained jet are small and impact a very small area. Such small breaks may erode coatings but the affected area will be small and the coatings debris generated is also small. Few of the coatings are chemically reactive. Thus, the conservatism in the modeling of coating debris is large.

QUESTION 12

Please provide an evaluation of the concentration of various materials that would occur following a large cold leg break under the conditions that water enters the bottom of the core and is boiled leaving all dissolved and suspended material behind. Consider that hot leg injection begins at 3 hours after the accident. Consider all the constituents within the ECCS water including boric acid, containment spray buffering agents, paint and fibrous debris.

a. *Provide graphs showing the concentration of each constituent as a function of time.*

b. *Concentration of material within the reactor core will depend on the water volume that is assumed to be available for mixing. Since the core will be boiling at low pressure it will be in a highly voided condition as will the upper plenum. Please provide and justify the values used for core void fraction and upper plenum void fraction used in the concentration analysis. Provide justification for the fraction of the lower plenum volume, which is included, as well as for any other contribution to the total mixing volume.*

c. *Provide the flow rates into the reactor system as a function of time during cold leg recirculation and during hot leg recirculation.*

d. *Provide and justify the concentrations flowing into the reactor core as a function of time for each constituent in the ECCS water for both cold leg and hot leg recirculation.*

Consider boric acid, containment spray buffering solution, paint debris, and fibrous debris.

RESPONSE

The PWR Owners Group Program is looking generically at post-LOCA core heat transfer, however based on the response to Question 4 above, TVA does not consider chemical effects on core heat transfer to be an issue for WBN.

QUESTION 13

Following the initiation of hot leg recirculation, material which passes through the sump screen will be available to flow to the reactor core from the top. Please provide a comparison of flow restrictions at the top of the core including the fuel elements to that of the sump screens.

RESPONSE

Drawings of the fuel design are included in the UFSAR. Detailed drawings of the fuel are considered proprietary to the fuel vendor and have been separately discussed with the NRC staff on behalf of WBN on June 8 and 9, 2006. If WBN can facilitate additional data transfer please let us know.

Head Loss Testing

QUESTION 1

Please provide the Sequoyah head loss test report that may provide validation that the paint chips would not have transported in the Watts Bar tests had the flow velocities been more prototypical.

RESPONSE

The Sequoyah Nuclear Plant test report is enclosed on the CD for your information.

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NRC AUDIT OF CONTAINMENT SUMP MODIFICATIONS

QUESTION 2

Please provide the paint chip specification parameters used in the cell floor drain analyses, specifically the floor tumbling velocity and the settling velocity for the turbulence model.

RESPONSE

Test data on the transport metrics for paint chips is limited. However, in general, the available test data shows that the tumbling and settling velocities of paint chips are more dependent on the paint chip thickness and density than the paint chip size.

NUREG/CR-6772, "GSI-191: Separate-Effects Characterization of Debris Transport in Water," dated August 31, 2002, (Section 3.3.2) discusses tests that were performed on epoxy-based paint chips ranging in size from 1-inch × 1/2-inch to 1/8-inch × 1/8-inch. The chips were approximately 15 mils thick. The results of the tests showed that the chips first started tumbling at 0.4 feet per second (ft/s). At 0.45 ft/s bulk motion occurred and at 0.5 ft/s transport was almost instantaneous. The settling velocity for these chips was also reported as a single value (0.15 ft/s).

Testing performed by ALION (formerly ITSC) in 1999 for Fitzpatrick Nuclear Power Plant showed similar results for the settling of 5 mil thick epoxy paint chips. The chips ranged in size, but had an approximate settling velocity of 0.08 ft/s.

QUESTION 3

Please provide an evaluation of the 3M fiber glass insulation to justify why other fiber surrogate material can be used to represent the 3M fiber glass in the head loss test.

RESPONSE

No surrogate material was used for 3M-M20C fiber glass insulation in the head loss test performed for the WBN strainers. The test used 3M. Therefore, an evaluation of surrogate material is not required.

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NRC AUDIT OF CONTAINMENT SUMP MODIFICATIONS

Downstream Effects (Component)

QUESTION 1

Please provide the downstream component hardware change plan, design and completion report.

RESPONSE

A hardware change that resulted from the downstream effects evaluation is to replace the orifice in 1-FE-63-170 in the common header downstream of the centrifugal charging pumps but upstream of the four boron injection line throttle valves. This will add head loss upstream of the individual branch line orifices and the branch line throttle valves to reduce the pressure drop required across the throttle valves and allow the valves to opened such that potential blockage of the valves does not occur.

