October 28, 2010

Mr. Robert Sisk, Manager
AP1000 Licensing Strategy
Westinghouse Electric Company
1000 Westinghouse Dr, Suite 115
Cranberry Township, PA 1606

SUBJECT: AP1000 PRESSURIZED WATER REACTOR DESIGN AIRCRAFT IMPACT ASSESSMENT INSPECTION, NRC INSPECTION REPORT NO. 05200006/2010-203 AND NOTICE OF VIOLATION

Dear Mr. Sisk:

On September 27, 2010, through October 01, 2010, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection of the Westinghouse Electric Company (WEC) Aircraft Impact Assessment (AIA) pertaining to activities conducted in support of your application, dated May 26, 2005, requesting an amendment to the AP1000 design certification rule. This inspection was performed in the WEC offices located in Cranberry Township, PA. The purpose of the inspection was to perform a limited-scope inspection to assess WEC's compliance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.150, "Aircraft impact assessment." The enclosed report presents the results of this inspection. This inspection report does not constitute NRC's endorsement of your overall AIA.

Based on the results of this inspection, the NRC has determined that a violation of NRC requirements occurred. The violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding it are described in detail in the subject inspection report. The violation cites that WEC did not use realistic analyses for certain aspects of its AIA and did not fully identify and incorporate into the design those design features and functional capabilities credited. With the exception of the issues identified in the Notice, the NRC inspection team concluded that the portions of the WEC AP1000 AIA reviewed by the NRC inspection team comply with the applicable requirements of 10 CFR 50.150.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC will use your response to the Notice to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

It is important to note that the NRC inspection team performed a limited review of the AIA. The deficiencies identified may affect other portions of the AIA that the NRC inspection team did not review. Therefore, WEC must extend its review, where applicable, beyond the specific examples identified by the inspection team and apply corrective actions as appropriate. In your response to this violation, WEC should document the areas for which it extended its review beyond the specific examples of the deficiencies identified by the inspection team, the extent of its review, the additional findings, and the corrective actions implemented.

In accordance with 10 CFR 2.390 of the NRC's "Public inspections, exemptions, requests for withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Document Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response, if applicable, should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

/RA/

Richard Rasmussen, Chief
Quality and Vendor Branch 2
Division of Construction Inspection
& Operational Programs
Office of New Reactors

Docket No.: 05200006

Enclosure:
1. Notice of Violation
2. Inspection Report No. 05200006/2010-203 and Attachments

In accordance with 10 CFR 2.390 of the NRC's "Public inspections, exemptions, requests for withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Document Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response, if applicable, should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

/RA/

Richard Rasmussen, Chief
Quality and Vendor Branch 2
Division of Construction Inspection
& Operational Programs
Office of New Reactors

Docket No.: 05200006

Enclosure:
1. Notice of Violation
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DATE	10/22/2010*	10/21/2010*	10/20/2010*	10/ 21/2010*	10/26 /2010*
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DATE	10/20/2010*	10/26/2010*	10/28/2010*	10/ 27/2010*	10/28/2010*
OFFICE	NRO/DNRL/DDLO/NG	AIA FRP Chair	OGC/GCHEA/AGCMLE		
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DATE	10/ 20 /2010*	10/28 /2010*	10/28/2010*		

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NOTICE OF VIOLATION

Westinghouse Electric Company
Cranberry Township, PA 16066

Docket Nos.: 05200006
Inspection Report No.: 05200006/2010-203

During a U.S. Nuclear Regulatory Commission (NRC) inspection of the Westinghouse Electric Company (WEC) AP1000 Pressurized Water Reactor design aircraft impact assessment (AIA) conducted at the WEC facility in Cranberry Township, PA, on September 27 through October 1, 2010, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

> Title 10, of the *Code of Federal Regulations* (CFR), Section 50.150, "Aircraft impact assessment," Paragraph (a)(1) requires that each applicant listed in 10 CFR 50.150(a)(3) shall perform a design-specific assessment of the effects on the facility of the impact of a large, commercial aircraft. Using realistic analyses, the applicant shall identify and incorporate into the design those design features and functional capabilities to show that, with reduced use of operator actions:
>
> (i) the reactor core remains cooled, or the containment remains intact; and
> (ii) spent fuel cooling or spent fuel pool integrity is maintained.
>
> Contrary to the above, as of October 01, 2010, WEC failed to use realistic analyses in certain portions of its AIA. Specifically, in the AIA the applicant failed to include a second impact scenario that was performed on the Auxiliary Building South wall; failed to adequately perform a fire damage analysis for the spread of fire into the annulus region; failed to provide a technical justification for crediting a water tank and Turbine Building equipment in damage footprint analyses; credited less than a 3-hour rated fire barrier to prevent the propagation of fire into adjacent spaces; failed to adequately assess the vibration effects on the shield plate support structure; and failed to perform an impact analysis for a potential plant vulnerability on the Auxiliary Building. Further, the applicant failed to identify and incorporate into the design the design features and functional capabilities credited in the AIA to show the reactor remains cool, or containment remains intact; and spent fuel cooling or spent fuel pool integrity is maintained as required by 10 CFR 50.150(a)(1). Specifically, the AP1000 AIA credited five walls as 5 psid rated barriers to prevent the spread of fire and the Design Control Document (DCD) only identified two walls as 5 psid rated barriers.
>
> This issue has been identified as Violation 05200006/2010-203-01.
>
> This is a Severity Level IV Violation (Section 6.5).

