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Your ref: Docket Number 52-006
Our ref: DCP_NRC_003174

June 8, 2011

Subject: Presentation Slides "AP1000 Design Control Document – Containment Pressure Analysis,"
Meeting with NRC Staff, June 2, 2011 (Proprietary and Non-Proprietary)

Westinghouse is submitting the subject slides to provide information that is proprietary in nature and is not part of the DCD. A non-proprietary version has also been prepared. These slides are submitted in support of the AP1000[®] Design Certification Amendment Application (Docket No. 52-006). The information provided in these slides is generic and is expected to apply to all Combined Operating License (COL) applicants referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

This submittal contains proprietary information of Westinghouse Electric Company LLC. In conformance with the requirements of 10 CFR Section 2.390, as amended, of the Commission's regulations, we are enclosing with this submittal one copy of the Application for Withholding, AW-11-3169 (non-proprietary, Enclosure 1), and one copy of the associated Affidavit (non-proprietary, Enclosure 2) with Proprietary Information and Copyright Notices. The affidavit sets forth the basis on which the information identified as proprietary may be withheld from public disclosure by the Commission.

Pursuant to 10 CFR 50.30(b), the presentation slides for the open portion of the meeting are submitted as Enclosure 3, the proprietary and non-proprietary versions of the presentation slides for the closed portion of the meeting are submitted as Enclosures 4 and 5. Correspondence with respect to the proprietary aspects of this application for withholding or the accompanying affidavit should reference AW-11-3169 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Questions or requests for additional information related to the content and preparation of this report should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

A handwritten signature in black ink, appearing to read "R. F. Ziesing for".

R. F. Ziesing
Director, US Licensing

D063
NRO

/Enclosures

1. AW-11-3169 “Application for Withholding Proprietary Information from Disclosure,” dated June 8, 2011
2. AW-11-3169, Affidavit, Proprietary Information Notice, Copyright Notice dated June 8, 2011
3. Presentation Slides “AP1000 Design Control Document – Containment Pressure Analysis (Open Portion),” Meeting with NRC Staff, June 2, 2011 (Non-Proprietary)
4. Presentation Slides “AP1000 Design Control Document – Containment Pressure Analysis (Closed Portion),” Meeting with NRC Staff, June 2, 2011 (Proprietary)
5. Presentation Slides “AP1000 Design Control Document – Containment Pressure Analysis (Closed Portion),” Meeting with NRC Staff, June 2, 2011 (Non-Proprietary)

cc: E. McKenna - U.S. NRC
P. Buckberg - U.S. NRC
T. Spink - TVA
P. Hastings - Duke Energy
R. Kitchen - Progress Energy
A. Monroe - SCANA
P. Jacobs - Florida Power & Light
C. Pierce - Southern Company
G. Zinke - NuStart/Entergy
R. Grumbir - NuStart
S. Ritterbusch - Westinghouse

ENCLOSURE 1

AW-11-3169

APPLICATION FOR WITHHOLDING
PROPRIETARY INFORMATION FROM DISCLOSURE



Westinghouse Electric Company
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Your ref: Docket Number 52-006
Our ref: AW-11-3169

June 8, 2011

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: Presentation Slides "AP1000 Design Control Document – Containment Pressure Analysis,"
Meeting with NRC Staff, June 2, 2011 (Proprietary and Non-Proprietary)

The Application for Withholding is submitted by Westinghouse Electric Company LLC (Westinghouse), pursuant to the provisions of Paragraph (b) (1) of Section 2.390 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary material for which withholding is being requested is identified in the proprietary version of the subject report. In conformance with 10 CFR Section 2.390, Affidavit AW-11-3169 accompanies this Application for Withholding, setting forth the basis on which the identified proprietary information may be withheld from public disclosure.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to the proprietary aspects of this application for withholding or the accompanying affidavit should reference AW-11-3169 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

A handwritten signature in black ink, appearing to read "Robert B. Sisk".

