



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

May 8, 2013

South Carolina Electric and Gas
ATTN: Mr. Ronald A. Jones
Vice President, New Nuclear Operations
P.O. Box 88 (Mail Code P40)
Jenkinsville, SC 29065-0088

SUBJECT: MEETING SUMMARY – CATEGORY I – REGULATORY CONFERENCE
VIRGIL C. SUMMER NUCLEAR STATION, UNIT 2, DOCKET NUMBER 52-027

Dear Mr. Jones:

This letter refers to the meeting conducted on April 30, 2013 at the NRC Region II office in Atlanta GA. The purpose of this meeting, which was scheduled at your request, was to provide an opportunity for you to present to the U.S. Nuclear Regulatory Commission (NRC) your perspective on the facts and assumptions the NRC used to arrive at, and assess the significance of, the finding and associated apparent violation (AV) documented in Inspection Report No. 05200027/2013008 (ML13085A058). This finding dealt with the failure to assure that applicable regulatory requirements were correctly translated into design specifications, drawings, procedures, and instructions, as required by Criterion III, "Design Control," of Appendix B to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50. As a result of this nonconformance, the anchorage and spacing of the headed shear reinforcement in multiple structural components of the nuclear island (NI), as detailed on the final design drawings, did not comply with the provisions of the "Code Requirements for Nuclear Safety Related Concrete Structures (ACI 349-01)," as required by the Updated Final Safety Analysis Report (UFSAR).

Topics discussed included the apparent violation, the significance of the finding, and completed and planned corrective actions.

Enclosed are a list of attendees and the presentation handouts.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter will be made available electronically for public inspection in the NRC Public Document Room or from

the Publicly Available Records (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this meeting, please contact me at (404) 997-4437.

Sincerely,

/RA/

M. Scott Freeman, Chief
Construction Inspection Branch 2
Division of Construction Inspection

Docket No. 52-027
License No. NPF-93

Enclosures:

1. List of Attendees
2. SCE&G Presentation Slides

cc: (See pages 3 – 5)

the Publicly Available Records (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

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Sincerely,

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M. Scott Freeman, Chief
Construction Inspection Branch 2
Division of Construction Inspection

Docket No. 52-027
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1. List of Attendees
2. SCE&G Presentation Slides

cc: (See pages 3 – 5)

Distribution:

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NRO_cROP Resource
OEMAIL.Resource
OEWEB.Resource
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R. Hannah, Public Affairs Officer, RII
V. McCree, RII
F. Brown, RII
J. Munday, RII
M. Miller, RII
J. Yerokun, RII
M. Ernestes, RII
R. Jackson, RII
A. Masters, RII
S. Freeman, RII
G. Khouri, RII
K. O'Donohue, RII
R. Musser, RII
J. Fuller, SRI-Vogtle Units 3 & 4
P. Miles, Region II Administrator's Administrative Assistant
S. DuBose, Region II DRAC's Administrative Assistant

☒ PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE ☒ NON-SENSITIVE
ADAMS: ☒ Yes ACCESSION NUMBER: ML13128A298 ☒ SUNSI REVIEW COMPLETE ☒ FORM 665 ATTACHED

OFFICE	RII:DCI/CIB2	RII:DCI/CIB2					
SIGNATURE	AFP1 via e-mail	MSF1					
NAME	A. Ponko	S. Freeman					
DATE	5/ 8 /2013	5/ 8 /2013					
E-MAIL COPY	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO					

OFFICIAL RECORD COPY DOCUMENT NAME: G:\CC\DCI\CIB2\VC SUMMER\VCs RC PUBLIC
MEETING SUMMARY 30 APR 2013 REV0.DOCX

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U.S. Nuclear Regulatory Commission Division of Construction Inspection

