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Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Duke Energy Carolinas, LLC
William States Lee III Nuclear Station Units 1 and 2
Docket Nos. 52-018 and 52-019
License for William States Lee III Nuclear Station – Update Roadmap
Ltr# WLG2010.03-05

Reference: Letter from Bryan Dolan (Duke Energy) to NRC Document Control Desk, *Update for William States Lee III Nuclear Station Units 1 and 2 Combined License Application,* dated February 25, 2010

This letter provides information supporting the recent Duke Energy update of the application for a combined license for William States Lee III Nuclear Station Units 1 and 2. Enclosed is a "roadmap" of the changes included in the recent update provided as an enclosure to the referenced letter, along with an explanation of the information contained in the roadmap.

If you have any questions or need any additional information, please contact Peter Hastings, Nuclear Plant Development, Licensing Manager, at (980) 373-7820.

Bryan J. Dolan
Vice President
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NRO

Enclosure:

2010 S-COLA Update Roadmap Format Explanation (by column) xc (w/out enclosure):

Loren Plisco, Deputy Regional Administrator, Region II
Stephanie M. Coffin, Branch Chief, DNRL

xc (w/ enclosure):

Brian Hughes, Senior Project Manager, DNRL

2010 S-COLA Update Roadmap Explanation (by column)

Change ID# - unique identifier for tracking purposes

COLA REP – identifies the change as Standard (STD) or Plant-Specific (WLS)

COLA Part A – identifies the affected COLA Part (Part 01 through Part 11)

COLA Chapter A – identifies the affected FSAR chapter (FSAR 01 to 19)

Section/Page A – section and page number (if identified) specific to the document to be revised

Complete Change Description – a description of the change

Basis for Change – the source or reason for the change

Attachment:

William States Lee III Units 1 and 2 Nuclear Station Units 1 and 2 COLA Update Roadmap

Attachment 1

William States Lee III Units 1 and 2 Nuclear Station Units 1 and 2 COLA Update Roadmap

NuStart's COLA Tracking Management (CTM) : COLA Changes | AP - WLS Submittal #5 Roadmap of February 2010

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10:30 AM

AP - WLS Submittal #5 Roadmap of February 2010

Technology is not ESBWR AND ...

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
Pt 01						**11 COLA Changes**
6911	WLS	Pt 01		01.00.T / T1.0-1	Part 1, Table 1.0-1 is revised to reflect Duke Energy organizational and planning update	Duke Energy organizational and planning update
6910	WLS	Pt 01		01.00.T / T1.0-2	Part 1, Table 1.0-2 is revised in its entirety to reflect Duke Energy Organizational and planning update	Duke Energy organizational and planning update
6901	WLS	Pt 01		01.01.01	Figure 1.1-1 is revised to reflect of Duke Energy Carolina's position within the Duke Energy Corporation structure.	Duke Energy organizational and planning update
6902	WLS	Pt 01		01.01.03	Part 1, Section 1.1.3 is revised to reflect organizational positions, position holders, citizenship status, and addresses in accordance with Duke Energy Organizational update.	Duke Energy organizational and planning update
6903	WLS	Pt 01		01.01.06	Part 01, Section 1.1.6 is revised to include corrected names and titles along with new schedule information.	Duke Energy organizational and planning update
6904	WLS	Pt 01		01.01.08	Part 1, Section 1.1.8 is revised to correct an address of a publication.	Duke Energy organizational and planning update
6905	WLS	Pt 01		01.03.01	Part 1, Section 1.3.1 is revised to reflect adjustments to the Decommissioning Cost Estimate.	Duke Energy organizational and planning update
6906	WLS	Pt 01		01.03.02	Part 1, Section 1.3.2 is revised to reflect decommissioning funding status reporting date.	Duke Energy organizational and planning update
6907	WLS	Pt 01		01.06.01	Part 1, Section 1.6.1 is revised to reflect updated financial information.	Duke Energy organizational and planning update
6908	WLS	Pt 01		01.06.03	Part 1, Section 1.6.3, second sentence is revised to replace 'separately' with 'severally'.	Duke Energy organizational and planning update
6909	WLS	Pt 01		01.06.04	Part 1, Section 1.6.4 is revised to read: Duke Energy Carolinas, LLC, will continue to evaluate the potential of the U.S. Department of Energy's loan guarantee program for energy projects that deploy new technologies. Administrative guidelines for this program have been promulgated and, currently Duke Energy Carolinas, LLC will assess the value of a federal loan guarantee for this project and the impact on its ratepayers. An acceptable federal loan guarantee must be accompanied by approval of the state regulatory commissions for Duke Energy Carolinas, LLC, to fully recover its costs as well as any associated contractual payment obligations that it	Duke Energy organizational and planning update

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
					assumes related to the project financing.	
Pt 02						**357 COLA Changes**
6915	WLS	Pt 02	FSAR 01	01.01.01	FSAR Subsection 1.1.1, 1st paragraph is revised to add the following at the end of the paragraph: Make-Up Pond C is an offsite facilitiy, located adjacent to the Lee Nuclear Station site on a tributary of the Broad River.	Conformance with Duke Energy Submittal Make-up Pond C, WLG2009.12-03.
6916	WLS	Pt 02	FSAR 01	01.01.05	FSAR Subsection 1.1.5, 1st paragraph is revised to delete the first sentence.	Duke Energy organizational and planning update
6930	WLS	Pt 02	FSAR 01	01.01.05	COLA Part 2, FSAR Chapter 1, Subsection 1.1.5, 2nd and 3rd paragraphs are revised as follows: Duke Energy's 2009 Annual Plan reflects a commercial operation date of 2021 for the first unit of the Lee Nuclear Station. The Annual plan is sensitive to assumptions made for various factors such as market conditions, commodity costs, environmental compliance costs, customer growth, and customer usage patterns. The precision with which these factors can be predicted diminishes as the forecast period increases. Although the current optimal timeframe for commercial operations is 2021, this plan will be updated annually, increasing the precision of this forecast as the licensing process progresses. The construction schedule in Table 1.1-203 provides for completion of the plant in a timeframe that would support commercial operation beginning in 2021. Such scheduling assumes that an adequate planning window exists in order to accommodate changes due to uncertainties in the Federal and State regulatory processes, construction schedule, availability of critical components, and market forces. The construction of Unit-2 is nominally planned to follow Unit-1 by one year. The actual schedule will be influenced by many of the same factors discussed above. Some population-sensitive impacts projected in the Final Safety Analysis Report Revision 0 were based on a projected operation date of 2016. Duke Energy has concluded that the change in operation date from 2016 to 2021 does not affect the validity of the data or conclusions in the Final Safety Analysis Report.	2009 Integrated Resource Plan, WLG2009.09-02
6949	WLS	Pt 02	FSAR 01	01.01.F / F1.1-201 F1.1-202	Revise FSAR Figure 1.1-201 to address conforming changes for MUPC. Revise FSAR Figure 1.1-202 to simplify figure.	Conformance to Duke Energy Submittal Make-up Pond C, WLG2009.12-03.
5822	WLS	Pt 02	FSAR 01	01.01.T / T1.1-201	Correct spelling errors on Table 1.1-201, sheets 1, 3, 6 "Effectitive", "Specfications", "Technicial"	Editorial
6917	WLS,STD	Pt 02	FSAR 01	01.01.T / T1.1-201	FSAR Table 1.1-201, sheet 6, is modified to include the following acronym: SNM Special Nuclear Material	Conformance to Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-109, RAI 12.05-02; COL-SER-OI-CH01, SER 01.05-01. WLG2009.12-11
6931	WLS	Pt 02	FSAR 01	01.01.T / T1.1-203	COLA Part 2, FSAR Chapter 1, Table 1.1-203 is revised based upon new commercial operation dates documented in the 2009 Integrated Resource Plan.	2009 Integrated Resource Plan, WLG2009.09-02
5823	WLS	Pt 02	FSAR 01	01.02.02	In the 5th paragraph, 1st line, change "consist" to "consists"	Editorial
6918	WLS,STD	Pt 02	FSAR 01	01.02.03	FSAR Subsection 1.2.3 is revised to modify the placement instruction as follows:	R-COLA conformance

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
					Add the following information at the end of the first paragraph of DCD Subsection 1.2.3.	
6919	WLS	Pt 02	FSAR 01	01.04.02.08	FSAR Subsection 1.4.2.8 is modified by adding new subsections 1.4.2.8.6 and 1.4.2.8.7: 1.4.2.8.6 PBS&J PBS&J is an engineering consulting firm based in the United States that delivers engineering, scientific, planning and architectural services to clients worldwide. The firm manages projects requiring expertise in several engineering areas such as environmental, civil and transportation and also handles projects in the areas of construction, architecture and land use planning. PBS&J has provided project management, environmental and consulting services to prepare the supplement to the Environmental Report for Make-Up Pond C. 1.4.2.8.7 HDR/DTA HDR/DTA is an architectural/engineering/consulting firm that provides consulting services to utility, industry and government clients. The firm manages projects providing engineering, regulatory and environmental services focused in the hydropower industry. HDR/DTA has provided hydrologic analyses and modeling of the Broad River basin and engineering services for dams and dikes associated with Make-Up Pond C.	Conformance to Duke Energy Submittal Make-up Pond C
6687	WLS,STD	Pt 02	FSAR 01	01.06.T / T1.6-201	1. COLA Part 2, FSAR Chapter 1, Section 1.6, Table 1.6-201, will be revised from: NEI 06-13A Technical Report on a Template for an 1 13.2 March 2008 ML080910051 Industry Training Program Description To read(note that footnote b was subsequently deleted by Qb6710): NEI 06-13A(b) Template for an Industry Training 2 13.2 March 2009 ML090910554 Program Description 2. COLA Part 2, FSAR Chapter 1, Section 1.6, Table 1.6-201, will be revised to add new footnote b to read(note that footnote b was subsequently deleted by Qb6710): b) NEI 06-13A Revision 2 includes the approved Revision 1 template, the NRC safety evaluation, and corresponding responses to the NRC Request for Additional Information. Only the approved template is incorporated by reference. The rest of the document is referenced but not incorporated into the FSAR. 3. COLA Part 2, FSAR Chapter 1, Section 1.6, Table 1.6-201, footnote a, will be revised from: a) NEI 07-02 Revision 3 is approved by the NRC. NEI 07-02A includes the approved Revision 3, the NRC safety evaluation, and corresponding responses to the NRC Request for Additional Information. To read: a) NEI 07-02A Revision 0 includes the approved Revision 3 template, the NRC safety evaluation, and corresponding responses to the NRC Request for Additional Information. Only the approved template is incorporated by reference. The rest of the document is referenced but not incorporated into the FSAR.	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-VOL-NE-06-13A. WLG2009.12-11
6710	WLS,STD	Pt 02	FSAR 01	01.06.T / T1.6-201	1. COLA Part 2, FSAR Chapter 1, Table 1.6-201 as revised by BLN-VOL-NEI-06, Update of NEI 06-13 footnotes, will be revised from: Author / Report Number: NEI 07-03 Title: Template Guidance for Radiation Protection Program Description Revision: 5 FSAR Section: Appendix 12AA Document Transmittal: March 2008 ADAMS Accession Number: ML080860403 Author / Report Number: NEI 07-02A(a) Title: Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52 Revision: 0 FSAR Section: 17.6	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-VOL-NEI-06-13, COL-SER-OI-CH12 CI. WLG2009.12-11

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
					Document Transmittal: March 2008 ADAMS Accession Number: ML080910149 To read: Author / Report Number(a): NEI 07-03A Title: Generic Template Guidance for Radiation Protection Program Description Revision: 0 FSAR Section: Appendix 12AA Document Transmittal: May 2009 ADAMS Accession Number: ML091490684 Author / Report Number(a): NEI 07-02A(a) Title: Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52 Revision: 0 FSAR Section: 17.6 Document Transmittal: March 2008 ADAMS Accession Number: ML080910149 2. COLA Part 2, FSAR Chapter 1, Section 1.6, Table 1.6-201, footnote a) as revised by, and footnote b) as added by, TVA R-COLA letter dated May 11, 2009, Update of NEI 06-13 References, will be revised from: a) NEI 07-02A Revision 0 includes the approved Revision 3 template, the NRC safety evaluation, and corresponding responses to the NRC Request for Additional Information. Only the approved template is incorporated by reference. The rest of the document is referenced but not incorporated into the FSAR. b) NEI 06-13A Revision 2 includes the approved Revision 1 template, the NRC safety evaluation, and corresponding responses to the NRC Request for Additional Information. Only the approved template is incorporated by reference. The rest of the document is referenced but not incorporated into the FSAR. To read (Note that footnote b) is entirely deleted): a) The NRC-accepted NEI documents identified by the A in the document number include the accepted template, the NRC safety evaluation, and corresponding responses to the NRC Requests for Additional Information. Only the accepted template is incorporated by reference. The remainder of the document is referenced but not incorporated into the FSAR.	
6717	WLS,STD	Pt 02	FSAR 01	01.06.T / T1.6-201	1. COLA Part 2, FSAR Chapter 1, Table 1.6-201 as revised by VEGP R-COLA letter dated October 16, 2009, Update of NEI 07-08A References, will be revised from: Author / Report Number: NEI 07-08 Title: Generic FSAR Template Guidance for Ensuring Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA) Revision: 3 FSAR Section: 12.1 Document Transmittal: November 2008 ADAMS Accession Number: ML083380345 To read: Author / Report Number: NEI 07-08A Title: Generic FSAR Template Guidance for Ensuring Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA) Revision: 0 FSAR Section: 12.1 Document Transmittal: October 2009 ADAMS Accession Number: ML09(tbd) 2. COLA Part 2, FSAR Chapter 1, Table 1.6-201 footnote will be revised from: (A) Denotes NRC approved document. Other listed documents are under NRC review. To read:	Duke Energy Submittal - Concurrence with Standard Content RAIs, COL-SER-OI-CH12 CI. WLG2009.12-11

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
					(A) Denotes NRC approved document.	
6920	WLS,STD	Pt 02	FSAR 01	01.06.T / T1.6-201	FSAR Table 1.6-201 is modified as follows: Change WLS SUP 1.6-1 to STD SUP 1.6-1 in table. Change the ADAMS accession number for NEI 07-08A to ML093220164	R-COLA conformance
6495	WLS	Pt 02	FSAR 01	01.07.T / T1.7-201	Table 1.7-201 is revised to add Figures 9.2-206 and 9.2-207 to the RWS entry under the FSAR Figure column.	Conforming change to WLG2009.11-04.
5983	WLS,STD	Pt 02	FSAR 01	01.08 01.08.T / T1.8-203	COLA Part 2, FSAR Chapter 1, Subsection 1.8, is revised by adding the following paragraph at the end of the section: WLS SUP 1.8-3 DCD Table 1.8-1 presents interface items for the AP1000. FSAR section(s) addressing these interface items are tabulated in Table 1.8-203. COLA Part 2, FSAR Chapter 1, Subsection 1.8, is revised by adding Table 1.8-203.	Duke Energy response to LTR 75, RAI 01-08. WLG2009.09-09 / R-COLA conformance
6716	WLS	Pt 02	FSAR 01	01.08.T / T1.8-202	Change FSAR Table 1.8-202 sheet 14, for the entry COL 12.3-1 to add: 12.5.4 Table 12AA-201	Conforming Change to Duke Energy Submittal - Concurrence with Standard Content RAIs, SNC-SER-CI-Ch12, CI 12.01-01. WLG2009.12-11
6938	WLS	Pt 02	FSAR 01	01.08.T / T1.8-202	FSAR Table 1.8-202, sheet 16, is revised to add FSAR subsections in Chapter 14 that were revised: Add the following FSAR Subsections to COL 14.4-3: 14.2.1, 14.2.3, 14.4.2.3.1 Add the following FSAR Subsections to COL 14.4-4: 14.2.3.3.1 For COL 14.4-4, change Subsection 14.2.3.2 to 14.2.3.2.1	Conformance to Duke Energy Submittal - Concurrence with Standard Content RAIs, RAI LTR 139 response to RAI 14.02-012, item 1
6679	WLS,STD	Pt 02	FSAR 01	01.08.T / T1.8-202	COLA Part 2, FSAR Chapter 1, Table 1.8-202, sheet 13, COL ITEM 19.59.10-4 will be changed from: Develop and Implement Severe Accident Management Guidance To read: Implement Severe Accident Management Guidance	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-152. WLG2009.12-11
6936	WLS,STD	Pt 02	FSAR 01	01.08.T / T1.8-203	FSAR Table 1.8-203 is revised as follows: Item 1.1 is deleted Items 3.3 and 3.6, DCD references are removed Items 11.1, 11.2, and 11.3 System Titles are capitalized Item 18.1, under Section or Subsection(a) column, (b) is replaced with 18.6 Item 18.2, under Section or Subsection(a) column, (b) is replaced with 18.8 and 18.10 Item 18.3, under Section or Subsection(a) column, (b) is replaced with 18.8 and 18.10 Items 18.4 and 18.5 are removed Note (b) is removed	R-COLA conformance
6937	WLS	Pt 02	FSAR 01	01.08.T / T1.8-203	FSAR Table 1.8-203, sheet 1, item 2.2, under Section or Subsection(a) column, '2.2.2.1.1' is replaced with '2.2.3.1.1'.	Editorial
6697	WLS,STD	Pt 02	FSAR 01	01.09.01.01	Revise the following text in FSAR Subsection 1.9.1.1 from: . . . One such general alternative is the use of previous revisions of the Regulatory Guide for design aspects as stated in the DCD in order to preserve the finality of the certified design. Stated conformance	Duke Energy Submittal - Concurrence with

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
					with the programmatic and/or operational aspects is only to the extent that a design change or departure from the approved DCD is not required to implement those programmatic and/or operational aspects. . . . To read: . . . One such general alternative is the use of previous revisions of the Regulatory Guide for design aspects as stated in the DCD in order to preserve the finality of the certified design (see Notes at the end of Appendix 1AA). . . .	Standard Content RAIs, COL-SER-OI-CH01 S1. WLG2009.12-11
6698	WLS,STD	Pt 02	FSAR 01	01.09.01.02	Revise the following text in FSAR Subsection 1.9.1.2 from: . . . One such general alternative is the use of previous revisions of the Regulatory Guide for design aspects as stated in the DCD in order to preserve the finality of the certified design. Stated conformance with the programmatic and/or operational aspects is only to the extent that a design change or departure from the approved DCD is not required to implement those programmatic and/or operational aspects. . . . To read: . . . One such general alternative is the use of previous revisions of the Regulatory Guide for design aspects as stated in the DCD in order to preserve the finality of the certified design (see Notes at the end of Appendix 1AA). . . .	Duke Energy Submittal - Concurrence with Standard Content RAIs, COL-SER-OI-CH01S1. WLG2009.12-11
6699	WLS,STD	Pt 02	FSAR 01	01.09.01.03	Revise the following text in FSAR Subsection 1.9.1.3 from: . . . One such general alternative is the use of previous revisions of the Regulatory Guide for design aspects as stated in the DCD in order to preserve the finality of the certified design. Stated conformance with the programmatic and/or operational aspects is only to the extent that a design change or departure from the approved DCD is not required to implement those programmatic and/or operational aspects. . . . To read: . . . One such general alternative is the use of previous revisions of the Regulatory Guide for design aspects as stated in the DCD in order to preserve the finality of the certified design (see Notes at the end of Appendix 1AA). . . .	Duke Energy Submittal - Concurrence with Standard Content RAIs, COL-SER-OI-Ch01S1. WLG2009.12-11
6700	WLS,STD	Pt 02	FSAR 01	01.09.01.04	Revise the following text in FSAR Subsection 1.9.1.4 from: . . . One such general alternative is the use of previous revisions of the Regulatory Guide for design aspects as stated in the DCD in order to preserve the finality of the certified design. Stated conformance with the programmatic and/or operational aspects is only to the extent that a design change or departure from the approved DCD is not required to implement those programmatic and/or operational aspects. . . . To read: . . . One such general alternative is the use of previous revisions of the Regulatory Guide for design aspects as stated in the DCD in order to preserve the finality of the certified design (see Notes at the end of Appendix 1AA). . . .	Duke Energy Submittal - Concurrence with Standard Content RAIs, COL-SER-OI-CH01 S1. WLG2009.12-11
6670	WLS,STD	Pt 02	FSAR 01	01.09.05.01.05	COLA Part 2, FSAR Chapter 1, will be revised to include the following new Subsection 1.9.5.1.5 (with an LMA of STD SUP 1.9-3): 1.9.5.1.5 Station Blackout Add the following text to the end of DCD Subsection 1.9.5.1.5. Training and procedures to mitigate a 10 CFR 50.63 "loss of all alternating current power" (or station blackout (SBO)) event are implemented in accordance with Sections 13.2 and 13.5, respectively. As recommended by NUMARC 87-00 (Reference 201), the SBO event mitigation procedures address response (e.g., restoration of onsite power sources), ac power restoration (e.g., coordination with transmission system load dispatcher), and severe weather guidance (e.g., identification of actions to prepare for the onset of severe weather such as an impending tornado), as applicable. The AP1000 is a passive design and does not rely on offsite or onsite ac sources of power for at least 72 hours after an SBO event, as described above. In addition, there are no nearby large power sources, such as a gas turbine or black start fossil fuel plant, that can directly connect to the station to mitigate the event. Restoration from an SBO event will be contingent upon ac power being made available from any one of the transmission lines described in Section 8.2 or any one of the standby diesel generators.	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-025 S1. WLG2009.12-11
6671	WLS,STD	Pt 02	FSAR 01	01.09.06	COLA Part 2, FSAR Chapter 1, will be revised to include the following new Subsection 1.9.6 (with no LMA): 1.9.6 References	Duke Energy Submittal - Concurrence with Standard Content

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
					Add the following text to the end of DCD Subsection 1.9.6. 201. NUMARC 87-00, Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors, Revision 1, August 1991.	RAIs, BLN-RAI-LTR-025 S1WLG2009.12-11
6718	WLS,STD	Pt 02	FSAR 01	01.09.T / T1.9-201	COLA Part 2, FSAR Chapter 1, Table 1.9-201, sheet 1, Regulatory Guide 1.8 will be revised from "12.1 (NEI 07-08)" to read "12.1 (NEI 07-08A)" in the FSAR Chapter, Section, or Subsection column. COLA Part 2, FSAR Chapter 1, Table 1.9-201, sheets 15 and 16 Regulatory Guides 8.2, 8.7, 8.8, 8.9, 8.10, 8.13, 8.15, 8.27, 8.28, 8.29, 8.34, 8.35, 8.36, and 8.38 will be revised from "12.1 (NEI 07-08)" to read "12.1 (NEI 07-08A)" in the FSAR Chapter, Section, or Subsection column.	Duke Energy Submittal - Concurrence with Standard Content RAIs, COL-SER-OI-CH12 S1. WLG2009.12-11
6711	WLS,STD	Pt 02	FSAR 01	01.09.T / T1.9-201 RG 1.008 RG 1.097 RG 1.206 RG 8.XXX	1. COLA Part 2, FSAR Chapter 1, Table 1.9-201, sheet 1, Regulatory Guide 1.8 will be revised from: 1.8 Qualification and Training of Personnel for Nuclear Power Plants (Rev. 3, May 2000) 12.1 (NEI 07-08) Appendix 12AA Appendix 12AA (NEI 07-03) 13.1.1.4 13.1.3.1 13.2 (NEI 06-13A) 16 (TS 5.3.1) To read: 1.8 Qualification and Training of Personnel for Nuclear Power Plants (Rev. 3, May 2000) 12.1 (NEI 07-08A) Appendix 12AA Appendix 12AA (NEI 07-03A) 13.1.1.4 13.1.3.1 13AA.1.1.1.5 13.2 (NEI 06-13A) 16 (TS 5.3.1) 2. COLA Part 2, FSAR Chapter 1, Table 1.9-201, sheets 5 and 6, Regulatory Guide 1.97, will be revised from: 1.97 Criteria For Accident Monitoring Instrumentation For Nuclear Power Plants (Rev. 4, June 2006) Appendix 12AA (NEI 07-03) 16 (TS bases 3.3.3) To read: 1.97 Criteria For Accident Monitoring Instrumentation For Nuclear Power Plants (Rev. 4, June 2006) Not referenced 1.97 Criteria For Accident Monitoring Instrumentation For Nuclear Power Plants (Rev. 3, May 1983) Appendix 12AA 16 (TS bases 3.3.3) 3. COLA Part 2, FSAR Chapter 1, Table 1.9-201, sheet 14, Regulatory Guide 1.206, FSAR cross-reference column entry, will be revised to add "Appendix 12AA (NEI 07-03A)" 4. COLA Part 2, FSAR Chapter 1, Table 1.9-201, sheets 15 and 16, Division 8 Regulatory Guides will be revised to read:	Duke Energy Submittal - Concurrence with Standard Content RAIs, COL-SER-OI-CH12 CI. WLG2009.12-11

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
					8.2 Guide for Administrative Practices in Radiation Monitoring (Rev. 0, February 1973) 12.1 (NEI 07-08A) 12.3.4 Appendix 12AA (NEI 07-03A) 8.4 Direct-Reading and Indirect-Reading Pocket Dosimeters (Rev. 0, February 1973) Appendix 12AA (NEI 07-03A) 8.5 Criticality and Other Interior Evacuation Signals (Rev. 1, March 1981) Appendix 12AA (NEI 07-03A) 8.6 Standard Test Procedure for Geiger-Muller Counters (Rev. 0, May 1973) Appendix 12AA (NEI 07-03A) 8.7 Instructions for Recording and Reporting Occupational Radiation Exposure Data (Rev. 2, November 2005) 12.1 (NEI 07-08A) Appendix 12AA (NEI 07-03A) 8.8 Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as Is Reasonably Achievable (Rev. 3, June 1978) 12.1 (NEI 07-08A) 12.3.4 Appendix 12AA Appendix 12AA (NEI 07-03A) 13.1.2 8.9 Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program (Rev. 1, July 1993) 12.1 (NEI 07-08A) Appendix 12AA (NEI 07-03A) 8.10 Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable (Rev. 1-R, May 1977) 12.1 (NEI 07-08A) 12.3.4 Appendix 12AA Appendix 12AA (NEI 07-03A) 13.1.2 8.13 Instruction Concerning Prenatal Radiation Exposure (Rev. 3, June 1999) 12.1 (NEI 07-08A) Appendix 12AA (NEI 07-03A) 8.15 Acceptable Programs for Respiratory Protection (Rev. 1, October 1999) 12.1 (NEI 07-08A) Appendix 12AA (NEI 07-03A) 8.27 Radiation Protection Training for Personnel at Light-Water-Cooled Nuclear Power Plants (Rev. 0, March 1981) 12.1 (NEI 07-08A) Appendix 12AA (NEI 07-03A) 8.28 Audible-Alarm Dosimeters (Rev. 0, August 1981) 12.1 (NEI 07-08A)	

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					Appendix 12AA (NEI 07-03A) 8.29 Instruction Concerning Risks from Occupational Radiation Exposure (Rev. 1, February, 1996) 12.1 (NEI 07-08A) Appendix 12AA.(NEI 07-03A) 8.34 Monitoring Criteria and Methods To Calculate Occupational Radiation Doses (Rev. 0, July 1992) 12.1 (NEI 07-08A) Appendix 12AA (NEI 07-03A) 8.35 Planned Special Exposures (Rev. 0, June 1992) 12.1 (NEI 07-08A) Appendix 12AA (NEI 07-03A) 8.36 Radiation Dose to the Embryo/Fetus (Rev. 0, July 1992) 12.1 (NEI 07-08A) Appendix 12AA (NEI 07-03A) 8.38 Control of Access to High and Very High Radiation Areas of Nuclear Plants (Rev. 1, May 2006) 12.1 (NEI 07-08A) Table 12AA-201 Appendix 12AA (NEI 07-03A)	
6922	WLS,STD	Pt 02	FSAR 01	01.09.T / T1.9-201 RG 1.016	FSAR Table 1.9-201, sheet 1, is revised to remove discussion of Regulatory Guide 1.16.	Regulatory Guide 1.16 withdrawn by NRC 8-11-2009 via 74 FR 40244. This modifies the change in RAI LTR 139 S1 response to RAI 14.02-012, item 3 SER with Open Items Confirmatory Item 14.2-5
5610	WLS	Pt 02	FSAR 01	01.09.T / T1.9-201 RG 1.023 RG 1.097	Revise Table 1.9-201, sheet 2, entry for Regulatory Guide 1.23, under FSAR Chapter, Section, or Subsection(a) column add Table 2.3-281 and Table 7.5-201. Revise Table 1.9-201, entry for Regulatory Guide 1.97, Rev. 3, add Table 7.5-201.	Duke-Energy response to RAI LTR 4, RAI 07.05-001. WLG2009.03-18
5720	WLS,STD	Pt 02	FSAR 01	01.09.T / T1.9-201 RG 1.068	COLA Part 2, FSAR. Chapter 1, Table 1.9-201, sheet 4, as shown in letter 139, will be revised from: 1.68 Initial Test Program for Water-Cooled Nuclear Power Plants (Rev. 3, March 2007) 14.2.1 14.2.3 14.2.8 14.2.11.2 16 (TS Bases 3.1.8) To read: 1.68 Initial Test Program for Water-Cooled Nuclear Power Plants (Rev. 3, March 2007) 14.2.1 14.2.3 14.2.5.2 14.2.8 16 (TS Bases 3.1.8)	Duke Energy Submittal - Concurrence with Standard Content RAIs, RAI LTR 139 S1 response to RAI 14.02-012, item 6 SER with Open Items Confirmatory Item 14.2-1 & 2. WLG2009.05-09

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6923	WLS,STD	Pt 02	FSAR 01	01.09.T / T1.9-201 RG 1.078 RG 1.091 RG 1.097 RG 1.133 RG 1.135 RG 1.152 RG 1.206 RG 4.015	FSAR Table 1.9-201, sheets 4, 5, 6, 8, 9, 14 and 15 are revised to update cross-references and titles, as follows: Add Table 19.58-201 to RG 1.78 Add Table 19.58-201 to RG 1.91 Change title for RG 1.97 (1983 revision) to "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident" Change FSAR column for RG 1.133 to read "Not referenced. See Appendix 1AA" Change FSAR column for RG 1.135 to read "Not referenced. See Appendix 1AA" Change FSAR column for RG 1.152 to read "Not referenced. See Appendix 1AA" Change FSAR Column for RG 1.206 to remove period. Add new item under Division 4 Regulatory Guides: 4.15 Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations to License Termination) -- Effluent Streams and the Environment (Rev. 2, July 2007) 11.5.3	R-COLA conformance
5706	WLS,STD	Pt 02	FSAR 01	01.09.T / T1.9-201 RG 1.101	COLA Part 2, FSAR Chapter 1, Section 1.9, Table 1.9-201, sheet 6, will be revised from: 1.101 Emergency Response Planning and Preparedness for Nuclear Power Reactors (Rev. 5, June 2005) 9.5.1.8.2.2 Table 9.5-201 13.3 (Emergency Plan I.C.1) To read: 1.101 Emergency Response Planning and Preparedness for Nuclear Power Reactors (Rev. 5, June 2005) Not referenced 1.101 Emergency Planning and Preparedness for Nuclear Power Reactors (Rev. 4, July 2003) Not referenced 1.101 Emergency Planning and Preparedness for Nuclear Power Reactors (Rev. 3, August 1992) 9.5.1.8.2.2 Table 9.5-201 13.3 (Emergency Plan I.C.1)	Duke Energy Submittal - Concurrence with Standard Content RAIs, RAI 01-11. WLG2009.05-09
5832	WLS	Pt 02	FSAR 01	01.09.T / T1.9-202	Table 1.9-202, Sheet 3, Insert a space after Rev. in 3.5.1.5 entry. Table 1.9-202, Sheet 6, Insert a space after Rev. in 2.5.1 entry. Table 1.9-202, Sheets 22 and 24 -- Correct punctuation and word insertion. Table 1.9-202, Sheet 30, Remove space after (PWR) in 15.4.8.A entry.	Editorial
6924	WLS,STD	Pt 02	FSAR 01	01.09.T / T1.9-202	FSAR Table 1.9-202, sheet 33, is revised to reflect Maintenance Rule revision. Change entry for 17.6 to "Maintenance Rule, Rev. 1, 08/2007.	Duke Annual Review.
6694	WLS,STD	Pt 02	FSAR 01	01.10.03	COLA Part 2, FSAR Chapter 1, Subsection 1.10.3 will be revised to add the following new paragraph at the end of the subsection (under the LMA of STD SUP 1.10-1):	Duke Energy Submittal -

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					The above discussed controls to eliminate or mitigate construction hazards that could potentially impact operating unit SSCs important to safety are in place when there is an operating nuclear unit on the site.	Concurrence with Standard Content RAIs, COL-SER-OI-CH01 01.04-04. WLG2009.12-11
6925	WLS	Pt 02	FSAR 01	01.10.T / T1.10-201	FSAR Table 1.10-201, sheet 1, ninth bullet of the first entry is revised as follows: • Construction-Generated Dust and Equipment Exhausts Encroachment on Plant Control Boundaries To read: • Construction-Generated Dust and Equipment Exhausts • Encroachment on Plant Control Boundaries	Editorial
6958	WLS	Pt 02	FSAR 01	01.10.T / T1.10-203	Table 1.10-203, sheet 2, fifth entry is revised to reflect corrected spacing of "Waste Release".	Editorial
6926	WLS,STD	Pt 02	FSAR 01	01AA RG 1.016 RG 1.026	FSAR Appendix 1AA is revised to remove discussion of Regulatory Guide 1.16. LMA STD COL 1.9-1 to Regulatory Guide 1.26 to re-establish applicability of STD COL 1.9-1 for this and the following Regulatory Guides.	Regulatory Guide 1.16 withdrawn by NRC 8-11-2009 via 74 FR 40244. This modifies the change in RAI LTR 139 S1 response to RAI 14.02-012, item 3 SER with Open Items Confirmatory Item 14.2-5
5704	WLS,STD	Pt 02	FSAR 01	01AA RG 1.033 RG 1.101 RG 8.4	1. COLA Part 2, FSAR Chapter 1, Appendix 1AA, Revision 1, conformance statement for Regulatory Guide 1.33 will be revised from: General Exception Quality assurance requirements utilize the more recently NRC endorsed NQA-1 in lieu of the identified outdated standards. To read: General Exception Quality assurance requirements utilize the more recently NRC endorsed NQA-1 and NEI 06-14A in lieu of the identified outdated standards. 2. COLA Part 2, FSAR Chapter 1, Appendix 1AA, Revision 1, conformance statement for Regulatory Guide 1.101 will be revised from: General N/A To read: General Exception Rev. 5 is not applicable for this site. Rev. 3 and 4 are essentially the same except for endorsement of NEI 99-01 which is not directly applicable to the AP1000 passive design. The EP conforms to Rev. 3 and 4 with the exception that the EALs are written with necessary modifications to address the	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-142, RAI 01.11. WLG2009.05-09