Robert B. Sisk
Program Manager
International Licensing
New Plants

ENCLOSURE 2

Affidavit

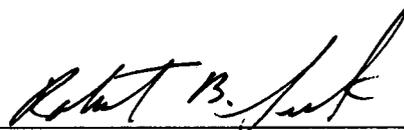
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COMMONWEALTH OF PENNSYLVANIA:

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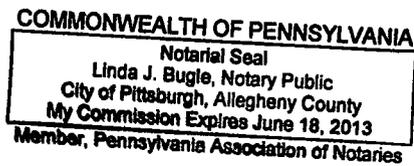
COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared Robert B. Sisk 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:



Robert B. Sisk
Program Manager
International Licensing
New Plants

Sworn to and subscribed
before me this 9th day
of June 2011.



Notary Public

- (1) I am Program Manager, International Licensing, 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 appropriately marked in Presentation Slides “Presentation Slides “AP1000 Design Control Document – Containment Pressure Analysis,” Meeting with NRC Staff, June 2, 2011 (Proprietary and Non-Proprietary) in support of the AP1000 Design Certification Amendment Application, being transmitted by Westinghouse letter (DCP_NRC_003174) and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse for the AP1000 Design Certification Amendment application is expected to be applicable in all licensee submittals referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application in response to certain NRC requirements for justification of compliance of the safety system to regulations.

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

- (a) Manufacture and deliver products to utilities based on proprietary designs.

- (b) Advance the AP1000 Design and reduce the licensing risk for the application of the AP1000 Design Certification
- (c) Determine compliance with regulations and standards
- (d) Establish design requirements and specifications for the system.

Further this information has substantial commercial value as follows:

- (a) Westinghouse plans to sell the use of similar information to its customers for purposes of plant construction and operation.
- (b) Westinghouse can sell support and defense of safety systems based on the technology in the reports.
- (c) The information requested to be withheld reveals the distinguishing aspects of an approach and schedule which was developed by Westinghouse.

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 digital technology safety systems 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

The reports transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies of the information contained in these reports which are necessary for its internal use in connection with generic and plant-specific reviews and approvals as well as the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, order, or regulation subject to the requirements of 10 CFR 2.390 regarding restrictions on public disclosure to the extent such information has been identified as proprietary by Westinghouse, copyright protection notwithstanding. With respect to the non-proprietary versions of these reports, the NRC is permitted to make the number of copies beyond those necessary for its internal use which are necessary in order to have one copy available for public viewing in the appropriate docket files in the public document room in Washington, DC and in local public document rooms as may be required by NRC regulations if the number of copies submitted is insufficient for this purpose. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

ENCLOSURE 3

Presentation Slides "AP1000 Design Control Document – Containment Pressure Analysis
(Open Portion)," Meeting with NRC Staff, June 2, 2011

(Non-Proprietary)



AP1000 Design Control Document

—

Containment Pressure Analysis

June 2, 2011

Objectives

- Summarize Westinghouse's response to recent questions on the calculation of the peak containment pressure in the Technical Specifications
- Provide an overview of the corresponding changes to the AP1000 Design Control Document (DCD) for Revision 19

Topics Covered

- History – Containment Vessel (CV) pressure analysis
 - ACRS comment in December 2010
- Results
 - Calculated peak pressure remains below the design pressure of 59 psig
 - No impact on the design
- Changes to the analysis
- Documentation

CV Pressure Analysis - History

- Evaluation model and analysis for containment peak pressure for AP1000 reviewed and reported by NRC in their safety evaluation report (NUREG-1793)
 - Conservatism was recognized in the models.
- After the freeze point for the AP1000 Design Certification amendment review in 2008, Westinghouse continued to evaluate the containment pressure analysis as part of design finalization efforts
 - Containment peak pressure of 57.8 psi reported in Revision 18 of the Design Control Document (DCD).

CV Pressure Analysis – Changes

- During the December 2010 ACRS meeting on this analysis, the need for a change in a scaling calculation for Passive Containment Cooling System “time to steady state film coverage” over the containment shell was identified
- As part of the effort to address the ACRS comment in January 2011, Westinghouse brought two items related to the pressure calculation to the NRC’s attention due to the expected impact on peak pressure. An evaluation showed:
 - The peak pressure was expected to remain below the design pressure
 - The results were consistent with earlier analyses reported in NUREG-1793 and do not affect the safety conclusion

CV Pressure Analysis – Changes...