Please see the Westinghouse report, LTR-SEE-06-118, Revision 1, Watts Bar ECCS Analysis Report, dated June 21, 2006, on the enclosed CD. Please note this document is considered *"Proprietary Information"* as classified by Westinghouse Electric company, LLC for which withholding is being requested under 10 CFR 2.390(b)(4). Enclosure 2 to this letter provides the required Affidavit (CAW-06-2169).

QUESTION 2

Chemical Considerations

a. *During the ICET, in certain chemical environments such as sodium tetraborate, precipitates formed as the solution cooled from the 140°F test temperature. These products could interact with other downstream debris to cause clogging in narrow passages of downstream components such as valves and pump internals, or affect internal surfaces of heat exchangers or the reactor vessel. Describe your evaluation of potential downstream effects related to interaction with chemical products and the criteria used to determine that performance of downstream components is acceptable for your plant-specific chemical products and debris combination.*

RESPONSE

The chemical constituents are considered as part of the downstream effects. TVA notes that the amount of chemical constituents is small compared to the other debris.

- The total amount of chemical precipitants is less than 45 pounds. The latent dirt weight is 170 pounds.
- The design basis coating debris is over 2000 pounds.

As a comparison, the amount of boron in the sump water is 19,000 pounds. The chemical precipitants quantity is so low that heat transfer in heat exchangers will not be degraded. Similarly the surface area of the reactor vessel and main loop RCS piping is sufficiently large that any film layer will be so thin that it will not have any affect. Also, the reactor vessel is stainless steel. If the chemicals will plate out on the vessel, it will also plate out on the RMI insulation that has a huge surface area as well as the outside of RCS piping, and the sump strainer surface. This means that the film layer if it exists, will be so thin as to have no impact on the operation of equipment downstream of the sump screen.

b. Explain how the interaction of downstream chemical effects combined with debris will be evaluated.

RESPONSE

The chemicals are considered as one of several particulate debris types. There are no materials in the downstream that are not present in the sump pool at large. The chemical precipitants are such a small fraction of the total debris source term that it will not result in a different behavior. There is no indication that chemical precipitants bind to other debris present in WBN containment. However, should chemical precipitants bind to other debris, it would occur in the sump pool. This would result in somewhat larger particles. This would make the particles more likely to settle out or not make it through the strainer to have a downstream effect. Particles that are small enough to go through the strainer are too small to be captured downstream. The chemical precipitants are being considered as a downstream particulate with other particles that will go through the strainer.

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NRC AUDIT OF CONTAINMENT SUMP MODIFICATIONS

QUESTION 3

Throttle Valves

a. *The TVA response to NRC GL 2004-02 dated September 1, 2005, indicated that an updated evaluation will be performed following final selection of strainer design and that the conclusions will be provided in a supplemental response. Describe the approach, including testing program, and schedule to finalize throttle valve positions/openings.*

RESPONSE

Based on a walkdown of a sample of Unit 1 throttle valves, a position or number of turns open was determined by correlating the valve stem position measured, to the valve stem position measurements on the valve drawing.

As a result of this walkdown, it could not be concluded that the boron injection valves were open such that the valve blockage would not occur. Steps have been taken to reposition these valves such that adequate clearance is available for potential debris passing through the sump strainers as discussed in the response to Question 1 of this section. The valve position will be recorded during the performance of 1-SI-63-905, "Boron Injection Check Valve Flow Test During Refueling Outages," with the current acceptance criterion and an additional acceptance criteria that the valves be open at least 1.5 turns. This approach and applicable procedures will be finalized during the Design Change process for the installation of the orifice.

The remaining valves could be positively confirmed to have an adequate clearance such that blockage of these valves due to debris passing through the sump strainers would not occur. The final calculation has not been issued since it is impacted by the revised debris generation results. As previously committed, the final results will be provided in a supplemental response.

The strainer design includes a hole size of 0.085-inch diameter. An additional orifice is being added into the centrifugal charging pump injection line to permit the throttle valves to be opened wider. The new throttle valve position will provide an opening that is more than 1.15 times greater than the strainer hole size. Thus, the throttle valve will not be subject to potential blockage from strainer bypass.

b. Explain how NRC Information Notice 96-27, and the recent NRC Throttle Valve Testing (NUREG/CR-6902), when available, will be considered in the throttle valve evaluation.