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					passive plant design. 3. COLA Part 2, FSAR Chapter 1, Appendix 1AA, Revision 1, conformance statement for Regulatory Guide 8.6 will be revised from: General Exception Instrument calibration program is based upon criteria in ANSI N323A-1997 (with 2004 Correction Sheet) "Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments." To read: General Exception Instrument calibration program is based upon criteria in ANSI N323A-1997 (with 2004 Correction Sheet) "Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments." The ANSI 42.3-1969 Standard is no longer recognized as sufficient for calibration of modern instruments.	
4114	WLS,STD	Pt 02	FSAR 01	01AA RG 1.053	COLA Part 2, FSAR Chapter 1, Appendix 1AA, Revision 1, title for Regulatory Guide 1.53 will be revised from: "Application of the Single-Failure Criterion to Nuclear Power Plant Protection Systems" To read: "Application of the Single-Failure Criterion to Safety Systems"	R-COLA conformance
5609	WLS	Pt 02	FSAR 01	01AA RG 1.097	Revise Appendix 1.AA entry for Regulatory Guide 1.97 to read: Regulatory Guide 1.97, Rev. 4, 6/06 - Criteria For Accident Monitoring Instrumentation For Nuclear Power Plants Conformance with Revision 3 of the Regulatory Guide for the DCD scope of work is as stated in the DCD. Conformance for remaining scope is documented below. General Conforms This is to have LMA = WLS COL 1.9-1	Duke Energy Response to RAI LTR 004S1, RAI 07.05-001. WLG2009.03-18
6675	WLS,STD	Pt 02	FSAR 01	01AA RG 1.133	COLA Part 2, FSAR Chapter 1, Appendix 1AA, conformance statement for Regulatory Guide 1.133 will be revised from: C.3a Conforms C.6 Conforms To read: C.2b Conforms Procedures are addressed in Section 13.5 C.3a Conforms Procedures are addressed in Section 13.5 C.4g Conforms Procedures are addressed in Section 13.5 C.4h Conforms Procedures are addressed in Section 13.5 C.4i Conforms ALARA is addressed in Chapter 12 and Section 13.5 C.4j Conforms Training is addressed in Section 13.2 C.6 Exception See position for Regulatory Guide 1.16	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-142S1, RAI 01-11. WLG2009.12-11
6927	WLS,STD	Pt 02	FSAR 01	01AA	FSAR Appendix 1AA is revised to remove discussion of Regulatory Guide 1.16 for Regulatory Guide 1.133	Regulatory Guide 1.16

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				RG 1.133	discussion: Change C.6 to read: C.6 Exception Regulatory Guide 1.16 has been withdrawn.	withdrawn by NRC 8-11-2009 via 74 FR 40244. This modifies the change in RAI LTR 142 S1 response to RAI 01-011, item 6 SER with Open Items Confirmatory Item 4.4-1
6928	WLS,STD	Pt 02	FSAR 01	01AA RG 1.135	FSAR Appendix 1AA is revised to revise discussion of Regulatory Guide 1.135. Replace 2nd sentence with "The programatic and/or operational aspects are not applicable since the guidance was withdrawn by NRC (74 FR 39349, 08/06/2009)." Delete "General" and "Conforms"	R-COLA conformance
6929	WLS,STD	Pt 02	FSAR 01	01AA RG 1.152	FSAR Appendix 1AA is revised to revise discussion of Regulatory Guide 1.152. Revise clarification / summary to read "The Cyber Security Program is based on March 2009 revisions of the 10 CFR 73.54 regulations in lieu of Revision 2 of the Regulatory Guide."	R-COLA conformance
6701	WLS,STD	Pt 02	FSAR 01	01AA Notes	Revise FSAR Appendix 1AA Note (at the end of the Appendix) from: Note - Above stated general alternatives regarding the use of previous revisions of the Regulatory Guide for design aspects as stated in the DCD is provided to preserve the finality of the certified design. Further, each stated conformance with the programmatic and/or operational aspects is only to the extent that a design change or departure from the approved DCD is not required to implement those programmatic and/or operational aspects. To read (the # may vary for R-COLA and S-COLA as appropriate): Note #. Above stated general alternatives regarding the use of previous revisions of the Regulatory Guide for design aspects as stated in the DCD is provided to preserve the finality of the certified design. Further, each stated conformance with the programmatic and/or operational aspects is only to the extent that a design change or departure from the approved DCD is not required to implement those programmatic and/or operational aspects. As the operational and programmatic aspects become more fully defined (for example, during the preparation, approval, or initial implementation of plant procedures), there exists a potential that a conflict could be identified between the design as certified in the DCD and the programmatic and/or operational aspects of the guidance. In such cases, the design certification (rule) becomes the controlling factor, and the design conformance to the Regulatory Guide is per the revision stated in the DCD.	Duke Energy Submittal - Concurrence with Standard Content RAIs, COL-SER-OI-CH01 S1. WLG2009.12-11
6703	WLS	Pt 02	FSAR 01	01AA Notes	Revise FSAR Appendix 1AA Note (at the end of the Appendix) to include the following additional note (the # may vary for the R-COLA and S-COLA as appropriate): Note #. A "Criteria Section" entry of "General" indicates a scope for the conformance statement of "all regulatory guide positions related to programmatic and/or operational aspects." Thus, an associated conformance statement of "Conforms" indicates that the applicant "complies with all regulatory guide positions related to programmatic and/or operational aspects."	Duke Energy Submittal - Concurrence with Standard Content RAIs, COL-SER-OI-CH01S1. WLG2009.12-11
6426	WLS	Pt 02	FSAR 02	02.00 02.01 02.03 02.04 02.05	Editorial revisions made to FSAR Chapter 2 include the following: 1. Section 2.0, Table 2.0-201, "Control Room" entry is revised to remove "See" under 'AP1000 DCD site Parameters', 'WLS Site Characteristic', and 'WLS FSAR Reference'. 2. Section 2.0, Table 2.0-201, note 'h' is revised to reflect the correct spelling of 'analysis'. 3. Section 2.1, fist paragraph, second sentence is revised to reflect the correct spelling of 'expectations'. 4. Section 2.1, second paragraph, second sentence is revised to reflect the correct spelling of 'accommodate'. 5. Subsection 2.1.1.2, first paragraph, the hyphen is removed from '50 mi.' 6. Subsection 2.1.3, second and third paragraphs the hyphen is removed between digits and units (km,	Editorial

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					mi), 24 instances. 7. Subsection 2.1.3.1 first and second paragraphs the hyphen is removed between digits and units (km, mi), 16 instances. 8. Subsection 2.1.3.2, first paragraph, the hyphen is removed between digits and units (km, mi), 9 instances. 9. Subsection 2.1.3.3.2.4, second paragraph, the hyphen is removed between digits and units (km, mi), 1 instance. 10. Subsection 2.1.5, Reference 209 spacing is corrected at the web address. 11. Section 2.1, Table 2.1-205, note 'a' is revised to reflect the correct spelling of 'available'. 12. Subsection 2.2.3.1.1.2, second paragraph, 4th sentence, '40inch' is revised to read '40-inch'. 13. Subsection 2.2.3.1.1.3, second paragraph, fourth sentence 'Table 2.2-203' is revised to red, hyperlinked text. 14. Subsection 2.3.2.5, second paragraph, first sentence is revised to reflect the correct spelling of 'presence'. 15. Subsection 2.3.6.2, the title is revised to reflect the correct spelling of 'Meteorology'. 16. Subsection 2.3.7, Reference 219 is revised to reflect the correct spelling of 'Pollution'. 17. Subsection 2.4.3.5, under 'Intermittent Stream/Make-Pond A, the last sentence is revised to reflect the correct spelling of 'provided'. 18. Subsection 2.4.5, fourth paragraph, second sentence is revised to reflect the correct spelling of 'exceedance'. 19. Subsection 2.4.13.1, third paragraph, second sentence is revised to reflect the correct spelling of 'effluent'. 20. FSAR Table 2.4.1-210 is revised to replace Note numbering to alpha listing. 21. FSAR Table 2.4.1-211 is revised to replace Note numbering to alpha listing. 22. Section 2.5, third paragraph, first sentence, 'Subsection' is revised to reflect plural form. 23. Subsection 2.5.1, second paragraph, ending of the first sentence is revised to reflect plural form of 'Subsection'. 24. Subsection 2.5.1.1.2.1, fifth paragraph, ending of the third sentence is revised to reflect plural form of 'Reference'. 25. Subsection 2.5.1.1.2.1, tenth paragraph, ending of the last sentence is revised to reflect plural form of 'Reference'. 26. Subsection 2.5.1.1.2.1, twelfth paragraph, fourth sentence is revised to reflect plural form of 'Reference'. 27. Subsection 2.5.1.1.2.4.1, under the heading "The New York-Alabama, Clingman, and Ocoee Lineaments", third paragraph, first sentence is revised to correct the spelling of 'Zietz'. 28. Subsection 2.5.1.1.2.4.3, under the heading "Wateree Creek fault", last sentence is revised to reflect the plural form of 'Reference'. 29. Subsection 2.5.1.1.2.4.5, second paragraph bullets are revised to reflect capitalization of 'Class'. 30. Subsection 2.5.1.1.3.2.1, under the heading "Central Virginia Seismic Zone", third paragraph is revised to reflect the plural of 'Reference'. 31. Subsection 2.5.1.2.1, seventh paragraph, third sentence is revised to reflect the hyphen between 'Ninety' and 'Nine'. 32. Subsection 2.5.1.2.4.1, first paragraph, second sentence is revised to reflect the correct spelling of 'Butler'. 33. Subsection 2.5.1.2.5.4, third paragraph, heading and first sentence is revised to reflect the correct spelling of McKowns, 2 instances. 34. Subsection 2.5.1.3 editorial revisions include: Reference 228 is revised to reflect the degree symbol at '10 x 20' and change to '1 x 2' Reference 270 is revised to reflect the correct spelling of 'Continental'. Reference 283 is revised to include 'Triassic'. Reference 286 is revised to replace a semicolon to a colon '1:24,000'. Reference 318 is revised to correct the title to "Regenerate Faults of Small Cenozoic Offset – Probable Earthquake Sources in the Southeastern United States". 35. Subsection 2.5.2.1., third paragraph is revised to correct the identification of the Subsection 2.5.5. 36. Subsection 2.5.2.2, first paragraph is revised to correct the identification of the Subsection 2.5.1 and	

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					Subsection 2.5.2. 37. Subsection 2.5.2.2.1, third paragraph, fourth sentence is revised to correct the identification of Subsection 2.5.2. 38. Subsection 2.5.2.2.2.4, first paragraph, last sentence is revised to correct the identification of Subsection 2.5.2. 39. Subsection 2.5.2.2.2.4.3 second paragraph, last sentence is revised to correct the identification of Subsection 2.5.2. 40. Subsection 2.5.2.2.2.4.3, ninth paragraph, first sentence is revised to correct the identification of Subsection 2.5.2. 41.. Subsection 2.5.2.4, third and fourth paragraphs are revised to reflect the correct spelling of 'exceedance', 3 instances. 42. Subsection 2.5.2.4.3.2, ninth paragraph, last sentence is revised to remove a stray period. 43. Subsection 2.5.2.4.5, third, fifth, and seventh paragraphs are revised to reflect the correct spelling of 'exceedance', 4 instances. 44. Subsection 2.5.2.6, third paragraph is revised to reflect the correct spelling of 'exceedance'. 45. Subsection 2.5.3.1.2, third paragraph is revised to reflect the singular form of 'Reference and the plural form of 'Figures'. 46. Subsection 2.5.3.2, under 'Southwest extension of the Boogertown shear zone', 'Reference' is revised to reflect the plural form, 2 instances. 47. Subsection 2.5.3.2, under 'Brindle Creek thrust fault', the second sentence is revised to reflect the correct spelling of 'microprobe'. 48. Subsection 2.5.3.6, the third sentence is revised to reflect the plural form of 'Reference'. 49. Subsection 2.5.3.9, Reference 208 is revised to reflect the elimination of a stray period following 'Jr.'. 50. Subsection 2.5.4.1, second paragraph, first sentence remove stray spacing; the second bullet is revised to reflect the correct spelling of 'Stratigraphy'; the third paragraph is revised to reflect the correct case assignment of 'subsection' and reflects the plural form of 'Subsection'. 51. Subsection 2.5.4.1.5, second paragraph is revised to correct quotation marks around "locked-in". 52. Subsection 2.5.4.1.5, the fourth paragraph is revised to reflect the plural form of 'Subsection'. 53. Subsection 2.5.4.2, second paragraph is revised to hyphenate 'state-of-the-practice', correct case assignment for 'site', correct the spelling of 'geologist', and revise 'Subsection 2.5.4.2.1 and Subsection 2.5.4.2.2' to read: Subsections 2.5.4.2.1 and 2.5.4.2.2'. 54. Subsection 2.5.4.2, third paragraph is revised from 'Subsection 2.5.4.3 and Subsection 2.5.4.2.4' to read 'Subsections 2.5.4.2.3 and 2.5.4.2.4'. 55. Subsection 2.5.4.2.1, first sentence is revised to change title case of subsection to lower case; 'in situ' is revised to italicize the text. 56. Subsection 2.5.4.2.1.1, the subsection header is revised to read "Soil, Rock and Conrete Borings" 57. Subsection 2.5.4.2.1.1, second and fourth paragraphs are revised to reflect the abbreviation of 'ft'. 58. Subsection 2.5.4.2.1.1, eighth paragraph is revised to reflect the singular form of 'boring'. 59. Subsection 2.5.4.2.2.1 first sentence is revised to remove the full form of the acronym SPT; the second sentence is revised to reflect the hyphenation of 'six-inch'. 60. Subsection 2.5.4.2.2.1, second paragraph, second sentence is revised to reflect the addition of 'and' to read "...2007 and had been placed..."; fourth and last sentences are revised to reflect the replacement of title case with lower case on 'test fill'; the fifth sentence is revised to reflect hyphenation on '30-inch' and 'six-inch'. 61. Subsection 2.5.4.2.2.5, first sentence is revised to reflect the addition of 'and' and the removal of a hyphen between '2006 and 2007. 62. Subsection 2.5.4.2.3 second paragraph, second sentence is revised to reflect the removal of title case on 'subsection'; the sixth bullet is revised to remove extra spacing around 'ASTM D 5084-03'. 63. Subsection 2.5.4.2.3.7, last paragraph, last word is revised to include a hyphen. 64. Subsection 2.5.4.2.4.1.3, first sentence is revised to reflect the addition of a hyphen on 'pre-construction'. 65. Subsection 2.5.4.2.4.2, second paragraph, tenth sentence is revised to reflect the replacement of the hyphen with 'and' between '2006 and 2007'. 66. Subsection 2.5.4.4.1.2 is revised to reflect the spelling correction to 'adjacent borehole'.	

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					67. Subsection 2.5.4.4.2.1, firs paragraph is revised to add a hyphen to 'built-in'; fourth paragraph is revised to reflect the removal of a comma following 'Table 2.5.4-215'. 68. Subsection 2.5.4.4.4, second paragraph is revised to add a period following 'Inc.' 69. Subsection 2.5.4.7, second paragraph, second sentence is revised to remove a comma between 'DCD' and 'Section'; last paragraph is revised to reflect the addition of 'Section' between 'and' and '8.7'. 70. Subsection 2.5.4.7.1, first paragraph, first sentence is revised to alleviate redundancy of 'Subsection' by pluralizing the first instance and removing the second instance. 71. Subsection 2.5.4.7.2, fifth paragraph is revised to add a comma following 'surveys'. 72. Subsection 2.5.4.8, eighth paragraph is revised to add a hyphen to 'safety-related'. 73. Subsection 2.5.4.9, first paragraph, second sentence is revised to remove a stray period; third sentence is revised to correct the spacing of '10 CFR 100.23'; second bullet parenthesis are added to '(Reference 219). 74. Subsection 2.5.4.10, first paragraph, second sentence a hyphen is added to 'safety-related'; second paragraph, second sentence is revised to alleviate redundancy of 'Subsection' by pluralizing the first instance and removing the second instance; the second paragraph, seventh paragraph is revised to combine 'base' and 'mat' to read 'basemat'. 75. Subsection 2.5.4.10.3, first paragraph, first sentence is revised to add a hyphen to 'below-grade'; first bullet is revised to remove title case from 'nuclear islands'; fifth bullet is revised to remove capitalization from 'elevations', 2 instances. 76. Subsection 2.5.4.10.3, fifth paragraph is revised to include a hyphen to 'at-rest'. 77. Subsection 2.5.4.11, second paragraph is revised to include a hyphen at 'safety-related'. 78. Subsection 2.5.5.1.1, third paragraph is revised by adding a comma following 'potential' and revising 'indicate' to 'indicates'. 79. Subsection 2.5.6.8 is revised to remove a comma following 'Subsections 2.5.4.5.4'. 80. FSAR Table 2.2-203 is revised to delete the parenthetical note regarding Reference 241 on the last sheet of the table. 81. FSAR Table 2.3-234 is revised to change the parenthetical content from "MPH" to "mph". 82. FSAR Table 2.3-280, footnote 3, is revised to correct the spelling of "pollution" 83. FSAR Table 2.5.1-203, is revised at the 'Linear Structures' entry, under 'D5' to remove the hyphen from 'intersection'.	
6969	WLS	Pt 02	FSAR 02	02.00.F / Figures	COLA Part 2, FSAR Chapter 2 the following figure titles are modified to reflect the following: 2.4.12-204 Potentiometric Surface Map 2.4.12-205 Cross Sections of the Le Nuclear Site 2.5.1-209 Site Tectonic Features 2.5.2-219 Rondout Source 26-BP, Showing Revision for Charleston Geometry B' – Rev 0 2.5.2-223 Seismic Hazard Curves for PGA 2.5.2-224 Seismic Hazard Curves for 25 Hz 2.5.2-225 Seismic Hazard Curves for 10 Hz 2.5.2-226 Seismic Hazard Curves for 5 Hz 2.5.2-227 Seismic Hazard Curves for 2.5 Hz 2.5.2-228 Seismic Hazard Curves for 1 Hz 2.5.2-229 Seismic Hazard Curves for 0.5 Hz 2.5.2-230 Mean and Median UHRS for 10-4, 10-5, and 10-6 Annual Frequency of Exceedence for Seven Structural Frequencies 2.5.2-243 Example of Median V/H Ratios Computed for M 80, Campbell and Bozorgnia (2003) Rock Model 2.5.2-246 Comparison of Horizontal and Vertical FIRS A-1 2.5.2-247 Unit 1 FIRS Horizontal and Vertical Component UHRS at Annual Exceedence Probabilities 10-4, 10-5, and 10-6 yr-1 2.5.4-203 Hand Sample Photographic and Photomicrograph of Meta-quartz Diorite,Sample B-1004 and 33.2 – 33.3 feet 2.5.4-204 Hand Sample Photographic and Photomicrograph of Mica-schist, Sample B-1014 and 7.3 – 7.4 feet 2.5.4-205 Hand Sample Photographic and Photomicrograph of Meta-dacite Porphyry, Sample B-1007 and	Editorial. Alignment of LOF with actual figure titles.

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					22.8 – 22.9 feet 2.5.4-206 Hand Sample Photographic and Photomicrograph of Meta-basalt, Sample B-1018 and 39.8 – 39.9 feet 2.5.4-219 Boring Summary Sheet, Boring B-1000 2.5.4-220 Boring Summary Sheet, Boring B-1002 2.5.4-221 Boring Summary Sheet, Boring B-1004 2.5.4-222 Boring Summary Sheet, Boring B-1011 2.5.4-223 Boring Summary Sheet, Boring B-1012 2.5.4-224 Boring Summary Sheet, Boring B-1015 2.5.4-225 Boring Summary Sheet, Boring B-1017 2.5.4-226 Boring Summary Sheet, Boring B-1024 2.5.4-227 Boring Summary Sheet, Boring B-1037A 2.5.4-228 Boring Summary Sheet, Boring B-1068 2.5.4-229 Boring Summary Sheet, Boring B-1070 2.5.4-230 Boring Summary Sheet, Boring B-1074 2.5.4-231 Boring Summary Sheet, Boring B-1074A 2.5.4-232 Boring Summary Sheet, Boring B-1075A 2.5.4-244b Cherokee Nuclear Station Foundation Drainage and Lee Nuclear Station Nuclear Island-Detail 1 2.5.4-244c Cherokee Nuclear Station Foundation Drainage and Lee Nuclear Station Nuclear Island-Detail 2 2.5.4-244d Cherokee Nuclear Station Foundation Drainage and Lee Nuclear Station Nuclear Island-Detail 3 2.5.4-246 Planned Excavation Profile Geologic Cross Section V-V'	
6771	WLS	Pt 02	FSAR 02	02.00.T / T2.0-201	COLA Part 2, FSAR, Chapter 2, Table 2.0-201, sheet 2 is revised to change the Unit 1 FIRS PGA value from 0.24 to 0.22.	Annual Update / FIRS A1 WLG2010.02-01
6346	WLS	Pt 02	FSAR 02	02.00.T / T2.0-201	COLA Part 2, FSAR, Chapter 2, Table 2.0-201, is revised per WLG2009.10-02. Liquefaction Potential edited under the WLS Site Characteristic column. To read: "None. Category I structures are founded on hard rock. Foundations for adjacent structures have negligible liquefaction"	Duke Energy Submittal – Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6604	WLS	Pt 02	FSAR 02	02.00.T / T2.0-201	Revise FSAR Table 2.0-201 in accordance with WLG2009.12-03. Flood Level edited under the WLS Site Characteristic column. Replaced "584.3" with "584.8".	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
5820	WLS,STD	Pt 02	FSAR 02	02.00.T / T2.0-201	Table 2.0-201, Sheet 5 of 7, Change the WLS Site Characteristic to read: "18.9 in./hr [1-hr 1-mi2 PMP]" [In DCD Rev. 17, the 1 hour value was changed from 19.4 to 20.7 and the 5 minute criterion was removed. The PMP was clarified as 1-hr 1-mi2 PMP.]	DCD Revision 17 conformance.
5794	WLS,STD	Pt 02	FSAR 02	02.00.T / T2.0-201	Table 2.0-201, sheet 7, note (e) is changed from "Figure 3.I.1-1" and "Figure 3.I.1-1" to "Figure 3I.1-1" and "Figure 3I.1-1"	DCD conformance
5795	WLS	Pt 02	FSAR 02	02.00.T / T2.0-202	Add WLS SUP 2.0-1 to Table 2.0-202,	Capture SUP item
6932	WLS	Pt 02	FSAR 02	02.01.03	COLA Part 2, FSAR Chapter 2, Subsection 2.1.3, last paragraph is revised to read:	2009 Integraged Resource Plan,

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					The commercial operation date was initially estimated to be 2016, but has been revised to approximately 2021. The FSAR evaluations are based on 2016; however, Duke Energy has evaluated the change and has determined that it is not significant.	WLG2009.09-02
6934	WLS	Pt 02	FSAR 02	02.01.03.01	COLA Part 2, FSAR Chapter 2, Subsection 2.1.3.1, 2nd paragraph is revised as follows: Table 2.1-203 shows the projected permanent population for each sector and projections for 2007, 2016, 2026, 2036, 2046, and 2056. The distances defining the sectors are 0 to 2 km (1.24 mi.), 2 to 4 km (2.5 mi.), 4 to 6 km (3.7 mi.), 6 to 8 km (5 mi.), 8 to 10 km (6.2 mi.), and 10 to 16 km (10 mi.). These sectors can be seen in Figure 2.1-206. The projections were carried out to 40 years past the initially estimated startup date of 2016. The population in the 16-km (10-mi.) area is shown in the "Cumulative Totals" field of Table 2.1-203 for each projected year. The percent of the 16-km (10-mi.) permanent population within 8 km (5 mi.) is 12.1 percent for all years of projection.	2009 Integraged Resource Plan, WLG2009.09-02
6935	WLS	Pt 02	FSAR 02	02.01.03.03	COLA Part 2, FSAR Chapter 2, Subsection 2.1.3.3, last paragraph is revised as follows: To project the transient information, the transient data per sector were summed. The summed number was multiplied by the sector growth ratio derived from the county growth ratios described above for each year. Because the method for collecting transient data provides point locations, some sectors have a zero value. This is because there are no accountable transient contributors in the zero value sectors. Table 2.1-208 illustrates the projected transient population for each sector and projections for 2007, 2016, 2026, 2036, 2046, and 2056 for the non-zero sectors (References 209, 211, 230, 231, and 232). The projections were carried out to 40 years past the initially estimated startup date of 2016. The sectors that have zero values are not illustrated in this table.	2009 Integraged Resource Plan, WLG2009.09-02
5796	WLS	Pt 02	FSAR 02	02.01.03.04	In the last sentence of Subsection 2.1.3.4, change "mile" to "square mile"	Editorial - units of measure
6957	WLS	Pt 02	FSAR 02	02.03.T / T2.3-278	Corrected spelling error in footnote 2 of Table 2.3-278. Changed spelling to "pollution"	Editorial
5611	WLS	Pt 02	FSAR 02	02.03.T / T2.3-281	FSAR Table 2.3-281 is revised in its entirity per Duke Energy Response to RAI LTR 004 Supplement 1, RAI 07.05-001.	Duke Energy response to RAI LTR 4, S1. WLG2009.03-18
5612	WLS	Pt 02	FSAR 02	02.03.T / T2.3-281	Revise FSAR Table 2.3-281 per Duke Energy Response to RAI Letter 004 Supplement 2, RAI 07.05-001.	Duke Energy response to RAI LTR 4, S2. WLG2009.07-06
6570	WLS	Pt 02	FSAR 02	02.04.01.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.1, is revised as follows: The 1900 acre (ac.) Lee Nuclear Site is located south and west of the Broad River in eastern Cherokee County, South Carolina (Figure 2.2 201). The nuclear island for the Lee Nuclear Station is located south and west of the Ninety Nine Islands Reservoir portion of the Broad River, approximately 1 mile (mi.) due northwest of the Ninety Nine Islands Dam. In addition to the Broad River and several tributaries, the Ninety Nine Islands Reservoir, Make Up Pond B, Make Up Pond A, and Hold Up Pond A (Figure 2.4.1 201) make up the majority of the surface water features in the vicinity of the site. Make Up Pond C is an off site facility, located on a tributary of the Broad River, west of the Lee Nuclear Station (Figure 2.4.1 213).	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6571	WLS	Pt 02	FSAR 02	02.04.01.01.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.1.2, is revised as follows: Duke Energy selected the AP1000 certified plant design for the Lee Nuclear Station combined operating license application. The AP1000 units (Units 1 and 2) are planned to be in the vicinity of the previously proposed Cherokee Units 1 and 3. The AP1000 is rated at 3400 megawatts thermal (MWt) with a minimum electrical output of 1000 megawatts electrical (MWe). Each unit uses three mechanical draft towers for circulating water system cooling with the intake system providing all raw water requirements. During normal flow conditions raw water is pumped from Broad River raw water intake structure to Make Up Pond A through the raw water discharge structure. During low flow conditions raw water from Make Up Pond B is pumped from the Make Up Pond B intake structure to Make Up Pond A through the raw water discharge structure. If Make Up Pond B usable storage is not sufficient to meet plant needs, Make	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					Up Pond C is then used to supply supplemental water. Water is pumped from the Make Up Pond C intake structure to a discharge structure in Make Up Pond B and then is pumped from Make Up Pond B to Make Up Pond A, as previously described. The ultimate heat sink for the Lee Nuclear Station is the atmosphere.	
6572	WLS	Pt 02	FSAR 02	02.04.01.01.04	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.1.4, is revised as follows: Plant water consumption and water treatment for the Lee Nuclear Station are determined from the AP1000 Design Control Document, site characteristics, and engineering evaluations. The raw water system supplies water to Make Up Pond A for plant use, including make up to the circulating water system (CWS) cooling towers, to makeup for water consumed as a result of evaporation, drift and blowdown. The raw water intake structure is located on the west bank of the Broad River, north northeast of Unit 2 (Figure 2.4.1 201). The raw water discharge structure is located at the north end of Make Up Pond A near the Unit 2 cooling towers. Water withdrawn from the Broad River is pumped into Make Up Pond A and from there enters the make up water intake structure. Raw water is also processed through the clarifier and used in plant water systems including the service water system, the demineralized water treatment system and the fire protection system. Effluent from the Lee Nuclear Station is to be diffused into the river at the upstream face of the Ninety Nine Islands Dam near the intakes for the hydroelectric station (Reference 256), avoiding recirculation of the plant effluent to the intake structure located approximately 1.25 river miles upstream (Figure 2.4.1 201). Intake System The intake system provides all raw water requirements for the plant. During normal flow conditions, raw water is pumped from the Broad River raw water intake structure to Make Up Pond A through the raw water discharge structure. During low flow conditions, raw water from Make Up Pond B is pumped from the Make Up Pond B intake structure to Make Up Pond A through the raw water discharge structure. If Make Up Pond B usable storage is not sufficient to meet plant needs, Make Up Pond C is then used to supply supplemental water. Water is pumped from the Make Up Pond C intake structure to a discharge structure in Make Up Pond B and then is pumped from Make Up Pond B to Make Up Pond A, as previously described. After low flow conditions have ceased, Make Up Pond B is replenished using water from the Broad River which is pumped into Make Up Pond A and subsequently into Make-Up Pond B. Raw water is pumped from the Make Up Pond A intake structure to Make Up Pond B using the same piping to supply Make Up Pond A with water from Make Up Pond B. Water is discharged into Make Up Pond B using the Make Up Pond B intake structure. An alternative refill path is to use the refill pumps on the river intake structure that pump directly to Make Up Pond B. Make Up Pond C is normally refilled directly from the river using the same refill pumps on the river intake structure that pump directly to Make Up Pond B. The section of pipe between Make Up Pond B and Make Up Pond C is used to both supply Make Up Pond B from Make Up Pond C and to refill Make Up Pond C from the river. Water is discharged into Make Up Pond C using the Make Up Pond C intake structure. An alternative refill path for Make Up Pond C is to pump from the Broad River into Make Up Pond A, then pump from Make Up Pond A to Make Up Pond B, and then pump from Make Up Pond B to Make Up Pond C using a dedicated line only for refilling Make Up Pond C. The intake, discharge, and pump structures for Make Up Ponds A and B are shown in Figure 2.4.1 201. Make Up Pond C is an off site facility, located west of the Lee Nuclear Station, as shown in Figure 2.4.1 213. The river intake structure serves as a platform to support trash racks, traveling screens, pumps, motors, and other equipment. Intake water taken from the Broad River passes through bar screens and traveling screens designed to minimize uptake of aquatic biota and debris. Each traveling screen has fish collection and return capability. Return of impinged fish is to a location downstream of the intake. Debris collected by the trash racks and traveling screens is collected and disposed of as solid waste (Reference 256). The raw water requirements vary depending on the operating mode, therefore the flow rates and intake velocities also vary. During the first four modes of operation, which include power operation, startup, hot standby, and safe shutdown, both the CWS and the service water system (SWS) require makeup water. The raw water system (RWS) supplies an average of 35,030 gallons per minute (gpm) (60,001 gpm maximum) raw water flow as makeup to the CWS, the SWS, and the demineralized treatment system (DTS) for the two units. Flow to the fire protection system (FPS) and the waste water system (WWS) is intermittent. The screens are sized so that the average through screen velocity is in accordance with the	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					Section 316 (b) of the Clean Water Act. The intake velocity is less than 0.5 fps. For the remaining two modes of operation, cold shutdown and refueling, the flow rate and the intake velocity is less as only the SWS requires makeup water from the raw water intake. For these final two modes of operation, the flow rate is 650 gpm per unit and the intake velocity is negligible. Discharge System The primary purpose of the discharge system is to disperse cooling tower blowdown into the Broad River along with other wastewater streams to limit the concentration of dissolved solids in the heat rejection system. Any additives in the discharge are as approved by the U.S. Environmental Protection Agency (EPA) as safe for humans and the environment. The volume and concentration of the constituents discharged to the environment will meet the requirements established in the South Carolina Department of Health and Environmental Control (SCDHEC) administered National Pollution Discharge Elimination System (NPDES) permit. Effluent from the Lee Nuclear Station is to be diffused into the river at the upstream face of the Ninety Nine Islands Dam near the intakes for the hydroelectric generating units. This discharge includes non radioactive process waste (including cooling tower blowdown) and low level liquid radioactive waste (at an average rate of 4 gpm within regulatory limits). The discharge structure consists of a submerged pipe that is perforated for the last portion of its length, diffusing the effluent into the hydroelectric station intakes. The effluent discharge rate to the Broad River during normal operations is approximately 8216 gpm with a maximum plant water discharge rate of 28,778 gpm (for two units).	
6573	WLS	Pt 02	FSAR 02	02.04.01.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2, is revised as follows: The location of the Lee Nuclear Station, as described in Subsection 2.4.1.1, falls within the Broad River basin. The Broad River and Ninety Nine Islands Reservoir are the main hydrologic features that may affect or be affected by construction activities in the immediate vicinity of the Lee Nuclear Site. Ninety Nine Islands Reservoir is the nearest major body of surface water to the Lee Nuclear Site. This reservoir is an impoundment of the Broad River by Ninety Nine Islands Dam. The Lee Nuclear Site is located adjacent to the reservoir, which surrounds the site to the north and east. Land along the south boundary of the site is private property. Current surface water features at the site include Make Up Pond B, Make Up Pond A, and Hold Up Pond A. Make-Up Pond C is an off-site facility, located on a tributary of the Broad River, west of the Lee Nuclear Station. A brief description of local groundwater conditions is also provided in this subsection.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6760	WLS	Pt 02	FSAR 02	02.04.01.02.01	COLA Part 2, FSAR Chapter 2, Subsection 2.4.1.2.1, 1st paragraphs is revised as follows and th 2nd paragraph is deleted: 2.4.1.2.1 Physiography and Topography The Lee Nuclear Site is located within the Piedmont physiographic province, a southwest to northeast-oriented province of the Appalachian Mountain System (Figure 2.4.1-203). The Piedmont province is 80 – 120 mi. wide, and it is situated between the Blue Ridge province, a mountainous region to the northwest, and the Atlantic Coastal Plain province to the southeast. The province is a seaward-sloping plateau, dominated by a monotonous topography of low rounded ridges with gentle slopes and ravines largely underlain by saprolite developed on crystalline rock.	Duke Energy organizational and planning update
6574	WLS	Pt 02	FSAR 02	02.04.01.02.02.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.2.1, the first paragraph is revised as follows: The Broad River accepts drainage from Ross Creek (Sarratt Creek), Mikes Creek, Bowens River (Wylies Creek), the Buffalo Creek watershed, and the Cherokee watershed (Figure 2.4.1 207). Further downstream, Peoples Creek (Furnace Creek, Toms Branch) drains into the Broad River near the city of Gaffney. Doolittle Creek enters the river near the town of Blacksburg, followed by London Creek (which feeds Lake Cherokee and Make Up Pond C, and has the Little London Creek as a tributary), Bear Creek, McKowns Creek (which feeds Make Up Pond B at the site), Dry Branch, the Kings watershed, and Quinton Branch. Mud Creek enters the Broad River next, downstream from Mud Islands, followed by Guyonmbore	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					Creek, Mountain Branch, Abington Creek (Wolf Branch, Service Branch, and Jenkins Branch), the Thicketty Creek watershed, Beaverdam Creek (McDaniel Branch), the Bullock Creek watershed, and Dry Creek (Nelson Creek). There are numerous ponds and lakes located off site (totaling 246 ac., not including the approximately 620 ac. Make Up Pond C) in this watershed (03050105 090) and all 133 stream mi. are classified as fresh water (Reference 268).	
6575	WLS	Pt 02	FSAR 02	02.04.01.02.02.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.2.2, the sixth through ninth paragraphs are revised as follows: Based on an 83 year period of record (1926 - 2008) for the Broad River at the Gaffney Station, an average annual flow of the Broad River was determined to be approximately 2500 cfs. The 83 year period of record was derived using three USGS stream gauges located on the Broad River. The Broad River gauge near Gaffney, SC (USGS 02153500) is located just upstream of the Lee Nuclear Site and has available data from 1938 1971 and 1986 1990. The Gaffney gauge data was used without correction for drainage area size and applied to the site. The Broad River gauge near Blacksburg, SC (USGS 02153200) is located upstream from the Gaffney gauge and has available data from 1997 2008. The Blacksburg gauge data was corrected by a ratio of drainage areas for the Gaffney gauge to the Blacksburg gauge and then applied to the site. The Broad River gauge near Boiling Springs, NC (USGS 02151500) is located upstream from the Blacksburg gauge and has available data from 1926 2008. Only data from the absent years of the Gaffney and Blacksburg gauges were corrected by a ratio of drainage areas for the Gaffney gauge to the Boiling Springs gauge and then applied to the site. The overlapping data from the Boiling Springs gauge were not utilized. Low flow conditions on the Broad River are a function of natural flow in the rivers and streams, available storage capacity of upstream reservoirs, and regulated discharge flow from upstream dams. Low flow conditions are generally defined as the lowest consecutive 7 day stream flow that is likely to occur every 10 years (7Q10). The 7Q10 was calculated with the same database described above to be 439 cfs using Log Pearson Type III distribution (Subsection 2.4.11.5). The South Carolina climate is subject to periodic droughts. Since 1900, severe droughts have occurred statewide in 1925, 1933, 1954, 1977, 1983, 1986, 1990, 1993, 1998, 2002, 2007 and 2008. The drought that officially began in June 1998 abated in the late summer of 2002 with the onset of the hurricane season. The effects of these droughts are reflected in the Broad River discharge characteristics. Low flow conditions are further discussed in Subsection 2.4.11.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6576	WLS	Pt 02	FSAR 02	02.04.01.02.02.04	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.2.4, the last paragraph is revised as follows: There are a number of other creeks and impoundments within a 6-mi. radius of the Lee Nuclear Site. Most of these features are hydraulically insignificant (i.e., small storage, low hazard structures, or outside drainage) with the exception of Make Up Pond C. The largest of these features within this radius is Make Up Pond C located on London Creek, as shown in Figure 2.4.1-213, which has a maximum storage of approximately 22,000 ac. ft. Details of Make Up Pond C are provided in Subsection 2.4.1.2.3.1. Lake Cherokee (also known as Wildlife Dam and Reservoir) is located on London Creek just upstream of Make Up Pond C. Lake Cherokee has a maximum storage of 720 ac. ft., and is hydraulically insignificant.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6577	WLS	Pt 02	FSAR 02	02.04.01.02.02.05	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.2.5, the third paragraph is revised as follows: Ninety Nine Islands Dam impounds a 433 ac. mainstem "run of the river" reservoira with a normal water level at 511 ft. above msl and a shoreline of approximately 14 mi. (Reference 216). Flow through Ninety Nine Islands Reservoir is dominated by the flow of the river channel, which divides the reservoir into two backwater regions. The two backwater regions exhibit very little circulation during nonflood periods. Therefore, the average transit time through the reservoir is conservatively estimated from the volume of the reservoir along the main channel excluding the backwater areas. Based on a storage volume of 570 ac ft along the main channel to a point about 0.7 river mi. upstream from the dam and an average annual flow of the Broad River of approximately 2500 cfs, the average transit time for water flow through the reservoir is approximately 3 hours. During low flow conditions the transit time slows to around 14 hours (Subsection 2.4.11).	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6578	WLS	Pt 02	FSAR 02	02.04.01.02.02.06	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.2.6, the first paragraph is revised as follows:	Duke Energy