- Westinghouse submitted a technical report to the NRC to support Revision 19 of the DCD on March 10, 2011.
 - Containment peak pressure was 58.1 psi
- NRC subsequently requested that any factors impacting the peak pressure reported in the Technical Specifications be accounted for in the analysis and that the results of the updated analysis be included in DCD Revision 19.
 - Containment peak pressure is 58.3 psi

Documentation for CV Pressure Analysis

- In final stages of review and transmittal
- DCD-19
 - Analysis input data
 - Mass and energy (M&E) releases
 - Transient analysis results
- Technical report
 - M&E analysis input changes
 - Containment pressure analysis input changes
 - Results
 - Extent of condition review of other calculations

DCD-19 Readiness for Docketing - Summary

- DCD-19 changes resolve ACRS comment and NRC confirmatory review of DCD-18
- Revised containment peak pressure analysis demonstrates the calculated peak pressure is less than the design pressure
- Revisions for DCD-19 produced in accordance with robust quality procedures
 - Internal review and approval
 - Customer involvement in review of DCD changes and supporting technical documentation
 - Independent management reviews
- Final results support the previous safety conclusion

ENCLOSURE 5

Presentation Slides "AP1000 Design Control Document – Containment Pressure Analysis
(Closed Portion)," Meeting with NRC Staff, June 2, 2011

(Non-Proprietary)

AP1000 Design Control Document
—
Containment Pressure Analysis
(Closed Meeting)

June 2, 2011

Objectives

- Summarize Westinghouse's response to recent questions on the calculation of the peak containment pressure in the Technical Specifications
 - Engage NRC staff to resolve questions
- Provide an overview of the corresponding changes to the AP1000 Design Control Document (DCD) for Revision 19 and APP-GW-GLR-096 Rev. 3

Containment pressure analysis summary



- Peak pressure of 57.8 psig reported in DCD-18
- Revised to resolve ACRS comment reported in a Westinghouse letter dated March 10, 2011
 - Time to establish steady state PCS film coverage
 - Peak pressure is 58.1 psig
- Changes made to address NRC request to include items affecting the peak containment pressure reported in the Technical Specifications.
 - Peak pressure is 58.3 psig

CV Peak Pressure Analysis Update

AP1000

- 13 changes made in updated peak pressure calculation
 - 7 items changed in LOCA Mass and Energy Model (combined impact of all 7 is +0.8 psi to containment peak pressure)
 - 5 items changed in Containment Response Model (combined impact of all 5 is +0.3 psi to containment peak pressure)
 - Additional heat sinks (already in plant design) are now included in the containment model (impact on containment peak pressure is -0.9 psi)
- Result is containment peak pressure of 58.3 psig (Overall change is +0.2 psig)

CV Peak Pressure Analysis Update



- Changes to LOCA M&E Input Values
 - Steam generator secondary pressure
 - Vessel metal mass
 - Core power
 - Steam generator tube heat transfer area
 - RCS volume
 - Feedwater flow rate
 - Equilibration temperature

CV Peak Pressure Analysis Update

AP1000

- Changes to Containment Response Model
 - Changed equipment coatings in model from inorganic zinc to epoxy to address GSI-191 concerns
 - Revised material specific heat input values to reflect updated test information
 - Changed input values for the containment shell to use ASME group A carbon steel material properties
 - Changed heat transfer coefficient input for the containment shell below operating deck
 - Modeled the effect of accumulator nitrogen gas
 - Included additional heat sinks already in the design

CV Peak Pressure Analysis Update – AP1000

Summary of Results

- Peak pressure value to be reported in Revision 19 of the DCD is 58.3 psig.