V.C. SUMMER NUCLEAR STATION UNIT 2 REGULATORY CONFERENCE

Attendance List April 30, 2013

Name	Affiliation (if any)
R. Jones	SCE&G
B. Stokes	SCE&G
R. Word	SCE&G
A. Paglia	SCE&G
G. Sanders	SCE&G
A. Bynum	SCE&G
F. Salter	SCE&G
R. O'Banion	SCE&G
L. Campange	SCE&G
T. Geer	WEC
M. Corletti	WEC
T. Baker	WEC
B. McIntyre	WEC
G. Couture	WEC
L. J. Tunon-Sanjur	WEC
F. Brown	NRC
J. Yerokun	NRC
T. Frye	NRC
B. Davis	NRC
M. Ernstes	NRC
K. O'Donohue	NRC

Name	Affiliation (if any)
R. Jackson	NRC
A. Ponko	NRC
C. Evans	NRC
S. Sparks	NRC
J. Fuller	NRC
M. Brown	NRC
B. Tegeler	NRC
M. Shams	NRC
C. Weber	NRC
L. Dudes	NRC
M. Miller	NRC
C. Julian	NRC
S. Smith	NRC
J. Seat	NRC
R. Fretz	NRC
L. Casey	NRC
B. Wood	Public
T. Clements	Public
T. Coolidge	Public
P. Greenlaw	Public
R. Thomas	Public
J. Williams	Public
J. Grant	Public
K. Haynes	Public
M. Cherry	Public
M. Crosby	Public
T. McCallum	Public

J. Redd	Public
F. Willis	Public
H. Mahan	Public
B. Whitley	Public

V. C. Summer Unit 2 Regulatory Conference

April 30, 2013

SCE&G Participants

- | | |
|-------------------|--|
| • Ron Jones | Vice President, New Nuclear Operations |
| • Brad Stokes | General Manager, Engineering Services |
| • Roosevelt Word | Manager, Organizational Development |
| • Al Paglia | Manager, Nuclear Licensing |
| • Garrett Sanders | Licensing Engineer |

Westinghouse Participants

- | | |
|------------------|--|
| • Tom Geer | Vice President, Licensing and Regulatory Affairs |
| • Brian McIntyre | Consortium Licensing Director |
| • Mike Corletti | Director, Technical Projects Integration |
| • Tod Baker | Fellow Engineer |

3

Agenda

- | | |
|------------------------|----------------|
| • Opening Remarks | Ron Jones |
| • Finding Significance | Brad Stokes |
| • Corrective Actions | Roosevelt Word |
| • Closing Remarks | Ron Jones |

4

Opening Remarks

Ron Jones
Vice President, New Nuclear Operations
V. C. Summer Units 2 & 3

5

Opening Remarks

- The NRC has proposed an Apparent Violation of Appendix B, Criterion III, Design Control for:
 - Failure to ensure shear reinforcement for portions of the nuclear island basemat and other structures meets the requirements of the Updated Final Safety Analysis Report (UFSAR) Section 3.8.4.4.1, "Seismic Category I Structures"
 - Section 3.8.4.4.1 of the UFSAR states, in part, that the design and analysis procedures for the Seismic Category I structures are in accordance with ACI 349 for concrete structures

6

Opening Remarks

- South Carolina Electric & Gas Company (SCE&G) agrees with the NRC determination of the apparent violation of UFSAR Section 3.8.4.4.1
- Immediate corrective actions have been taken
 - Shear reinforcement spacing has been corrected
 - License amendment requests have been submitted and approved to address shear reinforcement anchorage
 - Basemat reinforcement was corrected prior to pouring concrete
 - An extent of condition has been performed for shear reinforcement throughout the nuclear island

7

Opening Remarks

- A cause analysis is in progress by SCE&G
- Additional corrective actions will be developed based on the results of the cause analysis
- SCE&G disagrees with the NRC determination of preliminary significance of the finding
- SCE&G appreciates the opportunity to present additional information related to the very low safety significance of the finding and to demonstrate that reasonable assurance of design function is maintained

8

Finding Significance

Brad Stokes
General Manager, Engineering Services
V. C. Summer Units 2 & 3

9

Finding Significance

- NRC Significance Determination - Inspection Manual Chapter (IMC) 2519P
 - Low to moderate safety significance (WHITE)
 - Quality of Construction Row 2, due to a potential impairment of a design function of a portion of a structure
 - High Risk Column of Construction Significance Determination Matrix
 - Critical Sections defined by Table 3.3-7, Nuclear Island Critical Structure Sections