Pursuant to the provisions of 10 CFR 2.201, "Notice of Violation," WEC is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Chief, Quality and Vendor Branch 1, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this Notice of Violation. This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the

corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. Where good cause is shown, the NRC will consider extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, accessible at http://www.nrc.gov/reading-rm/adams.html, to the extent possible, it should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Dated this the 28th day of October 2010

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NEW REACTORS
DIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS
VENDOR INSPECTION REPORT

Docket Nos.:	05200006
Report Nos.:	05200006/2010-203
Vendor:	Westinghouse Electric Company 1000 Westinghouse Dr, Suite 115 Cranberry Township, PA 16066
Vendor Contact:	Mr. Robert Sisk, Manager AP1000 Licensing Strategy (412) 374-6206 E-mail: sisk1rb@wetinghouse.com
Nuclear Industry Activities:	Westinghouse Electric Company (WEC) has requested to amend the AP1000 Pressurized Water Reactor (AP1000) design certification to comply with the U.S. Nuclear Regulatory Commission (NRC) requirements in Title 10 of the *Code of Federal Regulation* (10 CFR), Section 50.150, "Aircraft impact assessment."
Inspection Dates:	September 27 - October 1, 2010

Inspectors:		
	Robert Prato, Team Leader	NRO/DCIP/CQVA
	Yamir Diaz-Castillo	NRO/DCIP/CQVA
	Mark Caruso	NRO/DSRA/SPRA
	Ryan Eul	NRO/DSRA/SBPB
	Thinh Dinh	NRO/DSRA/SBPA/SFPT
	Bret Tegeler	NRO/DE/SEB1
	Michael Magyar	NRO/DE/CIB1
	Dr. J. Guadalupe Argüello	Sandia National Laboratories
	Dr. Alexander L. Brown	Sandia National Laboratories

Approved by:	Richard Rasmussen, Chief Quality and Vendor Branch 2 Division of Construction Inspection & Operational Programs Office of New Reactors

EXECUTIVE SUMMARY

Westinghouse Electric Company
Inspection Report Nos.: 05200006/2010-203

The purpose of this U.S. Nuclear Regulatory Commission (NRC) inspection was to verify that Westinghouse Electric Company (WEC) had implemented the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.150, "Aircraft impact assessment," and performed a design-specific assessment[1] of the effects on the facility of the impact of a large, commercial aircraft. The inspection was conducted at the WEC facility in Cranberry Township, PA during the period September 27 – October 1, 2010.

The following served as the bases for the NRC inspection:

- 10 CFR 50.150

The NRC inspection team implemented Inspection Procedure 37804, "Aircraft Impact Assessment," dated April 27, 2010, during the conduct of this inspection. This AIA inspection was performed to verify that the WEC AP1000 AIA complies with the requirements of 10 CFR 50.150 and to ensure consistency with the industry guidance documented in Nuclear Energy Institute (NEI) 07-13, "Methodology for Performing Aircraft Impact Assessments for New Plant Designs," issued May 2009. NEI 07-13 has been endorsed by the NRC in Draft Regulatory Guide 1176 (DG-1176) "Guidance for the Assessment of Beyond-Design-Basis Aircraft Impacts," as one means of performing an AIA acceptable to the NRC. Applicants, who choose to implement an alternate means to analyze any portion of the AIA, must identify the use of an alternate approach to ensure that the NRC inspection team verifies that each applied alternate approach complies with 10 CFR 50.150.

The NRC had not previously inspected the WEC AP1000 aircraft impact assessment (AIA). The list of WEC staff interviewed during this inspection is listed in Attachment 1 to this report. The results of this inspection are summarized below.

With the exception of the violation described below, the NRC inspection team concluded that the portions of the WEC AP1000 AIA reviewed by the NRC inspection team comply with the applicable requirements of 10 CFR 50.150.

Systems-Loss Assessment

The portions of the WEC AP1000 AIA systems-loss assessment reviewed by the NRC inspection team met the requirements of 10 CFR 50.150 and were performed consistent with the guidance provided in DG-1176.

Fire Damage Assessment

With the exception of the contributing deficiencies to Violation 052000060/2010-203-01, the portions of the WEC AP1000 AIA fire damage assessment reviewed by the NRC inspection team

[1] By a ''design-specific'' assessment, the NRC means that the impact assessment must address the specific design of the facility which is either the subject of a construction permit, operating license, standard design certification, standard design approval, combined license, or manufacturing license application (see 74 FR 28129; June 12, 2009).

met the requirements of 10 CFR 50.150 and were performed consistent with the guidance provided in DG-1176. Specifically, with regards to the AP1000 AIA fire damage assessment, the applicant failed to include a second impact scenario that was performed on the Auxiliary Building South wall; failed to adequately perform a fire damage analysis for the spread of fire into the annulus region; failed to identify and incorporated all the design features into its design; failed to provide a technical justification for crediting a water tank and Turbine Building equipment in damage footprint analyses; and credited less than a 3-hour rated fire barrier to prevent the propagation of fire into adjacent spaces.

Structural Damage Assessment

With the exception of the contributing deficiencies to Violation 052000060/2010-203-01, the portions of the AP1000 AIA structural damage assessment reviewed by the NRC inspection team met the requirements of 10 CFR 50.150 and were performed consistent with the guidance provided in DG-1176. Specifically, with regards to the AP1000 AIA structural damage assessment, the applicant failed to adequately assess the vibration effects on the shield plate support structure. In addition, the applicant failed to perform an impact analysis for a potential plant vulnerability on the Auxiliary Building.

Documentation and Quality Assessment

The portions of the WEC documentation and quality assessment reviewed by the NRC inspection team met the requirements of 10 CFR 50.150 and were performed consistent with the guidance provided in DG-1176.

REPORT DETAILS

1. Systems-Loss Assessment

   a. Inspection Scope

      The NRC inspection team conducted a limited scope inspection of the WEC AP1000 AIA systems-loss assessment that included the following activities:

      - Verification of the location of key structures, systems, and components (SSCs) that provide core cooling or containment isolation, and spent fuel pool integrity to determine the potential for damage by aircraft impact
      - Verification that key SSCs would be capable of performing their intended function given the established structural, shock, and fire damage footprints and the rule sets and assumptions provided in NEI 07-13
      - Verification that damage from an aircraft impact has resulted in accident initiators such as a breach of the reactor coolant system or the failure of the reactor to trip
      - Verification that success paths for core cooling exist

      Specifically, the NRC inspection team reviewed the following WEC AP1000 AIA documents:

      1. APP-1000-GEC-001, "Aircraft Impact Assessment for AP1000 Nuclear Island Report," issued September 2010, (Safeguards Information (SGI))
      2. "AP1000 Design Control Document, Tier 2," Revision 17, issued September 2008
      3. APP-1000-GEC-002, "AP1000 Aircraft Impact large Fire and Shock Damage Assessment," issued September 2010 (SGI)
      4. APP-SES-M3C-001, "AP1000 Vital Equipment List," issued June 2010, (SGI)
      5. APP-GW-GLR-066, "AP1000 Safeguards Threat Assessment," issued August 2007, (SGI)
      6. APP-FPS-G1R-002, "AP1000 Fire Induced Multiple Spurious Actuation Report," issued January 2009
      7. APP-GW-GEE-1895, "Penetration Changes, DAS Upgrades, and PI&D Room Changes due to AIA," issued September 2010

   b. Observations and Findings

      b.1 Determination of the location of key SSCs

      The NRC inspection team reviewed the applicant's selection of SSCs needed to prevent core damage and the documented spatial configuration of those SSCs. SSCs needed to provide for spent fuel pool cooling were not reviewed because the applicant indicated in the DCD that its objective in adding key design features to address the AIA rule was to show that the reactor core remains cooled, containment remains intact, and spent fuel pool integrity[2] is maintained.