RESPONSE

With the modification discussed above, all valves will have adequate clearance such that the valves will not be susceptible to debris blockage. If the debris is small enough to pass through the 0.085-inch nominal diameter hole in the sump strainers, the debris will also pass through the throttle valves given that an additional acceptance criteria for valve position is required. As a result, NRC Information Notice 96-27, "Potential Clogging of High Pressure Safety Injection Throttle Valves During Recirculation" and NUREG/CR-6902, "Effects of Insulation Debris on Throttle-Valve Flow Performance," have been addressed since no credit is being given for ECCS pumps pulverizing the material that passes through the sump strainers.

QUESTION 4

Methodology

a. The TVA response to GL 2004-02 dated September 1, 2005, indicated that the evaluation of downstream effects is consistent with the Westinghouse Commercial Atomic Power (WCAP) Report, WCAP-16406-P, and during the audit the licensee confirmed that they are not taking any exceptions to the WCAP-16406-P methodology. The NRC staff has outstanding questions (NRC letter dated October 27, 2005) on the WCAP-16406-P methodology, and has recently been requested by the Westinghouse Owners Group to formally review WCAP-16406-P as a topical report. Explain how you plan to address comments that result in a revision or addendum to the methodology for topics such as:

- *Validation of potential non-conservative assumptions,*
- *Conservatism to account for uncertainties,*
- *Wear rates correlated to testing data,*
- *Debris adhesion to solid surfaces, and*

- *Downstream matting effect.*

RESPONSE

Westinghouse has responded to the questions asked the NRC's October 27, 2006 letter. These responses were discussed with NRC staff members during a technical exchange meeting held in May, 2006. It is Westinghouse's opinion that the responses to the questions poised by NRC do not affect or change the evaluation methods described in the WCAP. Rather, those responses are considered clarificiation of the methods presented in WCAP 16406-P

Following that meeting, a draft Revision 1 of WCAP 16406-P that contains line-in/line-out edits was prepared and submitted to NRC in June 2006. This submittal was made to support NRC's review and issuance of a Safety Evaluation Report on WCAP 16406-P. NRC is currently reviewing this document.

Sump Structure

QUESTION 1

Please provide the strainer final design and structure analyses report. If it is not available now, please indicate when it will be available.

RESPONSE

The final design and structural analysis report has received TVA review and is being held open by the vendor pending shop fabrication of the strainer packages. This fabrication is currently underway. Any required design changes will be reviewed for incorporation during this shop fabrication and assembly process. Assembly, drawing issuance, and final analysis are expected by the end of July. The analysis will be submitted for your use following final issuance in the supplemental response.

ENCLOSURE 1
ATTACHMENT

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NRC AUDIT OF CONTAINMENT SUMP MODIFICATIONS

LIST OF DOCUMENTS ON COMPACT DISC (CD)

Debris Generation

Question 1

TVAW001-RPT-001 - "Report on Watts Bar Unit 1 Containment Building Walkdowns for Emergency Sump Strainer Issues," Revision 0.

Net Positive suction Head/Loss-of-Coolant Accident

Question 1

FSDA-C-597 "RHR Pump NPSH," dated November 16, 1994 (PROPRIETARY INFORMATION)

Question 3

N3-72-4001 - Containment Spray System Description, Revision 16.

N3-74-4001 - Residual Heat Removal System Description, Revision 12.

Watts Bar Calculation EPM-RCP-120291, "Containment Spray Pump Net Positive Head (NPSH)," Revision 2.

Westinghouse Calculation FSDA-C-597 - See Question 1 above.

Head Loss Testing

Question 1

Sequoyah Nuclear Plant head loss test report.

Downstream Effects

Question 1

LTR-SEE-06-118, Revision 1, Watts Bar ECCS Analysis Report, dated June 21, 2006. (PROPRIETARY INFORMATION)

ENCLOSURE 2

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NRC AUDIT OF CONTAINMENT SUMP MODIFICATIONS

WESTINGHOUSE APPLICATIONS FOR WITHHOLDING
PROPRIETARY INFORMATION CAW-06-2163 and CAW-06-2169

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Our ref: CAW-06-2163

June 14, 2006

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: Calculation FSDA-C-597, "Watts Bar RHRP NPSH From the Sump," Response to NRC Request for Additional Information, Watts Bar Nuclear Plant, Unit 1, Docket No. 50-390 (Proprietary)

Reference 1: NRC Letter to TVA, "WATTS BAR NUCLEAR PLANT, UNIT 1 — REQUEST FOR ADDITIONAL INFORMATION REGARDING THE NUCLEAR REGULATORY COMMISSION STAFF AUDIT ON THE CONTAINMENT SUMP MODIFICATIONS (TAC NO. MC4730)," dated May 10, 2006.