10

Finding Significance

- SCE&G provided the NRC with Westinghouse document APP-1000-S3R-005, "Safety Assessment of NI Critical Sections for Headed Shear Reinforcement Development and Spacing"
- The assessment used multiple techniques that demonstrate the adequacy of structural designs
- The assessment provides reasonable assurance that the critical structures utilizing headed shear reinforcement would have satisfactorily performed their design function

11

Finding Significance

- APP-1000-S3R-005 Evaluation Process
 - Determine Critical Sections requiring evaluation
 - Perform evaluation of reinforcement spacing exceeding $d/2$
 - Success criteria – out of plane shear demand does not exceed capacity of concrete without reinforcement
 - Perform evaluation of reinforcement development length
 - Success criteria – development length adequate to develop necessary strength in the tie to resist out of plane shear demand

12

Finding Significance

- Critical Section Evaluation
 - 14 critical sections defined by UFSAR Table 3.3-7
 - As depicted in APP-1000-S3R-005, these sections were evaluated based on the following
 - Where drawings have been issued certified for construction (CFC)
 - Where out-of-plane shear reinforcement is required
 - Where American Concrete Institute (ACI) 349-01 shear tie spacing requirement of $d/2$ is not met
 - Where ACI 318-11 development of headed shear tie to mid-depth of wall is not met
 - Three critical sections were identified for further evaluation

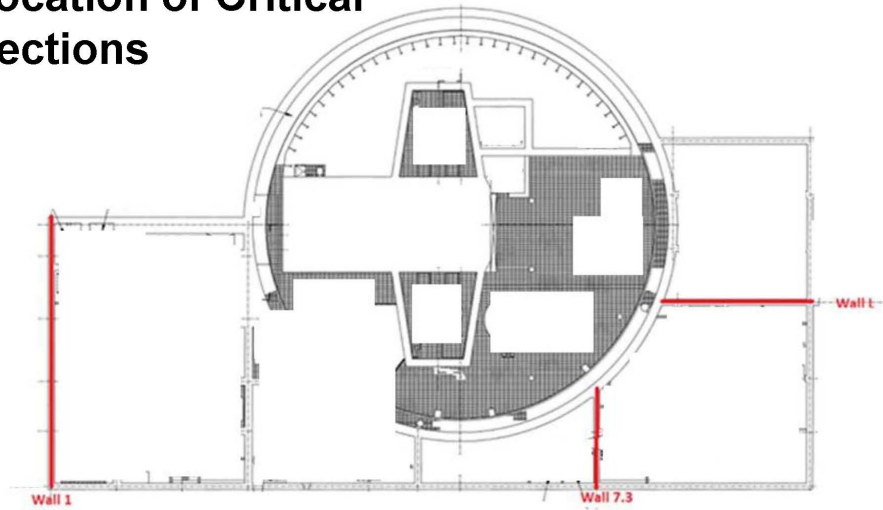
13

Finding Significance

- Seismic Category 1 Structure Safety Function
 - To provide support, protection, and separation for Safety Related Seismic Category 1 mechanical and electrical equipment
 - Seismic Category 1 structures must withstand design basis loads without loss of structural integrity

14

Location of Critical Sections



Finding Significance

Table 1 Summary of ACI Code Non-Compliance Issues and Critical Section Locations

Critical Section	Elevation	Description	Non-Compliance Issue
Wall 1	66'-6" to 82'-6"	#9 headed shear ties at 12" vertical by 12" horizontal spacing	ACI 318-11 Paragraph 12.6, Insufficient Development Length
Wall 7.3	155'-6" to 160'-6"	#6 headed shear ties at 12" vertical by 12" horizontal spacing	ACI 349-01 Paragraph 11.5.4.1, Spacing > d/2
Wall L	135'-3" to 154'-2"	#3 headed shear ties at a 12" vertical by 12" horizontal spacing	ACI 349-01 Paragraph 11.5.4.1, Spacing > d/2
	117'-6" to 135'-3"	#9 headed shear ties at 6" vertical by 12" horizontal spacing	ACI 318-11 Paragraph 12.6, Insufficient Development Length