[2] The AIA rule requires the applicant to identify and incorporate into the design those design features and functional capabilities to show that, with reduced use of operator actions: (I) The reactor core remains cooled, or the containment remains intact; and (ii) spent fuel cooling or spent fuel pool integrity is maintained. Since the applicant has chosen to maintain core cooling and spent fuel pool integrity to meet the rule, further assessment of containment and spent fuel pool cooling is not necessary.

The WEC "Aircraft Impact Assessment for AP1000 Nuclear Island Report," and "AP1000 Aircraft Impact large Fire and Shock Damage Assessment," (References 1 and 3) identifies the Passive Core Cooling System (PXS) and Reactor Coolant System (RCS), as described in Section 6 of the "AP1000 Design Control Document" (DCD) (Reference 2), as being necessary to maintain reactor core cooling.

The NRC inspection team compared the descriptions of SSCs in the AP1000 AIA to those in the DCD (Chapter 19), the WEC AP1000 probabilistic risk analysis (PRA) report, and confirmed that the scope of SSCs treated in the assessment was complete and consistent with those credited in the PRA for reactor core cooling. The inspection team used equipment location data and drawings from the certified fire hazards analysis in Section 9A of the DCD to confirm that the locations of equipment documented in the assessment report were accurate. The NRC inspection team determined that the fire and shock damage assessment (Reference 3) required protecting one of three safe shutdown control stations in each of the impact scenarios reviewed and verified that at least one station was protected. In addition, the NRC inspection team verified that the applicant adequately documented safe access to the applicable control station for each impact scenario reviewed.

The NRC inspection team verified that documentation used by the applicant to develop and identify spatial information (e.g., internal events PRA, internal flooding analysis, internal fire analysis and building layout diagrams) was current.

b.2 Determination of the state of SSCs in the aircraft impact scenarios

- The NRC inspection team reviewed those portions of the AP1000 AIA that described the approach used for identifying which SSCs will remain capable of performing their intended function following an aircraft impact. The applicant credits the Passive Core Cooling System (PXS) for providing reactor core cooling following an aircraft impact event that occurs during power operation. The inspection team reviewed the information relating to the PXS and determined that the PXS was designed as an entirely passive core cooling system located inside the containment structure and, as such, will be protected from aircraft impact. The inspection team also determined that the PXS is automatically initiated by a reactor scram and a containment isolation signal which are assumed to occur prior to an aircraft impact in accordance with the guidance in DG-1176. As part of the aircraft impact assessment, the applicant performed an analysis to show that the PXS will keep the core covered with water for at least 24 hours following an aircraft impact. The NRC inspection team reviewed this analysis and verified that the PXS will provide reactor core cooling consistent with the requirements of 10 CFR 50.150.

  The NRC inspection team reviewed the safety-related equipment in the Auxiliary Building to determine if the applicant adequately assessed the effects of falling debris. The NRC inspection verified that the Auxiliary Building is designed with a concrete roof. DG-1176 allows for crediting concrete roofs to protect the equipment below from falling debris. In

addition, the NRC inspection team reviewed the equipment located on the top elevation in the Auxiliary Building and verified that an aircraft impact on the Auxiliary Building roof will not affect safety-related equipment relied upon to maintain reactor core cooling consistent with the requirements of the AIA rule.

- The NRC inspection team, as part of its review of the structural damage assessment, determined that the applicant failed to adequately considered an Auxiliary Building impact scenario consistent with the guidance in DG-1176. An initial aircraft impact to the Annex Building that penetrates through to the Auxiliary Building in line with an equipment hatch was not considered in the WEC AP1000 AIA and a justification for excluding it from the analysis was not provided. Based on the Annex Building and Auxiliary Building configuration, the failure to perform an impact analysis and potentially a systems-loss analysis is not consistent with the requirements of the AIA rule or the guidance provide in DG-1176. The Auxiliary Building impact scenario in line with an equipment hatch is further evaluated in the structural assessment portion of this inspection report.

  In addition, the NRC inspection team, as part of its review of the fire damage assessment, determined that the applicant failed to adequately consider the spread of fire into the annulus region between the Shield Building and containment in a fire damage analysis from an aircraft impact on the South wall of the Auxiliary Building. The applicant's failure to adequately consider the spread of fire into the annulus region and potentially a subsequent systems-loss analysis is not consistent with the requirements of the rule or the guidance provided in DG-1176. The fire damage analysis to the annulus region is further evaluated in the fire damage assessment portion of this inspection report.

- The NRC inspection team reviewed the shock effects analysis on plant SSCs. More specifically, the NRC inspection team reviewed the shock effects to the polar crane and the components susceptible to shock that are attached to the containment wall. The NRC inspection team verified that the polar crane is not susceptible to shock damage due to the Shield Building-containment configuration and the limited shock pathways from the Shield Building to the polar crane. In addition, the inspection team verified that no fragile components, susceptible to shock, are attached to the containment wall based on the current plant design.

b.3 Determination of accident conditions

The NRC inspection team reviewed the following conditions to determine if the applicant used the appropriate assumptions and scenarios in determining accident conditions:

- The applicant's success criteria (and the scenario analysis) address initial plant states of 100 percent power and cold shutdown.

- The analysis takes no credit for the availability of offsite power.

- The applicant, as part of its shutdown cooling scenarios, assumes that the non-operating loop of shutdown cooling is out of service for maintenance, the reactor vessel is vented, the water level is at or near the reactor vessel head flange, and the reactor has been shut down for a specified time.

- The applicant has considered the possibility of an anticipated transient without a SCRAM (ATWS).

- The applicant has considered the influence of containment status on the operability of other equipment (e.g., pumps that draw suction water from the containment sump).

- The applicant has searched for instances in which a containment bypass LOCA may occur.