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					The Lee Nuclear Site has three manmade impoundments: (1) Make Up Pond B, (2) Make Up Pond A, and (3) Hold Up Pond A. These features, along with the constructed earthen dams and site structures, are shown in Figure 2.4.1 201. New retention ponds are constructed or existing ponds are used, if necessary, to accommodate surface water runoff and allow sediment laden water from dewatering activities to pass through the impoundments prior to discharge at a NPDES permitted outfall. Make Up Pond C is an off-site facility, located on a tributary of the Broad River, west of the Lee Nuclear Station. Details of Make Up Pond C are provided in Subsection 2.4.1.2.3.1. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.2.6, the fourth paragraph is revised as follows: Make Up Pond B dam crest elevation is 590 ft. with a low elevation west of the spillway bridge at about 588 ft. above msl. Make Up Pond B has a normal full pond elevation of 570 ft. above msl (spillway elevation) and occupies approximately 11 percent of the total drainage area of McKowns Creek. Bathymetry exhibited a maximum depth of 59.3 ft., a mean depth of 31.4 ft., total storage capacity of approximately 4000 ac. ft. and the surface area at full pond is approximately 150 ac. (Figure 2.4.1 209, Sheet 2). The useable storage is approximately 3200 ac. ft. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.2.6, the seventh paragraph is revised as follows: The maximum flood level at the Lee Nuclear Station is elevation 584.8 ft. msl. This elevation would result from a Probable Maximum Flood (PMF) event on Make Up Pond B watershed with the added effects of coincident wind wave activity as described in Subsection 2.4.3. The Lee Nuclear Station safety related structures have a grade elevation of 590 ft. msl. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.2.6, the ninth paragraph is revised as follows: Make Up Pond A crest elevation varies from 557.5 ft. to a low point of 555 ft. above msl (Reference 254). At the time of the survey, the impoundment elevation was approximately 546.1 ft. above msl with full pond elevation at 547 ft. This is a relatively small surface water impoundment with a full pond surface area of approximately 62 ac. Bathymetry exhibited a maximum depth of 59.6 ft., a mean depth of 26.1 ft., and an estimated volume storage of 1425 ac. ft. (Figure 2.4.1 209, Sheet 3). The useable storage is approximately 1200 ac. ft. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.2.6, the last paragraph is revised as follows: Hold Up Pond A is a small impoundment located north of the proposed reactor locations (Figure 2.4.1 209, Sheet 4). Two dams were built in the 1970s to form this impoundment. The crest elevation of the dam is approximately 539.7 ft. above msl, and it has a current normal pond elevation of approximately 536 ft. above msl (Reference 254). Very little to no sediment accumulation was observed in this impoundment. The surface area at full pond is 4.4 ac. and the total storage volume at full pond is 56.4 ac ft. Rainfall and runoff contribute on average 18 gpm to the pond. Based on site observation and review of available historical aerial photographs, Hold Up Pond A retains water to near full pond level under natural conditions.	Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6579	WLS	Pt 02	FSAR 02	02.04.01.02.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.3, the second paragraph is revised as follows: There are approximately 132 dams (five recreational dams are listed as breached) upstream from the Lee Nuclear Site (Reference 276). Six large dams (see Subsection 2.4.1.2.3.1 below) are upstream from the site and represent approximately 88 percent of the total storage capacity for the Broad River basin. There are two additional smaller dams (Cherokee Falls and Gaston Shoals) immediately upstream of the site on the Broad River; however, they possess less than 2 percent of the total storage capacity for the basin. Both of these dams are essentially run of river structures used for hydroelectric power and not flood control. Currently, Cherokee Falls Dam is not operating and is a low head structure without much volume/storage.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6580	WLS	Pt 02	FSAR 02	02.04.01.02.03.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.3.1, a new paragraph is inserted before the first paragraph and the first paragraph is revised, as follows: Make Up Pond C, shown in Figure 2.4.1-213, is located approximately 2 mi. west of the Lee Nuclear Station on London Creek in Cherokee County, South Carolina. Make Up Pond C is formed by construction of an earthen dam and saddle dikes that impound London Creek just upstream of the confluence with	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96,

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					Little London Creek. The Make Up Pond C dam crest elevation is 660 ft. above msl. A labyrinth spillway sets the normal pool elevation at 650 ft. above msl. Make Up Pond C has a drainage area of 2479 ac. At normal pool elevation, bathymetry exhibits a maximum depth of 116 ft., a total storage capacity of approximately 22,000 ac. ft., and a surface area of approximately 620 ac. Make Up Pond C water is used to supplement the Lee Nuclear Station during low flow conditions. The useable storage is approximately 17,500 ac. ft. Lake Whelchel is located approximately 8 mi. northwest of the Lee Nuclear Site on Cherokee Creek in Cherokee County, South Carolina. This Lake Whelchel dam is an earthen design that was constructed in 1964 and modified in 1989. The dam height is 61 ft. and the length is 2100 ft. The dam creates a reservoir that is owned by and used as a water supply source for Gaffney, South Carolina. The dam and associated reservoir are owned and operated by the city of Gaffney. The normal pool elevation of the reservoir is 670 ft. above msl (Table 2.4.1 205). The reservoir has a surface area of approximately 177 ac. and a normal storage of approximately 2438 ac. ft. The maximum storage of Lake Whelchel at the dam crest elevation of 685 ft. is approximately 5698 ac. ft. No hydroelectric power plant is associated with this dam.	RAI 2680. WLG2009.12-03
6581	WLS	Pt 02	FSAR 02	02.04.01.02.05.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.5.1, the first paragraph is revised as follows: The Lee Nuclear Site is located on the west bank of the Broad River approximately 3 mi. south southeast (downstream) of Cherokee Falls and 1 mi. north northwest (upstream) of the Ninety Nine Islands Dam and Hydroelectric Station. Surface water in the vicinity of the Lee Nuclear Site consists of the Broad River, three on site man made impoundments, and one off site man made impoundment. These features are discussed in detail in Subsections 2.4.1.2.2.6 and 2.4.1.2.3.1. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.1.2.5.1, the last paragraph is revised as follows: The plant water use is discussed in Subsection 2.4.1.1.4. Table 2.4.1 210 and Table 2.4.1 211 present raw water use and effluent discharge as a percentage of Broad River flow rates. The maximum consumption rate of Broad River water, predominantly resulting from evaporation during plant operations, is expected to be 63 cfs, approximately 3 percent of the average annual mean discharge of the Broad River (approximately 2500 cfs).	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6582	WLS	Pt 02	FSAR 02	02.04.02.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.2.2, the last paragraph is revised as follows: The maximum flood level at the Lee Nuclear Station is elevation 584.8 ft. msl. This elevation would result from a PMF event on Make Up Pond B watershed with the added effects of coincident wind wave activity as described in Subsection 2.4.3. The Lee Nuclear Station safety related plant elevation is 590 ft. msl. The maximum flood level is identified as a site characteristic in Table 2.0 201.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
5615	WLS	Pt 02	FSAR 02	02.04.02.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.2.3, Effects of Local Intense precipitation, third paragraph, will be revised to read: To analyze the effects of local intense precipitation, the site was divided into four drainage areas (northwest, northeast, southwest, southeast) based on the contours of the grading and drainage plan. Each area was modeled using the U.S. Army Corps of Engineers HEC-RAS version 3.1.3 (Reference 273) (standard-step, backwater analysis) computer software. Cross sections for each of the four areas were determined based on the grading and drainage plan and flows were modeled under steady state conditions. Buildings were modeled to obstruct flow and were not assumed to provide any storage. Tailwater elevations for the Broad River, Make-Up Pond B, and Make-Up Pond A correspond with the higher of the peak PMF water surface elevation provided in Subsection 2.4.3 or the peak dam failure water surface elevation provided in Subsection 2.4.4. A Manning's roughness coefficient, n = 0.025, was used for the paved or gravel surfaces. A Manning's roughness coefficient, n =0.050 was used for the grass surfaces.	Duke Energy response to RAI LTR 72, RAI 02.04.02-003. WLG2009.07-04
6583	WLS	Pt 02	FSAR 02	02.04.02.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.2.3, the thirteenth paragraph is revised as follows: The AP1000 plant design is based on a PMP of 20.7 in/hr. As shown in Figure 2.4.2 203, the site is within the plant design limits for PMP. The PMP is identified as a precipitation site characteristic in Table 2.0	Duke Energy Submittal on Hydrology - Offsite

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					201. Roofs are sloped to preclude ponding of water.	Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6584	WLS	Pt 02	FSAR 02	02.04.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3, a new heading and paragraph are inserted after the last paragraph as follows: London Creek/Make Up Pond C The Make Up Pond C reservoir is located on a tributary of the Broad River, west of the Lee Nuclear Station, as shown in Figure 2.4.1 213, but is not adjacent to the Lee Nuclear Station. However, the PMF for London Creek and Make Up Pond C is determined for combination with dam failure permutations as discussed in Subsection 2.4.4.1. The PMF is determined from the PMP for the 3.87 sq. mi. drainage basin of Make Up Pond C. The Make Up Pond C drainage basin is shown in Figure 2.4.3 239.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6585	WLS	Pt 02	FSAR 02	02.04.03.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.1, the third through fifth paragraphs are revised as follows: HMR 52 is used to determine spatial and temporal distribution of PMP estimates derived from HMR 51. The recommended elliptical isohyetal pattern from HMR 52, shown in Figure 2.4.3 202, is used for the watershed. The watershed model contains 20 subbasins and is shown in Figure 2.4.3 203. The Lake Whelchel and Make Up Pond C subbasins were not included in the existing study for Ninety Nine Islands Dam. Both the Lake Whelchel and Make Up Pond C watersheds are contained within the original subbasin labeled BR 15. Therefore, appropriate modifications were made to subbasin BR 15 to accommodate subbasins for Lake Whelchel and Make Up Pond C. HMR 52 computer software (Reference 271), developed by the U.S. Army Corps of Engineers (USACE), is used to determine the optimum storm size and orientation to produce the greatest PMP over the entire basin using the HMR 51 derived DAD table. The HMR 52 recommended temporal distribution is also used and provided by the HMR 52 computer software. Several storm centers were examined and the critical storm center was found to be near the centroid of the watershed for Gaston Shoals Dam, located upstream of Ninety Nine Islands Dam based on the runoff model discussed in Subsection 2.4.3.3. The critical storm area was found to be 1000 sq. mi., corresponding to isohyet I in Figure 2.4.3 202. The critical storm orientation was found to be 270 degrees. Refer to Figure 2.4.1 205 for structure locations and watershed. The critical 72 hr. storm PMP rainfall total is 25.48 in. for the entire watershed. The corresponding temporal arrangement of 6 hr. precipitation increments is provided in Table 2.4.3 202. The hourly temporal distribution of the 72 hr. PMP rainfall of each of the 20 subbasins is provided in Table 2.4.3 203. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.1, the ninth through eleventh paragraphs are revised as follows: McKowns Creek /Make-Up Pond B The PMP for McKowns Creek and Make Up Pond B is defined in Subsection 2.4.2.3. Two storms were modeled on the basis of the PMP curve detailed in Table 2.4.2 203 and Figure 2.4.2 203. The total PMP depth of the 72 hr. duration storm is 46.8 in. A 6 hr. storm with a 5 min. precipitation interval was examined to capture the effect of the short term, high intensity on the peak flow. In addition, a 72 hr. storm with a 1 hr. precipitation interval was examined to identify the total runoff volume of a PMP event. Several time distributions were examined for both modeled events. For the 72 hr. storm, an end peaking storm event was found to provide the greatest runoff. For the 6 hr. storm, a two thirds peaking storm event was found to provide the greatest runoff. However, an end peaking storm event was found to provide the controlling water surface elevation as discussed in Subsection 2.4.3.5. Hyetographs are provided in Figure 2.4.3 204 and Figure 2.4.3 205 for the two thirds peaking storm events. Hyetographs are provided in Figure 2.4.3 235 and Figure 2.4.3 236 for the end peaking storm events. Intermittent Stream/Make Up Pond A	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					The PMP for the intermittent stream and Make Up Pond A is defined in Subsection 2.4.2.3. Two storms were modeled on the basis of the PMP curve detailed in Table 2.4.2 203 and Figure 2.4.2 203. The total PMP depth of the 72 hr. duration storm is 46.8 in. A 6 hr. storm with a 5 min. precipitation interval was examined to capture the effect of the short term, high intensity on the peak flow. In addition, a 72 hr. storm with a 1 hr. precipitation interval was examined to identify the total runoff volume of a PMP event. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.1, a new heading and paragraphs are inserted after the last paragraph as follows: London Creek/Make Up Pond C The PMP for London Creek and Make Up Pond C is defined in Subsection 2.4.2.3. The storm is modeled on the basis of the 72 hr. PMP curve detailed in Table 2.4.2 203 and Figure 2.4.2 203. The total PMP depth of the 72 hr. duration storm is 46.8 in. The 72 hr. PMP storm is combined with an antecedent storm equal to 40 percent of the PMP. Therefore, the complete sequential storm considered includes a 3 day, 40 percent PMP event followed by a 3 day dry period, which is followed by the 3 day full PMP event. Several time distributions were examined for the PMP event using a 1 hr. precipitation interval. An end peaking storm event was found to provide the greatest discharge and water surface elevation at Make Up Pond C. The hyetograph is provided in Figure 2.4.3 240.	
6586	WLS	Pt 02	FSAR 02	02.04.03.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.2, a new paragraph is inserted after the first paragraph as follows: The SCS Curve Number method was also used to determine precipitation losses for the Lake Whelchel subbasin and the Make Up Pond C subbasin, The NRCS Web Soil Survey (Reference 299 and Reference 300) was used to determine hydrologic soil group values. Aerials and USGS information were used to determine land-use and impervious cover. An average antecedent moisture condition (AMC II) was also used to compute a weighted curve number for the subbasin. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.2, the fourth paragraph is revised as follows: The precipitation loss rate is variable and decreases as cumulative rainfall increases during the storm. The total precipitation depth, losses, and excess for each subbasin are provided in Table 2.4.3 204. Antecedent precipitation is 40 percent of the PMP, preceding the main storm for 3 days, with a 3 day dry period between. During the antecedent storm, precipitation losses account for between 37 and 74 percent of the total rainfall with an average of 53 percent. During the main storm, precipitation losses only account for between 3 to 22 percent with an average of 9 percent. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.2, a new heading and paragraphs are inserted after the last paragraph as follows: London Creek/Make Up Pond C Precipitation losses are incorporated into the USACE HEC HMS model, as discussed in Subsection 2.4.3.3, using the SCS Curve Number method as previously described for the Broad River. The NRCS Web Soil Survey (Reference 299) was used to determine hydrologic soil group values. Aerials and USGS information were used to determine land-use and impervious cover. An average antecedent moisture condition (AMC II) was then used to compute a weighted curve number for the watershed. The SCS Curve Number loss model collectively includes interception, infiltration, storage, evaporation, and transpiration. Initial losses and precipitation losses are derived as previously described for the Broad River. The precipitation loss rate is variable and decreases as cumulative rainfall increases during the storm. Most losses occur during the antecedent precipitation as identified in the hyetograph, Figure 2.4.3 240. The total precipitation depth is 65.52 in., including the antecedent storm. Precipitation losses account for 4.57 in. resulting in 60.95 in. of precipitation converted to runoff.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6587	WLS	Pt 02	FSAR 02	02.04.03.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.3, the first and second paragraphs are revised, and new paragraphs are inserted after the second paragraph, as follows: Broad River	Duke Energy Submittal on Hydrology - Offsite

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					The Broad River runoff and stream course model is based on an existing HEC 1 study (Reference 217) and modified to include the antecedent rainfall conditions. The watershed in Figure 2.4.1 205 was divided into 20 subbasins as shown in Figure 2.4.3 203. The watershed is predominately identified as Piedmont, as discussed in Subsection 2.4.1.2.1. Referencing Figure 2.4.3 203, subbasins labeled LS 1, LA 2, LL 4, CC 16, 2BR 19, and USS 18A correspond to mountainous areas and foothills of the Blue Ridge Mountains. Topographic characteristics of the Broad River watershed are also discussed in Subsection 2.4.1.2.2. The USACE HEC HMS, Version 3.0.1 (Reference 272), modeling software was used for rainfall runoff and routing calculations. Figure 2.4.3 206 shows the HEC HMS model watershed routing layout. Unit hydrographs for all subbasins except Make Up Pond C were derived from the techniques described in the regional unit hydrograph study for South Carolina, which was performed by the USGS (Reference 203). The USGS study uses a multiple regression analysis to describe regional unit hydrographs with an adjusted lag time, based on each region of the study. For the HEC 1 study, the unit hydrographs were subsequently converted to 1 hr. durations. Methods adopted to account for nonlinear basin response at high rainfall rates include increasing the peak of each unit hydrograph by 20 percent and reducing the time to peak by approximately 33 percent. The remaining ordinates of the modified unit hydrographs were adjusted to maintain smooth unit hydrographs with the standard characteristic of 1 in. of runoff. To accommodate the Lake Whelchel subbasin and the Make Up Pond C subbasin, the BR 15 subbasin unit hydrograph was also modified based on the decrease in drainage area. The resulting unit hydrographs for 19 of the subbasins except Make Up Pond C are presented in Figure 2.4.3 207, Figure 2.4.3 208, and Figure 2.4.3 209 and tabulated in Table 2.4.3 205. For the Make Up Pond C subbasin, the SCS unit hydrograph method was used as a basis for a modified unit hydrograph to transform rainfall to runoff and account for nonlinear basin response. An equivalent SCS unit hydrograph was first determined using the equations and ratios of the SCS dimensionless unit hydrograph. The equivalent SCS unit hydrograph was then modified by increasing the peak of the unit hydrograph by 20 percent and reducing the time to peak by approximately 33 percent. The remaining ordinates of the modified unit hydrograph were adjusted to maintain a smooth unit hydrograph with the standard characteristic of 1 in. of runoff. The best calibration of the modified SCS unit hydrograph with the initial SCS unit hydrograph was found using a 10 min. computational time step in the HEC HMS modeling software. Therefore, the time step used to define the ordinates of the modified SCS unit hydrograph is also 10 min. The Make Up Pond C subbasin has a lag time of 77 min. The initial SCS unit hydrograph and modified unit hydrograph to account for the effects of nonlinear basin response are provided in Figure 2.4.3 241. The modified SCS unit hydrograph is tabulated in Table 2.4.3 207. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.3, new paragraphs are inserted before the fifth paragraph, the fifth and sixth paragraphs are revised, and the seventh paragraph is deleted, as follows: The Lake Whelchel discharge rating curve is based on a riser with outlet pipe and spillway configuration. The riser maintains the normal pool elevation of 670 ft. The outlet pipe through the dam is a 48 in. concrete pipe. The spillway elevation varies from 680 ft. to 683 ft. The Lake Whelchel rating curve is presented in Figure 2.4.3 238. Lake Whelchel was modeled using a full-pond starting elevation. The Make Up Pond C discharge rating curve is based on the designed 4 cycle labyrinth spillway rating curve. Each cycle has a lateral width of 20 ft. The spillway crest elevation is 650 ft. Sensitivity analyses were performed based on a 10 percent increase and decrease of the designed labyrinth spillway rating curve. The Make Up Pond C rating curve is presented in Figure 2.4.3 242. Make Up Pond C was modeled using a full pond starting elevation. The entire watershed and individual subbasin unit hydrographs of the existing HEC 1 study were verified using three significant storm events occurring in October 1964, June 1972, and October 1976. Base flow separation was estimated by evaluating semilog plots of each storm event and confirmed with historical daily mean flows at USGS gauging locations. Several USGS gauges are located throughout the	Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					watershed. Subbasin input parameters, including the modified BR 15 subbasin, Lake Whelchel subbasin, and Make Up Pond C subbasin, are listed in Table 2.4.3 206. The exponential recession method is used to model baseflow. The Lake Whelchel subbasin and the Make Up Pond C subbasin use the same baseflow characteristics as the BR 15 subbasin with an adjusted recession threshold based on the ratio of drainage areas for the two subbasins. Snowmelt is not considered to be a factor in modeling the PMF event, as described in Subsection 2.4.3.1. To assure HEC HMS model calibration with the existing study, the HEC HMS model was first examined using the existing HEC 1 model inputs without antecedent conditions or the modifications for the addition of the Lake Whelchel subbasin and the Make Up Pond C subbasin. The results were satisfactorily comparable. The HEC HMS model was then examined using the modifications for the addition of the Lake Whelchel subbasin and the Make Up Pond C subbasin and the PMP with antecedent rainfall conditions. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.3, the tenth through fourteenth paragraphs are revised as follows: The HEC RAS model is based on the existing study's NWS DAMBRK model. To assure HEC RAS model calibration, the HEC RAS model was examined using the DAMBRK input and without antecedent conditions. The results were satisfactorily comparable. Hydrographs from the HEC HMS analysis, including antecedent rainfall and accounting for nonlinear basin response, were then used as inflow to the HEC RAS model. Lateral inflows representing local flow between Gaston Shoals Dam and Ninety Nine Islands Dam were also included in the model. Input hydrographs are shown in Figure 2.4.3 218, Figure 2.4.3 219, Figure 2.4.3 220, Figure 2.4.3 221, Figure 2.4.3 243, and Figure 2.4.3 245. McKowns Creek/Make Up Pond B For McKowns Creek and Make Up Pond B, HEC HMS modeling software was used for rainfall runoff and storage routing calculations. The watershed is shown in Figure 2.4.3 201. Methods adopted to account for nonlinear basin response at high rainfall rates include increasing the peak of the unit hydrograph by 20 percent and reducing the time to peak by approximately 33 percent. Topographic characteristics of the site and watershed are described in Subsection 2.4.1.2.1. The Soil Conservation Service (SCS) unit hydrograph method was used as a basis for a modified unit hydrograph to transform rainfall to runoff. An equivalent SCS unit hydrograph was first determined using the equations and ratios of the SCS dimensionless unit hydrograph. The equivalent SCS unit hydrograph was then modified by increasing the peak of the unit hydrograph by 20 percent and reducing the time to peak by approximately 33 percent. The remaining ordinates of the modified unit hydrograph were adjusted to maintain a smooth unit hydrograph with the standard characteristic of 1 in. of runoff. The best calibration of the modified SCS unit hydrograph with the initial SCS unit hydrograph was found using a 10 min. computational time step in the HEC HMS modeling software. Therefore, the time step used to define the ordinates of the modified SCS unit hydrograph is also 10 min. The Make Up Pond B subbasin has a lag time of 77 min. The initial SCS unit hydrograph and modified unit hydrograph to account for the effects of nonlinear basin response are provided in Figure 2.4.3 237. The modified SCS unit hydrograph is tabulated in Table 2.4.3 208. The drainage area, length of watercourse, and average slope of the watershed were determined from aerial topography created for the area. The lag time was determined using the standard SCS curve number regression equation: Tlag = (L0.8 * (S+1)0.7) / (1900 * Y0.5) where Tlag = lag time (hr.) L = hydraulic length of the watershed (ft.) S = maximum potential storage of the watershed (in.); where S = 1000/CN 10 and CN = average curve number for the watershed Y = average watershed land slope (percent)	

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					The resulting characteristic parameters for the watershed are as follows: Drainage Area (sq. mi.) L (ft.) CN S (in.) Y (%) Tlag (hr.) 2.55 10,320 87 1.49 1.60 1.28 The curve number is used to determine the lag time only. During rainfall routing, the model does not use the curve number loss method, under the conservative assumption that precipitation losses do not occur. The curve number was developed using the NRCS Web Soil Survey (Reference 278) to determine the soil types in the watershed. About 95 percent of the soil belongs to Hydrologic Soil Group B, and the remaining 5 percent to Hydrologic Soil Group C. The land use is predominately wooded. Make Up Pond B is modeled as impervious cover. Wet antecedent moisture conditions (AMC III) were also assumed. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.3, the seventeenth through twentieth paragraphs are revised as follows: Intermittent Stream/Make Up Pond A For the intermittent stream and Make Up Pond A, HEC HMS modeling software was used for rainfall runoff calculations. The watershed is shown in Figure 2.4.3 201. The following analysis for Make Up Pond A does not account for nonlinear basin response at high rainfall rates. During severe flooding events, Make Up Pond A is inundated by backwaters of the Broad River. Broad River flooding coincident with dam failures, as discussed in Subsection 2.4.4, exceeds the maximum flooding elevation for Make Up Pond A. Therefore, coincident wind wave activity for Make Up Pond A is based on flooding from the Broad River. By incorporating the Broad River analysis to determine the maximum water surface elevation, the Make Up Pond A coincident wind wave evaluation accounts for nonlinear basin response at high rainfall rates as discussed above. Topographic characteristics of the site and watershed are described in Subsection 2.4.1.2.1. The SCS unit hydrograph method was used to transform rainfall to runoff. The drainage area, length of watercourse, and average slope of the watershed were determined from aerial topography created for the area. The lag time was determined using the standard SCS curve number regression equation: Tlag = (L0.8 * (S+1)0.7) / (1900 * Y0.5) where Tlag = lag time (hr.) L = hydraulic length of the watershed (ft.) S = maximum potential storage of the watershed (in.); where S = 1000/CN 10 and CN = average curve number for the watershed Y = average watershed land slope (percent) The resulting characteristic parameters for the watershed are as follows: Drainage Area (sq. mi.) L (ft.) CN S (in.) Y (%) Tlag (hr.) 0.60 3340 92 0.87 3.48 0.29 The curve number is used to determine the lag time only. During rainfall routing, the model does not use the curve number loss method, under the conservative assumption that precipitation losses do not occur. The curve number was developed using the NRCS Web Soil Survey (Reference 278) to determine the soil types in the watershed. About 95 percent of the soil belongs to Hydrologic Soil Group B, and the remaining 5 percent to Hydrologic Soil Group C. The land use is predominately industrial. Make Up Pond A is modeled as impervious cover. Wet antecedent moisture conditions (AMC III) were also assumed. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.3, a new heading and paragraphs are inserted after the last paragraph as follows: London Creek/Make Up Pond C For London Creek and Make Up Pond C, HEC HMS modeling software was used for rainfall runoff calculations. The watershed is shown in Figure 2.4.3 239. The SCS unit hydrograph method was used as a basis for a modified unit hydrograph to transform rainfall to runoff and account for nonlinear basin response. As discussed above for the Make Up Pond C subbasin in the Broad River watershed, an equivalent SCS unit hydrograph was first determined using the equations and ratios of the SCS dimensionless unit hydrograph. The equivalent SCS unit hydrograph was then modified by increasing the peak of the unit hydrograph by 20 percent and reducing the time to peak by approximately 33 percent. The remaining ordinates of the modified unit hydrograph were adjusted to maintain a smooth unit	

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					hydrograph with the standard characteristic of 1 in. of runoff. The best calibration of the modified SCS unit hydrograph with the initial SCS unit hydrograph was found using a 10 min. computational time step in the HEC HMS modeling software. Therefore, the time step used to define the ordinates of the modified SCS unit hydrograph is also 10 min. The initial SCS unit hydrograph and modified unit hydrograph to account for the effects of nonlinear basin response are provided in Figure 2.4.3 241. The modified SCS unit hydrograph is tabulated in Table 2.4.3 207. The drainage area, length of watercourse, and average slope of the watershed were determined from aerial topography created for the area. The lag time was determined using the standard SCS curve number regression equation: Tlag = (L0.8 * (S+1)0.7) / (1900 * Y0.5) Where: Tlag = lag time (hr.) L = hydraulic length of the watershed (ft.) S = maximum potential storage of the watershed (in.); where S = 1000/CN 10 and CN = average curve number for the watershed Y = average watershed land slope (percent) The resulting characteristic parameters for the watershed are as follows: Drainage Area (sq. mi.) L (ft.) CN S (in.) Y (%) Tlag (min.) 3.87 5393 63.9 5.65 2.23 77 The curve number was developed using the NRCS Web Soil Survey (Reference 299) to determine the soil types in the watershed. About 87.4 percent of the soil belongs to Hydrologic Soil Group B, 10.4 percent belonging to Hydrologic Soil Group C, and the remaining 2.2 percent to Hydrologic Soil Group C/D and D. The land use is predominately wooded, grassland, and large lot residential. The watershed contains approximately 27.8 percent impervious cover, including Make Up Pond C and Lake Cherokee. Average antecedent moisture conditions (AMC II) were used, along with the 40 percent PMP antecedent rainfall. Base flow was determined based on the Broad River watershed BR 15 subbasin. The recession baseflow method was used with an initial discharge per area of 1.63 cfs/sq. mi. and a recession constant of 0.4919. The recession threshold was calculated to be 23 cfs based on a ratio of the Make Up Pond C and BR 15 subbasin drainage areas. The Make Up Pond C discharge rating curve is based on the designed 4 cycle labyrinth spillway rating curve. Each cycle has a lateral width of 20 ft. The spillway crest elevation is 650 ft. Sensitivity analyses were performed based on a 10 percent increase and decrease of the designed labyrinth spillway rating curve. The Make Up Pond C rating curve is presented in Figure 2.4.3 242. Available storage was determined based on aerial topography. Figure 2.4.3 244 provides the storage capacity curve. A full pond elevation of 650 ft. msl was assumed for antecedent conditions.	
6588	WLS	Pt 02	FSAR 02	02.04.03.04	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.4, the first and second paragraphs are revised as follows: Broad River Applying the precipitation, described in Subsection 2.4.3.1, and the precipitation losses, described in Subsection 2.4.3.2, to the runoff model, described in Subsection 2.4.3.3, the peak PMF discharge at the Lee Nuclear Station was determined to be 823,212 cfs resulting from the 1000 sq. mi. storm centered near the centroid of the Gaston Shoals Dam drainage basin. The resulting flow hydrograph at the Lee Nuclear Station is shown in Figure 2.4.3-226. Temporal distribution of the PMP and storm location is discussed in Subsection 2.4.3.1. Inclusion of upstream and downstream river structures is discussed in Subsection 2.4.3.3. Dam failures are discussed in Subsection 2.4.4. No credit is taken for the lowering of flood levels at the site due to downstream dam failure. McKowns Creek/Make Up Pond B Applying the precipitation, described in Subsection 2.4.3.1, with no precipitation losses, described in Subsection 2.4.3.2, to the runoff model, described in Subsection 2.4.3.3, the McKowns Creek and Make Up Pond B peak PMF runoff was determined to be 20,784 cfs resulting from the 6 hr. two thirds peaking	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					storm event. The routed peak discharge is 7457 cfs. However, the 72 hr. end peaking storm event resulting in a peak PMF runoff of 19,376 cfs and a routed discharge of 8430 cfs provided the controlling water surface elevation. The resulting flow hydrograph for the 72 hr. end peaking storm event is shown in Figure 2.4.3 227. Temporal distribution of the PMP is discussed in Subsection 2.4.3.1. Because the watershed is small, the position of the PMP is considered point rainfall affecting the entire watershed equally. There are no upstream structures. No credit is taken for the lowering of flood levels at the site due to downstream dam failure. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.4, a new heading and paragraph are inserted after the last paragraph as follows: London Creek/Make Up Pond C Applying the precipitation, described in Subsection 2.4.3.1, and the precipitation losses, described in Subsection 2.4.3.2, to the runoff model, described in Subsection 2.4.3.3, the London Creek and Make Up Pond C peak PMF runoff providing the highest water surface elevation from the 72 hr. end peaking storm event was determined to be 29,167 cfs. The routed peak discharge is 10,577 cfs. Temporal distribution of the PMP is discussed in Subsection 2.4.3.1. Because the watershed is small, the position of the PMP is considered point rainfall affecting the entire watershed equally. The upstream Lake Cherokee watershed was incorporated into the Make Up Pond C watershed. Therefore, Lake Cherokee was assumed to pass runoff flow without any detention. No credit is taken for the lowering of flood levels at the Lee Nuclear Station due to downstream dam failure.	
6589	WLS	Pt 02	FSAR 02	02.04.03.05	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.5, the first and second paragraphs are revised as follows: Broad River Subsection 2.4.4.3 addresses coincident wind wave activity for the Broad River. The maximum Lee Nuclear Station flood elevation is 551.49 ft. resulting from the 1000 sq. mi. storm centered near the centroid of the Gaston Shoals Dam drainage basin. Subsection 2.4.3.3 describes the models used to translate the PMP discharge to the elevation hydrograph. The resulting elevation hydrograph at the Lee Nuclear Station is shown in Figure 2.4.3 229. The maximum flood elevation is well below the station's safety related plant elevation of 590 ft. McKowns Creek/Make Up Pond B Subsection 2.4.3.6 addresses coincident wind wave activity for Make Up Pond B. The maximum water surface elevation of Make Up Pond B, resulting from the 6 hr. two thirds peaking storm event modeled with a 5 min. time step, was found to be 583.70 ft. The elevation hydrograph is provided in Figure 2.4.3-230. The maximum water surface elevation of Make Up Pond B resulting from the 72 hr. end peaking storm event modeled with a 10 min. time step was found to be 584.48 ft. The elevation hydrograph is provided in Figure 2.4.3 231. Subsection 2.4.3.3 describes the models used to translate the PMP discharge to the elevation hydrographs. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.5, a new heading and paragraph are inserted after the last paragraph as follows: London Creek/Make Up Pond C The Make Up Pond C reservoir is located on a tributary of the Broad River, west of the Lee Nuclear Station, as shown in Figure 2.4.1 213, but is not adjacent to the Lee Nuclear Station. However, the PMF for London Creek and Make Up Pond C is determined for the purpose of combination with dam failure permutations as discussed in Subsection 2.4.4.1. Because the PMF discharge flow from Make Up Pond C is bounded by the Broad River watershed PMF, spillover from Make Up Pond C during a PMF event is not a limiting event for flooding at the Lee Nuclear Station when taken as an isolated event. For reference to the dam failure permutations, the maximum water surface elevation of Make Up Pond C, resulting from the 72 hr storm modeled with a 10 min. time step, was found to be 656.68 ft. Subsection 2.4.3.3 describes the models used to translate the PMP discharge to elevation.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6590	WLS	Pt 02	FSAR 02	02.04.03.06	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.6, the fourth and fifth paragraphs are revised as follows:	Duke Energy Submittal on