Items Addressed in Updated Peak Pressure Calculation



- Changes to Code Inputs for LOCA M&E
 - Steam Generator Secondary Pressure
 - Vessel Metal Mass
 - Core Power
 - Steam Generator Tube Heat Transfer Area
 - Reactor Coolant System Volume
 - Feed water Flow Rate
 - Equilibrium Temperature
- The bundled effect on peak pressure is +0.8 psi

Items Addressed in Updated Peak Pressure Calculation



- Steam Generator Secondary Pressure
 - Description



a,c

Items Addressed in Updated Peak Pressure Calculation



- Steam Generator Secondary Pressure
 - SATAN M&E Model
 - Generic issue
 - How discovered
 - During a reload evaluation, an unexpected value for SG tube bundle pressure was provided

Items Addressed in Updated Peak Pressure Calculation



- Steam Generator Secondary Pressure
 - Changes:
 - Changed AP1000 LOCA M&E calculation
 - Updated guidance for LOCA M&E
 - Impact on Peak Pressure
 - Increase in peak pressure

Items Addressed in Updated Peak Pressure Calculation

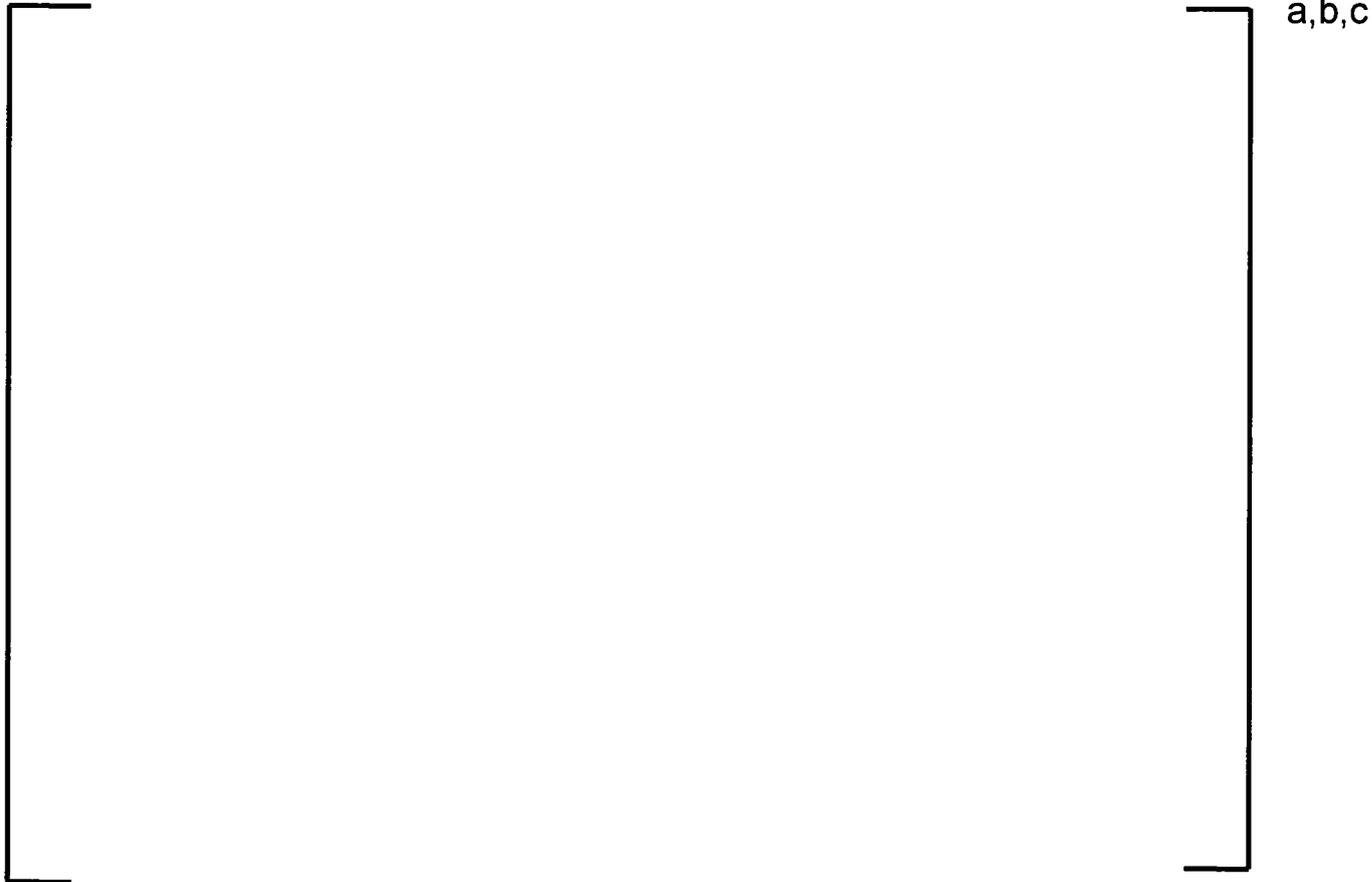


- Steam Generator Secondary Pressure
 - Extent of Condition Review for Affected Calculations
 - Determined other AP1000 analyses either do not use the bundle pressure or are conservative as-is

Summary of LOCA M&E Changes



- Input Changes for Higher Steam Pressure



Summary of LOCA M&E Changes

- Input Changes for Higher Steam Pressure



Items Addressed in Updated Peak Pressure Calculation



- Vessel Metal Mass
 - Description
 - Some metal mass from the reactor vessel core barrel region was not included in the SATAN M&E model

Items Addressed in Updated Peak Pressure Calculation



- Vessel Metal Mass
 - How discovered
 - During analysis for an operating plant
 - Operating plant has 2 units, one downflow configuration, the other was converted to upflow configuration
 - The difference in the barrel/baffle mass was identified and questioned
 - Discovered guidance material did not include this metal mass

Items Addressed in Updated Peak Pressure Calculation



- Vessel Metal Mass
 - Changes:
 - Updated AP1000 calculation
 - Updated guidance material to include this metal mass
 - Impact on Peak Pressure
 - Increase in peak pressure

Items Addressed in Updated Peak Pressure Calculation