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-06-2163 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by TVA Nuclear.

The subject calculation was prepared as an internal Westinghouse document and classified as Westinghouse Proprietary Class 2. In response to NRC's request for the calculation via Reference 1, Westinghouse is providing the calculation for use by the NRC staff in its audit activities and requests that the calculation be considered proprietary in its entirety. As such, a non-proprietary version will not be issued.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-06-2163 and should be addressed to B. F. Maurer, Acting Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

B. F. Maurer, Acting Manager
Regulatory Compliance and Plant Licensing

Attachment

cc: G. Shukla

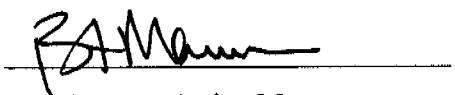
AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

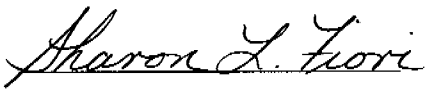
COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared B. F. Maurer, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:



B. F. Maurer, Acting Manager
Regulatory Compliance and Plant Licensing

Sworn to and subscribed before
me this 14th day of June, 2006



Notary Public

Notarial Seal
Sharon L. Fiori, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires January 29, 2007
Member, Pennsylvania Association Of Notaries

(1) I am Acting Manager, Regulatory Compliance and Plant Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse "Application for Withholding" accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's

competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is contained in Calculation FSDA-C-597, "Watts Bar RHRP NPSH From the Sump" (Proprietary), for submittal to the Commission, being transmitted by TVA Nuclear letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk.

This information is part of that which will enable Westinghouse to:

(a) Support TVA in the NRC staff audit regarding containment sump modifications at Watts Bar.

Further this information has substantial commercial value as follows:

(a) Westinghouse can sell the use of this information to its customers for similar audit proceedings.

(b) Westinghouse can use this information in the defense of sump modifications for other customers.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar calculations and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Proprietary Information Notice

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

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Our ref: CAW-06-2169

June 29, 2006

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-SEE-06-118, Revision 1 P-Attachment, "Watts Bar Unit 1 ECCS Analysis Report," dated June 2006 (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-06-2169 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by TVA Nuclear.

The subject report was prepared as an internal Westinghouse document and classified as Westinghouse Proprietary Class 2. In response to the NRC's request for the report, Westinghouse is providing this report for use by the NRC staff in its audit activities and requests that the report be considered proprietary in its entirety. As such, a non-proprietary version will not be issued.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-06-2169 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

J. A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Attachment

cc: G. Shukla

CAW-06-2169

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared J. A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

J. A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Sworn to and subscribed before
me this 29th day of June, 2006

Notary Public

Notarial Seal
Sharon L. Fiori, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires January 29, 2007
Member, Pennsylvania Association Of Notaries

(1) I am Manager, Regulatory Compliance and Plant Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse "Application for Withholding" accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's

competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is contained in LTR-SEE-06-118, Revision 1 P-Attachment, "Watts Bar Unit 1 ECCS Analysis Report," dated June 2006 (Proprietary), for submittal to the Commission, being transmitted by TVA Nuclear letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk.

This information is part of that which will enable Westinghouse to:

(a) Support TVA in the NRC staff audit regarding containment sump modifications at Watts Bar.

Further this information has substantial commercial value as follows:

(a) Westinghouse can sell the use of this information to its customers for similar audit proceedings.

(b) Westinghouse can use this information in the defense of sump modifications for other customers.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar calculations and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Proprietary Information Notice

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

Copyright Notice

ENCLOSURE 3

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
GENERIC LETTER 2004-02
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NRC AUDIT OF CONTAINMENT SUMP MODIFICATIONS

LIST OF OPEN ITEMS

The following items remain open in the NRC Audit scope for the containment sump:

1. The final debris calculation will be provided as part of an update of the remaining open items.
   [Break Selection and Zone of Influence Analysis, Question 1]

2. A hardware change that resulted from the downstream effects evaluation, is to replace the orifice in 1-FE-63-170 in the common header downstream of the centrifugal charging pumps but upstream of the four boron injection line throttle valves.
   [Downstream Effects (Component), Question 1]

3. TVA will provide the documentation for the recent internal studies using disk-like particulates of various shapes in the supplemental response.
   [Downstream Effects (Core), Question 10]

4. The final results of the Downstream Effects Calculation will be provided in a supplemental response.
   [Downstream Effects (Component), Question 3a]

5. The design and structural analysis The analysis will be submitted for your use following final issuance in the supplemental response.
   [Sump Structure, Question 1]