Finding Significance

- Design Loading Reduction
 - Wall 7.3
 - Thermal loading reduced by site specific minimum outside air temperature of -8.9 °F vs standard plant design of -40 °F
 - Wall L
 - Revised High Energy Line Break (HELB) loading reduced design basis loading

17

Finding Significance

- Shear reinforcement spacing greater than $d/2$
- Wall 7.3 155' 6" – 160' 6", Wall L 135' 3" – 154' 2"
 - In all cases it was demonstrated that the concrete out of plane shear capacity alone is adequate for demand

18

Finding Significance

- Reinforcement Development length
- Wall 1 66' 6" – 82' 6" (Table 5) , Wall L 117' 6" – 135' 3" (Table 6)
 - In all cases it was demonstrated that the nuclear island headed shear tie capacity is adequate to meet the design basis demand using the most conservative application of code requirements
 - Capacity for partial development
 - Concrete breakout, concrete pullout, concrete side face blowout considered
 - Capacity considering concrete breakout is less than capacity using partial development

19

Finding Significance

Table 5 Wall 1 Summary of #9 Headed Shear Tie Demand vs. Capacity (per Tie Basis)

Design Basis Demand	16.2 kips
Calculated Capacity at Yield	60.0 kips
Calculated Partial Development Capacity	53.3 kips
Calculated Concrete Breakout Capacity	33.9 kips
University of Texas Equation (Head)	66.2 kips
University of Texas Equation (Bond)	7.57 kips
University of Texas Equation (Total)	73.8 kips

20

Finding Significance

Table 5 Wall 1 Summary of #9 Headed Shear Tie Demand vs. Capacity (per Tie Basis)

Design Basis Demand	16.2 kips	Safety Factor of ~2
Calculated Capacity at Yield	60.0 kips	
Calculated Partial Development Capacity	53.3 kips	
Calculated Concrete Breakout Capacity	33.9 kips	
University of Texas Equation (Head)	66.2 kips	
University of Texas Equation (Bond)	7.57 kips	
University of Texas Equation (Total)	73.8 kips	

21

Finding Significance

Table 6 Wall L Summary of #9 Headed Shear Tie Demand vs. Capacity (per Tie Basis)

Design Basis Demand	9.60 kips
Calculated Capacity at Yield	60.0 kips
Calculated Partial Development Capacity	44.8 kips
Calculated Concrete Breakout Capacity	18.4 kips
University of Texas Equation (Head)	46.3 kips
University of Texas Equation (Bond)	5.05 kips
University of Texas Equation (Total)	51.4 kips

22

Finding Significance

Table 6 Wall L Summary of #9 Headed Shear Tie Demand vs. Capacity (per Tie Basis)	
Design Basis Demand	9.60 kips
Calculated Capacity at Yield	60.0 kips
Calculated Partial Development Capacity	44.8 kips
Calculated Concrete Breakout Capacity	18.4 kips
University of Texas Equation (Head)	46.3 kips
University of Texas Equation (Bond)	5.05 kips
University of Texas Equation (Total)	51.4 kips

Safety
Factor
of ~2

23

Finding Significance

- Technical Conclusions
 - There is reasonable assurance that headed shear tie capacity in applicable Critical Sections of the AP1000 design was adequate to meet the design basis demand
 - Seismic Category 1 structures design function was not impaired
 - Based on the above, SCE&G has concluded that this finding of very low safety significance should be designated Green as defined in NRC Inspection Manual Chapter (IMC) 2519P

24

Corrective Actions

Roosevelt Word
Manager, Organizational Development
V. C. Summer Units 2 & 3

25

Corrective Actions

- Overview:
 - Cause evaluations by SCE&G are in progress
 - These evaluations include an assessment of the Root Cause Analysis (RCA) completed by Westinghouse and to determine the thoroughness and effectiveness of corrective actions taken
 - Both SCE&G and Westinghouse view this as an opportunity to review and improve design review processes