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					McKowns Creek/Make-Up Pond B Wind wave activity on Make-Up Pond B is evaluated coincident with the maximum water surface elevation of the PMF as discussed in Subsection 2.4.3.5. The determined critical fetch length of 1.48 mi. is shown in Figure 2.4.3-234. The 2-year annual extreme mile wind speed is adjusted based on the factors of fetch length, level overland or over water, critical duration, and stability. The critical duration is approximately 36 min. The adjusted wind speed is 50.22 mph. Significant wave height (average height of the maximum one-third of waves) is estimated to be 2.07 ft., crest to trough. The maximum wave height (average height of the maximum 1 percent of waves) is estimated to be 3.44 ft., crest to trough. The corresponding wave period is 2.2 sec. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.3.6, the last paragraph is revised, and a new heading and paragraph are inserted after the last paragraph, as follows: The 0.66 percent slopes along the banks of Make Up Pond B adjacent to the site are used to determine the wave setup and runup. The maximum runup, including wave setup, is estimated to be 0.26 ft. The maximum wind setup is estimated to be 0.08 ft. Therefore, the total wind wave activity is estimated to be 0.34 ft. The PMF and the coincident wind wave activity results in a flood elevation of 584.8 ft. msl. The Lee Nuclear Station safety related plant elevation is 590 ft. msl and is unaffected by flood conditions and coincident wind wave activity. London Creek/Make Up Pond C The Make Up Pond C reservoir is located on a tributary of the Broad River, west of the Lee Nuclear Station, as shown in Figure 2.4.1 213, such that wind wave activity has no consequence to the Lee Nuclear Station. However, a postulated failure of the Make Up Pond C dam would release water to the Broad River prior to reaching the Lee Nuclear Station. A failure of the Make Up Pond C dam coincident with the PMF is discussed in Subsection 2.4.4.1, and flooding effects as a result of wind wave activity are bounded by that discussion.	Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6591	WLS	Pt 02	FSAR 02	02.04.04	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.4, is revised as follows: The guidance in Appendix A of NRC Regulatory Guide 1.59, Rev. 2, Design Basis Floods for Nuclear Power Plants, was followed in evaluating potential dam failures, by applying the guidance of American National Standards Institute/American Nuclear Society 2.8 1992, Determining Design Basis Flooding at Power Reactor Sites (Reference 202). The Upper Broad River drainage basin above Ninety Nine Islands Dam derives water from several tributaries that contain a considerable number of dams. According to the U.S. Army Corps of Engineers (USACE), National Inventory of Dams, there are approximately 131 upstream dams, not including Make Up Pond C, and five of those have been breached (Reference 276). Most of the dams in the drainage basin have small to insignificant storage capacity. The six largest reservoirs in the basin represent about 88 percent of the total storage capacity for the basin. Two additional dams, Cherokee Falls and Gaston Shoals, located immediately upstream from the Lee Nuclear Station, possess less than 2 percent of the total storage capacity for the basin. Make Up Pond B and Make Up Pond A are located at elevations much lower than the Lee Nuclear Station's safety related facilities. Failure of these water features would result in a discharge to smaller ponds and then directly to the Broad River. The respective volumes are small compared to the available capacity of the Broad River and the freeboard available at the site. Failure of the on site reservoirs would not affect the safety related facilities. Make Up Pond C is located on a tributary of the Broad River, west of the Lee Nuclear Station. As described below, the critical dam failure evaluation coincident with the PMF for the Broad River watershed includes the assumed overtopping failure of Make Up Pond C. Assumed overtopping dam failure coincident with the PMF for the Make Up Pond C watershed has also been evaluated, but does not exceed the maximum flood elevation associated with the Broad River critical dam failure event and, thus, is	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					bounded by the critical dam failure event. Therefore, there are no safety related structures that could be affected by flooding due to a Make Up Pond C dam failure. The described studies have been made solely to ensure the safety related facilities of the Lee Nuclear Station are protected against floods caused by the assumed failure of dams. The postulated dam failure events do not infer or concede that the dams are unsafe. The critical dam failure event is the assumed overtopping failures of Lake Lure Dam, Tuxedo Dam, Turner Shoals Dam, Lake Whelchel Dam, Kings Mountain Reservoir Dam, and Make Up Pond C Dam, including the dam at Lake Cherokee, coincident with the probable maximum flood (PMF). The resulting flow rate and water surface elevation at the station is provided in the discussion below. There are no safety related structures that could be affected by flooding due to dam failure. All elevations provided in this subsection are above mean sea level.	
6592	WLS	Pt 02	FSAR 02	02.04.04.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.4.1, the seventh paragraph is revised as follows: Cherokee Falls and Gaston Shoals An overtopping breach of Gaston Shoals, coincident with the PMF, results in a flow of 824,000 cfs and a water surface elevation of 551.52 ft. at the Lee Nuclear Station. Overtopping breaches of both Gaston Shoals and Cherokee Falls, coincident with the PMF, result in the same flow and water surface elevation. Because of the small reservoir volumes and large PMF discharge, the dam failures have little effect on the resulting flow and water surface elevations. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.4.1, new paragraphs are inserted after the eleventh paragraph as follows: Lake Whelchel is located approximately 8 mi. northwest of the Lee Nuclear Station on Cherokee Creek in Cherokee County, South Carolina. The dam at Lake Whelchel, built in 1964, is a compacted earth fill structure approximately 2100 ft. long and 61 ft. high. The dam crest elevation is 685 ft. A riser and 48 in. concrete pipe outlet works sets the normal pool elevation at 670 ft. The spillway is 565 ft. long and varies in elevation from 680 ft. to 683 ft. Lake Whelchel has an estimated storage capacity of approximately 2438 ac. ft. at normal water surface elevation. Make Up Pond C is located approximately 2 mi. west of the Lee Nuclear Station on London Creek in Cherokee County, South Carolina. Make Up Pond C is formed by construction of an earthen dam and saddle dikes that impound London Creek just upstream of the confluence with Little London Creek. The Make Up Pond C dam crest elevation is 660 ft. A labyrinth spillway sets the normal pool elevation at 650 ft. The designed 4 cycle labyrinth spillway has a lateral width of 20 ft. per cycle. The dam is 132 ft. high. The impounded reservoir has an estimated storage capacity of approximately 22,000 ac. ft. at normal water surface elevation. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.4.1, the thirteenth paragraph is revised, and new paragraphs are inserted after the thirteenth paragraph, as follows: Kings Mountain Reservoir Dam, the Lake Whelchel Dam, and the Make Up Pond C Dam are not expected to be overtopped based on the PMF analysis with antecedent storm conditions. However, overtopping failure is postulated for this analysis, and dam failures have been calibrated to occur coincident with the PMF peak flood wave in order to maximize water surface elevations. Lake Cherokee is located just upstream of Make Up Pond C on a tributary of London Creek in Cherokee County, South Carolina. The dam is a compacted earth fill structure approximately 940 ft. long, 40 ft. high and has an estimated maximum storage capacity of 720 ac. ft. The dam at Lake Cherokee is assumed to fail by overtopping based on the full height of the structure. The peak failure flow is derived using the HEC HMS dam failure equation identified below. No tailwater elevation was assumed, maximizing the head difference and breach outflow. The peak outflow is added to the PMF peak flood	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					wave for the Make Up Pond C watershed to maximize the Make Up Pond C dam failure. Qmax = 1.7 * Wb * h1.5 + 1.35 * S * h2.5 Where: Qmax = peak outflow (cfs) Wb = width of breach (ft.) h = smaller of the head difference between the reservoir interior water surface elevation and the tailwater surface elevation, or head difference between the reservoir interior water surface elevation and the breach bottom invert elevation (ft.) S = side slope of the breach COLA Part 2, FSAR, Chapter 2, Subsection 2.4.4.1, the fourteenth paragraph is revised, and a new paragraph is inserted after the fourteenth paragraph, as follows: Embankment breach characteristics are based on the USACE RD 13 (Reference 250). Failure development time for embankment sections is estimated to occur from 0.5 to 4 hr. Breach width for embankment sections is estimated to be from 0.5 to 3 times the dam height. Side slopes for an embankment breach are estimated to be from 0:1 to 1:1 (horizontal:vertical). To maximize the peak outflow a breach width of 3 times the dam height was used along with 1:1 side slopes and the shortest failure development time of 0.5 hr. Sensitivity was also performed based on the time of failure for the various structures. Additionally, several failure times were examined based on the peak outflow time at Ninety Nine Islands Dam. Using the same breach parameters as discussed above, all structures were assumed to fail simultaneously, rather than individually based on the peak flood wave at each dam. It was determined that the critical dam failure scenario occurred when all dams failed simultaneously with a failure time near to the peak PMF outflow at Ninety Nine Islands Dam. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.4.1, the fifteenth paragraph is revised, the sixteenth through eighteenth paragraphs are deleted, and a new heading and paragraphs are inserted after the eighteenth paragraph, as follows: The multiple failures due to overtopping, coincident with the PMF, result in a peak flow of approximately 1,720,000 cfs. The peak flow is determined using the HEC HMS model discussed in Subsection 2.4.4.2. Make Up Pond C Dam Assumed overtopping dam failure of the Make Up Pond C Dam has also been evaluated coincident with a more intense PMF confined to the smaller Make Up Pond C watershed as described in Subsection 2.4.3. As previously discussed, failure of the dam at Lake Cherokee was also included to maximize the peak dam failure outflow from Make Up Pond C. The Make Up Pond C peak dam failure outflow was combined with the maximum historical flow recorded on the Broad River at Gaffney, identified in Table 2.4.2 201, to account for any coincidental flow in the Broad River. However, the resulting combined peak outflow of 1,307,000 cfs does not exceed the critical dam failure event for the Broad River watershed previously described. Therefore, even if routed to the Lee Nuclear Station without attenuation, the resulting water surface elevation would not exceed the elevation determined from the critical multiple dam failure scenario coincident with the Broad River watershed PMF.	
6593	WLS	Pt 02	FSAR 02	02.04.04.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.4.3, the first and second paragraphs are revised as follows: The methods and models used to determine the resulting water surface elevation are described above and in Subsection 2.4.3. Model verification and reliability is also discussed above and in Subsection 2.4.3. The HEC RAS model, as described above, was used to model a resulting steady state flow of 1,720,000 cfs to determine the water surface elevation at the station. The resulting water surface elevation at the Lee Nuclear Station is 573.26 ft. The maximum flood	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					elevation is well below the station's safety related plant elevation of 590 ft. The resulting water surface elevation of the dam failure analysis using HEC HMS and HEC RAS was compared with the resulting water surface elevations of the PMF analysis using HEC HMS and HEC RAS. The comparison is provided in Table 2.4.4 201. Given the significant freeboard remaining at the site, a full unsteady flow analysis to determine dam breach flows and resulting water surface elevations with greater precision was determined to be unnecessary. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.4.3, the fourth paragraph is revised, the fifth paragraph is deleted, and the sixth through ninth paragraphs are revised, as follows: Broad River Wind wave activity on the Broad River is evaluated coincident with the maximum water surface elevation of the PMF including the effects of dam failures as discussed above. The determined fetch length of 2.77 mi., shown in Figure 2.4.4 201, has a runup slope of 46 percent. The PMF including effects of dam failures and the coincident wind wave activity results in a flood elevation of 582.35 ft. msl. The Lee Nuclear Station safety related plant elevation is 590 ft. msl and is unaffected by flood conditions and coincident wind wave activity. A more critical wind wave activity result was determined considering a fetch length through Make Up Pond A, which becomes inundated by backwaters of the Broad River during severe flooding events. Therefore, the critical wind wave activity for the Broad River is equal to the wind wave activity for Make Up Pond A, as discussed below. Intermittent Stream/Make Up Pond A During severe flooding events, Make Up Pond A is inundated by backwaters of flooding of the Broad River. Therefore, wind wave activity on Make Up Pond A is evaluated coincident with the maximum water surface elevation of the PMF on the Broad River including the effects of dam failures as discussed above. The determined critical fetch length of 2.69 mi. is shown in Figure 2.4.4 202. The 2 year annual extreme mile wind speed is adjusted based on the factors of fetch length, level overland or over water, critical duration, and stability. The critical duration is approximately 53 min. The adjusted wind speed is 49.9 mph. Significant wave height (average height of the maximum 33 1/3 percent of waves) is estimated to be 2.76 ft., crest to trough. The maximum wave height (average height of the maximum 1 percent of waves) is estimated to be 4.59 ft., crest to trough. The corresponding wave period is 2.6 sec. The 53 percent slopes along the banks of Make Up Pond A adjacent to the site are used to determine the wave setup and runup. The maximum runup, including wave setup, is estimated to be 9.45 ft. The maximum wind setup is estimated to be 0.08 ft. Therefore, the total wind wave activity is estimated to be 9.53 ft. The PMF including effects of dam failures and the coincident wind wave activity results in a flood elevation of 582.79 ft. msl for Make Up Pond A and the Broad River. The Lee Nuclear Station safety related plant elevation is 590 ft. msl and is unaffected by flood conditions and coincident wind wave activity. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.4.3, a new heading and paragraph are inserted after the tenth paragraph as follows: London Creek/Make Up Pond C The Make Up Pond C reservoir is located on a tributary of the Broad River, west of the Lee Nuclear Station, as shown in Figure 2.4.1 213, such that a postulated failure of the Make Up Pond C dam would release water to the Broad River prior to reaching the Lee Nuclear Station. Failure of the Make Up Pond C dam coincident with the PMF for the Make Up Pond C watershed is discussed in Subsection 2.4.4.1. Flooding effects as a result of dam failure due to wind wave activity are bounded by that discussion.	
6594	WLS	Pt 02	FSAR 02	02.04.05	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.5, the last paragraph under the heading "Make Up Pond A" is revised as follows: The slopes along the banks of Make Up Pond A adjacent to the site area are approximately 52 percent at	Duke Energy Submittal on Hydrology - Offsite Water

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					most and are used to determine the wave setup and runup. The maximum runup, including wave setup, is estimated to be 6.40 ft. The maximum wind setup is estimated to be 0.08 ft. Therefore, the total water surface elevation increase due to high speed wind wave activity is estimated to be 6.48 ft. The resulting flood elevation is 562.55 ft. The Lee Nuclear Station safety related plant elevation is 590 ft. and is unaffected by high speed wind wave activity flooding conditions. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.5, the third and fifth paragraphs under the heading "Make Up Pond B" are revised as follows: The slopes along the banks of Make Up Pond B adjacent to the site area are approximately 9 percent and are used to determine the wave setup and runup. The maximum runup, including wave setup, is estimated to be 3.28 ft. The maximum wind setup is estimated to be 0.21 ft. Therefore, the total water surface elevation increase due to high speed wind wave activity is estimated to be 3.49 ft. The resulting flood elevation is 579.71 ft. The Lee Nuclear Station safety related plant elevation is 590 ft. and is unaffected by high speed wind wave flooding conditions. Based on bathymetry mapping, an average depth of 29.81 ft. is determined for Make Up Pond A and used as the depth of water. The resulting natural fundamental period is 2.1 min. The Make Up Pond B average depth is 33.05 ft. The resulting natural fundamental period is 6.5 min. The wave periods determined above (1.8 sec. and 2.6 sec.) are much shorter than the natural fundamental period for both water bodies (2.1 min. and 6.5 min.). Furthermore, natural fundamental periods are significantly shorter than meteorologically induced wave periods (e.g., synoptic storm pattern frequency and dramatic reversals in steady wind direction necessary for wind setup). Since the natural periods of Make Up Pond A and Make Up Pond B are significantly different than the period of the excitations, they are not susceptible to meteorologically induced seiche waves. Seismically induced waves are discussed in Subsection 2.4.6. COLA Part 2, FSAR, Chapter 2, Subsection 2.4.5, a new heading and paragraph are inserted after the last paragraph as follows: Make Up Pond C The Make Up Pond C reservoir is located on a tributary of the Broad River, west of the Lee Nuclear Station, as shown in Figure 2.4.1 213, such that a postulated failure of the Make Up Pond C dam would release water to the Broad River prior to reaching the Lee Nuclear Station. Failure of the Make Up Pond C dam coincident with the PMF for the Make Up Pond C watershed is discussed in Subsection 2.4.4.1. Flooding effects as a result of dam failure due to surge and seiche are bounded by that discussion.	Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6595	WLS	Pt 02	FSAR 02	02.04.06	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.6, a new heading and paragraph are inserted after the last paragraph as follows: Make Up Pond C The Make Up Pond C reservoir is located on a tributary of the Broad River, west of the Lee Nuclear Station, as shown in Figure 2.4.1 213, such that a postulated failure of the Make Up Pond C dam would release water to the Broad River prior to reaching the Lee Nuclear Station. Failure of the Make Up Pond C dam coincident with the PMF for the Make Up Pond C watershed is discussed in Subsection 2.4.4.1. Flooding effects as a result of dam failure due to seismic or landslide induced waves are bounded by that discussion.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6596	WLS	Pt 02	FSAR 02	02.04.11.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.11.1, the second and third paragraphs are revised as follows: The Upper Broad River drainage basin above the Ninety Nine Islands Dam derives water from several smaller tributaries that contain a considerable number of dams. According to the U.S. Army Corps of Engineers National Inventory of Dams, there are approximately 132 upstream dams of which five dams have been breached (Reference 276). Therefore, the water volume available during low flow conditions on the Broad River is a function of natural flow in contributing rivers and streams, available storage capacity of upstream reservoirs, and regulated discharge flow from upstream dams.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					Dam failure could affect normal operation during low flow conditions. Failure of Ninety Nine Islands Dam would drain the associated reservoir. In this portion of the Broad River, flow would resemble a function of natural flow. However, there are no safety related facilities that could be affected by low flow or drought conditions, since the passive cooling system does not rely on the Broad River as a source of water. If necessary, the make up ponds can be used to supplement natural flow to support continued operations for additional periods of time. Non safety related water supply during drought is addressed in Subsection 2.4.11.5.	
6597	WLS	Pt 02	FSAR 02	02.04.11.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.11.3, the first paragraph is revised as follows: Low flow conditions at the site were analyzed based on stream flow records at USGS gauging stations on the Broad River (Reference 290). Low flow conditions typically exist during the months of July through November. The six largest reservoirs in the basin, Lake Lure, Lake Summit, Lake Adger, Kings Mountain Reservoir, Lake Whelchel, and Make Up Pond C represent about 88 percent of the total storage capacity for the basin. Two additional dams, Cherokee Falls and Gaston Shoals, immediately upstream from the Lee Nuclear Site, possess less than 2 percent of the total storage capacity for the basin.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6598	WLS	Pt 02	FSAR 02	02.04.11.05	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.11.5, the second through sixth paragraphs are revised as follows: The normal river intake flow rate for the station is approximately 35,000 gpm. The maximum expected river intake flow is approximately 60,000 gpm. Institutional restraints on water use are imposed by Federal and State agencies as discussed. Title 40 Code of Federal Regulations Part 125 Section 84 requires that for cooling water intake structures located in a freshwater river or stream, the total design intake flow must be no greater than five percent of the source water annual mean flow. Water use and annual mean flow are discussed in Subsection 2.4.1.2.5.1 and Subsection 2.4.1.2.2.2. The South Carolina Code of Laws Title 49 Chapter 23 Part 40 identifies that during a drought declaration, the use of water from a managed watershed impoundment shall not be restricted as long as minimum streamflow or flow equal to the 7Q10 is maintained, whichever is less. Make Up Pond B and Make Up Pond C are expected to be used to supplement flow during periods of low flow. The 7Q10 for the Gaffney gauge was determined to be 439 cfs using the USGS recommended Log Pearson Type III distribution. However, because the 7Q10 is less than the Ninety Nine Islands Dam FERC license minimum flow requirement of 483 cfs for July through November (Subsection 2.4.11.3), the FERC license minimum flow was used as a constraint in evaluating operation during low flow conditions. Furthermore, FERC license minimum flow requirements are more restrictive than the 100 year drought flow rates described in Subsection 2.4.11.3 and Table 2.4.11 203. Therefore, the following low flow analysis applies to the discussion of nonsafety related water supply during a 100 year drought. A low flow analysis was performed based on the FERC licensed 483 cfs minimum flow requirements at Ninety Nine Islands Dam and the Lee Nuclear Station consumptive use requirements. Consumptive use is estimated to be approximately 55 cfs. When flows in the Broad River drop below 538 cfs, combined FERC licensed 483 cfs minimum flow plus 55 cfs consumptive use, makeup water to the station is supplemented by on site water storage, Make Up Pond B and off site Make Up Pond C. When flows in the Broad River drop below 483 cfs, the station relies only on Make Up Pond B and Make Up Pond C storage for consumptive uses of the station. Detailed bathymetry mapping of the on site Make Up Pond B (Figure 2.4.1 209 Sheet 2) and Make Up Pond A (Figure 2.4.1 209 Sheet 3) was performed in September 2006. Make Up Pond A is designed for a normal full pond elevation of 547 ft. Based on current topography Make Up Pond A retains a volume of 1425 ac. ft. The usable storage is approximately 1200 ac. ft. Make Up Pond B is designed for a normal full pond elevation of 570 ft. Based on current topography, Make Up Pond B retains a volume of approximately 4000 ac. ft. The usable storage is approximately 3200 ac. ft.Make Up Pond C is designed for a normal full pond elevation of 650 ft. Based on the bathymetry shown in Figure 2.4.1-213, Make Up Pond C retains a volume of approximately 22,000 ac. ft.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					The usable off-site storage capacity is approximately 17,500 ac. ft. The total usable storage capacity of Make Up Pond B and Make Up Pond C is approximately 20,700 ac. ft. Make Up Pond C has sufficient capacity to support full power operation for approximately 160 days. Make Up Pond B has sufficient capacity to support full power operations for approximately 30 days. There are no safety related water requirements for normal plant shutdown associated with the AP1000. Make Up Pond A nominally provides for approximately 1200 ac. ft. of usable water storage. Make Up Pond A has sufficient capacity to conduct a normal plant shutdown and to maintain shutdown conditions for both units. Make Up Pond A can be replenished with water from the Broad River, from Make Up Pond B, and from Make Up Pond C via Make Up Pond B.	
5631	WLS	Pt 02	FSAR 02	02.04.12.02.03	COLA Part 2, FSAR Chapter 2, Subsection 2.4.12.2.3 will be revised to read: 2.4.12.2.3 Current On-Site Conditions In March 2006, the current groundwater investigation was initiated as part of the subsurface study to evaluate hydrogeologic conditions for the Lee Nuclear Site. The dewatering of the existing excavation preceded the subsurface investigation, thus returning the site to hydrogeologic conditions similar to those of the previous construction phase. Approximately 740 million gal. of water were removed from the excavation from December 19, 2005, through September 7, 2006. Following the initial dewatering, an apparent 5-foot thick interval of staining was observed on the existing Cherokee concrete structures, the top of which was surveyed at an elevation of 578.72 ft. msl. Given the range of apparent water table fluctuations as indicated by the concrete staining (574 – 579 ft msl), the hydrostatic equilibrium elevation for the excavation area was estimated to be the midpoint of the range (576.5 ft. msl). A comparison of the apparent water levels in this impoundment, as shown on the February 1994 and February 2005 aerial photographs, with the topographic survey conducted in 2006 indicated a similar range of water levels in the excavation area (574 ft. msl in 1994 to 579 ft. msl in 2005). Precipitation data for the period preceding these observations indicated near normal conditions, confirming the aerial images captured typical impoundment water levels. Ongoing maintenance dewatering activities are expected to end following construction activities. As part of the 2006-2007 groundwater investigation, fifteen borings were drilled into the crystalline bedrock, and monitoring wells were installed in partially weathered rock intervals. In July 2006, nine additional monitoring wells were installed to evaluate shallow groundwater conditions across the site. Details regarding well construction are presented in Table 2.4.12-201. Following well development, water levels were measured monthly from April 2006 to April 2007 (Table 2.4.12-202) to characterize seasonal trends in groundwater levels and to identify flow pathways surrounding the Lee Nuclear Site. The hydrograph for this groundwater data is presented on Figure 2.4.12-203. Surface waters at four locations were also gauged as part of the monitoring program. These locations included Make-Up Pond B, a water retention impoundment below Make-Up Pond B, Make-Up Pond A, and Hold-Up Pond A. Based on this year of study, groundwater levels were observed to fluctuate with the highest groundwater elevations observed between January and April 2007 and the lowest groundwater elevations between September and November 2006. This trend correlates with both the river flow and rainfall patterns and confirms that both groundwater levels and river flow are governed by local precipitation (Section 2.3). Potentiometric surface maps developed from water level data showed that during the recent construction dewatering and site investigation, groundwater surrounding the excavation is drawn toward the excavation (Figure 2.4.12-204, Sheets 1- 7). During the dewatering activities, continuous decline of water levels in areas downgradient of the excavation was observed, as recharge entering the power block area from the south was intercepted by the excavation and discharged to Make-Up Pond B. Following the completion of construction dewatering, the potentiometric surface beneath the reactor buildings is expected to rebound to equilibrium conditions. Under natural conditions the topography of the water table within the Piedmont mimics the topography of	Duke Energy Response to RAI LTR 70, RAI 02.04.12-018. WLG2009.07-09

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					the land surface, but has less relief. Cross-sections of the Lee Nuclear Site are presented in Figure 2.4.12-205, Sheets 1 - 4. These figures depict the relationship between groundwater beneath the site and the surface water bodies surrounding the site. Groundwater flow in the Piedmont province is typically restricted to the topographic area underlying the slope that extends from a divide to an adjacent stream. Both regionally and locally, surface topography plays a dominant role in groundwater occurrence. Post-construction topography was observed to affect groundwater conditions such that cuts in topography induce a lowered water table and fill induces a raised water table. Field evidence for this is based on comparison between the Cherokee water table map (Figure 2.4.12-201) and the maps developed from the Lee Nuclear Site investigation (Figure 2.4.12-204, Sheet 1-7). For example, MW-1204, located on the Unit #2 Cooling Tower Pad, is where construction fill was placed during Cherokee construction, resulting in a significantly higher land surface elevation (approximately 610 ft. msl compared to its pre-grading elevation of around 560 ft. msl). Consequently, the water table elevation is higher in MW-1204: groundwater elevation of approximately 570 ft. msl compared with the former groundwater elevation of less than 550 ft. msl. Another example includes MW-1200, located west-northwest of Unit #1, where construction cuts resulted in a significantly lower land surface elevation (approximately 590 ft. msl compared to its pre-grading elevation of approximately 670 ft. msl). Consequently, the water table elevation has lowered (groundwater elevation of 565 ft. msl compared with the former groundwater elevation of more than 585 ft. msl). Upon returning to post-dewatering conditions, the water table is expected to mimic land surface, consistent with slope-aquifer conditions of the Piedmont physiographic province. The potentiometric surface beneath Lee Units 1 and 2 is expected to rebound to an elevation near the apparent hydrostatic equilibrium (576.5 ft. msl). Seasonal water table fluctuations, as observed at the site, do not exceed 5 to 10 ft. A conservative estimate of the post-construction maximum high groundwater elevation in the area of the excavation was established at 584 ft msl. The projected post-dewatering water table conditions are illustrated in Figure 2.4.12-204, Sheet 8. The potentiometric conditions shown in Figure 2.4.12-204, Sheet 8 affect the directions of groundwater flow surrounding the Lee Nuclear Station. Each of the ponds serves as constant head flow boundary. The crests of the water table indicate groundwater divides within the slope-aquifer system. These features indicate distinct compartments of groundwater flow at the site, with the nuclear site area flowing to the north toward the Broad River, the area west of the north divide flowing toward Make-Up Pond B, and the area east of the south divide flowing toward Make-up Pond A. Ultimately all groundwater flow discharge to the Broad River, the groundwater sink for the site and the surrounding area. Based on site observations, a network of storm drains and buried piping was partially installed during the Cherokee project to manage surface water runoff. While no as-built drawings for the existing storm drain system for the former Cherokee Nuclear Station exist, a review of stormwater plans was conducted to assess the drain system's potential effect on groundwater movement. Storm drains located upgradient (south) of the excavation appear to intercept the water table and allow movement of water toward the make-up ponds. Other storm drains appear to be above the water table and would not affect the movement of groundwater. One exception is a storm drain originally designed to transfer stormwater from the Cherokee power block area to Hold-Up Pond A. The depth of this storm drain pipe appears to be below the projected water table and, thus, if left as is could locally affect groundwater movement when groundwater recovers from the dewatering. The Lee Nuclear Station stormwater drainage system (DRS) is designed to facilitate and control the runoff of precipitation along surface water flow paths, diverting surface runoff away from the power block area and reducing the potential for flooding. The site grading and drainage plan is shown in Figure 2.4.2-202. The site is relatively flat; however, the site is graded such that overall runoff will drain away from safety-related structures to Make-Up Pond B, Make-Up Pond A, or directly to the Broad River. The DRS is not expected to directly affect groundwater flow system of the limiting groundwater flow pathway. Editorial changes:	

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					1. Subsection 2.4.12.2.3, sixth paragraph, fourth sentence is revised to remove '#' between 'Unit' and '2'; eighth sentence is revised to remove '#' between 'Unit' and '1'. 2. Subsection 2.4.12.2.3, ninth paragraph is revised to to reflect the change of 'discharge' as a noun to 'discharges' as a verb. 3. Subsection 2.4.12.2.3, tenth paragraph is revised to remove the hyphen to reflect 'overexcavation' as a single word.	
6498	WLS	Pt 02	FSAR 02	02.04.12.02.03	COLA Part 2, FSAR Chapter 2, Subsection 2.4.12.2.3. The next to final paragraph will be changed to read: Based on site observations, a network of storm drains and buried piping was partially installed during the Cherokee project to manage surface water runoff. While no as-built drawings for the existing storm drain system for the former Cherokee Nuclear Station exist, a review of stormwater plans was conducted to assess the drain system's potential affect on groundwater movement. Storm drains located more than 500 ft. upgradient (south) of the power block could potentially intercept the water table and allow shallow groundwater movement towards Make-Up Pond A: these drains do not affect groundwater movement in the power block area. Other storm drains appear to be above the water table and would not affect the movement of groundwater. One exception is a storm drain originally designed to transfer stormwater from the Cherokee power block area to Hold-Up Pond A. The depth of this storm drain pipe appears to be below the projected water table. Therefore, if left in place this conduit could potentially cause a preferential groundwater pathway from the power block area downgradient to Hold-Up Pond A once groundwater recovers from the construction dewatering activities. The existing storm drain and bedding materials will be removed by over-excavation. The remaining void will then be plugged with low-permeability backfill material, and compacted to density sufficient to assure no short-circuiting can occur. Editorial changes: 1. Subsection 2.4.12.2.3, next to last paragraph, third sentence is revised to reflect the replacement of 'affect' to 'effect' 2. Subsection 2.4.12.2.3, second to last paragraph, third sentence following 'Make-Up Pond A;' 'effect' is replaced by 'affect'.	Duke Energy Response to RAI LTR 73 RAI 02.04.12.02.03. WLG2009.11-05
5624	WLS	Pt 02	FSAR 02	02.04.12.02.04.01	COLA Part 2, FSAR Chapter 2, Subsection 2.4.12.2.4.1, will be revised to read: Site-specific subsurface materials in the area surrounding the power block include fill, residual soil, saprolite, and partially weathered rock. Based on the results of the geotechnical investigation, representative engineering properties of the soils were determined according to methods described in Subsection 2.5.4.2. Characterization of porosity and effective porosity were made using the data provided in Table 2.5.4-211. Fill materials are located in former drainage ways, which were built up to existing elevations during Cherokee construction. Based on the specific gravity (particle density, 2.71 grams per cubic centimeter, g/cc) and dry unit weight (101 pounds per cubic foot, pcf) provided for fill material, a mean total porosity of 40 percent was determined (Table 2.4.12-203). The effective porosity is assumed to be equivalent to specific yield, and was estimated using grain size distribution described within Water Supply Paper 1662-D (Reference 299). This technique indicates effective porosity was estimated to be 9 percent. Fill materials have been cut from other areas of the site, and they are typically comprised of undifferentiated materials (residual soils, saprolite and/or PWR) similar to native materials. The residual soils have undergone relatively complete weathering and lack the relict features found in the saprolite zone. Saprolite is the isovolumetrically weathered zone which does not reflect the characteristics of surficial soil development processes, but does reflect some of the physical properties of the underlying parent rock from which it was formed. According to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), surficial soils in the vicinity of the power block area consisted predominantly of Tatum silty clay loam and Tatum very fine sandy loam with variable slope and erosion (Figure 2.4.12-206). Tatum soils are well-drained (not seasonally saturated) and are typically derived from sericite schist, phyllite, and/or other related metamorphic rocks of the Piedmont. Tatum soils are typically composed of a surficial 0 - 8 in. silty clay loam or very fine sandy loam (CL, CL- ML, ML). These soil horizons grade subsoils of clay, silty clay, and/or silty clay loam (CH, MH). Clay content in the subsoil	Duke Energy Response to RAI LTR 70, RAI 02.04.12-016. WLG2009.07-09

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					stratum of Tatum soils ranges from 12 to 60 percent. Tatum soils transition at depths of 45-60 inches to saprolite materials reflecting the characteristics of the underlying parent rock. The saturated hydraulic conductivity of Tatum soils is reported by the NRCS to be moderately permeable: 4 to 14 micrometers per second (μm/s) (4 to 14 x 10-4 centimeters per second [cm/s]). Tatum soils are not prone to flooding and exhibit erosion factors (Kf) that range from 0.32 to 0.43. The soils are highly corrosive to both concrete and steel (Reference 278). Based on geotechnical analyses of the residual soil and saprolite, a mean total porosity of 45 percent was determined for these materials. The effective porosity was estimated to be approximately 20 percent. The native soils in the immediate area of the power block were essentially completely removed or mixed with deeper saprolite materials to become site fill materials during Cherokee-era activities. Regardless, knowledge of the natural properties of these surface soil materials is useful in understanding characteristics of site soils, and conditions in the undisturbed portions of the site. Partially weathered rock (PWR) is a transitional weathering zone between the saprolite and the hard, competent, underlying bedrock. The PWR materials are similar to the overlying saprolite zone, but include more fragments of less weathered and less porous rock. Partially weathered rock was conservatively estimated to have an effective porosity of 8 percent. This value is based on the free drainage (specific yield) represented by the difference between saturated unit weight (140 pcf) and the wet unit weight (135 pcf) . The total porosity of partially weathered rock, based on saturated unit weight, is estimated to be 27 percent. Editorial changes: 1. 2.4.12.2.4.1 first paragraph, first sentence is revised to reflect the addition of the acronym, PWR. 2. 2.4.12.2.4.1 second paragraph, first sentence is revised to form one compound word from 'drainage ways'; last sentence is revised to include a comma following 'saprolite'. 3. 2.4.12.2.4.1 last paragraph, first, second, and last sentences are revised to reflect the removal of the full form of the acronym, PWR.	
6755	WLS	Pt 02	FSAR 02	02.04.12.02.04.01	Subsection 2.4.12.2.4.1, second paragraph is revised to delete reference to Table 2.4.12-203.	Conforming change to groundwater analysis (WLG2009.12-12)
5628	WLS	Pt 02	FSAR 02	02.04.12.02.04.02	COLA Part 2, FSAR. Chapter 2, Subsection 2.4.12.2.4.2, second paragraph, is revised to read: During the Cherokee investigation in the early 1970's, 135 field and laboratory tests were conducted to characterize soil and rock permeability. Fifty-five packer tests were conducted in soil and rock intervals in 17 soil borings across the site. An additional 42 field and 38 laboratory tests were performed to evaluate soil permeability. The recent investigation supplements the above investigation with the performance of an additional 11 packer tests in bedrock materials, 16 slugout tests across the site, and one multi-well aquifer pump test performed within the limiting groundwater flow path (i.e. the flow path with the shortest time-of-travel) from the nuclear island area toward the Broad River to the north. COLA Part 2, FSAR. Chapter 2, Subsection 2.4.12.2.4.2, third paragraph, third bullet, is revised to read: Reported hydraulic conductivities measured in the partially weathered rock (PWR), or transition zone, range from approximately 9.67 x 10-7 cm/s to a maximum value of 9.89 x 10-3 cm/s with a median of 1.54 x 10-4 cm/s. For samples exceeding the median hydraulic conductivity of the data set, the geometric mean (1.0 x 10-3 cm/s) represents a conservative hydraulic conductivity value for the PWR transition zone across the site. Based on its thorough review of the properties of the PWR zone Duke asserts that a value of 1.4 x 10-3 cm/s is a scientifically-sound, conservative, and representative hydraulic conductivity value for PWR materials at the Lee site. This is the value obtained from aquifer tests in 2006 for an area believed to best represent the limiting groundwater flow path, and is used as the representative value of hydraulic conductivity for PWR. Figure 2.4.12-207 includes three PWR samples that were subsequently excavated in the area of the reactors. Editorial changes: 1. Subsection 2.4.12.2.4.2, third paragraph, third bullet, third sentence is revised to include a comma	Duke Energy Response to RAI LTR 70, RAI 02.04.12.02.04.02. WLG2009.07-09