- Vessel Metal Mass
 - Extent of Condition Review for Affected Calculations
 - Extent of condition was performed for AP1000 safety analyses
 - AP1000 does not use the SATAN model for any other safety analyses

Summary of LOCA M&E Changes



- Input Changes for Core Barrel Metal



a,b,c

Items Addressed in Updated Peak Pressure Calculation



- Core Power
 - Description



a,c

- The NSSS power was used as the input into the original analysis
- Difference is 15 MWt from the pump power
- How discovered
 - Review of the input file for the current update

Items Addressed in Updated Peak Pressure Calculation



- Core Power
 - Changes:
 - SATAN M&E Model guidance made more robust in 2005
 - Safety analysis calculations are based on specified guidance material which determines appropriate power level to be used in analyses
 - Revised current analysis input to be 3400 MWt

Items Addressed in Updated Peak Pressure Calculation



- Core Power
 - Impact on Peak Pressure
 - Slight benefit to long-term M&E releases and peak containment pressure by reducing decay heat
 - Extent of Condition Review for Affected Calculations
 - Use of a power level higher than licensed core power is isolated to this analysis

Items Addressed in Updated Peak Pressure Calculation



- Steam Generator Tube Heat Transfer Area
 - Description
 - The SG tube heat transfer area input in the SATAN LOCA M&E model was greater than 8000 sq. ft more than the actual value per generator
 - How discovered
 - Review of the input file for the current update

[a,c]

Items Addressed in Updated Peak Pressure Calculation



- Steam Generator Tube Heat Transfer Area
 - Changes:
 - SATAN M&E Model guidance made more robust in 2005
 - Additional verification step created with new guidance for SG steam pressure issue
 - Corrected the heat transfer area in the current calculation
 - Impact on Peak Pressure
 - Slight benefit to long-term M&E releases and peak containment pressure

Items Addressed in Updated Peak Pressure Calculation



- Steam Generator Tube Heat Transfer Area
 - Extent of Condition Review for Affected Calculations
 - Use of an incorrect SG tube heat transfer area is isolated to this analysis