The NRC inspection team reviewed the applicant's treatment of the following potential accident conditions:

- LOCA inside the containment
- LOCA outside the containment
- ATWS
- flooding
- loss of decay heat removal

LOCA inside containment

The NRC inspection team reviewed the applicant's assessment of a LOCA inside the containment. The inspection team determined that the applicant had included design features to prevent structural and shock damage footprints from extending inside the containment structure. As such, the applicant concluded that a LOCA inside the containment is not a credible scenario. The NRC inspection team verified that a LOCA inside of containment is not a credible scenario.

LOCA outside containment

The NRC inspection team verified that the applicant considered the potential for LOCA outside containment and its consequences. The only potential for this involves cooling the core with the residual heat removal system (RNS) during some shutdown scenarios. The RNS system is located outside of containment. The team verified that piping connected to the RCS that penetrates containment includes isolation valves that are located inside the primary containment and that the containment is isolated simultaneous with initiation of the PXS.

ATWS

The NRC inspection team reviewed the AP1000 AIA to determine if the applicant adequately assessed the potential for any damage scenarios that could affect the ability to scram the reactor. The inspection team considered potential structural damage to the rod control system used for reactor scram. The NRC inspection team reviewed drawings from the fire hazards analysis and structural damage

footprints and verified that ATWS was not a viable outcome from an aircraft impact.

Flooding

The NRC inspection team reviewed the AP1000 AIA to determine if the applicant adequately assessed the potential for flooding from a large water source as described in DG-1176. The AP1000 AIA states that any potential effects from flooding initiated by an aircraft impact is bounded by the flooding analysis contained within the DCD. The NRC inspection team verified that the design features relied upon for core cooling resides inside the primary containment and will be actuated prior to impact or promptly thereafter and, therefore, will not be affected by flooding from an aircraft impact. The NRC inspection team reviewed the information for other sources of flooding that may be affected by an aircraft impact and verified that they are bounded by the flooding analysis in the DCD and that they will not affect the safety-related equipment relied upon to maintain reactor core cooling consistent with the requirements of the AIA rule.

Loss of Decay Heat Removal

The NRC inspection team reviewed the AP1000 AIA to determine if the applicant adequately assessed the potential for a loss of decay heat removal event. The team verified that the design features relied upon (i.e., PXS and RCS) if the normal decay heat removal system is damaged are sufficient to be relied upon for core cooling.

b.4 Identification of success path

The NRC inspection team reviewed the AP1000 AIA to determine if the applicant had adequately identified success paths for core cooling. The inspection team reviewed the PRA which serves as the basis for information documented in Chapter 19 of the DCD, and verified that the design features identified by the applicant are shown as success paths for avoiding core damage in the PRA. The NRC inspection team verified that the applicant had performed an adequate thermal-hydraulic analysis using methods that were the same as those used for the PRA to justify the assertion that core cooling could be maintained for at least 24 hours when the AIA success criterion is applied.

c. Conclusions

The NRC inspection team found that, with the exception of some additional system-loss analysis that may need to be performed, the portions of the WEC systems-loss assessment reviewed by the NRC met the requirements of 10 CFR 50.150 and was conducted consistent with the guidance provided in DG-1176.

2. Fire Damage Assessment

a. Inspection Scope

The NRC inspection team conducted a limited scope inspection of the WEC AP1000 AIA fire damage assessment that included the following activities:

- Verification that the fire damage assessment identifies and incorporates the necessary design features and functional capabilities
- Verification that the fire damage assessment is realistic and design-specific
- Verification that key design features credited in the AIA is consistent with those documented in the AP1000 DCD
- Verification that the fire damage assessment includes most limiting scenarios.
- Verification that damage footprints include the effects from the spread of fire damage through existing connected compartments and through new compartment connections due to overpressure
- Verification that SSCs credited for safe shutdown following aircraft impact scenarios remain free from physical and fire damages.

Specifically, the NRC inspection team reviewed the following WEC AP1000 AIA documents:

1. APP-1000-GEC-002, "AP1000 Aircraft Impact large Fire and Shock Damage Assessment," issued September 2010, (SGI)
2. APP-1030-P2-001 Drawings, "Nuclear Island General Arrangement Plan at EL 100'-0" & 107'-2"
3. AP1000 Concrete Drawings
4. "AP1000 Design Control Document, Tier 2," Appendix 9A, "Fire Protection Analysis," Revision 17, issued September 2008
5. "AP1000 Design Control Document, Tier 2," Appendix 19F, "Malevolent Aircraft Impact." proposed Revision 18, dated September 30, 2010

b. Observations and Findings

b.1 Fire-damage assessment

- The WEC "AP1000 Aircraft Impact Large Fire and Shock Damage Assessment" (Reference 1) includes an evaluation of the seven most limiting impact scenarios for the auxiliary building. The NRC inspection team reviewed all seven impact scenarios as part of this inspection to determine if the AP1000 AIA fire-damage assessment was performed consistent with the requirements of the rules and the guidance provided in DG-1176. The NRC inspection team also reviewed several additional impact scenarios to attain reasonable assurance that the most limiting impact scenarios are presented in the AP1000 AIA. The NRC inspection team verified that, with few exceptions as discussed within this section of the inspection report, the AP1000 AIA physical and fire damage footprints were developed consistent with the guidance and assumptions provided in DG-1176.

- The NRC inspection team, as part of its review of the structural damage assessment, determined that the applicant did not adequately consider an Auxiliary Building impact scenario consistent with the guidance in DG-1176. An initial aircraft impact to the Annex Building that penetrates through to the Auxiliary Building in line with an equipment hatch was not considered in the WEC AP1000 AIA and a justification for excluding it from the analysis was not provided. Based on the Annex Building and Auxiliary Building configuration, the failure to perform an impact analysis and potentially a fire-damage analysis is not consistent with the requirements of the rule or the guidance provide in DG-1176. The Auxiliary Building impact scenario in line with an equipment hatch is further evaluated in the structural analysis portion of this inspection report.

- The NRC inspection team reviewed the impact scenarios performed by the applicant to verify that the AP1000 AIA included all impact scenarios consistent with the guidance provided in DG-1176. The inspection team determined that WEC performed two impact scenarios for the Auxiliary Building South wall but did not include one of the impact scenarios in the AP1000 AIA. The NRC inspection team determined that the failure to include the second impact scenario was not consistent with the rule or the guidance provided in DG-1176.