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					between '-sound' and 'conservative,'.	
6757	WLS	Pt 02	FSAR 02	02.04.12.02.04.02	Subsection 2.4.12.2.4.2, second bullet, first sentence and second sentences respectively: '6.38 x 10-6' is reved to '1.14 x 10-5' and '3.2 x 10-4' is revised to '4.5 x 10-4'. Subsection 2.4.12.2.4.2, last bullet, second sentence, '1.03 x 10-3' is revised to '1.81x10-4'; last sentence, '1.81 x 10-4' is revised to '7.00 x 10-5' and '6.2 x 10 -4' is revised to '1.2 x 10-4'.	Conforming changes - Duke Energy Submittal on Hydrology - Offsite Water Storage. WLG2009.12-03
5625	WLS	Pt 02	FSAR 02	02.04.12.02.04.02	COLA Part 2, FSAR Chapter 2, Subsection 2.4.12.2.4.2, third paragraph, fourth bullet, will be revised to read: Values of hydraulic conductivity reported in the Cherokee-era studies represent the upper 100 ft. of the saturated interval. This undifferentiated aquifer zone is comprised of residual soil, saprolite, and partially weathered rock. The resultant hydraulic conductivity values range from 2.21 x 10-4 cm/s to 3.90 x 10-3 cm/s. These results are consistent with and support the recent findings of the Lee-era site investigation. These more recent studies determined the hydraulic conductivity of PWR, the most hydraulically conductive aquifer material, to be 1.4 x 10-3 cm/s.	Duke Energy Response to RAI LTR 70, RAI 02.04.12-016. WLG2009.07-09
5629	WLS	Pt 02	FSAR 02	02.04.12.03.01	COLA Part 2, FSAR. Chapter 2, Subsection 2.4.12.3.1, first paragraph, will be revised to read: The nature and depth of groundwater circulation in the Piedmont is predictably variable. This variability is a function of the singular aquifer system being comprised of weathered saprolite, partially weathered rock, and fractured bedrock, and the degree of interconnection of pores and fractures between these materials. Typical of the Piedmont, groundwater flow is from topographic positions (recharge areas) to the regional drainage features (discharge areas). Groundwater flow at this site likewise generally mirrors the surface topography, with strong gradients and flow paths from the power block area, northward to the Broad River.	Duke Energy Response to RAI LTR 70, RAI 02.04.12-017. WLG2009.07-09
6599	WLS	Pt 02	FSAR 02	02.04.12.03.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.12.3.1, a new paragraph is inserted after the last paragraph as follows: The impacts of construction and operation of Make Pond Up C within the London Creek watershed were evaluated and determined not to affect groundwater conditions beyond Little London Creek drainage way. Consequently, Make Up Pond C does not affect the groundwater flow regime at the Lee Nuclear Station, including the evaluation of hydrostatic loading (Subsection 2.4.12.5) or analyses of accidental releases of radioactive liquid effluents (Subsection 2.4.13).	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
5620	WLS	Pt 02	FSAR 02	02.04.12.03.02	COLA Part 2, FSAR Chapter 2, Subsection 2.4.12.3.2, 2nd, 3rd and 4th paragraphs, will be revised to read: After construction dewatering and the return to static conditions, the potentiometric surface in the area of the reactor buildings is expected to rebound to a maximum elevation of approximately 584 ft. msl. These conditions reflect the maximum anticipated groundwater level during operations. Travel distances for contaminants from postulated release points at the reactors to downgradient receptors were estimated from site information for each of five possible flowpaths. Although the aquifer is comprised principally of saprolite and PWR, the more conservative PWR values for hydraulic conductivity and effective porosity were used in the analysis of groundwater velocities. Estimated travel times for the five groundwater flow paths are as follows: • Pathway 1: Groundwater travels from Unit 2 to Hold-Up Pond A in approximately 1.35 years. • Pathway 2: From Unit 2 to the Broad River in approximately 2.35 years. • Pathway 3: From Unit 2 to Make-Up Pond A in approximately 4.04 years. • Pathway 4: From Unit 1 to the non-jurisdictional wetland area in approximately 4.86 years. • Pathway 5: From Unit 1 to Make-Up Pond B in approximately 5.06 years.	Duke Energy Response to RAI LTR 70, RAI 02.04.12-015. WLG2009.07-09 Estimated groundwater flow path travel times shown in the bullets are SUPERSEDED by QB 6656.

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					These flow paths are represented on Figure 2.4.12-208. This analysis indicates the limiting flow path for the evaluated postulated release to be from the Unit 2 radwaste storage tank to Hold-Up Pond A (Pathway 1, Figure 2.4.12- 205, Sheet 3).	
6656	WLS	Pt 02	FSAR 02	02.04.12.03.02	COLA Part 2, FSAR Chapter 2, Subsection 2.4.12.3.2, 3rd paragraph (bulleted material), will be revised as follows: • Pathway 1: Groundwater travels from Unit 2 to Hold-Up Pond A in approximately 1.5 years. • Pathway 2: From Unit 2 to the Broad River in approximately 2.5 years. • Pathway 3: From Unit 2 to Make-Up Pond A in approximately 4.2 years. • Pathway 4: From Unit 1 to the non-jurisdictional wetland area in approximately 4.7 years. • Pathway 5: From Unit 1 to Make-Up Pond B in approximately 5.5 years.	Duke Energy Response to RAI LTR 70 S1, RAI 02.04.12-015. WLG2009.12-12 These estimated travel times for groundwater flow paths supersede QB 5620.
5621	WLS	Pt 02	FSAR 02	02.04.12.03.03	COLA Part 2, FSAR Chapter 2, Subsection 2.4.12.3.3, 2nd paragraph is revised to read: Most domestic wells in the vicinity of the Lee Nuclear Site are completed as either shallow bored wells, or deeper drilled wells. Shallow bored wells are usually completed in the saprolite zone, typically no deeper than 75 ft. Deeper drilled wells are installed in the PWR and fractured bedrock zones. Both types of wells generally have yields of 5-10 gpm, or less. Using these conditions, provides a conservative estimate of the potential reach of a typical domestic well producing at full capacity. Assuming the hydraulic conductivities are consistent with partially weathered rock, as listed in Table 2.4.12-204, the radius of influence is approximately 1700 ft. (0.32 mi.) from these wells. The lateral area of influence of the dewatered excavation is approximately 500 ft. (0.095 mi.).	Duke Energy Response to RAI LTR 70, RAI 02.04.12-015. WLG2009.07-09
5797	WLS	Pt 02	FSAR 02	02.04.12.04	Subsection 2.4.12.4, last paragraph is revised as follows: "...Subsection 12AA.5.4.13." to read "...Subsection 12AA.5.4.14."	Editorial
5622	WLS	Pt 02	FSAR 02	02.04.12.05	COLA Part 2, FSAR. Chapter 2, Subsection 2.4.12.5, first paragraph, will be revised, to read: According to the AP1000 Design Control Document (DCD), the design maximum groundwater elevation is 2 ft. below yard grade elevation. The Lee Nuclear Station plant elevation is 590.0 ft. above msl and the yard grade is 589.5 ft. above msl; therefore, the design maximum groundwater elevation is 587.5 ft. above msl. The maximum static groundwater level anticipated in the vicinity of Units 1 and 2 power blocks during operations is expected to be a maximum of 584 ft. msl. (Figure 2.4.12-204, Sheet 8). The hydrostatic loading is not expected to exceed design criteria. An unsaturated zone of at least 5 ft. below grade level will be maintained during operations. The installation and operation of a permanent dewatering system is not a facility design requirement. Editorial change: 1. Subsection 2.4.12.5, second sentence is revised to reflect a semi-colon following 'msl'.	Duke Energy Response to RAI LTR 70, RAI 02.04.12.05. WLG2009.07-09
6503	WLS	Pt 02	FSAR 02	02.04.13.01	COLA Part 2, FSAR Chapter 2, Subsection 2.4.13.1, beginning with the third paragraph, will be revised to read: Historical and projected groundwater flow paths were evaluated in Subsection 2.4.12 to characterize groundwater movement from the nuclear island area to a point of exposure. Groundwater at the Lee Site exists as a single, undifferentiated aquifer, comprised of soil, saprolite, partially weathered rock (PWR), competent bedrock and to a limited extent, fill soils. Although the projected groundwater flow paths travel through zones with saprolite, fill, and PWR, the more conservative hydrogeologic characteristics of PWR were used in both the determination of the limiting groundwater flow path and as inputs. where appropriate, into the RESRAD-OFFSITE model. Using the PWR characteristics for hydraulic conductivity, bulk density, and effective porosity, the flow path from the Unit 2 effluent hold-up tank to Hold-Up Pond A is assumed to be the limiting pathway of radionuclide migration, with the shortest (i.e. most rapid) travel time to a surface water body. For purposes of this analysis, because the spillway and dam of Hold-Up Pond A are proximal to the Broad River, entry concentrations at Hold-Up Pond A are assumed to be entry concentrations at the Broad River. This direct conveyance to the Broad River thus provides for no additional retardation, hold-up, or restrictions to transport between Hold-Up Pond A and the Broad River.	Duke Energy Response to RAI LTR 73, RAI 02.04.13-029. WLG2009.11-05

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					Figures 2.4.12-204, Sheet 8 and 2.4.12-205, Sheet 3 depict subsurface conditions that control the movement of groundwater beneath the Lee Nuclear Station. While groundwater functions as the transport media for fugitive radionuclides, interaction of individual radionuclides with the soil matrix can potentially delay their movement. The solid/liquid distribution coefficient, Kd, is, by definition, an equilibrium constant that describes the process wherein a species (e.g., a radionuclide) is partitioned between a solid phase (soil, by adsorption or precipitation) and a liquid phase (groundwater, by dissolution). Soil properties affecting the distribution coefficient include the texture of soils (sand, loam, clay, or organic soils), the organic matter content of the soils, pH values, the soil solution ratio, the solution or pore water concentration, and the presence of competing cations and complexing agents. Because of its dependence on many soil properties, the value of the distribution coefficient for a specific radionuclide in soils can range over several orders of magnitude under different conditions. The measurement of distribution coefficients of radionuclides within the limiting groundwater pathways allows further characterization of the rate of movement of fugitive radionuclides in groundwater. Soil and groundwater samples were collected from Monitoring Wells MW-1208 and MW-1210 located on the north and south sides of the nuclear island (Figure 2.4.12-205, Sheet 1). Three soil samples were collected from the saturated zone at depths ranging from 45 to 73 ft. below ground level. The samples were submitted for laboratory analysis of soil distribution characteristics for specific radiological isotopes (Co-60, Cs-137, Fe-55, 1-129, Ni-63, Pu-242, Sr-90, Tc-99, U-235). Results of these analyses are presented in Table 2.4.13-201, along with default Kd values found in literature, for comparison. For conservatism, those radionuclides which had been evaluated for site-specific distribution coefficients used the lowest measured Kd values in the evaluation, regardless of the media from which the samples were collected. The values are adjusted to the low limit of their reporting range, (e.g. for a reported Cs-137 value of 1156+/- 163 cm3/g, a value of 993 cm3/g was used in the analysis). All other radionuclides use the most conservative Kd value of 0. Editorial changes: 1. Subsection 2.4.13.1, third paragraph, third sentence the full form of the acronym PWR is removed; fourth sentence an extra space is removed following 'conductivity'; fifth sentence a hyphen is added to reflect 'hold-up' and a comma is added between '(i.e., and most rapid)'; sixth sentence a hyphen is added to reflect 'hold-up'. 2. Subsection 2.4.13.1 last paragraph, first sentence is revised to reflect title case on 'Monitoring Wells'; last sentence a comma is added between '(eg., for a reported..'.	
5630	WLS	Pt 02	FSAR 02	02.04.13.01	COLA Part 2, FSAR. Chapter 2, Subsection 2.4.13.1, fourth paragraph, will be revised to read: While groundwater functions as the transport media for fugitive radionuclides, interaction of individual radionuclides with the soil matrix can potentially delay their movement. The solid/liquid distribution coefficient, Kd , is, by definition, an equilibrium constant that describes the process wherein a species (e.g., a radionuclide) is partitioned between a solid phase (soil, by adsorption or precipitation) and a liquid phase (groundwater, by dissolution). Soil properties affecting the distribution coefficient include the texture of soils (sand, loam, clay, or organic soils), the organic matter content of the soils, pH values, the soil solution ratio, the solution or pore water concentration, and the presence of competing cations and complexing agents. Because of its dependence on many soil properties, the value of the distribution coefficient for a specific radionuclide in soils can range over several orders of magnitude under different conditions. The measurement of distribution coefficients of radionuclides within the limiting groundwater pathway allows further characterization of the rate of movement of fugitive radionuclides in groundwater.	Duke Energy Response to RAI LTR 70, RAI 02.04.12-017. WLG2009.07-09
6504	WLS	Pt 02	FSAR 02	02.04.13.02	COLA Part 2, FSAR Chapter 2, Subsection 2.4.13.2, first paragraph will be revised to read: 2.4.13.2 Accident Scenario The limiting postulated failure of a Unit 2 effluent holdup tank, located in the Unit 2 auxiliary building, is analyzed to estimate the resulting concentration of radioactive contaminants entering Hold-Up Pond A via groundwater flow. Contaminant concentrations at this point are then assumed to represent entry concentrations to the surface water receptor, the Broad River, which is located proximal to Hold-Up Pond A.	Duke Energy Response to RAI LTR 73, RAI 02.04.13-029. WLG2009.11-05

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					The event is defined as an unexpected and uncontrolled release of radioactive water produced by plant operations from a tank rupture. The AP1000 tanks which normally contain radioactive liquid are listed in Table 2.4.13-202. The contents from the effluent holdup tank are conservatively assumed to enter the environment instantaneously, allowing radionuclides to be transported in the direction of groundwater flow. The flow path from Unit 2 to Hold-Up Pond A is determined to be the limiting pathway based on travel time.	
6505	WLS	Pt 02	FSAR 02	02.04.13.03	COLA Part 2, FSAR Chapter 2, Subsection 2.4.13.3 will be revised to read: The radioactive source term is: • Tritium source term concentration is 1.0 microcuries per gram taken from DCD Table 11.1-8; • Corrosion product source terms Cr-51, Mn-54, Mn-56, Fe-55, Fe-59, Co-58, and Co-60 taken from DCD Table 11.1-2; • Other isotope source terms taken from DCD Table 11.1-2 multiplied by 0.12/0.25 to adjust the radionuclide concentrations to the required 0.12 percent failed fuel fraction outlined in Branch Technical Position 11-6, March, 2007: and • Gaseous state nuclides and nuclides with short half-lives not included in the RESRAD default library are removed from consideration as they have no impact on the evaluation. These radionuclides include: • Ba-137m Br-83 Br-85 I-131 I-133 Kr-83m Kr-85 Kr-85m Kr-87 Kr-88 Kr-89 Rh-106 Te-131 Te-131m Xe-131m Xe-133 Xe-133m Xe-135 Xe-137 Xe-138 Analysis of failure of the effluent holdup tank of Unit 2 rather than Unit 1 is conservative in that the pathway from the Unit 2 effluent holdup tank to Hold-Up Pond A has the shortest (i.e. most rapid) travel duration, assuming conservative PWR characteristics along the entire flow path. As discussed in Subsection 2.4.12, dewatering activities are currently occurring at the site. After construction is complete, dewatering activities will end. The conceptual model of radionuclide transport through groundwater, from Unit 2 to Hold-Up Pond A, is shown in Figure 2.4.12-205 (Sheet 3). As stated in Subsection 2.4.13.1, a direct conveyance between Hold-Up Pond A and the Broad River is assumed. With the failure of the effluent holdup tank and subsequent liquid release to the environment, radionuclides enter the subgrade soils at an elevation of 33 feet 6 inches below the surrounding grade. The contaminated zone is therefore, a volume of contaminated soil for which the effective porosity is saturated with contaminated water released from the liquid effluent holdup tank. The contaminated zone soil is assumed to exhibit PWR characteristics. Because RESRAD-OFFSITE considers soil at the source of the contamination, the liquid initial source term concentrations were converted to an equivalent concentration on a soil mass basis. Currently, the overburden soils continually receive the average annual onsite precipitation. In general, the precipitation that does not runoff or is not lost to evapotranspiration infiltrates the overlying unsaturated zone and contributes to groundwater as recharge. However, as an additional conservative measure in the model, runoff was assumed to be zero, and precipitation not lost to evapotranspiration was treated by RESRAD-OFFSITE as recharge. Editorial Changes: 1. Subsection 2.4.13.3, 2nd paragraph, first sentence is revised to include a comma following "(i.e.,....". 2. Subsection 2.4.1.3., last paragraph, last sentence is revised to include a comma following "...was assumed to be zero,.."	Duke Energy Response to RAI LTR 73, RAI 02.04.13-029. WLG2009.11-05
6600	WLS	Pt 02	FSAR 02	02.04.13.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.13.3, a new paragraph is inserted after the first full paragraph as follows: The impacts of construction and operation of Make Up Pond C within the London Creek watershed were evaluated and determined not to affect groundwater conditions beyond Little London Creek drainage way. Consequently, Make Up Pond C does not affect the groundwater flow regime at the Lee Nuclear Station	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements

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					and therefore has no impact on the transport paths and accidental release analyses discussed in this subsection.	ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6506	WLS	Pt 02	FSAR 02	02.04.13.04	COLA Part 2, FSAR Chapter 2, Subsection 2.4.13.4 will be revised to read: 2.4.13.4 Conceptual Model The conceptual model assumes that one of the liquid effluent tanks, located at the lowest level of the auxiliary building, ruptures while containing 80% of its total capacity. The liquid is assumed to be released in accordance with Branch Technical Position 11-6 of NUREG-0800. The liquid from the ruptured tank would flood the tank room and proceed to the auxiliary building radiologically controlled area sump by way of the floor drains. The sump pumps are assumed to be inoperable to create a bounding case. The liquid then enters the environment outside the auxiliary building. The consequence is a release of 22,400 gallons of contaminated liquid into the soil. The liquid is transported via groundwater flow to the surface water receptor, the Broad River. Because Hold-Up Pond A is the surface water body with the shortest (i.e. most rapid) groundwater transport time, assuming PWR characteristics, the model calculates radionuclide concentrations in a hypothetical well at the edge of this pond. The dam and spillway of Hold-Up Pond A are proximal to the Broad River. This model then assumes that concentrations in Hold-Up Pond A are immediately conveyed to the Broad River, without any additional intermediate retardation, hold-up, or transport restrictions between Hold Up-Pond A and the Broad River. The conceptual model then assumes the liquid is diluted in the Broad River reservoir upstream of the Ninety-Nine Islands Dam. This is conservative because the nearest potable water supply using the Broad River surface water is located approximately 21 miles downstream from the postulated release point, at the City of Union public water supply. Concentrations are modeled for an evaluation period of 1,000 years. The conceptual model is conservative because it provides for the shortest (i.e., most rapid) travel time to a surface water body, even though that surface water body is not the receptor body, and it also includes faulting the limiting tank. The analysis uses conservative estimates for parameters that are not developed from site-specific data. In addition, site-specific inputs to the model are also conservative, including the use of the lowest Kd values and the assumption that all groundwater pathways traveled through geo-media with the porosity and conductivity properties of PWR. Values used as inputs in the model are shown in Table 2.4.13-203. The straight line flow path is used, which is also conservative as actual groundwater pathways are more tortuous, have longer transport times , and lower hydraulic conductivities for the fractures and joints. Radionuclide concentrations in the hypothetical well at the edge of Hold-Up Pond A and in the Broad River at the Ninety-Nine Islands Dam are modeled using RESRAD-OFFSITE (Reference 212). The model considers the effects of different transport rates for radionuclides and progeny nuclides, while allowing radioactive decay during the transport process. The concentration of each radionuclide transmitted to the Broad River is determined by the transport through the groundwater system, dilution by groundwater and infiltrating surface water from the overburden soils, adsorption, and radioactive decay. Radionuclide decay during transport by groundwater occurs and is considered in the analysis. Radionuclide transport by groundwater is assumed to be affected by adsorption by the surrounding soils. As discussed in Subsection 2.4.12, the soils surrounding the auxiliary building at the elevation of the liquid release are modeled as having the porosity and hydraulic conductivity characteristics of PWR. The saturated zone dispersion values are set to mimic infusion, rather than injection, of the contaminated liquid into the groundwater flow by assigning a value to the longitudinal dispersivity equal to one-tenth the length of the contaminated zone. Horizontal lateral and vertical lateral dispersivity values are set at one-tenth the longitudinal dispersivity. These settings allow the contamination to move with the natural groundwater flow rather than be pushed through the groundwater and arrive over a longer time frame in a more dilute state. Eidtorial changes: 1. Subsection 2.4.13.4, first paragraph, first sentence is revised to remove '%' following 'containing 80' and replace with 'percent'; sixth sentenece is revised to include a comma following '(i.e.'. The ninth sentence is revised to include a hyphen between 'hold' and 'up', 2 instances.	Duke Energy Response to RAI LTR 73, RAI 02.04.13-029. WLG2009.11-05

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					2. Subsection 2.4.13.4, second paragraph, first sentence is revised to include a comma following '(i.e.'. The last sentence is revised to inlcude a hyphen between 'straight' and 'line'.	
6507	WLS	Pt 02	FSAR 02	02.04.13.05	COLA Part 2, FSAR Chapter 2, Subsection 2.4.13.5 will be revised to read: 2.4.13.5 Sensitive Parameters Sensitivity analyses were performed on a number of input parameters to evaluate the sensitivity of the RESRAD-OFFSITE model to a range of values for specific input factors. A parameter is considered sensitive if the resulting effect on the evaluated radionuclide concentration varied by more than 10%. Input parameters evaluated in the sensitivity analyses include: • Hydraulic gradient of the saturated zone (varied by a factor of 1.5): • Well pump intake depth (varied by a factor of 2); • Volume of the surface water receptor (varied by a factor of 2): and • Kd values in the saturated zone for site-specific (non-zero) radionuclides (varied by a factor of 10). Overall, the sensitivity analyses indicate that variations in the single parameters analyzed have no significant impact on the resulting concentrations; in no case do the resulting concentrations exceed 10 CFR 20 Appendix B, Table 2, Column 2 limits or a sum of fractions calculation. Of particular note: • When the surface water volume is reduced by a factor of 2, concentrations doubled, but the sum of fractions remained in the E-05 range. This expected outcome confirmed that even with a significant reduction in available volume, the sum of fractions remained below the unity value of one. • Even with a relatively high hydraulic gradient (0.06 ft/ft considered not plausible for this site), increases in radionuclide concentrations varied by less than 10%, and the sum of fractions remained below 10 CFR 20 Appendix B, Table 2, Column 2 limits and unity standard. Editorial changes as follows: 1. Subsection 2.4.13.5 first paragraph, first sentence is revised to replace '%' with 'percent' following '...cocentration varied by more that 10'. 2. Subsection 2.4.13.5 second paragraph, second bullet the period is removed following 'ft/ft'.	Duke Energy Response to RAI LTR 73, RAI 02.04.13-029. WLG2009.11-05
6508	WLS	Pt 02	FSAR 02	02.04.13.06	COLA Part 2, FSAR Chapter 2, Subsection 2.4.13.6, 2nd and 3rd paragraphs will be revised to read: The radiological consequence of a postulated failure of the Unit 2 effluent holdup tank as the limiting fault is evaluated and determined not to exceed 10 CFR 20 Appendix B, Table 2, Column 2 limits at the nearest waters adjoining the Lee site (Broad River). The analysis demonstrates that radionuclide concentrations in both the hypothetical well located at the edge of Hold-Up Pond A and in the Broad River at the Ninety-Nine Islands Dam are below 10 CFR 20 Appendix B, Table 2, Column 2 limits. Further, the nearest potable water supply located in an unrestricted area using the Broad River surface water is the City of Union public water supply located approximately 21 miles downstream of the Ninety-Nine Island Dam. The maximum radionuclide concentration for each isotope sum of fractions of 10 CFR 20 Appendix B, Table 2, Column 2 limits calculated for both the hypothetical well at the edge of Hold-Up Pond A and in the receptor body, the Broad River during the 1,000-year period is below a value of 1. Table 2.4.13-204 provides the fraction of effluent concentration for the significant radionuclide. Editorial changes: 1. Subsection 2.4.13.6, second paragraph, seond sentence is revised to include a hyphen between 'Ninety' and 'Nine'. Subsection 2.4.13.6, third paragraph, first sentence is revised to replace 'are' with 'is' following '...the 1,000-year period'.	Duke Energy Response to RAI LTR 73, RAI 02.04.13-029. WLG2009.11-05
6601	WLS	Pt 02	FSAR 02	02.04.14	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.14, the first and second paragraphs are revised as follows: The maximum flood level at the Lee Nuclear Station is elevation 584.8 ft. msl. This elevation would result from a Probable Maximum Flood (PMF) event on the Make Up Pond B watershed with the added effects of coincident wind wave activity as described in Subsection 2.4.3.6. The Lee Nuclear Station safety related structures have a plant elevation of 590 ft. msl. Also, Subsection 2.4.12.5 describes plant elevation relative to the maximum anticipated groundwater level. The hydrostatic loading is not expected to exceed design criteria.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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					There are no safety related facilities that could be affected by low flow or drought conditions of the Broad River. At low flow conditions, water is drawn from Make Up Ponds B and C (Subsection 2.4.11.5). Full power plant operations could be sustained for approximately 190 days with water from Make Up Ponds B and C, with sufficient water remaining in Make Up Pond A to shutdown the plant and maintain safe shutdown conditions.	
5819	WLS	Pt 02	FSAR 02	02.04.16	In Subsection 2.4.16, remove References 227, 279, 282, 283, 292 from list of references.	References not used.
5626	WLS	Pt 02	FSAR 02	02.04.16	COLA Part 2, FSAR Chapter 2, Subsection 2.4.16, will be revised to add a new reference as follows: 299. U.S. Department of Interior, Johnson A.I., "Specific Yield – Compilation of Specific Yields for Various Materials", Geological Survey Water Supply Paper 1662-D, prepared in accordance with California Department of Water Resources, 1967, Table 1. Editorial changes: 1. Subsection 2.4.16, Reference 299 is revised to read: 299. U.S. Department of Interior, Johnson, A.I., "Specific Yield – Compilation of Specific Yields for Various Materials," Geological Survey Water Supply Paper 1662-D, prepared in accordance with California Department of Water Resources, 1967, Table 1.	Duke Energy Response to RAI LTR 70, RAI 02.04.12-016. WLG2009.07-09
6602	WLS	Pt 02	FSAR 02	02.04.16	COLA Part 2, FSAR, Chapter 2, Subsection 2.4.16, is revised to insert new references as follows: 299. U.S. Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey, Website, http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm, accessed November 2008. 300. U.S. Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey, Website, http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm, accessed August 2009. Editorial change: References are re-numbered to follow the addition of Reference 299 on RAI Response to Letter 70: Reference 299, as shown above, is renumbered to Reference 300. Reference 300, as shown above, is renumbered to Reference 301.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6652	WLS	Pt 02	FSAR 02	02.04.F / 02.04 Figures	Revise the following figures in accordance with WLG2009.12-03: 2.4.1-201 2.4.3-229 2.4.1-205 2.4.3-230 2.4.1-209 Sheet 2 of 4 2.4.3-231 2.4.1-209 Sheet 3 of 4 2.4.3-234 2.4.1-209 Sheet 4 of 4 2.4.3-235 2.4.1-213 2.4.3-236 2.4.2-203 2.4.3-237 2.4.3-203 2.4.3-238 2.4.3-206 2.4.3-239 2.4.3-207 2.4.3-240 2.4.3-208 2.4.3-241 2.4.3-209 2.4.3-242 2.4.3-218 2.4.3-243 2.4.3-219 2.4.3-244 2.4.3-220 2.4.3-245 2.4.3-221 2.4.4-201 2.4.3-226 2.4.4-202 2.4.3-227	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
5486	WLS	Pt 02	FSAR 02	02.04.F / F02.04.12-204 Sh08 F02.04.12-208	Revise Figure 2.4.12-204, sheet 8 and Figure 2.4.12-208 per WG2009.05-07	Duke Energy Response to RAI LTR 17 S1, RAI 02.04.12-

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						014. WLG2009.05-07
6657	WLS	Pt 02	FSAR 02	02.04.F / F02.04.12-205 Sh02-04	COLA Part 2, FSAR Chapter 2, Figure 2.4.12-205 sheets 2-4 are revised.	Duke Energy Response to RAI LTR 70, RAI 02.04.12-015. WLG2009.12-12 SUPERSEDES #5623
6511	WLS	Pt 02	FSAR 02	02.04.F / F02.04.13-201	COLA Part 2, FSAR Chapter 2, Figure 2.4.13-201 is removed in accordance with WLG2009.11-05.	Duke Energy Response to RAI LTR 73, RAI 02.04.13-029. WLG2009.11-05
6605	WLS	Pt 02	FSAR 02	02.04.T / T02.04.01-201	Revise FSAR Table2.4.1-201 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6606	WLS	Pt 02	FSAR 02	02.04.T / T02.04.01-204	Revise FSAR Table 2.4.1-204 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6607	WLS	Pt 02	FSAR 02	02.04.T / T02.04.01-205	Revise FSAR Table 2.4.1-205 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
5821	WLS	Pt 02	FSAR 02	02.04.T / T02.04.01-206 T02.04.01-207 T02.04.01-210 T02.04.01-211	Change LMA in Tables 2.4.1-206, 207, 210, 211 to "WLS COL2.4-1"	Material is site-specific. Text that calls out table is WLS COL 2.4-1 (see COL Tables).
6608	WLS	Pt 02	FSAR 02	02.04.T / T02.04.01-210	Revise FSAR Table 2.4.1-210 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6609	WLS	Pt 02	FSAR 02	02.04.T / T02.04.01-211	Revise FSAR Table 2.4.1-211 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite

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						Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6610	WLS	Pt 02	FSAR 02	02.04.T / T02.04.02-203	Revise FSAR Table 2.4.2-203 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6611	WLS	Pt 02	FSAR 02	02.04.T / T02.04.03-202	Revise FSAR Table 2.4.3-202 in accordance with WLG2009.12-03. This reverts back to revision 1.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6612	WLS	Pt 02	FSAR 02	02.04.T / T02.04.03-203	Revise FSAR Table 2.4.3-203 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6613	WLS	Pt 02	FSAR 02	02.04.T / T02.04.03-204	Revise FSAR Table 2.4.3-204 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6614	WLS	Pt 02	FSAR 02	02.04.T / T02.04.03-205	Revise FSAR Table 2.4.3-205 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6615	WLS	Pt 02	FSAR 02	02.04.T / T02.04.03-206	Revise FSAR Table 2.4.3-206 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96,

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						RAI 2680. WLG2009.12-03
6616	WLS	Pt 02	FSAR 02	02.04.T / T02.04.03-207	Add new FSAR Table 2.4.3-207 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6617	WLS	Pt 02	FSAR 02	02.04.T / T02.04.03-208	Add new FSAR Table 2.4.3-208 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6618	WLS	Pt 02	FSAR 02	02.04.T / T02.04.04-201	Revise FSAR Table 2.4.4-201 in accordance with WLG2009.12-03.	Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6759	WLS	Pt 02	FSAR 02	02.04.T / T02.04.12-201	For MW-1217 entry, change: B/Screen from 24.0 to 22.3 T/Screen from 14 to 12 T/Sand from 13 to 11 T/Seal from 11 to 9	Conformance with Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03
6756	WLS	Pt 02	FSAR 02	02.04.T / T02.04.12-203	Remove FSAR Table 2.4.12-203	Avoid redundancies related to Table 2.5.4-211
5627	WLS	Pt 02	FSAR 02	02.04.T / T02.04.12-203 T02.04.12-204	Revise Tables 2.4.12-203 and 204 per RAI 2.4.12-016	Duke Energy Response to RAI LTR 70, RAI 02.04.12-016. WLG2009.07-09
6758	WLS	Pt 02	FSAR 02	02.04.T / T02.04.12-204	In Table 2.4.12-204, the entry for Saprolite/Soil: change 6.38 x 10-6 to 1.14 x 10-5 and change 3.2 x 10-4 to 4.5 x 10-4 For the entry for fill material: change 1.03 x 10-3 to 1.81x10-4; change 1.81 x 10-4 to 7.00 x 10-5; change 6.2 x 10 -4 to 1.2 x 10-4.	Conformance with Duke Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680. WLG2009.12-03

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6512	WLS	Pt 02	FSAR 02	02.04.T / T02.04.13-201	COLA Part 2, FSAR Chapter 2, Table 2.4.13-201 is to be deleted from FSAR per WLG2009.11-05. Revise List of Figures per attachment.	Duke Energy Response to RAI LTR 73, RAI 02.04.13-029. WLG2009.11-05
6509	WLS	Pt 02	FSAR 02	02.04.T / T02.04.13-203	COLA Part 2, FSAR Chapter 2, Table 2.4.13-203 to be changed per WLG2009.11-05. Markup attached.	Duke Energy Response to RAI LTR 73, RAI 02.04.13-029. WLG2009.11-05
6510	WLS	Pt 02	FSAR 02	02.04.T / T02.04.13-204	COLA Part 2, FSAR Chapter 2, Table 2.4.13-204 to be changed per WLG2009.11-05.	Duke Energy Response to RAI LTR 73, RAI 02.04.13-029. WLG2009.11-05
6841	WLS	Pt 02	FSAR 02	02.05	FSAR Section 2.5, is revised to incorporate editorial and conforming changes associated with annual review. 1. Subsection 2.5.2.4.5, fourth paragraph, 5th sentence, superscript hyphen in 10-5, and 6th sentence superscripte hyphen in 10-6. 2. Subsection 2.5.4, revise last paragraph, last sentence, to read "Results from historic site investigations for Cherokee Nuclear Station are presented in the Preliminary Safety Analysis Report (PSAR) (Reference 201) and Final Safety Evaluation Report (Reference 202)." 3. Subsection 2.5.4.1, revise second paragraph, first sentence to read "...techniques to improve subsurface conditions, and issues related to construction." 4. Subsection 2.5.4.2.1.6.4, revise ASTM reference in the first sentence to "ASTM D 4630-96 (2002)" 5. Subsection 2.5.4.2.2.2, revise subsection title to "Coring" 6. Subsection 2.5.4.2.2.2, revise second paragraph first sentence to read "The rig geologist visually described the rock core and noted the presence of joints..." 7. Subsection 2.5.4.2.2.4, revise first paragraph, beginning with the fourth sentence to read "Bulk samples were placed in new 5-gallon plastic buckets with lids and handles for carrying. Glass jar samples were obtained and sealed for moisture retention. The buckets and jar samples were labeled and transported to the onsite storage area. The rig geologist prepared a Geotechnical Test Pit Log based on visual description of the excavated materials according to ASTM D 2488-00. The backhoe was used to backfill the test pit excavation using the excavated materials. The backfilled materials were tamped in-place using the backhoe bucket. 8. Subsection 2.5.4.2.2.5, revise second paragraph, first sentence to read "Soil samples were obtained from split spoon sampler or undisturbed tube samples as part of the geotechnical exploration process for the Lee Nuclear Station exploration in 2006 and 2007." 9. Subsection 2.5.4.2.2.5, revise third paragraph to add a new last sentence to read "Rock and concrete cores were transported according to ASTM D 5079-02 (2006)." 10. Subsection 2.5.4.2.2.5, revise fifth paragraph, first sentence to read "Boring field records were reviewed and samples were identified for possible laboratory testing." 11. Subsection 2.5.4.2.2.5, revise sixth paragraph, first sentence to read "Soil samples were handled and transported..." 12. Subsection 2.5.4.2.2.5, revise sixth paragraph, fifth sentence to read "At the laboratory, prior to testing, the undisturbed samples were stored in the controlled laboratory environment in a secure location." 13. Subsection 2.5.4.2.2.5, revise eighth paragraph, last sentence to read "Some unused portions of the jar or undisturbed tube sample were returned to the sample storage facility if the portion was of reasonable size." 14. Subsection 2.5.4.2.3, delete the second paragraph 15. Subsection 2.5.4.2.4.1.3, revise last sentence to read "Most of the "B-horizon" soils at the site were utilized in the central core area of the former Cherokee Nuclear Station Nuclear Service Water Dam, now known as Lee Nuclear Station Make-Up Pond B Dam, so relatively minor amounts were encountered in the borings for the Lee Nuclear Station." 16. Subsection 2.5.4.2.4.1.5, revise last sentence to add "blows per foot" after "100"	Duke Annual review.