Items Addressed in Updated Peak Pressure Calculation



- Reactor Coolant System Volume
 - Description
 - Summation of all fluid volumes in SATAN M&E Model input found to be approximately 35 cubic feet too low
 - How discovered
 - Review of the input file for the current update

Items Addressed in Updated Peak Pressure Calculation

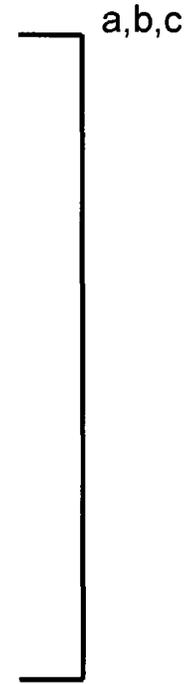


- Reactor Coolant System Volume
 - Changes:
 - SATAN M&E Model guidance made more robust in 2005
 - Corrected current calculation
 - Impact on Peak Pressure
 - Insignificant change in overall mass and energy release and therefore peak pressure
 - Extent of Condition Review for Affected Calculations
 - Use of an incorrect RCS fluid volume is isolated to this analysis

Summary of LOCA M&E Changes



- Input Changes for RCS Fluid Volume



Items Addressed in Updated Peak Pressure Calculation



- Feedwater Flow Rate
 - Description
 - Main feedwater flow in SATAN M&E Model should equal steam flow (per SG)
 - Value in SATAN input file was too low for AP1000 at 100% power
 - How discovered
 - Review of the input file for the current update
 - Current guidance material suggests checks for this item

Items Addressed in Updated Peak Pressure Calculation



- Feedwater Flow Rate
 - Changes:
 - SATAN M&E Model guidance made more robust in 2005 – checks added for this type of error
 - Changed current calculation
 - Impact on Peak Pressure
 - Increase in long-term LOCA M&E releases and peak pressure

Items Addressed in Updated Peak Pressure Calculation



- Feedwater Flow Rate
 - Extent of Condition Review for Affected Calculations
 - Use of an incorrect main feedwater flow is isolated to this analysis

Summary of LOCA M&E Changes

- Input Changes for Power Level, Core Stored Energy, SG Heat Transfer Area, and Main Feedwater Flow



Items Addressed in Updated Peak Pressure Calculation



- Equilibrium Temperature

- Description



a,c

- How discovered

- During the review of the current calculation

Items Addressed in Updated Peak Pressure Calculation



- Equilibrium Temperature
 - Changes:
 - Changed current calculation
 - Impact on Peak Pressure
 - Increase in long-term LOCA M&E releases and peak pressure
 - Extent of Condition Review for Affected Calculations
 - Determined no other analyses are affected

Summary of LOCA M&E Changes



- Overall impact of all the Mass and Energy changes on the Containment Peak Pressure was an increase of approximately 0.8 psi

Summary of LOCA M&E Changes

- DCD Impacts
 - Table 6.2.1.3-8 (SG pressure)
 - Tables 6.2.1.3-9 and 6.2.1.3-10 (M&E Releases)
 - Figure 6.2.1.3-1 thru 6.2.1.3-4 (M&E Releases)

Items Addressed in Updated Peak Pressure Calculation



- The Analysis Presented in APP-GW-GLR-096, Rev. 2 Includes Consideration of the Following:
 - Changes to the Scaling Calculation for Time To Steady State PCS Film Coverage
 - Inclusion of an Epoxy Coating on the Lower Inside Surface of the Containment
- The Analysis shows an Increase in Peak Containment Pressure of 0.3 psi (to 58.1 psig) from that presented in the DCD, Revision 18 (57.8 psig).