  WEC's failure to include the second impact scenario that was performed on the Auxiliary Building South wall consistent with the requirements of the rule and the guidance provided in DG-1176 is an example of a deficiency in the assessment contributing to Violation 05200006/2010-203-01 that cites WEC for not performing an adequate assessment using realistic analyses as required by 10 CFR 50.150(a)(1).

  During the inspection, WEC revised the AP1000 AIA report to include the second impact scenario. The NRC inspection team reviewed the revised AP1000 AIA as part of this inspection and verified that the second impact scenario analysis was accurate and complete.

- The NRC inspection team further evaluated the fire damage analysis resulting from the impact scenario on the Auxiliary Building South wall. The structural damage impact analysis determined that the structural damage ended at the Shield Building wall in the area of an access door to the annulus (a single 5 psid penetration). Consistent with the guidance in DG -1176, the access door to the annulus region was assumed to fail exposing the annulus to potential damage due to the spread of fire. However, the corresponding fire damage analysis unrealistically indicates that fire will not extend past the access door into the annulus region. The NRC inspection team determined that the ample ventilation that exists at the top of the annulus region and the failure of the annulus access door will provide a substantial ventilation pathway causing fire to spread into the annulus region due to the "chimney effect." The NRC inspection team determined that the current fire damage analysis under represents the potential damage to the annulus region due to the spread of fire.

WEC's failure to adequately consider the spread of fire into the annulus region as part of the Auxiliary Building South wall impact scenario fire damage analysis and the potential effects on safety-related systems relied upon to maintain reactor core cooling is another example of a deficiency in the assessment contributing to Violation 05200006/2010-203-01 that cites WEC for not performing an adequate assessment using realistic analyses as required by 10 CFR 50.150(a)(1).

- The NRC inspection team reviewed the design features and functional capabilities credited in the AP1000 AIA to verify consistency with the AP1000 current design as documented in the AP1000 DCD. The NRC inspection team identified that the AIA credits five walls as 5 psid rated barriers to prevent the spread of fire and the DCD only identified two walls as 5 psid rated barriers.

  The differences in the design features and functional capabilities as documented in the DCD and AIA is an example of a deficiency in the assessment contributing to Violation 05200006/2010-203-01 that cites WEC for crediting certain design features not identified and incorporated into its design contrary to the requirements of 10 CFR 50.150(a)(1).

- The NRC inspection team reviewed the methodology used for the AP1000 AIA damage footprint analyses. The NRC inspection team determined that the applicant credited an intervening water tank and Turbine Building equipment in two (Wall Q and Wall 11, respectively) damage footprint analyses, but failed to provide a technical justification for crediting these items in the analysis consistent with the guidance in DG-1176.

  WEC's failure to provide a technical justification for crediting a water tank and Turbine Building equipment in its fire damage footprint analyses is another example of a deficiency in the assessment contributing to Violation 05200006/2010-203-01 that cites WEC for not performing an adequate assessment using realistic analyses as required by 10 CFR 50.150(a)(1).

  During the inspection, WEC revised the two damage footprint analyses in the AP1000 AIA to remove credit for the intervening water tank and Turbine Building equipment. The NRC inspection team reviewed the revised damage footprints as part of this inspection and verified them to be accurate, complete and consistent with the guidance in DG-1176.

- The NRC inspection team also reviewed fire damage footprints used in the AP1000 AIA. The inspection team identified a number of fire damage footprint analyses that credited 1-hour and 2-hour rated fire barriers for stopping fire propagation into adjacent spaces, which is inconsistent with the guidance in DG-1176, which indicates that 3-hour rated fire barriers are necessary to stop the propagation of fire into adjacent spaces.

  WEC's failure to perform fire damage footprint analyses using 3-hour rated fire barriers to stop fire propagation into adjacent spaces is another example of a deficiency in the assessment contributing to Violation

05200006/2010-203-01 that cites WEC for not performing an adequate assessment using realistic analyses as required by 10 CFR 50.150(a)(1).

During the inspection, WEC revised the applicable fire damage analyses in the AP1000 AIA to extend the damage footprints to 3-hour rated fire barriers consistent with the guidance in DG-1176. The NRC inspection team reviewed the revised analyses as part of this inspection and verified that they were accurate, complete and consistent with the guidance in DG-1176.

b.2 Fire Damage Effects on SSCs

The NRC inspection team reviewed the fire damage footprints for all impact scenarios to determine if the applicant had properly identified the SSCs within the fire damage footprints. The NRC inspection team verified that the applicant did identify all the SSCs within the fire damage footprint and that the applicant had correctly considered the identified SSCs as failing within 5 minutes from the start of the fire consistent with the guidance provided in DG-1176. The NRC inspection team also verified that the safe shutdown methods credited in the AIA report were reasonable due to the absence of damage to required SSCs.

c. Conclusions

The NRC inspection team found that, with the exception of the contributing deficiencies to Violation 05200006/2010-203-01, the portions of the AP1000 fire-damage assessment reviewed by the NRC inspection team met the requirements of 10 CFR 50.150 and was conducted consistent with the guidance provided in DG-1176.

3. Structural Damage Assessment

a. Inspection Scope

The NRC inspection team conducted a limited scope inspection of the WEC AP1000 AIA structural damage assessment that included the following activities:

- Verification of information found in plant documentation including plant arrangement drawings that display the locations of major equipment, plant elevation drawings that document the relative heights of various buildings, civil-structural drawings that provide wall thicknesses and reinforcement details, and material specifications
- Verification of general structural analysis considerations such as design inputs, analyses parameters, and assumptions, computer codes, methods used for structural analyses and results to determine whether the applicant has adequately analyzed the effects of and damage to structures resulting from global and local aircraft impact loads
- Verification of the containment and spent fuel pool impact analyses to determine whether the applicant has met the sufficiency criteria in DG-1176, in Section 2.5 of NEI 07-13
- Verification of the structural damage footprint assessments to determine whether the applicant has adequately assessed the containment and other reinforced

concrete buildings that contain essential SSCs for maintaining reactor core and spent fuel pool cooling using the damage rule sets in DG-1176

Specifically, the NRC inspection team reviewed the following AP1000 AIA documents:

1. APP-1000-GEC-001, "Aircraft Impact Assessment for AP1000 Nuclear Island Report," issued September 2010, (SGI)
2. APP-1000-GEC-001, "Aircraft Impact Analysis for AP1000 Nuclear Island," Revision 2, dated October 1, 2010
3. APP-1000-GEC-002, "AP1000 Aircraft Impact Large Fire & Shock Damage Assessment," Revision 1, dated September 23, 2010
4. APP-1000-GEC-002, "AP1000 Aircraft Impact Large Fire & Shock Damage Assessment," Revision 2, dated October 1, 2010
5. APP-GW-GLR-066, AP1000 Safeguards Assessment, Revision 5, July 2010
6. APP-1000-S2C-041, "LS-DYNA Benchmarking for OOP Shear Test for SC Beam with a/d=3.5," Revision 0, dated September 27, 2010.
7. APP-1000-S2C-081, "Aircraft Impact Analyses, Local Model Analyses for a Conceptual Design," Revision 1, dated January 30, 2007
8. APP-1000-S2C-083, "Aircraft Collision Study to the SB Wall Portion," Revision 0, dated July 17, 2007
9. APP-1000-S2C-084, "Aircraft Collision Study to the SB Air Inlet Portion," Revision 0, dated July 19, 2007
10. APP-1000-S2C-098, "Shield Building Shield Plate Impact Analysis," Revision 0
11. SMIRT-18-J05-1, "Investigation on Impact Resistance of Steel Plate Reinforced Concrete Barriers Against Aircraft Impact," Part 1: "Test Program and Results," dated August 12, 2005
12. Len Schwer, "An Introduction to the Winfrith Concrete Model," issued April 2010, Schwer Engineering and Consulting Services
13. "AP1000 Design Control Document, Tier 2," Appendix 19F, "Malevolent Aircraft Impact." proposed Revision 18, dated September 30, 2010

b. Observations and Findings

b.1 Structural Assessment Document Review

The NRC inspection team reviewed the applicant's plant structural assessment design inputs including plant arrangement drawings, plant elevation drawings, civil-structural drawings, and seismic Category I material specifications. The inspection team verified that the plant arrangement drawings displayed the locations of major equipment, the plant elevation drawings identified the relative heights of various buildings, the civil-structural drawings provided wall thicknesses, and material specification provided concrete and reinforcement material details accurately and consistent with the AP1000 DCD.

b.2 General Structural Analysis.

- The NRC inspection team reviewed the WEC AP1000 AIA structural damage assessment including design inputs, analysis parameters and assumptions, computer codes, method used for structural analyses and results. Specifically, the NRC inspection team reviewed the LS-DYNA computer code used in the structural analysis for the AP1000 AIA to

determine if the applicant had adequately validated and verified the code for the applicable class of problems assessed and had adequately documented the validation and verification. DG-1176, in Section 2.4.1 of NEI 07-13 states that "new design features may be subject to failure modes that are outside of their existing experience base, and may require experimentally-verified analytical evaluation" or benchmarking.

The AP1000 Shield Building makes use of steel concrete composite construction for which there is greater uncertainty with respect to impact behavior compared to reinforced concrete. WEC performed benchmarking of the LS-DYNA analysis code on steel concrete structures using the Winfrith concrete model. The NRC inspection team reviewed the benchmarking process and the technical justification and verified it to be accurate and complete.

- The NRC inspection team reviewed the assumptions used in the structural damage analyses. For the purpose of validating predicted structural damage to the Shield Building, the applicant performed an analysis of an impact experiment involving steel concrete (SC) panels and a deformable projectile. The applicant's comparison of predicted and measured results agreed reasonably well. The NRC inspection team verified that the applicant adequately documented the technical basis in the AP1000 AIA for the assumptions used in each analysis.

- The NRC inspection team reviewed a sample of the impact scenarios and subsequent structural damage analyses and results, and verified that the applicant applied appropriate elements, boundary conditions, initial conditions, and time duration for the AIA. In addition, the inspection team reviewed the model and mesh refinement used in the structural analyses and determined that the applicant refined the model by using a finer mesh around the area of impact. The NRC inspection team verified that the applicant used sufficient modeling and meshing refinement in the structural damage analyses.

- The NRC inspection team reviewed the structural damage impact scenario analyses to determine if the applicant properly applied the NRC-supplied forcing function in the AP1000 AIA. The inspection team verified that the applicant properly applied the NRC-supplied forcing function in its structural damage impact scenarios analyses.

- The NRC inspection team reviewed the aircraft impact scenarios to determine if the applicant had conducted the assessments in accordance with the guidance in DG-1176. The applicant evaluated several impact scenarios on the Shield Building to address the potential for subsequent damage on containment. The applicant assessed the effects of debris falling and impacting the shield plate, which is suspended from the shield building roof but did not analyze the vibration effects of the aircraft impact on the shield plate support structure.

WEC's failure to adequately assess the vibration effects on the shield plate support structure is another example of a deficiency in the assessment contributing to Violation 05200006/2010-203-01 that cites WEC for not performing an adequate assessment using realistic analyses as required by 10 CFR 50.150(a)(1).

- The NRC inspection team reviewed the aircraft impact scenarios on the Auxiliary Building and determined that the applicant did not perform an Auxiliary Building impact analysis consistent with the guidance in DG-1176. An initial aircraft impact to the Annex Building that penetrates through to the Auxiliary Building in line with multiple barriers that leads to an equipment hatch was not considered in the WEC AP1000 AIA and a justification for excluding it from the analysis was not provided. Based on the Annex Building and Auxiliary Building configuration, the failure to perform the impact analysis is not consistent with the requirements of the rule or the guidance provide in DG-1176.

  WEC's failure to perform an impact analysis for a potential plant vulnerability on the Auxiliary Building is another example of a deficiency in the assessment contributing to Violation 05200006/2010-203-01 that cites WEC for not performing an adequate assessment using realistic analyses as required by 10 CFR 50.150(a)(1).

b.3 Containment structure and spent fuel pool specific impact assessment

The NRC inspection team reviewed the containment and spent fuel pool impact analyses to determine whether the applicant has met the sufficiency criteria in DG-1176. The NRC inspection team reviewed the structural damage assessment as it relates to local loading on the containment structure and verified that the following activities were conducted in the analyses reviewed by the inspection team:

- The applicant adequately documented and cross-checked the aircraft engine parameters used in the analysis against NRC-specified parameters.

- The applicant properly accounted for the effects of local impact loading by performing detailed finite element analyses using wall panels and a projectile whose parameters matched those supplied by the NRC. These analyses were performed using benchmarked analysis methods.