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					17. Subsection 2.5.4.2.4.1.6, revise third sentence to read "At the time of the Lee Nuclear Station exploration program in 2006 and 2007..." 18. Subsection 2.5.4.5, revise first paragraph, last sentence to read "...Elevation 589.5 feet which is 0.5 feet..." 19. Subsection 2.5.4.5.2.1, revise second paragraph, fourth sentence to correct two instances of "base mat" to read "basemat" 20. Subsection 2.5.4.5.2.1, revise fifth paragraph, fifth sentence to read "Geotechnical borings drilled in 2006 and 2007 in this area..." 21. Subsection 2.5.4.5.3.3, revise third bullet, first sentence to read "Fill any depressions or cavities in the surface of the foundation soil or rock with fill concrete or properly..." 22. Subsection 2.5.4.5.3.4, delete references to "flowable fill", correct grammar due to this change, and delete the last sentence of the subsection 23. Subsection 2.5.4.7.1, revise second paragraph, first sentence to read "...Middle Proterozoic to Permian (1,100 to 265 Ma) meta-granodiorite to meta-quartz diorite intruded by mafic dikes." 24. Subsection 2.5.4.7.2, revise last paragraph to replace "were" with "was" 25. Subsection 2.5.4.7.4.1, revise first paragraph, second sentence to read "Northeast-trending meta-diorite dikes are present in the meta-granodiorite and meta-quartz diorite host rock." 26. Subsection 2.5.4.7.4.1, revise second paragraph, fourth sentence to read "...generally ranges between several feet to about 25 feet thick." 27. Subsection 2.5.4.7.4.1, revise third paragraph, last sentence to read "The nuclear island foundation rock is characterized as sound, massive meta-granodioritic to meta-quartz dioritic rock, no dipping layers exist and the rock supporting the nuclear island foundation meet DCD case 1 criteria." 28. Subsection 2.5.4.7.4.2, revise first and second sentences to read "...bedrock with meta-diorite dikes. Rock in these intrusions is strong...", correct spacing between the sixth and seventh sentences, and revise the last sentence to read "...massive meta-granodioritic to meta-quartz dioritic rock, no dipping layers exist..." 29. Subsection 2.5.4.10, revise third paragraph, sixth sentence to read "...is 588 feet per the DCD." 30. Subsection 2.5.4.11, revise second paragraph, last sentence to read "...as defined in Section 2.1 of ACI 318-02 (Reference 233)." 31. Subsection 2.5.4.13, revise Reference 209 citation to "ACI 349-02" 32. Subsection 2.5.4.13, revise to add Reference 233 "American Concrete Institute (ACI), "Building Code Requirements for Structural Concrete," ACI 318-02, Chapter 2.1, 2002." 33. Delete FSAR Table 2.5.4-221 34. Make global change of all "in-situ" or other variants to "in situ"	
5553	WLS	Pt 02	FSAR 02	02.05.01.01.01	COLA Part 2, FSAR, Chapter 2; Subsection 2.5. 1.1. 1, third paragraph, is revised to read: Depending on the focus of a given study, the Appalachian orogenic belt has been subdivided in a variety of ways by various researchers. These subdivisions, in the past, included provinces, belts, and terranes. More recent syntheses have been organized around lithotectonic associations based on common tectonic or depositional origins, mainly relative to the lapetus ocean and it marginal continental masses, Laurentia and Gondwana (Hibbard et al. (2002) (Reference 204): Hibbard et al. (2006) (Reference 260); Hibbard et al. (2007) (Reference 428): Hatcher et al. (2007) (Reference 404)). Physiographic provinces are defined based on both physiography (landforms) and geology. However, with the modern emphasis on lithotectonic association, the influence of physiographv has become subordinate and the "belt" concept has been abandoned. Figure 2.5.1-235 diagrams how the modern lithotectonic classification schemata of Hibbard et al. (2006) (Reference 260) and Hibbard et al. (2007) (Reference 428) relate and compare to Hatcher et al. (2007) (Reference 404) and to the nomenclature for the physiographic provinces. Note for instance that the Tugaloo terrane of Hatcher et al. (2007) (Reference 404) falls on both sides of the Brevard Fault Zone, which roughly coincides with the boundary of the Blue Ridge and Piedmont Physiographic provinces. Similarly, this same fundamental physiographic boundary also transects the Hibbard et al. (2006) (Reference 260) Piedmont Domain. Also, note that the Piedmont Physiographic province, in the schema of Hibbard et al. (2006)(Reference 260) is divided by the Central Piedmont shear zone into the Piedmont Domain to the west and Carolinia (i.e., the "Carolina Zone" in Hibbard et al. (2002) (Reference 204)) to the east. These examples serve to illustrate the decreased role of physiography in modern lithotectonic classifications.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-004. WLG2009.05-04

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5554	WLS	Pt 02	FSAR 02	02.05.01.01.01.04	COLA Part 2, FSAR, Chapter 2; Subsection 2.5.1.1.1.4, is revised to read: 2.5.1.1.1.4 The Piedmont Physiographic Province The Lee Nuclear Site is located in the Piedmont physiographic province. The Piedmont physiographic province extends southwest from New York State to Alabama and lies west of and adjacent to the Atlantic section of the Coastal Plain. It is the easternmost physiographic province of the Appalachian Mountains. The Piedmont is a seaward-sloping plateau varying in width from about 10 mi. in southeastern New York State to almost 125 mi. in South Carolina; it is the least rugged of the Appalachian provinces. Elevation of the inland boundary ranges from about 200 ft. msl in New Jersey to over 1,800 ft. msl in South Carolina. Within the Lee Nuclear Site region, the area of the Piedmont physiographic province is also divided on the basis of its geologic history and lithology into different lithotectonic associations, which include the Carolina Zone and the Piedmont Zone. The Carolina Zone is also referred to in more recent literature as "Carolinia" (Hibbard et al. (2006 and 2007) (References 260 and 428)) or as the "Carolina Superterrane" (Hatcher et al. (2007) (Reference 404)). The terranes that compose the Carolina Zone are all considered to be of peri-Gondwanan association and are representative of volcanic arcs resulting from subduction in the Gondwanan realm of lapetus (Hibbard et al. (2006) (Reference 260); Hibbard et al. (2007) (Reference 428); Hatcher et al. (2007) (Reference 404)). In detail, there is disagreement in the assignment of some terranes into this division. For instance, Hibbard et al. (2002) (Reference 204) consider the Gaffney terrane (i.e., the Kings Mountain terrane of Hatcher et al. (2007) (Reference 404)) to be exclusively of peri-Gondwanan association. However, Hatcher et al. (2007) (Reference 404) consider the Kings Mountain terrane to have) both Laurentian and peri-Gondwanan associations. These two lithotectonic elements, the Piedmont and Carolina zones, are separated by a series of faults collectively referred to as the Central Piedmont Shear Zone. West of the Central Piedmont Shear Zone, the Piedmont Zone contains the Inner Piedmont block the Smith River allochthon +nof Virginia and North Carolina, and the Sauratown Mountains anticlinorium in north central North Carolina (Reference 226) (Figure 2.5.1-202a). The province is a composite stack of thrust sheets containing a variety of gneisses, schists, amphibolite, sparse ultramafic bodies, and intrusive granitoids (References 227 and 228). The protoliths are immature quartzo-feldspathic sandstone, pelitic sediments, and mafic lavas. The Inner Piedmont block is a fault-bounded, composite thrust sheet with metamorphic complexes of different tectonic affinities (Reference 226). Rocks within the Inner Piedmont block include gneisses, schists, amphibolites, sparse ultramafic bodies, and intrusive granitoids (References 227 and 228). There is some continental basement within the block (Reference 228) and scattered mafic and ultramafic bodies and complexes (Reference 229), suggesting the presence of oceanic crustal material (Reference 226). The remainder of the block contains a coherent, though poorly understood, sequence of metasedimentary rock, metavolcanic gneisses, and schists (Reference 226). The Smith River allochthon is a completely fault-bounded terrane that contains two predominantly metasedimentary units and a suite of plutonic rocks (Figure 2.5.1-202b). The Sauratown Mountains anticlinorium is a complex structural window of four stacked thrust sheets exposed in eroded structural domes (Figure 2.5.1-202b). Each sheet contains Precambrian basement with an overlying sequence of younger Precambrian to Cambrian metasedimentary and metaigneous rocks (Reference 226). The stratigraphic and structural geologic data in the Western Piedmont reflect complex tectonic history from the Precambrian Grenville through Late Paleozoic Alleghanian orogenies. Metamorphism affected the basement rocks of the Sauratown Mountains anticlinorium at least twice: during the Precambrian Grenville orogen and later during the Paleozoic. A metamorphic event in the Paleozoic affected the metasedimentary cover sequence, the Smith River allochthon, and the Inner Piedmont block (Reference 226). The Alleghanian continental collision is reflected in the thrust and dextral strike slip fault systems	Duke Energy Response to RAI LTR 59, RAI 02.05.01-004. WLG2009.05-04

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					such as the Brevard and Bowens Creek fault zones. A few late Paleozoic granites were emplaced in the Inner Piedmont block; however, the majority lies further east in the Carolina Zone. Early Mesozoic extension resulted in the formation of rift basins (Dan River and Davie County basins). The Central Piedmont shear zone (Reference 225) (Figure 2.5.1-202a) includes the Ocmulgee, Middleton-Lowndesville, Cross Anchor, Kings Mountain, Eufola, and Hyco fault zones (Hibbard et al. (2006) (Reference 260) and Hatcher et al. (2007) (Reference 404)). Since the Central Piedmont Shear Zone marks the boundary between rocks on both sides of lapetus, it is associated with a "suture," (Hatcher et al. (2007) (Reference 404)) although the polarity and timing of the subduction and suturing event are under debate, (Hibbard et al. (2007) (Reference 428): (Hatcher et al. (2007) (Reference 404)). The detailed relationship of the Central Piedmont Shear Zone to the original structure associated with the suture is obscured by the fact that the original structure has been tectonically modified and overprinted by the final orogenic effects of the interactions of the Gondwanan and Laurentian continents during the Carboniferous (late Alleghanian orogeny). Hibbard et al. (2002) (Reference 204) and Hibbard et al. (2007) (Reference 428) consider the Central Piedmont Shear Zone to be a Late Alleghanian thrust that cut the original suture off in the subsurface and that the portion of the hanging wall containing the cut off suture has been eroded away (Hibbard et al. (1998) (Reference 417)). Hatcher et al. (1989) (Reference 429) also consider that the Central Piedmont Shear Zone has been tectonically modified in the late Alle-ghanian orogeny, in large Part by folding. This allows infolding of rocks with Laurentian affinities and rocks of peri-Gondwanan affinities to explain terranes considered to have mixed associations such as the Kings Mountain Terrane (Hatcher et al. (2007) (Reference 404)). The Lee Nuclear Site is located east of the Central Piedmont shear zone in the Carolina Zone (Hibbard et al. (2007) (Reference 428); (Carolina Superterrane of Hatcher et al. (2007) (Reference 404)). The Carolina Zone represents an amalgamation of metaigneous-dominated terranes along the eastern flank of the southern Appalachians. The Carolina Zone and the terranes within the zone are intended to replace the archaic 'belt' terminology of the southern Appalachians (Reference 204). The Carolina terrane extends for more than 300 mi. from central Virginia to eastern Georgia and is characterized by generally low-grade metaigneous and metasedimentary rocks. The original definition of the Carolina terrane (Secor et al. 1983) (Reference 231) includes higher-grade metamorphic rocks along its western margin, but more recent classification (Reference 204) includes these rocks in the Charlotte terrane to the west. The Lee Nuclear Site lies within the Charlotte terrane, the westernmost terrane of the Carolina Zone (Figure 2.5.1-202a). Neoproterozoic to Early Paleozoic plutonic rocks that intrude a suite of mainly metaigneous rocks dominate the Charlotte terrane (Reference 204). The rocks of the Carolina Zone are unconformably overlain by sediments of the Carolina Coastal Plain southeast of the Fall Line (Figure 2.5.1-202a). The Carolina Zone is part of a late Precambrian-Cambrian composite arc terrane, exotic to North America (References 231 and 238), and accreted either during the Ordovician Silurian (Hibbard et al. (2002) (Reference 204)) or during the Middle Devonian to Early Mississippian (Hatcher et al. (2007) (Reference 404)) sometime during the Ordovician to Devonian Period (Reference 239): (Reference 240)). It comprises felsic to mafic metaigneous and metasedimentary rock. Middle Cambrian fossil fauna indicate a European or African affinity for the Carolina Zone (Reference 231). Hibbard et al. (2002) (Reference 204) propose updated nomenclature for the Carolina Zone ("Carolinia" in Hibbard et al. (2006)) Reference 260) based on the tectonothermal overprint of units. Suprastructural terranes (i.e., the upper structural layer in an orogenic belt subjected to relatively shallow or near-surface processes) comprise rocks of lower-grade metamorphism where original rock fabric is preserved. Infrastructural terranes (produced at relatively deep crustal levels at elevated temperature and pressure, located beneath suprastructural terranes) comprise higher-grade metamorphic units where original rock fabric has been completely destroyed.	

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					The western part of the Carolina Zone in central Georgia, South Carolina, and North Carolina consists of the infrastructural Charlotte terrane and, to a lesser extent, the Savannah River terrane. The easternmost portion of the Carolina Zone in South Carolina and portions in North Carolina contains the Suprastructural Albemarle and South Carolina Sequence (Figure 2.5.1-202a). Metamorphic grade increases to the northwest from lower greenschist facies to upper amphibolite facies. Rocks include amphibolite, biotite gneiss, hornblende gneiss, and schist, and likely derived from volcanic, volcanoclastic, or sedimentary protoliths. Structures of Pre-Alleghanian age are predominantly northeast-trending, regional-scale folds with steeply dipping axial surfaces. The country rock of the Charlotte terrane was penetratively deformed during Late Proterozoic to Early Cambrian (Hibbard et al. (2002) (Reference 204)), thereby producing axial plane cleavage and foliation (Reference 203). The Charlotte terrane also contains numerous granitic and gabbroic intrusions dating to about 300 Ma.	
5557	WLS	Pt 02	FSAR 02	02.05.01.01.02.03.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.3.1, seventh paragraph, is revised to read: In general, there is better spatial correlation in the Lee Nuclear Site study region among gravity anomalies and igneous intrusions than faults. The exceptions are the Paleozoic Modoc shear zone and the Brevard zone. The Modoc shear zone appears to separate higher density rocks to the northwest from lower density rocks to the southeast. The Brevard zone marks the western boundary of the Piedmont gravity gradient. The juxtaposition of basement terranes with varying densities across these faults occurred during the Paleozoic Alleghanian orogeny (Reference 203), and therefore does not reflect Cenozoic activity. The mapped trace of the southern segment of the East Coast fault system (ECFS) is not expressed in the gravity field and cuts across anomalies with wavelengths on the order of tens of miles without noticeable perturbation. This implies that the southern segment of the ECFS, if present, has not accumulated sufficient displacement to systematically juxtapose rocks of differing density, and thus produce an observable gravity anomaly at the scale of Figure 2.5.1-205.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-005. WLG2009.05-04
5558	WLS	Pt 02	FSAR 02	02.05.01.01.02.03.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.3.2, from the second paragraph through the end of the Subsection, is revised to read: Several of the characteristics of the regional magnetic field and its relation to geology are illustrated in the magnetic field for the site vicinity (Figure 2.5.1-233) and on a northwest-southeast-trending profile that passes through the Lee Nuclear Site (Figure 2.5.1-208). The magnetic field for the site vicinity is modeled on a 1,312 ft. (400 m) grid that is based on flight lines spaced one mile apart, flown at 500 ft. above the ground surface, in an east-west orientation. The magnetic intensities northwest of the Central Piedmont Shear Zone are relatively low compared to the magnetic field characterized by intense northeast trending magnetic highs and lows to the southeast. This expression in the magnetic field results from the exposures of mafic to intermediate composition metavolcanic basement rocks of the Charlotte terrane to the southeast and the relative lack of intense magnetic sources in the Inner Piedmont terrane to the northwest. In the site vicinity, the difference in the response of the magnetic field does not occur abruptly at the boundary between the Charlotte terrane and the Inner Piedmont (Central Piedmont Shear Zone), but is transitional over about a mile east of the Central Piedmont Shear Zone. This behavior has been attributed to a Central Piedmont Shear Zone that dips relatively shallowly to the east so that the rocks of the Charlotte terrane form a thin, easterly thickening upper plate over the Inner Piedmont (Milton (1981) (Reference 408); (Hatcher et al. (2007) (Reference 404)). In the Charlotte terrane, southeast of the Central Piedmont Shear Zone, the northeast-trending fabric in the magnetic field defined by the intense magnetic highs and lows is interrupted by several elliptical shaped areas defined by a subdued magnetic response. Based on comparison with geologic maps, these subdued areas in the magnetic field correspond to late Paleozoic intrusions such as the Bald Rock, York and Clover plutons, and several related smaller intrusive bodies, which are felsic in composition and relatively nonmagnetic. In addition, other plutonic masses such as the Lowery's Pluton and the Greensboro Plutonic suite also correspond with subdued magnetic field response. Lowery's Pluton is part of the Silurian Concord suite (McSween et al. (1991) (Reference 409)). Although the Concord suite consists of mafic lithologies, Lowery's Pluton does not give rise to the intense magnetization present in the surrounding metavolcanic country rock. The faults within the Charlotte terrane such as the Tinsley	Duke Energy Response to RAI LTR 59, RAI 02.05.01-005. WLG2009.05-04

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					Bridge fault and the Boogertown shear zone parallel the regional northeasterly trending magnetic fabric, and their magnetic signature and effects on the magnetic field are not readily apparent. In a discussion of the Central Piedmont Suture, Hatcher et al. (2007) (Reference 404) noted a gravity and magnetic linear anomaly that they identified as possibly representing the trace of the subsurface northeastern extension of the Central Piedmont suture. This feature passed through the southeastern portions of the site vicinity approximately 12 miles southeast of the site (Figure 2.5.1-233). These data within the site area reveal several elongate to elliptical dipole anomalies that are characterized by magnetic highs of various amplitudes, with associated magnetic lows to the northwest. The elongation direction and alignment of the magnetic highs form prominent northeast to north-northeasterly striking linear features throughout the site area (Figure 2.5.1-206). One of the most prominent linear anomalies trends northeast-southwest and is formed by several individual, elongate magnetic highs in the northern portion of the site area. The most salient anomaly of this group (Shown as A on Figure 2.5.1-234) that comprises this feature has amplitude of about 300 nT and is located about 3.5 mi. northwest of the site (near the town of Cherokee Falls, South Carolina). This anomaly is accompanied to the northeast by two anomalous highs (about 180 nT) and to the southwest by a 50 nT high. The linear alignment generally follows the regional geologic trend and the southeastern flank of the Cherokee Falls synform (discussed in Subsection 2.5.1.2.4.1). This coincides with the location of stratiform iron deposits of massive and disseminated magnetite and other metallic sulphides (References 284 and 285). Adjacent to and just southeast of the anomaly that marks the northeastern termination of the linear feature discussed above, an elongate magnetic high of about 230 nT (Shown as B on Figure 2.5.1-234) is oriented in a more northerly direction at a relatively high angle to the regional geologic trend. This location is closely associated with a zone of alteration as shown by Howard (2004) (Reference 286).. The anomaly is parallel to a reentrant of the zone of alteration into the crystal metatuff unit to the south. Several small outcrops of diabase also occur in this area. The relatively high amplitude of the anomaly and the presence of the alteration zone suggest that concentrations of magnetite due to hydrothermal alteration are present and account for a significant amount of the magnetic response. However, the alignment of diabase outcrops in this area may exert some control on the orientation of this feature. A 70 nT circular magnetic high is located about 3 mi. northwesteast of the site (Shown as C on Figure 2.5.1-234). This feature is accompanied by a more elongate north-northeasterly trending magnetic high to the south that shows amplitude of approximately 60 nT. These locations both correspond to diabase outcrops and are likely the magnetic response of these mafic lithologies. In contrast, the metagabbro unit just southwest of these anomalies only produces a slight bending of the magnetic contours. This is a consistent magnetic response compared to that of the mafic units of Lowery's Pluton, as discuss above. However, the association of the metagabbro with the Concord Suite is not demonstrated. An elongate magnetic high (amplitude about 120 nT) is located about 2.5 mi. south of the site (Shown as D on Figqure 2.5.1-234). This anomaly trends northeasterly, concordant with the regional geologic trend, and coincident with quartzite outcrops. The magnetic signature of this feature is likely the result of magnetite and other metallic sulphides associated with hydrothermal alteration. To summarize, magnetic data published since the mid-1 980s provide additional characterization of the magnetic field in the Lee Nuclear Site region (Reference 277). The first-order magnetic anomalies are associated primarily with northeast-southwest-trending Paleozoic terranes of the Paleozoic Appalachian orogen. Superimposed on this regional magnetic field are anomalies with wavelengths on the order of 3 to 12 mi. that are associated with intrusive bodies orstratiform ore bodies resulting from hydrothermal alteration. The anomalous response of concentrations of magnetite associated with stratiform metallogenic deposits typically produce anomaly amplitudes of 100 to 300 nT, and are typically aligned with the regional geologic trend. Diabase dikes and other small outcrops produce secondary anomalous effects with amplitudes of about 50 nT. The metagabbro unit located about one mile east of the Lee Nuclear Site produces minimal effects on the magnetic field, and this response is consistent with the magnetic signature of Lowery's Pluton further to the southeast in the site vicinity.	

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					The magnetic data generally are not of sufficient resolution to identify or map discrete faults such as border faults along the Triassic basins. In particular, the southern segment of the ECFS has no expression in the magnetic field and cuts across anomalies with wavelengths on the order of tens of miles without noticeably perturbing or affecting them. If the ECFS exists as mapped, then it has not accumulated sufficient displacement to juxtapose rocks of varying magnetic susceptibility, and thus does not produce an observable magnetic anomaly at the scale of Figure 2.5.1-206.	
5562	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.4.1, first paragraph, is revised to read: A number of regional geophysical anomalies are located within 200 mi. of the Lee Nuclear Site (Figures 2.5.1-209, 210 and 211). From southeast to northwest these include the East Coast Magnetic Anomaly, the southeast boundary of Iapetan normal faulting, Clingman lineament, Ocoee lineament, New York-Alabama lineaments, the Appalachian gravity gradient, the northwest boundary of Iapetan normal faulting, Appalachian thrust front, and the Grenville Front. These features are described below, with more detail provided for those features within the 200-mi site region. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.4.1, fourth paragraph, is revised to read: Appalachian Gravity Gradient. This regional gravity gradient extends the length of the Appalachian orogen (Figure 2.5.1-209) and exhibits a southeastward rise in Bouguer gravity values as much as 50 to 80 mGal (References 265 and 295). The Appalachian gravity gradient represents the southeastern thinning of relatively intact Precambrian continental crust, and the early opening of the Iapetan Ocean (Reference 265).	Duke Energy Response to RAI LTR 59, RAI 02.05.01-008. WLG2009.05-04
5561	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.4.1, second paragraph, is revised to read: East Coast Magnetic Anomaly. The East Coast Magnetic Anomaly (ECMA) is a broad, 200 to 300 nT magnetic high that is located approximately 30 to 120 mi. off the coast of North America, and is continuously expressed for about 1,200 mi. from the latitude of Georgia to Nova Scotia (References 248 and 289) (Figures 2.5.1-211). The ECMA is subparallel to the Atlantic coastline, and is spatially associated with the eastern limit of North American continental crust (Reference 248). The ECMA has been variously interpreted to be a discrete, relatively magnetic body such as a dike or ridge, or an "edge effect" due to the juxtaposition of continental crust on the west with oceanic crust (higher magnetic susceptibility) on the east (in Reference 287). In the vicinity of the ECMA, deep seismic reflection profiling in the Atlantic basin has imaged packages of east-dipping reflectors that underlie the sequence of Mesozoic-Tertiary passive-margin marine strata (Reference 288). The rocks associated with the east-dipping reflectors are interpreted to be an eastward-thickening wedge of volcanic and volcaniclastic rocks that were deposited during the transition between rifting of the continental crust and opening of the Atlantic basin during the Mesozoic (Reference 289). Models of the magnetic data show that the presence of this volcanic "wedge" can account for the wavelength and amplitude of the ECMA (Reference 248).	Duke Energy Response to RAI LTR 59, RAI 02.05.01-007. WLG2009.05-04
5563	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.4.1, seventh paragraph, is revised to read: The New York-Alabama, Clingman, and Ocoee Lineaments. King and Zietz (1978) (Reference 290) identify a 1,000-mi.-long lineament in aeromagnetic maps of the eastern U.S. that they name the "New York-Alabama lineament" (NYAL) (Figure 2.5.1-209). The NYAL primarily is defined by a series of northeast-southwest-trending linear magnetic gradients in the Valley and Ridge province of the Appalachian fold belt that systematically intersect and truncate other magnetic anomalies. The NYAL also is present as complementary but less-well-defined lineament on regional gravity maps (Reference 290).	Duke Energy Responset to RAI LTR 59, RAI 02.05.01-009. WLG2009.05-04
5564	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.4.2, third paragraph, is revised to read: The majority of these structures dip eastward, initially at a steep angle that becomes shallower as they approach the basal Appalachian decollement (Figure 2.5.1-207). The Appalachian orogenic crust is relatively thin across the Valley and Ridge province, Blue Ridge province, and western part of the Piedmont province, and thickens eastward beneath the eastern part of the Piedmont province and the Coastal Plain province. Below the decollement are rocks that form the North American basement complex.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-011. WLG2009.05-04

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					These basement rocks contain northeast-striking, Late Precambrian to Cambrian normal faults that formed during the Iapetan rifting that preceded the deposition of Paleozoic sediments.	
5565	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.4.2, second paragraph through the end of the Subsection, is revised to read: The majority of these structures dip eastward, initially at a steep angle that becomes shallower as they approach the basal Appalachian decollement (Figure 2.5.1-207). The Appalachian orogenic crust is relatively thin across the Valley and Ridge province, Blue Ridge province, and western part of the Piedmont province, and thickens eastward beneath the eastern part of the Piedmont province and the Coastal Plain province. Below the decollement are rocks that form the North American basement complex. These basement rocks contain northeast-striking, Late Precambrian to Cambrian normal faults that formed during the Iapetan rifting that preceded the deposition of Paleozoic sediments. Researchers observe that much of the sparse seismicity in eastern North America occurs within the North American basement below the basal decollement. Therefore, seismicity within the Appalachians may be unrelated to the abundant, shallow thrust sheets mapped at the surface (Reference 267). For example, seismicity in the Giles County seismic zone, located in the Valley and Ridge province, is occurring at depths ranging from 3 to 16 mi. (see Subsection 2.5.1.1.3.2.3) (References 265 and 371), which is generally below the Appalachian thrust sheets and basal decollement (Reference 265). Paleozoic faults within 200 mi. of the Lee Nuclear Site are shown on Figure 2.5.1-209, and those within 25 mi. and 50 mi. are shown on Figure 2.5.1-210. The faults that are considered most important, either because of their regional tectonic significance or their proximity to the site, are discussed below. Not every fault depicted in Figures 2.5.1-209 and 2.5.1-210 is discussed explicitly. Kings Mountain Shear Zone (Central Piedmont Shear Zone). The northeast-striking Kings Mountain shear zone is a zone of mylonitic deformation that separates the Inner Piedmont terrane from the Carolina terrane, and is considered part of the larger Central Piedmont shear zone (References 236, 296, and 297). The Kings Mountain shear zone comprises smaller, localized shear zones, including the Blacksburg and Kings Creek shear zones. At its nearest point, the Kings Mountain shear zone is located 5 mi. north of the Lee Nuclear Site (Figure 2.5.1-210). The sense of motion on the Kings Mountain shear zone is unclear, but structural data suggest that the zone is a steeply northwest-dipping reverse fault (Reference 236). Mylonitic deformation in the Kings Mountain shear zone is overprinted by semi-brittle cleavage. Pegmatitic dikes in North Carolina intruded parallel to the semi-brittle cleavage and some have been ductiley deformed. Hence, the dikes are interpreted as syn- to post-kinematic and their Rb/Sr whole rock isochron age of 340 ± 5 Ma indicates that the late-stage semi-brittle deformation occurred in the Mississippian (Horton (1981) (Reference 421)). Cross Anchor Fault. The greater than 60-mi.-long Cross Anchor fault is mapped by Hibbard et al. (2006) (Reference 260) as a thrust fault of variable strike. At its nearest point, the Cross Anchor fault is located approximately 10 mi. west of the Lee Nuclear Site (Figure 2.5.1-210). West (1998) (Reference 297) interprets the Cross Anchor fault as the Carolina-Inner Piedmont terrane boundary. Dennis and Wright (1995) (Reference 422) interpreted an unnamed granite, dated at 326 ± 3 Ma, to cut and post-date the Central Piedmont shear zone. However, West (1998) (Reference 297) interpreted the same pluton as syn- to pre-kinematic to deformation on the fault and interpreted movement on the fault to be approximately 325 Ma. Hyco Shear Zone. In northern North Carolina and southern Virginia, the Hyco shear zone dips shallow to steeply to the southeast and juxtaposes the Carolina terrane rocks over the Milton terrane, rocks correlated with the Inner Piedmont or Piedmont zone (Hibbard et al. (1998) (Reference 417)) (FSAR Figure 209). Hence, it is interpreted as part of the Central Piedmont shear zone (Hibbard et al. (2002) (Reference 204)). Ages on granitoids interpreted as syn-kinematic to deformation on this structure range from about 320 Ma to about 335 Ma, and indicate a Mississippian age for deformation (Wortman et al. (1998) (Reference 418)).	Duke Energy Response to RAI LTR 59, RAI 02.05.01-014. WLG2009.05-04

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					Brindle Creek Thrust Fault. The Brindle Creek thrust was recognized in North Carolina as a low-angle fault with an extensive mylonite zone, but authors have indicated that the mapping of this structure in South Carolina is speculative (Bream (2002), Reference 403). According to Hatcher et al., 2007 (Reference 404), the following lines of evidence are used to map the Brindle Creek fault: • The fault separates areas with different stratigraphy, • The fault separates areas with different detrital zircon age distributions, • The fault separates areas with different mafic and ultramafic rocks, and • The fault separates areas with different age and character of plutons. The fault is interpreted as an early Paleozoic unconformity that was activated as a mylonitic fault in the late Paleozoic during the Alleghanian orogeny (Dennis, 2007; Reference 405) or as a Neoacadian (early Mississippian) thrust (Hatcher et al., 2007; Reference 404). In North Carolina, a granite exposed only in the hanging-wall of the Brindle Creek fault has zircons with a weighted 206Pb/238U ion microprobe age of 366 ± 3 Ma (Giorgis et al. (2002) (Reference 415)). This field relationship was interpreted to indicate that the Brindle Creek fault was active after the intrusion of the granite, or is Devonian or younger in age. Also in North Carolina, migmatitic, high-temperature deformation is spatially associated with the Brindle Creek fault (Giorgis et al. (2002) (Reference 415)). Metamorphic rims in migmatitic rocks in the immediate footwall of the Brindle Creek fault yield ion-microprobe U-Pb ages of ca. 350 Ma, probably correlative with emplacement of the Brindle Creek hanging-wall (Merschat and Kalbas (2002) (Reference 416)). Tinsley Bridge Fault. The Tinsley Bridge fault is a less than 20-mi.-long zone of retrograde mylonite with apparent down-to-the-northwest sense of slip (Dennis (1995) (Reference 298)). At its nearest point, the Tinsley Bridge fault is located 5 mi. southwest of the Lee Nuclear Site (Figure 2.5.1-210). Based on the observations that mylonitic deformation occurred after peak metamorphic conditions (early Cambrian) and that the fault is cut by the undeformed Pacolet granite (whole-rock Rb/Sr age of 383 ± 5 Ma) the fault was active in the early Paleozoic (Reference 298). Southwest Extension of the Boogertown Shear Zone. The northeast-striking Boogertown shear zone marks the boundary between the Kings Mountain belt and the Charlotte belt (Reference 236). At its nearest point, this shear zone is located 8 mi. east of the Lee Nuclear Site (Figure 2.5.1-210). The northeastern end of the Boogertown shear zone is truncated by an unsheared granitic pluton (Milton (1981) (Reference 408)). This pluton is undated, but the youngest plutons within the Carolina Zone are 300-265 Ma (Hatcher et al. (2007) (Reference 404)). Reedy River Thrust Fault. The Reedy River thrust fault is a northeast-striking structure in the Inner Piedmont (References 260, 299, and 300). At its nearest point, the Reedy River thrust fault is located 18 mi. west-northwest of the Lee Nuclear Site (Figure 2.5.1-210). Gold Hill-Silver Hill Shear Zone. The Gold Hill-Silver Hill shear zone is a dextral strike-slip shear zone located approximately 30 mi. south of the Lee Nuclear Site (Figure 2.5.1-210). Based upon cross-cutting relationships with intrusive igneous bodies and the Cross Anchor fault, West (1998) (Reference 297) constrains motion on this shear zone to between approximately 400 and 325 Ma. Work along the Gold Hill-Silver Hill shear zone to the northeast has variably indicated deformation events of earliest Cambrian dextral-reverse faulting (Allen et al. (2007) (Reference 427)), Late Ordovician sinistral deformation (Hibbard et al. (2007) (Reference 425)), and Devonian to Mississippian remobilization (Hibbard et al (2007 (Reference 425): Hibbard et al. (2008) (Reference 426)). The best evidence for the latest movement on the GHSZ, however, is based on its cross-cutting relationship with the Cross Anchor fault that indicates latest motion was sometime prior to 325 Ma (West (1998) (Reference 297)). Middleton-Lowndesville Shear Zone. The Lowndesville shear zone is located approximately 40 mi. south of the Lee Nuclear Site (Figure 2.5.1-210), and is a zone of predominantly mylonitic gneisses, along with	

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					local muscovite phyllonites and silicified breccias, with a subvertical, N65°E-striking foliation, bearing subhorizontal stretching lineations (West (1998) (Reference 297)). It coincides with the sharply defined southeastern boundary of the Piedmont zone (or Inner Piedmont terrane), characterized by amphibolites-facies to migmatitic rocks (Griffin (1981) (Reference 423)), and is interpreted as part of the Central Piedmont shear zone (West (1998) (Reference 297)). Where it extends south into Georgia, it is described as a cataclastic zone, striking northeast, where it is mapped in geophysical data (Rozen (1981) (Reference 235)). The ductile and brittle deformation features associated with this structure all occurred at a minimum of greenschist-facies conditions and the brittle features are interpreted to have formed near the brittle-ductile transition (Nelson (1981) (Reference 424)). In South Carolina the Lowndesville shear zone is mapped as being truncated by the Cross Anchor fault, and hence was active older than approximately 325 Ma (West (1998) (Reference 297)). Beaver Creek Shear Zone. The Beaver Creek shear zone is a 4 km wide zone of mylonitic paragneiss, amphibolites and paragneiss (West (1998) (Reference 297)). The N80°E, subvertically dipping fabric bears dextral shear sense indicators and is cut by the Newberry granite, which is 415 ± 9 Ma in age (West (1998) (Reference 297)). The shear zone is also truncated by the Cross Anchor fault (West (1998) (Reference 297)). Modoc Shear Zone. The Modoc shear zone is a region of high ductile strain separating the Carolina terrane (Carolina Slate and Charlotte belts) from amphibolite facies migmatitic and gneissic rocks (Reference 301). The northeast-trending Modoc zone dips steeply to the northwest and is traced through the Piedmont from central Georgia to central South Carolina based on geological and geophysical data. The Modoc shear zone appears to continue northeastward to North Carolina beneath the Coastal Plain, as demonstrated by geologic mapping and aeromagnetic data (Figure 2.5.1-206). At its nearest point, the Modoc shear zone is about 75 mi. south of the Lee Nuclear Site. The Modoc shear zone contains fabrics characterized by brittle and ductile deformation produced by ductile shear during an early phase of the Alleghanian orogeny (References 302, 303, 304, and 305). Geochronologic data from Dallmeyer et al. (1986) (Reference 410) indicate movement occurred between 315 and 290 Ma. Howard et al. (2005) (Reference 411) and McCarney et al. (2005) (Reference 412) describe the Modoc fault zone as exposed by construction of Saluda Dam on Lake Murray, west of Columbia, South Carolina. They interpret brittle features in the Saluda Dam spillway as the result of readjustment from differential loading and unloading, as well as tectonic movement associated with latest Alleghanian deformation and initial Triassic rifting. Chappells Shear Zone. Horton and Dicken (2001) (Reference 308) and Hibbard et al. (2006) (Reference 260) map the 60-mi.-long Chappells shear zone as an approximately northeasterly-trending, 2-mi.-wide zone of ductile deformation. At its nearest point, the Chappells shear zone is located approximately 57 mi. south of the Lee Nuclear Site (Figure 2.5.1-210). Post-Paleozoic slip on the Chappells shear zone is precluded by cross-cutting relationships with the late Paleozoic (309 Ma; Reference 309) Winnsboro pluton. Other Paleozoic Faults. Other Paleozoic faults are present in the site region, most are located northwest of the site and are oriented parallel to the regional structural grain (Figure 2.5.1-209). These include, but are not limited to, the Eufola, and Tumblebug Creek faults shown on FSAR Figure 2.5.1-210, and the Pine Mountain, Bowens Creek, and Fries faults shown on Figure 2.5.1-209. While definitive timing evidence does not exist for many of the faults within the site region, any combination of many factors may have prompted workers to assess them as Paleozoic including: • Mapping that indicates that these faults only deform rocks of Paleozoic or older age, • Geometries and kinematics similar to other faults with established Paleozoic ages (e.g., west-directed thrusts), and/or • Textural fabrics or mineral assemblages consistent with deformation at ductile high-temperature metamorphic conditions, the latest of which generally occurred during the late Paleozoic collision with Gondwana (e.g., Hatcher et al. (2007) (Reference 404)). For example, the Tumblebug Creek fault was active during upper amphibolites, sillimanite-grade metamorphism (Davis (1993) (Reference 419)).	