CV Peak Pressure Analysis Update

AP1000

- Changes to Containment Response Model
 - Changed equipment coatings in model from inorganic zinc to epoxy to address GSI-191 concerns
 - Revised material specific heat input values to reflect updated test information
 - Changed input values for the containment shell to use ASME group A carbon steel material properties
 - Changed heat transfer coefficient input for the containment shell below operating deck
 - Modeled the effect of accumulator nitrogen gas
 - Included additional heat sinks already in the design

Items Addressed in Updated Peak Pressure Calculation



- Changes to the WGOTHIC Containment Input for Rev. 3 of APP-GW-GLR-096
 - Updated LOCA M&E Releases
 - Coatings on Equipment in Containment
 - Coatings Specific Heat
 - Material Properties of Carbon Steel – Containment Vessel (CV) Shell
 - Modeling Shell Heat Transfer at Middle Annulus
 - Modeling Accumulator Nitrogen Gas Release
 - Crediting of Existing Thermal Conductors

Items Addressed in Updated Peak Pressure Calculation



- Coatings on Equipment in Containment
 - Description
 - A Design Change Proposal was initiated for GSI-191 which limited the amount of Inorganic Zinc (IOZ) on components and equipment inside containment
 - Change was made to limit particulate debris from areas which had a LOCA jet
 - Originally did not consider containment model to be impacted
 - WGOTHIC Containment Model

Items Addressed in Updated Peak Pressure Calculation



- Coatings on Equipment in Containment
 - How discovered
 - During review of the containment model
 - Coating properties reviewed and use of the IOZ was discovered
 - Changes:
 - Changed coating on components and equipment inside containment to have epoxy

Items Addressed in Updated Peak Pressure Calculation



- Coatings on Equipment in Containment
 - Impact on Peak Pressure
 - Increase
 - Extent of Condition Review for Affected Calculations
 - Change only affects the WGOTHIC calculations
 - LOCA, MSLB, air only cooling analyses were redone with revised containment inputs – acceptance criteria still met
 - The pressure increase will be a slight benefit for the minimum backpressure and LTCC analyses

Items Addressed in Updated Peak Pressure Calculation



- Coatings Specific Heat
 - Description
 - Issue identified that not all coatings properties were provided to vendors for qualification
 - Requested additional information from vendors
 - Specific heat values were provided from vendor that were lower than those considered in the containment model for epoxy and IOZ
 - WGOTHIC Containment Model

Items Addressed in Updated Peak Pressure Calculation



- Coatings Specific Heat
 - How discovered
 - Vendor technical report provided for specific heat test was reviewed
 - Changes:
 - Incorporated revised specific heats with some margin into the containment calculations
 - Revising coatings specification to add requirements for the vendors to meet

Items Addressed in Updated Peak Pressure Calculation



- Coatings Specific Heat
 - Impact on Peak Pressure
 - Slight increase
 - Extent of Condition Review for Affected Calculations
 - Change only affects the WGOTHIC calculations
 - LOCA, MSLB, air only cooling analyses were redone with revised containment inputs – acceptance criteria still met
 - The pressure increase will be a slight benefit for the minimum backpressure and LTCC analyses

Items Addressed in Updated Peak Pressure Calculation



- Material Properties of Carbon Steel – CV Shell
 - Description
 - The containment vessel is an ASME stamped component
 - Non-ASME steel properties were previously used in the containment calculation
 - WGOTHIC Containment Model
 - How discovered
 - During a review of the material properties, it was discovered that the non-ASME values were being used

Items Addressed in Updated Peak Pressure Calculation



- Material Properties of Carbon Steel – CV Shell
 - Changes:
 - Incorporated the revised thermal properties for the CV shell
 - Impact on Peak Pressure
 - Slight decrease

Items Addressed in Updated Peak Pressure Calculation



- Material Properties of Carbon Steel – CV Shell
 - Extent of Condition Review for Affected Calculations
 - Change only affects the WGOTHIC calculations
 - Slight benefit to peak pressure analyses: LOCA MSLB, air cooling, etc
 - The pressure decrease will be a slight penalty for the minimum backpressure and LTCC analyses

Items Addressed in Updated Peak Pressure Calculation



- Modeling Shell Heat Transfer at Middle Annulus
 - Description
 - Inconsistency identified with the modeling of the containment shell below the operating deck
 - At this location the shell was incorrectly modeled as an internal heat conductor
 - The outside surface should be modeled as insulated in this region per WCAP-15846 methods
 - WGOTHIC Containment Model