The NRC inspection team reviewed the structural damage assessment as it relates to gross loading of the containment structure. The inspection team verified that the following activities were conducted in the analyses:

- The applicant effectively used and adequately documented the application of the force time-history analysis method and cross-checked it for its equivalency to the NRC-specified force time-history.

- For the application of the force time-history analysis method, the applicant properly used and adequately documented the NRC-specified spatial distribution of the impact force in the analyses.

The NRC inspection team reviewed a sample of documents for material characterization and failure criteria related to the structural damage assessment and verified that the following analysis activities were conducted:

- The applicant used the Winfrith concrete damage model consisting of material properties and equations used to model the nonlinear behavior of concrete materials used in the analyses. The various steel components, including reinforcements, were modeled with appropriate elasto-plasticity models. The model parameters are consistent with the material properties and equations documented in DG-1176, and are adequately documented.

- The applicant properly applied the dynamic increase factors specified in DG-1176, for the various materials use in the analyses.

- The applicant properly applied the ductile failure strain limits specified in DG-1176, for the various materials used in the analyses.

- The concrete structural failure criteria used in the analyses are appropriate and consistent with the criteria specified in DG-1176, and are adequately documented.

- The applicant properly applied the material models specified in DG-1176.

- The applicant properly applied and adequately documented the structural integrity failure criteria specified in DG-1176.

The NRC inspection team reviewed DG-1176, regarding the major assumptions applied to the containment structural analyses and verified that the following activities were conducted in the analyses reviewed by the inspection team:

- The AP1000 consists of many new design features such as the shield building and additional turbine building wall, which were identified and subjected to analytical evaluations consistent with DG-1176.

- Containment regions containing critical penetrations received an appropriate level of special consideration.

- The applicant assessed potential aircraft impact at other locations that could result in greater consequences.

The NRC inspection team reviewed DG-1176, regarding the sufficiency criteria applied to the containment structural and spent fuel pool analyses and verified

that the following activities were conducted in the analyses reviewed by the inspection team:

- The containment and spent fuel pool were concluded to remain intact upon impact, consistent with the sufficiency criteria of DG-1176.

b.4 Structural damage footprint assessment

The NRC inspection team reviewed the structural damage footprint analyses to determine that the following items of interest related to the damage rule sets identified in DG-1176, "Heat Removal Capability," have been met. The NRC inspection team reviewed the structural damage rule sets and verified that the following activities were conducted in the analyses reviewed by the inspection team:

- Structures of concern that contain systems, structures, and components (SSCs) have been identified.

- A systematic evaluation of susceptible damage was conducted and adequately documented.

- Assumptions used to determine elevations of concern have been addressed and adequately documented.

- Each external face of each building exposed to a direct hit has been divided into two categories, containment structures and other reinforced concrete buildings; and has been analyzed and adequately documented.

The NRC inspection team reviewed the structural damage rule sets for containment structures for consistency with DG-1176, and verified that the following activities were conducted in the analyses reviewed by the inspection team:

- Damage to the polar crane has been investigated consistent with guidance in DG-1176 and has been adequately documented.

- Buildings without concrete roofs that are adjacent and below the area of impact on the containment have been considered consistent with guidance in DG-1176 in order to define the damage footprint, and have been adequately documented.

The NRC inspection team reviewed the structural damage rule sets for reinforced concrete buildings for consistency with the guidance in DG-1176, and verified that the following activities were conducted in the analyses reviewed by the inspection team:

- Various impact points have been investigated consistent with the guidance in DG-1176 in order to define the damage footprint, and have been adequately documented.

- Structural damage rule sets regarding perforations were developed consistent with the guidance in DG-1176.

- Shock damage was evaluated in the structural damage footprints in accordance with DG-1176 and these evaluations have been adequately documented.

c. Conclusions

The NRC inspection team found that, with the exception of the contributing deficiencies to Violation 05200006/2010-203-01, the portions of the AP1000 structural damage assessment reviewed by the NRC inspection team met the requirements of 10 CFR 50.150 and were conducted consistent with the guidance provided in DG-1176.

4. AIA Documentation and Quality Assessment

a. Inspection Scope

The NRC inspectors reviewed WEC quality assurance (QA) plan implemented in the development of the aircraft impact assessment (AIA) structural and heat removal analysis to verify compliance with the requirements of 10 CFR 50.150, "Aircraft Impact Assessment." Specifically, the NRC inspectors reviewed the following policies and procedures established by Westinghouse:

- "Quality Management System (QMS)," Revision 5, dated October 1, 2002
- APP-GW-GAH-004, "AP1000 Standard Project Quality Plan," Revision 1, dated February 18, 2010
- "WEC Quality Management System, Table of Contents," dated July 19, 2010
- NSNP 3.1.4, "Change Control for the AP1000 Program," Revision 2, dated February 8, 2010
- NSNP 3.2.6, "Design Analysis," Revision 3, dated March 31, 2010
- NSNP 3.3.3, "Design Verification by Independent Review or Alternate Calculations," Revision 2, dated February 8, 2010
- WEC 6.1, "Document Control," Revision 2, dated February 8, 2010
- APP-1000-GEC-001, "Aircraft Impact Analysis for AP1000 Nuclear Island," Revision 2, dated October 1, 2010
- APP-1000-GEC-002, "AP1000 Aircraft Impact Large Fire and Shock Damage Assessment," Revision 1, dated September 23, 2010
- APP-1000-GEC-003, "Verification of Shear Reinforcement in Aircraft Impact Analysis," Revision 0, dated September 26, 2010
- APP-1000-S2C-098, "Shield Building Shield Plate Impact Analysis," Revision 0, dated September 26, 2010
- APP-1000-S2C-081, "Aircraft Impact Analyses, Local Model Analyses for a Conceptual Design," Revision 1, dated January 1, 2007
- APP-1000-S2C-083, "Aircraft Collision Study to the SB Wall Portion," Revision 0, dated July 17, 2007

- APP-1000-S2C-084, “Aircraft Collision Study to the SB Air-Inlet Portion,” Revision 0, dated July 19, 2007
- APP-1000-S2C-041, “LS-DYNA Benchmarking for OOP Shear Test for SC Beam with a/d=3.5,” Revision 0, dated September 27, 2010.
- Letter from Ken Canavan, (Electric Power Research Institute Senior Manager) to Mr. David A Christian, (Chair of the NEI Aircraft Impact Assessment Group) with regards to the results of the AIA peer evaluation, dated June 17, 2010

Furthermore, the NRC inspectors reviewed a sample of documentation, which described the performance and verification, and validation of the AP1000 AIA.

b. Observations and Findings

b.1 Documentation

DG-1176 contains the industry guidance for documenting the AIA for compliance with 10 CFR 50.150. With regards to documentation, DG-1176 states, in part, that each “vendor should retain a file of the complete set of analyses performed consistent with the level of detail described in this methodology document. The documentation should be sufficiently complete and thorough to support an onsite review by the NRC to determine the overall adequacy of the assessments performed.”