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					Furthermore, no seismicity is attributed to these Paleozoic faults in the site region, and published literature does not indicate that any of these faults offset late Cenozoic deposits or exhibit a geomorphic expression indicative of Quaternary deformation. In addition, Crone and Wheeler (2000) (Reference 310) and Wheeler (2005) (Reference 311) do not show any of these faults to be potentially active Quaternary faults. Therefore, these Paleozoic structures in the site region are not considered to be capable tectonic sources. No new information has been published since 1986 on any Paleozoic fault in the site region that would cause a significant change in the EPRI seismic source model.	
6941	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.02	Restore the following paragraphs to Subsection 2.5.1.1.2.4.2: Hatcher et al. (1977) (Reference 306) suggest that the Modoc shear zone, the Irmo shear zone, and the Augusta fault are part of the proposed Eastern Piedmont fault system, an extensive series of faults and splays extending from Alabama to Virginia. Aeromagnetic, gravity, and seismic reflection data indicate that the Augusta fault zone continues northeastward in the crystalline basement beneath the Coastal Plain province sediments. Brevard Fault Zone. The northeast-trending Brevard fault zone extends for over 400 mi. from Alabama to Virginia (References 260 and 307). At its nearest point, the Brevard fault zone is located approximately 55 mi. northwest of the Lee Nuclear Site (Figure 2.5.1-210). The Brevard fault zone separates the Blue Ridge province to the west from the Piedmont province to the east. Diabase dikes preclude post Jurassic slip on the Brevard fault and cooling age histories indicate that no slip has occurred on the Brevard fault since the late Paleozoic (Reference 226).	Duke Energy response to RAI LTR 086, RAI 02.05.01-054. WLG2009.12-02
5567	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.03 F2.5.1-209 F2.5.1-210	COLA Part 2, FSAR, Chapter 2, Figures 2.5.1-209 and 2.5.1-210 have been revised. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.4.3, first paragraph, is revised to read: Tectonic features in the site region of known or postulated Mesozoic age include faults and extensional rift basins. These features, which are described below, are shown and labeled on Figure 2.5.1-210. The features also are shown on Figure 2.5.1-209, but not all features are labeled due to the scale limitations of the figure.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-015. WLG2009.05-04
5568	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.4.3, seventh paragraph, is revised to read: Mesozoic Rift Basins. A broad zone of fault-bounded, elongate, depositional basins associated with crustal extension and rifting formed during the opening of the Atlantic Ocean in early Mesozoic time. These rift basins are common features along the eastern coast of North America from Florida to Newfoundland (Figures 2.5.1-201 and 210). Wheeler (1995) (Reference 267) suggests that many earthquakes in the eastern part of the Piedmont province and beneath the Coastal Plain province may be associated spatially with buried normal faults related to rifting that occurred during the Mesozoic Era. However, definitive correlation of seismicity with Mesozoic normal faults is not conclusively demonstrated. Figure 2.5.1-210 shows the lack of spatial correlation between Mesozoic basins and seismicity within 50 miles of the site. As of March 2009, there was no positive correlation between earthquakes in the site region and Mesozoic basins. Normal faults in this region that bound Triassic basins may be listric into the Paleozoic detachment faults (Reference 268) or may penetrate through the crust as high-angle faults. Within regions of stable continental cratons, areas of extended crust potentially contain the largest earthquakes (Reference 317) (Figure 2.5.1-212). Mesozoic basins have long been considered potential sources for earthquakes along the eastern seaboard (Reference 318) and were considered by most EPRI teams in their definition of seismic sources (Reference 269).	Duke Energy Response to RAI LTR 59, RAI 02.05.1-017. WLG2009.05-04
5569	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.04	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.4.4, sixth paragraph, is revised to read: Arches and Embayments. The basement surface on which Coastal Plain sediments were deposited is not a simple planar platform. Instead, it is characterized by broad structural upwarps (arches) that separate depositional basins (embayments) (Horton and Zullo (1991) (Reference 261)). The hinge lines of these upwarps are aligned roughly perpendicular to the coastline. Two of these upwarps. the Cape Fear and	Duke Energy Response to RAI LTR 59, RAI 02.05.01-019. WLG2009.05-04

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					Yamacraw arches, are located within the site region. The Cape Fear Arch is located near the South Carolina-North Carolina border and the Yamacraw Arch is located near the South Carol ina-Geora ia border (Fioure 2.5.1-209.) Evidence constraining the timing of most-recent movement on the Cape Fear and Yamacrawarches is limited. Gohn (1998) (Reference 413) indicates that the Cape Fear Arch has affectedthe thickness and distribution of Late Cretaceous to late Tertiary strata. Prowell and Obermeier(1991) (Reference 414) suggest that upwarping on the Cape Fear Arch may have continued through the Pleistocene Epoch. Data constraining the timing of most-recent movement on the Yamacraw Arch are unavailable. However, since the tectonic history of the Yamacraw Arch likely is analogous to that of the Cape Fear Arch, the timing of most-recent movement on these two arches is assessed to be similar. Crone and Wheeler (2000) (Reference 310) classify the Cape Fear Arch as a Class C feature based on lack of evidence for Quaternary faulting and do not include the Yamacraw Arch in their assessment.	
5572	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.05	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1,2.4.5, fifth paragraph, is revised to read: Belair Fault zone. The Belair fault zone is mapped for at least 15 mi. as a series of northeast-striking, southeast-dipping, oblique-slip faults located 125 mi. south of the Lee Nuclear Site near Augusta, Georgia (Figure 2.5.1-213). The Belair fault juxtaposes Paleozoic phyllite over Late Cretaceous sands of the Coastal Plain province (References 323 and 324). Mapping and structural analysis by Bramlett et al. (1982) (Reference 301) indicate that the Belair fault likely is a tear fault or lateral ramp associated with the Augusta fault when displacement on these faults initiated during the Paleozoic Alleghanian orogeny. While simultaneous post-Paleozoic reactivation of the Belair and Augusta faults cannot be precluded by available data, it is not well established that these two faults share a common slip history and sense of displacement. Prowell et al. (Reference 324) and Prowell and O'Connor (Reference 323) document Cenozoic brittle reverse slip on the Belair fault. The latest well-constrained movement on the Augusta fault, as demonstrated by brittle overprinting of ductile fabrics, exhibits a normal sense-of-slip. Brittle slip occurred late in the Alleghanian during the transition from ductile to brittle conditions (References 320 and 321), with possible minor localized reactivation under Mesozoic hydrothermal conditions (Reference 320). No geomorphic expression of the fault has been reported (Reference 310).	Duke Energy Response to RAI LTR 059, RAI 02.05.01-020. WLG2009.05-04
5570	WLS	Pt 02	FSAR 02	02.05.01.01.02.04.05	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.2.4.5, ninth paragraph, is revised to read: Cape Fear Arch. The Cape Fear Arch is discussed previously in Subsection 2.5.1.1.2.4. Crone and Wheeler (2000) (Reference 310) classify the Cape Fear Arch as a Class C feature based on lack of evidence for Quaternary faulting.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-019. WLG2009.05-04
5577	WLS	Pt 02	FSAR 02	02.05.01.01.03.02.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.3.2.2, fifth paragraph, is revised to read: Subsequent hazard studies use Mmax values almost entirely within the range of maximum magnitudes used by the six EPRI models. Collectively, upper-bound maximum values of Mmax used by the EPRI teams range from M 6.3 to 7.5 [conversion from mb to M by arithmetic mean of three equally weighted relations: Atkinson and Boore 1995 (Reference 365), Frankel et al. 1996 (Reference 361), and EPRI (Reference 367).] Subsection 2.5.2.2.2.5 describes Mmax values used for the ETSZ in hazard studies subsequent to the EPRI models.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-026. WLG2009.05-04
5578	WLS	Pt 02	FSAR 02	02.05.01.01.03.02.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.1.3.2.3, second paragraph, is revised to read: Earthquakes in the Giles County seismic zone occur within Precambrian crystalline basement rocks beneath the Appalachian thrust sheets at depths from 3 to 16 mi. (Reference 265). Earthquake foci define a 25-mi-long, northeasterly striking, tabular zone that dips steeply to the southeast beneath the Valley and Ridge thrust sheets (References 265 and 371). The lack of seismicity in the shallow Appalachian thrust sheets, estimated to be about 2 to 3.5 mi. thick, implies that the seismogenic structures in the Giles County seismic zone, similar to those inferred for the ETSZ, are unrelated to the surface geology of the Appalachian orogen (Reference 265). The spatial distribution of earthquake hypocenters, together with considerations of the regional tectonic evolution of eastern North America, suggest that the earthquake activity is related to contractional reactivation of late Precambrian or Cambrian normal faults	Duke Energy Response to RAI LTR 59, RAI 02.05.01-028. WLG2009.05-04

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					that initially formed during rifting associated with opening of the Iapetan Ocean (References 265 and 352).	
5580	WLS	Pt 02	FSAR 02	02.05.01.02.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.1, fourth paragraph, is revised to read: Surficial geologic materials consist predominantly of residual soils and saprolite that mantle igneous and metamorphic bedrock. Relatively few natural bedrock outcrops are present within the site area, characteristic of the long weathering history of the Piedmont. The long history of weathering and erosion has created a relatively flat, rolling plain with local relief generally the result of variations in the weathering resistance of bedrock and/or stream incision. In the site area, the most erosion-resistant rock types contain large amounts of quartz (typically metaconglomerate or chert deposits), and often suppport linear ridges (Figures 2.5.1-219a, 219b and 2.5.1-220). The highest point in the Lee Nuclear Site area is Draytonville Mountain at about 1,010 ft. msl. Draytonville Mountain is an elongated, east-west-trending ridge located 4 mi. west-northwest of the site and underlain by quartzite pebble-cobble metaconglomerate (References 386 and 387). Other ridges in the site area include McKowns Mountain, Silver Mine Ridge, and unnamed ridges near Cherokee Falls, South Carolina. The site area ridges are associated with erosion-resistant quartzite rocks.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-030. WLG2009.05-04
5581	WLS	Pt 02	FSAR 02	02.05.01.02.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.1, sixth paragraph, is revised to read: One of the lineaments identified by PSAR Project 81 (Lineament No. 1) (Figures 2.5.1-219a and 2.5.1-221) is of particular interest for two reasons: (1) its orientation parallel to the predominant regional structural grain, and (2) its proximity to the site (Reference 401). This 4- to 5-mi.-long linear feature is located approximately 2 mi. northwest of the Lee Nuclear Site, and strikes approximately N55°E, and is a relatively steep northwest-facing slope. London Creek flows northeastward along much of the length of the northwestern base of the slope, before joining with the Broad River near the southernmost tip of Ninety-nine Islands. The lineament, most easily recognizable on the 1:40,000-scale USGS photography, terminates northeastward at the Broad River and is not expressed in the topography northeast of the river. Field reconnaissance performed for this project and geologic mapping by Nystrom (2004) (Reference 391) reveal that resistant, northeast-striking quartzite layers outcrop along the top of the slope. The linear topographic expression of this slope or ridge is the result of erosion by London Creek (and the erosion resistance of the quartzite layers) and is assessed to be non-tectonic in origin.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-031. WLG2009.05-04
5582	WLS	Pt 02	FSAR 02	02.05.01.02.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.2, is revised to read: 2.5.1.2.2 Site Area Geologic Setting and History The site area is underlain by a complexly deformed and metamorphosed plutonic-volcanic sequence and associated sediments. Under the "older" belt nomenclature these rocks are considered part of the "Kings Mountain Belt" (Reference 207). More recent classification of Hibbard et al. (2002) (Reference 204) associates these rocks with other Neoproterozoic – Early Paleozoic metaigneous terranes that were formed in volcanic arc systems. The subduction associated with these systems occurred distant from Laurentia, and based on fossil evidence was in the Gondwana realm. This schema groups these diverse terranes into the Carolina Zone, which in more recent publications is called "Carolinia" (References 425 and 428) and is given "Domain" status. Carolinia forms the exposed eastern margin of the Appalachian system. Hatcher et al. (2007) (Reference 404) use "Carolina Superterrane" to describe the amalgamated peri-Gondwanan volcanic arcs, but they consider the Kings Mountain Belt to have both Laurentian and peri-Gondwanan components. They consider the volcanic arc protoliths of the Battleground Formation to be of peri-Gondwanan origin, but consider the sedimentary protoliths of the Blacksburg Formation to have Laurentian affinities. However, they place the surface expression of the Carolina terrane suture to the west of the Battleground Formation. Hibbard et al. (2002) (Reference 204) assign both the metasediments of the Blacksburg Formation and the metavolcanic rocks of the Battleground Formation to the Charlotte terrane of Carolinia. Their rationale	Duke Energy Response to RAI LTR 59, RAI 02.05.01-032. WLG2009.05-04

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					for this association is the occurrence of similar rock types in both units, including protolithic felsic volcanics, quartzites that probably represent siliceous exhalatives related to hydrothermal activity associated with felsic volcanism, and similar styles of gold mineralization. Hibbard et al. (2002) (Reference 204) consider the metasediments of the Blacksburg Formation to represent the late stage clastic and carbonate sedimentary cap to the volcanic arc comprising the Battleground Formation, and therefore assign all the formations of the Kings Mountain Belt to have peri-Gondwanan associations. The following geologic scenarios and discussion are based on the detailed discussion of the characteristics of the Charlotte terrane in Hibbard et al. (2002) (Reference 204). The site area is located in the western portion of the Charlotte terrane. This terrane represents an "infrastructural" element of the Carolina Zone, characterized by lack of primary features due to regionally penetrative tectonothermal processes in Hibbard et al. (2002) (Reference 204). The Charlotte terrane contains elements from a long and complex geologic history (Figure 2.5.1-202a and 202b) that began with arc related magmatic activity in the Neoproterozoic, and extends through the rift related Triassic extension and magmatism associated with the opening of the modern Atlantic Ocean basin. Figure 2.5.1-223 is based on PSAR (1974) (FSAR Reference 401), Schaeffer (1981) (Reference 392), Hibbard et al. (2002) (Reference 204), and Hatcher et al. (2007) (Reference 404), and summarizes the geologic history of the site area. The protoliths for the lithologies in the western portion of the Charlotte terrane are the result of magmatic activity (Stage II of Hibbard et.al. (2002)) associated with subduction and arc rifting that straddled the Neoproterozoic-Cambrian boundary. An early stage of magmatism and deposition at about 570 Ma resulted in both felsic and mafic volcanism and shallow intrusion of tonalite and granodiorite plutonic bodies into the volcanic accumulation itself. Deposition of volcanic material was accompanied in later stages with deposition of both clastic and carbonate sediments that produced a volcaniclastic sequence with interfingered marine sediments. Locally, intense hydrothermal activity from the interaction of seawater with hot volcanic centers has significantly modified the bulk chemistry of these units. This modification occurred by severe leaching, transport, and redeposition of certain chemical components. Subsequently, in the 549 to 535 Ma interval, the volcanic pile and its sedimentary units were intensely deformed and metamorphosed to upper greenschist to amphibolite facies, probably resulting from the complex thermal and tectonic interactions occurring in the subduction-magmatic environment (i.e., the Virgilina Event) (Reference 204). This event is associated with at least two deformational episodes (D1 and D2) and produced most of the more noticeable foliation, structures, and map patterns of geologic units in the site area. The ages of structures and fabrics associated with D1 and D2 are constrained to pre-535 Ma by crosscutting relationships with post-tectonic and post-metamorphic diorite in Hibbard et al. (2002) (Reference 204). At least three scenarios are proposed in the literature for the cause(s) of this tectonothermal activity. These three scenarios include: (1) back arc rifting and closure, (2) subduction of a block of isotopically different material into the subduction zone, and (3) assembly of the composite Charlotte and Carolina terranes. Other locations of the Charlotte terrane contain rock types resulting from a later stage of magmatism that occurred around 540 to 530 Ma (Stage III; Figure 2.5.1-223) resulting in intrusion of large mafic-ultramafic complexes and granitic material. In the site area, these do not appear to occur (Reference 204) unless they are possibly represented by late gabbro intrusions (Figure 2.5.1-219a and 219b). The Charlotte terrane also shows tectonic and thermal evidence from later events in the Silurian, Devonian, and Carboniferous-Permian (i.e., the Alleghanian event; Subsection 2.5.1.1.2.1). However, the record for pre-Carboniferous tectonic activity is obscure in the Charlotte terrane in Hibbard et al. (2002) (Reference 204) probably due to thermal and structural overprinting by Alleghanian tectonic processes (Hatcher et al. 2007) (Reference 404). Hibbard et al. (2002) (Reference 204) and subsequent publications (References 428 and 430) argue for Late Ordovician - Silurian subduction of Carolinia and consequently the Charlotte terrane beneath Laurentia based on evidence from other portions of Carolinia and the Silurian thermal activity in the Charlotte terrane. Amphibole 40Ar/39Ar cooling ages (425 - 430 Ma) in North Carolina record the time at when the thermal environment in that location cooled through the temperature at which radiogenic argon would be lost from the amphibole (about 500 ± 50°C;	

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					Reference 388). Hibbard et al. (2002) (Reference 204) interpret this to indicate cooling following the elevated thermal conditions associated with the subduction of Carolinia beneath Laurentia. Based on detrital zircon ages in the Cat Square Terrane of the Inner Piedmont, Hatcher et al. (2007) (Reference 404) argue against Late Ordovician – Silurian subduction of Carolinia beneath Laurentia and for Neoacadian to early Alleghanian (post -405Ma) subduction of Laurentia beneath the Carolina Superterrane. Hatcher et al. (2007) (Reference 404) also cite the existence of the Concord suite, which represents Devonian mafic plutonism that resulted from this subduction event. In any case, in addition to the Concord suite plutons, the record for Devonian tectonothermal activity in the Charlotte terrane is confined to the Gold Hill-Silver Hill Shear zone. This indicates that Devonian effects may have been highly localized (Reference 204). Alleghanian (Carboniferous-Permian) tectonothermal activity is heterogeneously distributed in the Charlotte terrane (Reference 204). Deformation occurs mainly in discrete shear zones within the terrane and at the Central Piedmont shear zone, which in the site vicinity comprises the Cross Anchor fault and the Kings Mountain shear zone. Metamorphism associated with Alleghanian orogenesis ranges from greenschist to amphibolites facies in the Charlotte terrane. Late Alleghanian tectonic activity is attributed to the thrusting of the Charlotte terrane onto the Inner Piedmont terrane in the site vicinity (References 204 and 404). However, proposed accretion of Carolinia to Laurentia in either the Late Ordovician - Silurian (Reference 204) or in the Neoacadian - Early Alleghanian (Reference 404) means that the suture between Carolinia and Laurentia is an older structure and the Alleghanian activity on the Central Piedmont shear zone must represent a later event. One explanation for this relationship is that the present surface expression of the Central Piedmont shear zone represents the head of the suture that was decapitated in the subsurface during the late Alleghanian collision of Laurentia and Gondwana (References 204 and 404). Hatcher et al. (2007) (Reference 404) map the surface trace of the subsurface suture throughout the Carolina Superterrane based on geophysical evidence. Although the Charlotte terrane experienced accretion either during the Late Ordovician – Silurian or during the Neoacadian - early Alleghanian, the thermal and structural record is limited or obscure as discussed above. This has no doubt contributed to the controversy surrounding the timing and nature of the event. One K-Ar age for the site yields an age of 290 ± 7 Ma for hornblende (Table 2.5.1-202), and therefore it is uncertain if the site and site area experienced pre-late Alleghanian thermal elevation and therefore the extent of Late Ordovician or Neoacadian - early Alleghanian tectonogenesis. The fact that both Rubidium-Strontium ages (Rb-Sr; 291 - 10 Ma; sample B-51, 76 ft.) and Potassium-Argon (K-Ar; 296 ± 7 Ma; sample BP-7, 59 ft.) for undeformed biotite (closure to argon loss at about 300°C and undeformed hornblende K-Ar (290 ± 9; sample B-28, 106 ft.) (closure to Ar loss at about 500°C) are the same within analytical uncertainty indicates rapid cooling at the site following Alleghanian tectonic activity, presumably from rapid unroofing following emplacement of the Charlotte terrane upon the Inner Piedmont (at about 335 to 320 Ma) (Reference 404). Undeformed potassium feldspar from the site gives a K-Ar age of 219 ± 1 Ma (closure to argon loss at about 250°C) shows that the rate of cooling decreased and that the site area and site passed below about 250°C around 219 Ma. These data suggest that the site has not experienced thermal conditions that could be associated with greenschist grade metamorphism since at least 219 Ma, and likely since around 300 Ma. Based on the relatively limited record in the Charlotte terrane for Late Ordovician - Silurian and Devonian tectonics, the activity associated with Alleghanian tectonics is likely the cause of the last three deformational phases (D3 - Q5) at the site and site area. However, any or all of these structures could have resulted from earlier accretion events and could have been overprinted by the thermal elevation associated with the late Alleghanian interaction of Gondwana with Laurentia. Mesozoic extensional tectonics associated with opening of the Atlantic Ocean almost certainly affected the area, at least to a limited extent, with the development of joints and fractures with associated quartz and zeolite mineralization. Mesozoic extension-related fracturing and brittle faulting associated with development of cataclasites, silicification, and zeolite mineralization are widespread features throughout	

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					the Piedmont in the site region and site vicinity (Reference 420). These features also are associated with late kinematic open to healed fractures lined with crystalline quartz and syntaxial extension veins filled with anhedral quartz. Garahan et al. (1993) (Reference 420) report brittle faulting associated with Mesozoic reactivation of the Kings Mountain shear zone, northwest of the site. Murphy and Butler (1981) (Reference 389) report limited displacement (less than 10 cm), small scale brittle faulting in the site area. Schaeffer (1981) (Reference 392) reports laumontite - calcite mineralization associated with S5 kink planes. Undeformed Triassic diabase dikes are the only documented evidence of Mesozoic activity in the site area. Subsequent to this rifting, broad flexure occurred as a result of erosional unloading and the onset of drift margin sedimentation. In summary, the majority of rock types, metamorphism, and deformation in the site area can be attributed to Neoproterozoic-Early Cambrian subduction zone-related magmatic and tectonic activity. However, the site area may have experienced thermal environments and stresses associated with Silurian and/or Devonian orogenic events. Based on regional considerations, any effects resulting from these events are to be limited in the site area. In contrast, Alleghanian tectonic activity likely produced folding and shearing localized in discrete zones under greenschist to amphibolite grade conditions as recorded in the mineral cooling ages. Alleghanian emplacement of the Charlotte terrane upon the Inner Piedmont was followed by rapid cooling that resulted from rapid unroofing and cooling. Extensional tectonics associated with the opening of the modern Atlantic Ocean probably caused some jointing and fracturing in the Lee Nuclear Site area. In addition, magmatism associated with this extension is evident in the site area as a set of undeformed diabase dikes.	
5599	WLS	Pt 02	FSAR 02	02.05.01.02.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.3, is revised as follows: 2.5.1.2.3 Site Area Stratigraphy and Lithology Rock units in the site area generally belong to the Battleground Formation(References 308, 391, 286, and 260). There is disagreement, however, as to whether the rock mass mapped at the site (map unit "Zto" on Figures 2.5.1-218 through 2.5.1-220) belongs to the Battleground Formation. Murphy and Butler (1981) (Reference 389) suggest that these rocks belong to the Battleground Formation, whereas more recent publications by Horton and Dicken (2001) (Reference 308) and Nystrom (2004) (Reference 391) indicate that rock mass Zto comprises plutonic rocks that intruded into the Battleground Formation. For the purposes of this COL application, rock mass Zto is assessed to be separate from, and younger than (or possibly coeval with), the Battleground Formation. Other rocks in the site area include Mesozoic diabase dikes (References 236 and 389) and Quaternary alluvial deposits (References 286 and 391). Subsection 2.5.1.2.3.1 describes the Battleground Formation. Subsection 2.5.1.2.3.2 describes intrusive rock mass Zto. Subsection 2.5.1.2.3.3 describes the Mesozoic diabase dikes and Quaternay alluvial deposits within the site area. Figure 2.5.1-219a presents geologic mapping of the site area performed at two different scales by three different researchers (References 308, 286, and 391). As such, unit contacts do not match perfectly across adjacent source map boundaries. 2.5.1.2.3.1 Battleground Formation The Battleground Formation primarily comprises metavolcanic and metasedimentary rocks of Neoproterozoic age (Reference 308) (Figures 2.5.1-219a and 219b). The occurrence of metasedimentary carbonate rocks is indicative of a marine depositional environment. The Battleground Formation includes felsic metavolcanic rocks, intermediate to mafic metavolcanic rocks, and quartz-rich metasedimentary rocks. Major units within the Battleground Formation are described below, with additional detail provided in Figures 2.5.1-219a and 219b. Mafic to intermediate metavolcanic rocks (map unit Zbvm). Nystrom (2004) (Reference 391) maps mafic	Duke Energy Response to RAI LTR 59, RAI 02.05.01-036. WLG2009.05-04

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					to intermediate metavolcanic rocks west and south of the site. These rocks are described as medium gray, dark gray, and green hornblende phyllite, hornblende gneiss, and amphibolite. Nystrom (2004) (Reference 391) maps the contact separating Zbvm from the western edge of plutonic rock mass Zto as nearly linear (Figure 2.5.1-219a). Subsection 2.5.3.1.3 describes evidence indicating the irregular and intrusive nature of this contact, as shown in Figures 2.5.1-220 and 2.5.1-229. Felsic metavolcanic rocks (map unit Zbvf). Nystrom (2004) (Reference 391) maps assorted felsic metavolcanic rocks in the southeast corner of the Blacksburg South quadrangle. These rocks are described as medium gray, dark gray, and green in color. Interlayered mafic and felsic gneiss (map unit Ztrs). Howard (2004) (Reference 286) maps interlayered mafic and felsic gneiss in the southwest corner of the Kings Creek quadrangle. Based on general unit descriptions and mapped location, units Ztrs and Zbvf are assessed to be roughly equivalent across the quadrangle boundary. However, Nystrom (2004) (Reference 391) indicates that Zbvf is part of the Battleground Formation, whereas Howard (2004) (Reference 286) suggests that Ztrs is not part of the Battleground Formation. For the purposes of this COL application, rock masses Zbvf and Ztrs are assessed to be equivalent and part of the Battleground Formation. Plagioclase crystal metatuff (map unit Zbct). Nystrom (2004) (Reference 391) describes unit Zbct as gray, generally well foliated, assorted metavolcanics of mainly felsic to intermediate composition with crystal and less abundant lithic metatuffs. This unit is assessed to be the equivalent of Howard's (2004) (Reference 286) crystal metatuff (Zbct). Phyllitic metatuff (map unit Zbmp). Nystrom (2004) (Reference 391) describes unit Zbmp as gray to dark gray varied metavolcanics including crystal and lithic metatuffs. This unit is assessed to be equivalent to Howard's (2004) (Reference 286) mottled phyllite (lapilli metatuff) (map unit Zbmp). Howard (2004) (Reference 286) maps a siliceous alteration zone within unit Zbmp (shown as Zbmp-a on Figure 2.5.1-219a) that does not appear on Nystrom's (2004)(Reference.391) map. Quartzite and metaconglomerate (map units Zbq, Zbkq, Zbdc, Zbc). Nystrom (2004) (Reference 391) maps various north- and northeast-striking quartzite and quartz metaconglomerate units within the site area. These long and thin "stringers" are described as white to gray, fine- to medium-grained quartzite and medium- to coarse-grained, schistose metaconglomerate. As described in Subsection 2.5.1.2.1, some of these quartzite and metaconglomerate units are mapped atop ridges in the site area, including McKowns Mountain. Due to intense deformation, few primary features survive with which to determine stratigraphic order within the Battleground Formation. However, inferred relationships (References 236, 389, and 390) suggest the proposed northeast-striking South Fork antiform forms a homocline such that units within the Battleground decrease in age to the northwest (Reference 236) (Figure 2.5.1-219a). If these inferred relationships are correct, then the oldest rocks would occur in the antiform's core and rocks farther from the core to the northwest would be younger. This inference is supported by the occurrence of the metasedimentary component primarily to the northwest, the expected stratigraphic relationships for deposition of marine-dominated clastic and chemical precipitate rocks at the later stages of the volcanic pile accumulation (Reference 308). Figure 2.5.1-224 schematically shows the stratigraphic relationships of the various units in the site area. 2.5.1.2.3.2 Site Pluton (Rock Mass Zto) The site is underlain by a metamorphosed plutonic rock mass, shown on Figures 2.5.1-218 through 2.5.1-220, 2.5.1-224, and 2.5.1-229 as rock mass Zto. Goldsmith et al. (1988)(Reference 228) report a discordant 207 Pb/206 Pb age of approximately 590 Ma for rock mass Zto. This rock mass has been	

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					mapped at various scales by various geologists and, consequently, has been described differently, as indicated below. Murphy and Butler (1981) (Reference 389) note the similarity between the compositions of volcaniclastic units of the Battleground Formation and the plutonic units that intrude them (Zto). Based on this observation, they suggest that these metavolcanics were intruded by their own parent magmas, and assign both to the Battleground Formation. However, more recent mapping separates these plutonic rocks (Zto) from the Battleground Formation host units. For the purposes of this COL application, rock mass Zto not considered to be part of the Battleground Formation. This distinction larqely is semantic, however, since the Battleground Formation and rock mass Zto likely formed at approximately the same time in the Neoproterozoic (Reference 389). Horton and Dicken's (2001) (Reference 308) 1:500,000-scale mapping describes rock mass Zto at the site as Neoproterozoic metatonalite (Figures 2.5.1-218a and 218b), comprising metamorphosed biotite tonalite and lesser amounts of hornblende tonalite, trondhiemite, and granodiorite. Rock mass Zto locally contains angular xenoliths of Battleground Formation metavolcanic and metasedimentary rocks (Reference 308). Nystrom's (2004) (Reference 391) 1:24,000-scale mapping of the Blacksburg South quadrangle describes rock mass Zto at the site as metatonalite (Figures 2.5.1-219a and 219b). This metatonalite is described as light to medium gray, coarse-grained, with large potassium feldspar and quartz grains (Reference 391). Howard's (2004) (Reference 286) 1:24,000-scale mapping of the adjacent Kings Creek quadrangle describes rock mass Zto as metatonalite and volcaniclastic rocks (Figures 2.5.1-219a and 219b). These felsic rocks are of mixed origin, comprising intrusive tonalite, dacitic flows, and epiclastic byproducts of both (Reference 286). Howard (2004) (Reference 286) maps Zto approximately 3 miles east of the site (Figure 2.5.1-219a). Whereas rock mass Zto generally is metatonalite, its composition varies spatially (Reference 286). Subsection 2.5.3.1 indicates that meta-granodiorite is the most abundant rock type present within map unit Zto exposed by the excavation at the site, based on petrographic analyses (Reference 401). As such, Figure 2.5.1-229 and discussions throughout Section 2.5.3, describe rock mass Zto within the site excavation as meta-granodiorite. 2.5.1.2.3.3 Other Lithologic and Stratigraphic Units within the Site Area In addition to the rocks described above, Mesozoic diabase dikes and Quaternary alluvial deposits are mapped within the site area. The diabase primarily are of plagioclase, pyroxene, and olivine composition. These dikes crosscut, and therefore post-date, the units described above. These diabase dikes are undeformed and unmetamorphosed rocks of Jurassic-Triassic age (References 236 and 389). Quaternary alluvial deposits are mapped in active river and stream channels in the site area. These deposits Primarily are modern channel deposits and bars that are actively transported by the Broad River and its tributaries comprising gravels, sands, and silts. Additional editorial revision to Subsection 2.5.1.2.3.2, sixth paragraph, third sentence correcting 'Section 2.5.3' to 'Subsection 2.5.3'.	
5590	WLS	Pt 02	FSAR 02	02.05.01.02.04	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.4, first paragraph, is revised to read: Previous geologic investigations include specific studies conducted for the Lee Nuclear Site and geologic mapping of the surrounding area. Schaeffer (1981) (Reference 392), Butler (1981) (Reference 285), and Murphy and Butler (1981) (Reference 389) present structural analyses for the site area. Schaeffer (1981)	Duke Energy Response to RAI LTR 59, RAI 02.05.01-046. WLG2009.05-04