Items Addressed in Updated Peak Pressure Calculation



- Modeling Shell Heat Transfer at Middle Annulus
 - How discovered
 - During the review of containment model
 - Changes:
 - Checked the shell thermal conductors
 - Corrected 2 conductors which were in error
 - Impact on Peak Pressure
 - Increase

Items Addressed in Updated Peak Pressure Calculation



- Modeling Shell Heat Transfer at Middle Annulus
 - Extent of Condition Review for Affected Calculations
 - Change only affects the WGOTHIC calculations
 - LOCA, MSLB, air only cooling analyses were redone with revised containment inputs – acceptance criteria still met
 - The pressure increase will be a slight benefit for the minimum backpressure and LTCC analyses

Items Addressed in Updated Peak Pressure Calculation



- Accumulator Nitrogen
 - Description
 - The release of the pressurized nitrogen gas after injection had not been previously considered in the AP600 or AP1000 models
 - WGOTHIC Containment Model
 - Impact on Peak Pressure
 - Increase

Items Addressed in Updated Peak Pressure Calculation



- Accumulator Nitrogen
 - Extent of Condition Review for Affected Calculations
 - Change only affects the WGOTHIC calculations
 - Only LOCA analyses are affected
 - SLB and Air Only Cooling Analyses do not release Nitrogen Gas
 - The pressure increase will be a slight benefit for the minimum backpressure and LTCC analyses

Items Addressed in Updated Peak Pressure Calculation



- Crediting Existing Thermal Conductors
 - Description
 - Credit for some containment heat sinks in the model was not previously taken
 - The design of these heat sinks could not be previously confirmed
 - The design has matured such that these heat sinks are contained on construction drawings
 - Existing heat sinks were “turned-on” in the model
 - WGOTHIC Containment Model

Items Addressed in Updated Peak Pressure Calculation



- Crediting Existing Thermal Conductors
 - Impact on Peak Pressure
 - Significant decrease
 - Extent of Condition Review for Affected Calculations
 - Change only affects the WGOTHIC calculations
 - Benefits peak pressure type analyses: LOCA, MSLB, air cooling, etc
 - Minimum backpressure and LTCC cases already model these heat sinks

WGOTHIC Thermal Conductors



- Table of thermal conductors being credited

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a,c

Containment Heat Sink Locations

AP1000



a,c

Summary of WGOTHIC Model Changes



- Summary Table

	a,b,c
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Summary of *WGOTHIC* Model Changes



- Containment pressure response plots vs. licensing basis



Summary of WGOTHIC Model Changes



- Containment pressure response plots vs. licensing basis



Summary of WGOETHIC Model Changes



- DCD Impacts
 - Sections 6.2.1.1.3, 6.2.1.4.3, 6.2.5.1.2
 - Table 6.2.1.1-1, 6.2.1.1-3, Table 6.2.1.1-8
 - Figures 6.2.1.1-1, 6.2.1.1-2, 6.2.1.1-5, 6.2.1.1-6, 6.2.1.1-7, 6.2.1.1-8, 6.2.1.1-9, 6.2.1.1-10, TS 5.5.8, B 3.6.1, B 3.6.2, B 3.6.4

Draft Information for NRC Review



- LOCA M&E Calculation (APP-SSAR-GSC-522, R3)
- Containment Response Calculation (APP-SSAR-GSC-193, R2)
- Roadmap/Reviewer's Guide of changes made to the models and extent of condition review
- DCD Mark-ups for Revision 19
- Technical Report on Containment Response (APP-GW-GLR-096, R3)

Westinghouse Review Process

- WEC QA procedures and HuP fundamentals were followed in developing and verifying the calc notes
- The recent changes were identified as part of this process
- Customer review included

Conclusions

- Current licensing basis methodology was followed with these changes:
 - Crediting existing thermal conductors for the peak pressure calculation
 - Incorporating the accumulator nitrogen gas release
- Changes made to address NRC request to include items affecting the peak containment pressure reported in the Technical Specifications.
- Peak containment pressure remains under 59 psig