WEC 6.1 establishes the responsibilities and requirements for controlling documents. Design associated documentation shall meet applicable requirements and design changes must be evaluated prior to implementation. In addition, design output must comply with design input and regulatory requirements. Furthermore, design verification must be performed in accordance with procedural requirements.

The NRC inspection team reviewed the AP1000 Project Quality Plan (PQP) and related AIA documentation and verified that with the exception of the documentation errors identified throughout this inspection report, the portions of the AP1000 AIA reviewed by the inspection team were documented consistent with the PQP and the guidance provided in DG-1176.

b.2 Quality Requirements

DG-1176 states that the quality assurance standards and measures applied by an applicant must be able to establish the validity of the assessment and supporting calculations, and that the results must be document consistent with 10 CFR 50.150. The applicant credits the AP1000 PQP as their quality assurance standard for AIA. The PQP defines the specific processes, procedures, and requirements that are applicable to AP1000 projects, including the AIA.

NSNP 3.2.6 establishes the process, responsibilities, and requirements for performing and documenting design analyses, evaluations, and revisions to design analyses.

NSNP 3.3.3 establishes the process, requirements and responsibilities for performing design verification by independent review or by alternate calculations.

Verification is accomplished using design reviews, alternate calculations, or qualification tests as described in applicable procedures.

Section 4.2.6 of the QMS describes the design verification process as well as the requirements for verification documentation, and verification by alternate calculations and independent review.

The NRC inspection team reviewed the applicable portions of the AP1000 AIA and verified that the inputs and assumptions supporting the analyses were clearly identified. The inspection team also reviewed WEC independent reviews and alternate calculations and verified that the inputs, assumptions, methodology, assessment results, and conclusions were consistent with the QMS and AP1000 PQP.

c. Conclusions

The NRC inspection team found that the portions of the AP1000 documentation and quality requirements reviewed by the NRC inspection team met the applicable requirements of 10 CFR 50.150.

5. Entrance and Exit Meetings

On September 27, 2010, the NRC inspection team discussed the scope of the inspection with Mr. Cummins, from WEC, and other representatives from WEC. On October 1, 2010, the NRC inspection team presented the inspection results and observations during an exit meeting with Mr. Cummins from WEC. In addition, on October 27, 2010, the NRC inspection team contacted WEC to provide clarification on potential findings and performed a final exit of the WEC AP1000 AIA inspection. Attachment 2 to this report lists the entrance and exit meeting attendees.

ATTACHMENT 1

1. PERSONS CONTACTED

Name	Company/Employer	Area
Winters, James	WEC	Passive Plant Technology
Repp, David	WEC	Systems, Fire
Tunon-Sanjur, Lee	WEC	Structural Engineering
Ray, Thomas	WEC	Licensing
Pfister, Andrew	WEC	Systems Engineering
Mathanson, Philip	WEC	Systems, Fire
Kostelnik, John	WEC	Engineering
Shand, Lamarr	WEC	Systems Engineering
Ford, Justin	WEC	Structural Engineering
Goossen, Chris	WEC	Structural Engineering
Sweidan, Basheer	WEC	

ATTACHMENT 2

1. ENTRANCE MEETING ATTENDEES

OCT-03-2010 19:00 P.004

ATTENDANCE ROSTER ENTRANCE MEETING 9/27/2010

PRINT Last, First MI	Signature	Organization
ED CUMMINS		WEC
ROBERT PATTO		U.S. NRC
LEE TUNON-SANJUR		WEC
TEGELER, BRET		USNRC
DINH, THANH		USNRC
ELL, RYAN		US NRC
Ray, Thomas J.		WEC
Pfister, Andrew		WEC
Sims, Jerry G.		Consultant
MATTHEWSON, PHIL		WEC
JOHN KOSTELNIK		WEC
Lamarr Shand		WEC
Justin Ford		WEC
Phil Greco		WEC
CHAD WEBER		WEC
David Repp		WEC
Jose G. Arguello		SNL
Michael Mayfield		NRC
Yamir Diaz		NRC
Basheer Sweidan		WEC
Corletti, Michael		WEC
Pfister, Andrew		WEC
Goossen, Chris		WEC
DO, KHANH		WEC

2 EXIT MEETING ATTENDEES October 1, 2010

OCT-03-2010 19:00 P.005

EXIT MEETING 10/1/2010

A/A Inspection Outbrief Attendance

R. F. Ziesing	WEC Director US Licensing
Alex Brown	Sandia National Labs
Jim Winters	WEC Mgr. Passive Plant Technology
David Repp	WEC Engineer
Lamar Shand	WEC Engineer
Phil Mathewson	WEC NPP
Mark Caruso	NRC
Jerry G. Sims	Nuclear Security Consultant
Michael Magyar	NRC
Brad Jeczen	NRC
Yamir Diaz	NRC
Sandy Ruppert	Westinghouse
Thom Ray	Westinghouse
Bonheur Sweidan	WEC
Chris Grosser	WEC
Lee Tunon-Senyuk	WEC
José Guadalupe Arguello	SNL
Bob Prato	NRC
Ed Cummins	WEC

TOTAL P.005

3. EXIT MEETING ATTENDEES October 27, 2010

Robert Prato	NRC
Richard Rasmussen	NRC
Perry Buckberg	NRC
Eileen McKenna	NRC
Thinh Dinh	NRC
Robert Sisk	WEC
James Winters	WEC
John Kostelnik	WEC
Thomas Ray	WEC

4. Inspection Procedures Used

Inspection Procedure 37804, "Aircraft Impact Assessment"

5. List Of Items Opened, Closed, And Discussed

The NRC has not performed any previous inspections of the WEC AP1000 AIA.

The NRC found the following items during this inspection:

Item Number	Status	Type	Description
05200006/2010-203-01	Open	NOV	10 CFR 50.150(a)(1)