26

Corrective Actions

- Westinghouse Electric Company Root Cause Analysis (WEC RCA)
 - NRC inspector identified the Unresolved Item (URI) in September 2012
 - Adequacy of anchorage reinforcement as required by American Concrete Institute (ACI) Code 349-01 was not apparent
 - WEC Corrective Action Program (CAP) process had identified a trend with respect to ACI 349-01 code issues
 - The Root Cause Analysis (RCA) team investigated a total of 40 CAPs Issue Reports (IRs) related to the ACI 349-01 code
 - This has led to comprehensive corrective actions to address the concern

27

Corrective Actions

- WEC RCA Immediate Corrective Actions
 - All structural related drawings issued for construction were placed on Hold
 - WEC contracted additional technical and management experts from Sargent & Lundy
 - WEC Structural Review Board (SRB) was implemented
 - Includes Sargent & Lundy experts
 - RCA investigation/causes/corrective actions were broadly communicated throughout engineering organizations, including a stand-down

28

Corrective Actions

- WEC RCA Immediate Corrective Actions (cont.)
 - Shear reinforcement spacing was redesigned in the sump and elevator pits and affected areas of the lower auxiliary and containment building elevations
 - License amendment requests were developed to address shear reinforcement
 - Submitted and approved for basemat
 - Submitted for auxiliary building walls
 - A detailed extent of condition was performed in conjunction with SCE&G personnel for shear reinforcement in the basemat, auxiliary, and containment walls and floors

29

Corrective Actions

- WEC RCA Extent of Condition / Cause
 - Design revisions to resolve code issues
 - Completed for sump and elevator pits, and affected areas of the containment and auxiliary walls and floors up to and including Elevation 2
 - Identified and in process for structures above Elevation 2
 - Guidelines were developed for other engineering disciplines (e.g., Electrical) to evaluate whether similar issues exist and require resolution

30

Corrective Actions

- WEC RCA Additional Corrective Actions
 - Develop and implement a design plan for civil structures including:
 - A process for the evaluation, justification, and documentation of exceptions to code
 - A process for design requirements management
 - Improve the training and qualification program for personnel working in new plants engineering groups

31

Corrective Actions

- WEC RCA Corrective Action Effectiveness
 - The WEC SRB confirmed the revised design meets ACI code requirements
 - Completion of the RCA described corrective actions is being regularly monitored by WEC executive management
 - The WEC Corrective Action Review Board will evaluate interim and final effectiveness reviews

32

Corrective Actions

- **SCE&G Actions**
 - Upon identification by the NRC, the shear reinforcement issue was entered in the SCE&G Corrective Action Program (CAP)
 - This item is being tracked in the SCE&G CAP as a Category 1 significant condition adverse to quality (the highest level)
 - A root cause evaluation is in progress to:
 - Review the Westinghouse RCA, including extent of condition and corrective actions
 - Evaluate effectiveness of SCE&G oversight of Westinghouse design control
 - Identified corrective actions will be entered into the SCE&G CAP for resolution
 - The root cause will be completed by May 31, 2013

33

Closing Remarks

Ron Jones
Vice President, New Nuclear Operations
V. C. Summer Units 2 & 3

34

Closing Remarks

- SCE&G agrees with the NRC determination of the apparent violation of UFSAR Section 3.8.4.4.1
- SCE&G and Westinghouse performance did not meet our expectations
- The apparent violation has been corrected
- We have demonstrated reasonable assurance that the design function of the impacted structures was not impaired

35

Closing Remarks

- We have concluded that this finding of very low safety significance should be designated Green as defined in NRC Inspection Manual Chapter (IMC) 2519P
- Immediate corrective actions have been taken, including correction of shear reinforcement spacing, license amendments, and an extent of condition evaluation
- Westinghouse has completed an RCA and is implementing corrective actions

36

Closing Remarks

- SCE&G is reviewing the Westinghouse RCA and performing a root cause evaluation to assess the effectiveness of SCE&G oversight
- As this was a construction finding, the health and safety of the public and plant workers was never impacted
- SCE&G appreciates having the opportunity to present additional information related to the significance and corrective actions for the apparent violation

37

Questions?