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					(Reference 392) incorporates much of the structural data obtained as part of the PSAR Project 81 (Reference 401). According to Schaeffer (1981) (Reference 392), the site area has experienced five deformational episodes (D1 through D5), which are expressed as associated cleavage development (S1 through S5), folding (F 1 through F5) , and lineations (L1 through L5) (Table 2.5.1-203). In addition to these penetrative fabrics, discrete zones of both ductile and brittle deformation are present, mainly concentrated in sheared-out fold limbs (Table 2.5.1-203). The map pattern of surface geology is mainly controlled by the planar S1 and S2 foliations, and by the axial surfaces of F2 folds. Because the S2 foliation is the best developed, these features are the most commonly seen. Both the D1 and D2 deformations are closely related and formed during the same greenschist- to amphibolite-grade metamorphic event. This metamorphism and deformation has been shown to have occurred near the Neoproterozoic-Cambrian boundary (549 to 535 Ma) in Hibbard et al. (2002) (Reference 204). In addition to the structures described above, Schaeffer (1981) (Reference 392) also notes probable effects resulting from Mesozoic extension.	
5579	WLS	Pt 02	FSAR 02	02.05.01.02.05.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.5.1, is revised to read: 2.5.1.2.5.1 Site Physiography and Geomorphology The physiographic and geomorphologic characteristics of the site are typical of those described for the site area. Elevations at the site range from 510 to 820 ft. msl (Figure 2.5.1-222). Site relief is largely the result of tributary drainage incision. McKowns Mountain, the linear, north-trending ridge west of the site, is the result of erosion-resistant quartzite. The variation in bedrock resistance to weathering locally control drainage directions, and is also discussed in Subsection 2.5.1.2.1. Topography controlled by differential erosion is particularly evident in the orientations of McKowns Creek and a smaller creek that occurs between McKowns Mountain and a smaller quartzite ridge to the east. The smaller creek is essentially sub-parallel to the quartzite ridges and McKowns Creek and the confluence of the smaller creek can be seen to bend around the nose of McKowns Mountain.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-029. WLG2009.05-04
5587	WLS	Pt 02	FSAR 02	02.05.01.02.05.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.5.2, is revised to read: 2.5.1.2.5.2 Site Geologic Setting and History The site geologic history is congruent with the scenario outlined above for the site area. However, whereas five deformational events are documented within the site area (Reference 392), at least two are recognized in rocks at the site. The reasons why all five events are not recorded in site rocks are: (1) the emplacement of the site plutonic rocks in Neoproterozoic time (FSAR Reference 308) post-dates some of the older deformational events recorded in site vicinity country rocks: and (2) the contrasting rheological properties between the site plutonic rocks and the surrounding metavolcanic country rocks makes correlation of deformational events problematic. These contrasting rheological properties make correlation of deformational events recorded in the pluton and the country rocks difficult because the plutonic mass probably developed different structures in response to stress relative to the surrounding country rock. The site is underlain by a pluton of granodiorite to tonalite composition that has intruded into mafic to felsic volcaniclastic country rock. Lee Nuclear Site rocks have undergone at least two deformational events and metamorphism to upper greenschist to amphibolite facies. These deformation events produced two foliations, and the second deformation event produced tight to isoclinal folding. These deformation events occurred in Neoproterozoic and Early Cambrian time in association with island arc subduction, probably located proximal to Gondwana (Reference 204).	Duke Energy Response to RAI LTR 59, RAI 02.05.01-043. WLG2009.05-04
5589	WLS	Pt 02 .	FSAR 02	02.05.01.02.05.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.5.3, first paragraph, is revised to read: The eastern portion of the site, including the area for the facility foundations, is underlain by a meta-granodiorite to meta-diorite intrusive body (Figure 2.5.1-220). Western portions of the site are underlain by mafic to intermediate metavolcanic rocks that consist primarily of homblende phyllite, homblende gneiss, and amphibolite. The metavolcanic rocks locally contain quartzite bodies that form geomorphically	Duke Energy Response to RAI LTR 59, RAI 02.05.01-045. WLG2009.05-04

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					prominent linear ridges.	
5588	WLS	Pt 02	FSAR 02	02.05.01.02.05.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.5.3, third paragraph, is revised to read: Quaternary alluvial deposits are mapped in active stream channels at the site and include gravels, sands, and silts (Figure 2.5.1-220). These deposits primarily are modern channel deposits and bars that are actively transported by the Broad River and its tributaries.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-044. WLG2009.05-04
5595	WLS	Pt 02	FSAR 02	02.05.01.02.05.04	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.5.4, is revised to read: 2.5.1.2.5.4 Site Area Structure As in the site area, the major control on geologic trends in the country rock and map patterns are foliations and folding due to the D2 deformation. However, the intrusive metagranodiorite-diorite pluton is massive in nature and locally contains discrete zones expressed as joints, fractures and shear/ breccia zones. These features are discussed in detail below. The relatively massive nature of the pluton compared to the surrounding country rock which is composed of volcaniclastic protoliths, probably indicates that there has been a significant difference in rheological properties between these two lithologies, both in strength and anisotropy. That this is the case, is indicated by the fact that the volcaniclastic country rock carries a well developed, penetrative foliation compared to the pluton in which strain is expressed in more discrete zones. This rheological difference makes correlation of deformational events between the pluton and country rock problematic in that the strain from a single deformational event may be expressed as different structures in the country rock verses the pluton (i.e., folding in the foliated country rock verses discrete shearing in the pluton). For this reason the deformational events associated with the structures in the pluton will be annotated with lower case (i.e., di) as opposed to the deformational events in the site area (i.e., country rock) which are expressed as upper case (i.e., D1) (Table 2.5.1-204). McKown's Creek Antiform. Mapping by Butler (1981) (Reference 285) indicates that the metagranodiorite - diorite body that serves as the foundation for the Lee Nuclear Site structures is located in the nose of McKown's Creek antiform. This antiform is shown at the map scale by metatonalite-dacite-complex lithologies that are folded about a core of metaandesite (Figures 2.5.1-219a and 219b). Two prominent north-south oriented quartzite ridges are located in the western portion of the site on the eastern flank of the structure (Figures 2.5.1-219a and 219b). The dominant axial planar foliation is S2 , which occurs at an angle to the lithologic contacts and an earlier foliation (S1), is folded in the nose of the structure, Schaeffer (1981) (Reference 392). Based on these observations and the orientation of the fold axes and axial surface, Schaeffer (1981) (Reference 392) assigns this structure to F2 . Therefore, this structure results from 02 deformation and is Neoproterozoic to Early Cambrian in age. More recent mapping by Nystrom (2004) (Reference 391) does not include the McKowns Creek antiform. Shear and Breccia Zones. Several "shear-breccia" zones were investigated during field studies performed for the Project 81 PSAR (Reference 401) and in subsequent foundation excavation mapping. These zones were mapped and studied in great detail including borings and detailed petrographic descriptions of the structural fabric. Detailed mapping shows that these zones comprise smaller-scale anastomozing zones that are preferentially developed in the smaller dikes or along the margins of the larger dikes of the more mafic lithologies. The structural fabric in these zones contains an early ductile (foliated) component (d1) with a late-stage brittle overprint (d2). The orientation data for these zones are shown plotted on a stereonet in Figure 2.5.1-231. The most well developed zones strike a few degrees east of north and dip steeply east. A second, less well-developed set strikes northwest and dips moderately southwest. The early ductile fabric is composed primarily of elongated "polygonalized" polycrystalline quartz aggregates indicative of dynamic recrystallization and annealing recovery mechanisms. These quartz aggregates occur in a foliated matrix of white mica and sometimes biotite. Potassium feldspar and plagioclase porphyroclasts are reported and this fabric is described as mylonitic.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-046. WLG2009.05-04

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					The feldspars fraction is highly altered to white mica and epidote. Iron staining of the shear planes is ubiquitous. Biotite in the protolith is reported to be "olive green" in color. In contrast, biotite reported in association with the shear zones is almost always reported to be "brown." A brittle fabric that contains fractured and broken plagioclase, quartz and quartz aggregates in a finer grained matrix of smaller clasts and fine-grained material overprints the early ductile fabric. This fine-grained matrix is overgrown by undeformed white mica. This white mica occasionally stitches the boundary between larger clasts and the fine-grained matrix. In addition, the matrix contains randomly oriented chlorite plates and masses, along with epidote, calcite and pyrite. Veins containing quartz, calcite, epidote, white mica, chlorite, pyrite and what is reported to be a low birefringent material (likely albite) cut the ductile and brittle fabrics. Veins also occur that contain various mixtures of these minerals and potassium feldspar. These veins are in various states of deformation ranging from undeformed, to slightly deformed, to folded and bent. In addition, stringers of the vein material are reported sub-parallel to the dominant foliation, and ground up in the brittle matrix. This indicates that these veins are both syn- and post-kinematic with respect to both the ductile and brittle phases of deformation. The relationships described above indicate that fluid-dominated metamorphic processes accompanied the ductile and brittle strain. This metamorphism resulted in a granodiorite to tonalite mineralogy consisting mainly of plagioclase (andesine-oligoclase), quartz, potassium feldspar, biotite, and amphibole transformed into more hydrous and carbon-rich phases. The presence of calcite and potassium feldspar in the metamorphic assemblage indicates that the fluid contained significant amounts of C02, and water. In addition to hydration of the mineralogy, this metamorphism is characterized by the release of significant amounts of calcium from the plagioclase due to removal of the anorthic component as the stable phase becomes albite in the presence of both H20 and CO2 (Reference 393): 4CaAI 2 Si2O8 + KAISi3O8 + H2O -- KAI3O10(OH)2 + 2Ca2AI3S3012(OH) + 2SiO2 anorthite + Kspar + water -- muscovite + epidote + quartz in the presence of water and potassium feldspar (Reference 394), or: 2CaAI2Si208 + C02 + H20 -- CaAI4Si2010(OH)2. + CaCO3 + 2SiO2 anorthite + C02 + water -- margarite + calcite + quartz These reactions are characteristic of greenschist-grade metamorphism (Reference 394). Additional potassium would be added to this system as a result of the breakdown of biotite and amphibole to chlorite. The kinematic history of the shear-breccia zones began with a ductile event (d1). The dynamic recrystallization and recovery features recorded in quartz indicate that this occurred at mid- to upper-greenschist facies conditions in the presence of a fluid with an aqueous component. During this initial stage, in association with mechanical processing of the other mineralogy, protolith plagioclase and potassium feldspar were metamorphosed to produce a foliated assemblage of dynamically recrystallized quartz, albite, white mica and possibly biotite. Subsequently, either due to reduced temperature, increased strain rate, or both, brittle deformation produced a cataclastic fabric (d2) that contains clasts of the earlier fabric and probably protolith material. The metamorphic reactions discussed above and the breakdown of biotite and amphibole to chlorite produced white mica, calcite, quartz, epidote and chlorite. Coeval with the ductile and brittle shearing, extensional fractures were generated and filled with metamorphic fluids that resulted in the crystallization of reaction products in the fracture void. Fractures initially formed parallel to the maximum compression direction (Figure 2.5.1-230), which occurred at some angle to the shear zone boundaries. As the shear strain increased,	

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					fractures rotated into the field of compression and were folded. Further shear continued to rotate the fractures out of the field of compression into the field of extension. The extensional strain deformed fractures and strung out into the structural fabric. The persistence of elevated thermal conditions after the brittle deformation is indicated by the occurrence of extensional fractures with infilling of the metamorphic products that are undeformed and that crosscut the foliation that defines the structural fabric. This also resulted in the overgrowth of undeformed metamorphic products on the matrix material. The K-Ar radiometric data reported for potassium feldspar from an undeformed vein in a dilatational feature that cross cuts one of the shear zones is an important constraint on the minimum age possible for the shear-breccia zones. This sample gives a mineral age of 219 ± 1 Ma (sample GTP-7). This result is significant in two and the feldspar is older than 219 Ma, the timing of deformation related to shear zone formation is constrained to some time before 219 Ma; (2) the temperature for closure to argon loss for potassium feldspar is about 250°C (Reference 388). These data indicate that the thermal environment at the site has not been sufficient to produce greenschist facies metamorphic effects since at least 219 Ma. Although feldspar geochronology constrains the formation of the shear-breccia zones to be pre-219 Ma, the K-Ar biotite mineral age indicates cooling from greenschist grade thermal conditions at 296 ± 7 Ma. This cooling was probably associated with unroofing following thrusting of the Charlotte terrane over the Inner Piedmont along the nearby Kings Mountain shear zone. Schaeffer (1981) (Reference 392) assigns the development of ductile fabric in these zones to D, and the later brittle overprint to D3 similar to features seen in sheared out Fz fold limbs in the site area. The D0 event is associated with upper greenschist to amphibolite grade metamorphism which would be consistent with the features observed in the ductile fabric elements. If this association is correct, then the ductile fabric in the shear - breccia zones would be Late Proterozoic to Early Cambrian in age. However, because of the orobability that the pluton may have seen elevated thermal conditions and stresses in the Late Ordovician - Silurian, Hibbard et al. (2002) (Reference 204). or Devonian to late Mississippian, Hatcher et al. (2007) (Reference 404) or late Alle-ghanian, Hibbard et al. (2002) (Reference 204), Hatcher et al. (2007) (Reference 404) the ductile fabric (di) and subseauent cataclasis (d2) in the shear-breccia zones could have resulted from, or been reactivated by stresses associated with any of these events. The only constraints are that the ductile fabric (d1) is older than the cataclasis (d2) and that the cataclasis is older than approximately 300 Ma based on the radiometric ages of the post-kinematic greenschist facies assemblage. It should be noted that ductile fabrics with brittle overprint are commonly reported with late stage Alleghanian tectonism. Therefore it is also possible that these shear breccia zones are related to, or have been reactivated by localized deformation of the pluton in response to stresses associated with this thrusting event and may be Alleghanian in age. Dilation Fractures. Dilation fractures (d3) less than or equal to 4 in. thick and partially filled with undeformed quartz, potassium feldspar and minor amounts of calcite, pyrite and fluorite cut across the shear-breccia zones with no apparent effect except for the dilatational separation. The open spaces have euhedral crystals indicating growth from a hydrothermal fluid. These are straight breaks similar to joints and in locations where they change direction they become wider. Based on the occurrence of similar mineralogy in the fracture filling, these dilational features were probably produced during the metamorphic event described above for the shear - breccia zones. In any event, the potassium feldspar that constrains the age of the shear-breccia zones cross cuts one of these features and places the same constraints on the age. Joints. Joints are common at the site and in the surrounding area (Figure 2.5.1-225). Most of these features are steeply dipping (60° to 90°) and exhibit a range of strike directions, including slightly east of north, northeast, and east-west. The joint spacing ranges from one inch to several feet. Comparison of the orientations of the joint surfaces with Mesozoic structures in the site vicinity, Garahan et al. (1993) (Reference 420), indicates that at least one population of the joint sets may be related to Mesozoic extension (d5).	

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					Slickensides on Joint Surfaces. In some cases slickensides are mapped on joint surfaces and contacts between rock types. Study of these features in the geologic test pits indicate that they may extend from 2 to 20 ft. These surfaces cut across both the shear-breccia zones and the dilation fractures. These striated surfaces show various stages of development ranging from poorly developed with incipient chlorite films and striations to chlorite-calcite films up to 0.04 in. thick with well-developed striations. Chlorite is the most common phase on these surfaces but traces of calcite are commonly found. Microscopic study of these features shows that most of the movement has occurred in the chlorite, and that calcite is rarely deformed. The displacement on the slickensided surfaces ranges from 0 to 1 in. in unweathered rock. One example in partially weathered rock measured 4 in., and a similar feature in saprolite recorded a 2 ft. displacement. These features apparently post-date both the dilatational fractures and the shear breccia zones, but the close association of chlorite with the movement on these surfaces indicates that they were also associated with the pre-219 Ma greenschist facies event (d4). Slickensides in Weathered Rock and Saprolite. Partially weathered rock and saprolite show slickensides (d6) on surfaces coated with white clay and a black secondary material. The black material consists of gelatinous iron and manganese hydroxides of varying proportions. This material also contains clay (7 angstrom), which results from weathering of biotite and has a high iron content.	
5598	WLS	Pt 02	FSAR 02	02.05.01.02.05.05	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.2.5.5, sixth paragraph, is revised to read: Top-of-foundation mapping was completed for the former Duke Cherokee nuclear site Unit 2 in the northern area of the excavation. Two large metadiorite dikes cross-cut the area and provide several contacts in a east-west and north-south orientation. Points were established by WLA geologists and were surveyed in multiple locations. These coordinates were then compared to the digitized maps.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-052. WLG2009.05-04
5555	WLS	Pt 02	FSAR 02	02.05.01.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.3, is revised to add the following references: 428. Hibbard, J. P., van Staal, C., Rankin, D. W., Comparative analysis of pre-Silurian crustal building blocks of the northern and the southern Appalachian orogen: American Journal of Science, v.307, p.23-45, 2007. 429. Hatcher, R. D. Jr., Tectonic synthesis of the U. S. Appalachians: in The Geology of North America, The Appalachian-Ouachita Orogen in the United States, Volume F-2, The Geological Society of America, p.511-535, 1989.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-004. WLG2009.05-04
5559	WLS	Pt 02	FSAR 02	02.05.01.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.3, is revised to add the following references: 408. Milton, O. J., The northern termination of the Kings Mountain belt. In Geological investigations of the Kings Mountain belt and adjacent areas in the Carolinas, Carolina Geological Society Field Trip Guidebook 1982, p. 1-5, 1981. 409. McSween, H. Y. Jr., Speer, J. A., Fullagar, P. Q., 1991, Chapter 7. Plutonic Rocks. In, The Geoloqy of the Carolinas. Horton, J. W. Jr., Zullo, V. A. eds., University of Tennessee Press, p. 109-126.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-005. WLG2009.05-04
5566	WLS	Pt 02	FSAR 02	02.05.01.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.3, is revised by adding the following references: 408. Milton, D. J., The northern termination of the Kings Mountain belt. In Geological investigations of the Kings Mountain belt and adjacent areas in the Carolinas, Carolina Geological Society Field Trip Guidebook 1982, p. 1-5, 1981. 410. Dallmeyer, R.D., Wright, J.E., Sêcor, D.T., Jr., and Snoke, A.W., Character of the Alleghanian Orogeny in the Southern Appalachians: Part II- Geochronological constraints on the tectonothermal evolutions of the Eastern Piedmont in South Carolina: Geological Society of America Bulletin. v. 97, p. 1,329-1,344, 1986.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-014 WLG2009.05-04

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					411. Howard, C.S., Charleton, J.E., and McCarney, K.J., New geologic synthesis of the Dreher Shoals and Carolina Terranes, Lake Murray and Saluda Dam, Columbia, SC: Geological Society of America Abstracts with Programs, v. 37, no. 2, p. 36, 2005. 412. McCarney, K.J., Charleton, J.E., and Howard C.S., Brittle features mapped along a shear zone at Saluda Dam, central South Carolina: Geological Society of America Abstracts with Proarams. v. 37. no. 2. D. 5. 2005. 415. Giorgis, S. D., Mapes, R. W., Bream, B. R., The Walker Top Granite: Acadian granitoid or eastern Inner Piedmont basement, in Hatcher, R. D. and Bream, B. R., eds., Inner Piedmont geology in the South Mountains-Blue Ridge foothills and the southwestern Brushy Mountains, central-western North Carolina: North Carolina Geological Survey, Carolina Geological Society annual fieldtrip guidebook, p. 33-43, 2002. 416. Merschat, A. J., Kalbas, J. L., Geology of the southwestern Brushy Mountains, North Carolina Inner Piedmont: A summary and synthesis of recent studies, in Hatcher, R. D. and Bream, B. R., eds., Inner Piedmont geoloqy in the South Mountains-Blue Ridge foothills and the southwestern Brushy Mountains, central-western North Carolina: NorthCarolina Geological Survey. Carolina Geological Society annual fieldtrip guidebook, p.101-126, 2002. 417. Hibbard, J. P., Shell, G. S., Bradley, P. J., Samson, S. D., Wortman, G. L., 1998, The Hyco shear zone in North Carolina and southern Virginia: implications for the piedmont zone-Carolina zone boundary in the southern Appalachians: American Journal of Science, v. 298, p. 85-107. 418. Wortman, G. L., Samson, S. D., Hibbard, J. P., Precise timing constraints on the kinematic development of the Hyco shear zone: implications for the Central Piedmont shear zone, southern Appalachian orogen: American Journal of Science, v. 298, p. 108-130, 1998. 419. Davis, T. L., Geology of the Columbus promontory, western Piedmont, North Carolina, southern Appalachians, in Hatcher, R. D. and Davis, T. L., Studies of Inner Piedmont geology with a focus on the Columbus promontory: Carolina Geological Society Fieldtrip Guidebook, p. 17-39, 1993. 421. Horton, J. W., Shear zone between the Inner Piedmont and Kings Mountain belts in the Carolinas: Geology, v. 9, p. 28-33, 1981. 422. Dennis, A. J., Wright, J. E., Mississippian (ca. 326-323 Ma) U-Pb crystallization for two granitoids in Spartanburg and union counties, South Carolina: Carolina Geological Society Guidebook, p. 43-47. 1995. 423. Griffin, V. S., The Lowndesville belt north of the South Carolina-Georgia border, in Horton, J. W., Butler, J. R., and Milton, D. J., eds. Geological investigations in the Kings Mountain belt and adjacent areas, Carolina Geological Society Fieldtrip Guidebook, p. 166-173, 1981. 424. Nelson, A. E., Polydeformed rocks of the Lowndesville shear zone in the Greenville 2 degree quadrangle, South Carolina and Georgia, in Horton, J. W., Butler, J. R., and Milton, D. J., eds. Geological investigations in.the Kings Mountain belt and adjacent areas, Carolina Geological Society Fieldtrip Guidebook, p. 181-193, 1981. 425. Hibbard, J., Miller, B., Hames, W., Allen, J., and Sandard, I., Carolinia: definition and recent finding in central North Carolina: Geoloqical Society of America, Southeastern Section Abstracts with Programs, v. 39, p. 11-12, 2007. 426. Hibbard, J., Pollock, J., Allen, J., and Brennan, M., The heart of Carolinia: Stratigraphic and tectonic studies in the Carolina terrane of central North Carolina, Geological Society of America Southeast Section FieldtriD) Guidebook. 54 p,. 2008.	

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					427. Allen, J.S., Miller, B., Hibbard, J., and Boland, I., Significance of intrusive rocks along the Charlotte-Carolina terrane boundary: evidence for the timing of deformation in the Gold Hill fault zone near Waxhaw, NC: Geological Society of America Southeast Section Abstracts with Programs, v. 39, r. 12, 2007.	
5571	WLS	Pt 02	FSAR 02	02.05.01.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.3, is revised to add the following references: 413. Gohn, G.S., 1988, "Late Mesozoic and early Cenozoic geology of the Atlantic Coastal Plain: North Carolina to Florida," in The Geology of North America vol. 1-2, The Atlantic Continental Margin, The Geological Society of America. 414. Prowell, D.C. and Obermeier, S.F., 1991, "Evidence of Cenozoic Tectonism," in The Geology of the Carolinas - Carolina Geological Society 50th Anniversary Volume, University of Tennessee Press.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-019. WLG2009.05-04
5573	WLS	Pt 02	FSAR 02	02.05.01.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.3, is revised to add the following reference: 431. Nystrom, P.G. Jr., Late Cretaceous-Cenozoic Brittle Faulting Beneath the Western South Carolina Coastal Plain: Reactivation of the Eastern Piedmont Fault System, Geological Society of America Abstracts with Programs, Southeastern Section 55th annual meeting, 2006.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-020. WLG2009.05-04
5583	WLS	Pt 02	FSAR 02	02.05.01.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.3, is revised to add the following references: 420. Garahan, J. M., Preddy, M. S., Ranson, W. A. (1993) Summary of Mid-Mesozoic Brittle Faulting in the Inner Piedmont and Nearby Charlotte Belt of the Carolinas. In Studies of Inner Piedmont Geology with a focus on the Columbus Promontory. Carolina Geological Society Field Trip Guidebook. p. 55-65. 425. Hibbard, J., Miller, B., Hames, W., Allen, J., and Sandard, I., Carolinia: definition and recent finding in central North Carolina: Geological Society of America, Southeastern Section Abstracts with Programs, v. 39, p. 11-12, 2007. 428. Hibbard, J. P., van Staal, C., Rankin, D. W., Comparative analysis of pre-Silurian crustal building blocks of the northern and the southern Appalachian oroqen: American Journal of Science, v.307, p.23-45, 2007. 430. Hibbard, J. P., van Staal, C. R., Miller, B. V., Links among Carolinia, Avalonia, and Ganderia in the Appalachian peri-Gondwanan realm, Geological Society of America Special Paper 433, p.291-311, 2007.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-032. WLG2009.05-04
5596	WLS	Pt 02	FSAR 02	02.05.01.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.1.3, is revised to add the following reference: 420. Garahan. J. M., Preddy, M. S., Ranson, W. A. (1993) Summary of Mid-Mesozoic Brittle Faulting in the Inner Piedmont and Nearby Charlotte Belt of the Carolinas. In Studies of Inner Piedmont Geology with a focus on the Columbus Promontory. Carolina Geological Society Field Trip Guidebook. p. 55-65.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-046. WLG2009.05-04
5799	WLS	Pt 02	FSAR 02	02.05.01.03	Revise Reference 372 to read: "Removed".	Reference not cited in text.
6762	WLS	Pt 02	FSAR 02	02.05.02.01.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.1.3, is added after Subsection 2.5.2.1.2 as follows: 2.5.2.1.3 Evaluation of the Potential for Reservoir Induced Seismicity This subsection presents information on the potential for reservoir induced seismicity (RIS) at the Lee Nuclear Station associated with the construction and operation of Make Up Pond C (Figure 1.1 202). No documented RIS is associated with the impoundment of Make Up Pond B, which was constructed as part of the former Cherokee Nuclear Station. Evaluations to assess the potential for RIS associated with the Make Up Pond C impoundment indicate a low potential for RIS and negligible risk to safe operations for Lee Nuclear Station Units 1 and 2. RIS has sometimes been observed at comparable sized reservoirs, and is usually confined to earthquake magnitudes of M < 4 for this depth of reservoir. Factors controlling the presence or absence of RIS are strongly dependent on local geologic properties, including reservoir rock type, fault and fracture	WLG2009.07-05 / ER RAI 59, 60, 96

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					characteristics, local and regional tectonics, and reservoir operation characteristics. These evaluations consider RIS potential associated with the configuration and operating parameters for Make Up Pond C, and include an extensive review of RIS literature and scientific understanding of the potential for RIS based on crustal (e.g., underlying geologic and tectonic) properties and reservoir operations. The evaluations also include a review of past world wide cases of RIS associated with reservoirs with similar or greater hydraulic heights to Make Up Pond C, an analysis of seismicity associated with similar reservoirs operated in the Carolina Piedmont, and an analysis of U.S. Bureau of Reclamation dams and reservoirs located in metamorphic terranes with historic hydraulic height and operating configurations comparable to or exceeding Make Up Pond C hydraulic height or hydraulic height variation operating parameters. NUREG/CR 5503 (Reference 300) notes that almost all the largest magnitude RIS has occurred in areas where there is active Quaternary faulting. NUREG/CR 5503 makes several important distinctions. First, NUREG/CR 5503 distinguishes between a seismogenic fault, defined as being capable of producing a moderate to large earthquake (M > 5), and a nonseismogenic fault that is not capable of producing a moderate to large earthquake. Second, NUREG/CR 5503 defines a tectonic fault as produced by deep seated crustal scale processes acting at or below seismogenic depths and a nontectonic feature as a feature produced by shallow crustal or surficial processes acting above seismogenic depth (note seismogenic in this context refers to M > 5 earthquakes). These distinctions are important because they directly correspond to distinctions made between the most common form of RIS (nontectonic nonseismogenic shallow earthquakes with M ≤ 5) and M > 5 triggered seismicity that occurs on tectonic seismogenic faults. The operation of Make Up Pond C represents a surficial process. Based on NUREG/CR 5503, the lack of identified active seismogenic faults in the Make Up Pond C reservoir area indicates that M > 5 triggered seismicity is unlikely. The analysis considers reservoirs from regions of ongoing tectonic activity, such as California, as well as regions with low rates of tectonic deformation, such as the Carolina Piedmont. Following NUREG/CR 5503, it is important to make a distinction between triggered seismicity in regions of active faulting that are characterized by M > 5 tectonic seismogenic earthquakes in the historical record, such as the region west of the Rocky Mountains, and RIS in regions that are not associated with ongoing seismic activity and generally lack M > 4 historical seismicity. Triggered seismicity implies that a tectonic seismogenic earthquake that was likely to occur at a later date is triggered and occurs earlier as a result of perturbations of elastic stresses and/or pore pressures associated with reservoir operations. The most significant example of triggered seismicity appears to be the 2008 M 7.9 Wenchuan, China, earthquake (Klose, 2008) (Reference 301). This earthquake occurred in a tectonically active region of China on a large pre existing active fault with a recurrence interval of large magnitude (M ~ 8) surface rupturing earthquakes in the late Holocene of ~1000 1200 yr (Lin et al., 2009) (Reference 302). The reservoir did not influence the maximum size or the long term likelihood that the earthquake would occur; it may have caused the earthquake to occur earlier than if the reservoir had not been impounded (Reference 301). The 2008 M 7.9 Wenchuan, China, earthquake was inevitable in the geologic timeframe of seismic source characterization (Reference 302), and is the type of tectonic seismogenic source that would be accounted for in a probabilistic seismic hazard analysis and related ground motion analyses. Analysis of documented cases of RIS for reservoirs located in metamorphic terranes, including reservoirs in the Carolina Piedmont, suggests that for low seismicity rate regions, maximum RIS magnitudes for reservoirs with hydraulic heights < 60 m are less than M 4. Considering all U.S. Bureau of Reclamation reservoirs located in metamorphic terranes and all earthquakes located within 30 km of the reservoirs, post impoundment maximum magnitudes have been less than M 4 for reservoirs located in regions of low historical seismicity, and have been less than or equal to M 5 for reservoirs located in regions where historical pre impoundment maximum magnitudes were ≥ M 5.5. Consequently, available information indicates that any RIS that might be associated with Make Up Pond C operating parameters would likely have a maximum RIS magnitude of M < 4, and is unlikely to have a maximum magnitude of M ≥ 5. The current short period design is controlled by a local M 5 5.5 as described in Subsection 2.5.2.4.5. There is no observed precedent for M > 5 RIS associated with reservoirs located in low seismicity rate metamorphic terranes. In metamorphic terranes comparable to the Make Up Pond C site, if through going fault(s) and/or fractures that intersect the reservoir exist, increasing fluid pore pressure is likely to be the dominant mechanism that would induce earthquakes (Talwani et al., 2007) (Reference 303). Talwani et al., 2007	

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					shows that earthquakes are only induced over a specific range of fault and fracture hydraulic diffusivities. Outside the range of hydraulic diffusivity of 0.1 m2/s to 10 m2/s, induced seismicity rarely occurs and is mostly associated with injection induced seismicity (Reference 303). The largest observed Carolina Piedmont RIS magnitude of M 4.3 occurred as a delayed response at Clark Hill (Strom Thurmond) Reservoir (Talwani, 1976 (Reference 304) and Secor, 1987 (Reference 305)). Assuming the Talwani et al., 2007 evaluation of hydraulic diffusivities is correct (Reference 303), it follows that steeply dipping faults and/or fractures with hydraulic diffusivity of 0.1 m2/s to 10 m2/s exist at Clark Hill (Strom Thurmond) Reservoir to produce the observed delayed RIS. The nearly universal observation of metamorphic RIS maximum magnitudes being less than M 4 documented in the Carolina Piedmont, the western U.S., and the Brazilian craton strongly suggests that metamorphic terranes rarely contain steep faults and/or fractures with sufficient hydraulic diffusivities to allow pore pressure perturbations to propagate to sufficient depths to create enough fault area for maximum RIS magnitudes to exceed M > 4. Thus, metamorphic site RIS is typically caused by nontectonic nonseismogenic processes (NUREG/CR 5503) associated with initial elastic/pore pressure responses at shallow depths, such as observed at Monticello Reservoir (Chen and Talwani, 2001a and 2001b (References 306 and 307) and Secor et al., 1982 (Reference 310)), relatively tight faults/fractures that confine RIS to relatively shallow depths, or where more permeable faults/fractures exist, as observed at Jocassee Reservoir (Rajendran, 1995) (Reference 308), Keowee Reservoir (Schaeffer, 1991) (Reference 309), and Clark Hill (Strom Thurmond) Reservoir (References 304 and 305). By analogy, there is no documented RIS associated with Make Up Pond B, located approximately 2.5 miles to the southeast and constructed over 30 years ago as part of the former Cherokee Nuclear Station project. It is likely that no significant steeply dipping faults or fractures exist beneath the Make Up Pond C location that are oriented nearly orthogonal to the local direction of minimum compressive stress. Therefore, it would appear unlikely that RIS with maximum magnitudes exceeding M > 4 are probable at Make Up Pond C, if at all. This is because of 1) the likely confinement of RIS responses to the top several km of the crust by low effective hydraulic diffusivity, and 2) the limited maximum magnitudes associated with coupled elastic/pore pressure initial loading and shallow confinement of fault/fracture related RIS responses (Reference 307), and the nearly instantaneous poroelastic response (Reference 303). Based on the review of the Carolina Reservoirs, it appears that three conditions are needed for RIS to occur: (1) Rock stressed close to failure conditions (a situation more likely to occur in felsic crystalline rock rather than felsic to intermediate meta volcanic and meta sedimentary crystalline rock underlying Make Up Pond C), (2) Through going fractures favorably oriented relative to the maximum horizontal stress direction, and (3) Hydraulic diffusivity in the range of 0.1 m2/s to 10 m2/s as determined by Talwani et al., 2007 (Reference 303). RIS has been shown to not occur when one of these conditions does not exist (e.g., Bad Creek Reservoir) (Schaeffer et al., 1991; Talwani et al., 1990a and 1990b; and Widdowson et al., 1991) (References 309, 311, 312, and 313). For a large region that contains Make Up Pond C, the dominant joint orientation is N47°E vertical (Schaeffer, 1981) (Reference 314), and the predominant large scale shear zone strike northeast (Horton and Dicken, 2001) (Reference 315). Zoback and Zoback, 1980 (Reference 316) find that the Atlantic coastal plain that encompasses Make Up Pond C is dominated by NW SE oriented compressive stress. Thus, the dominant joint and fault orientations are orthogonal to the maximum compressive stress, which would minimize fracture hydraulic diffusivities on these dominant through going structures. Secondary joints are oriented nearly vertical and normal to the minimum compressive stress direction of Zoback and Zoback, 1980 (Reference 316) based on Schaeffer, 1981 (Reference 314) and would be optimally oriented to maximize fracture hydraulic diffusivities. Consequently, RIS on large through going faults and fractures is inhibited in the current stress regime and the second condition above is not satisfied if the regional fracture results of Schaeffer, 1981 apply to the Make Up Pond C site. Instead, it appears that any RIS that may occur in Make Up Pond C would be associated with secondary, nonthrough going joints, which are likely to place strong limits on maximum RIS magnitude of M < 5 and possibly M < 3. Review of the Lee Nuclear Station site conditions indicates that all three conditions are not present. Specifically, it is concluded that the first condition is not met and that M > 3 RIS is not expected to be associated with the Make Up Pond C impoundment, and the second condition is not likely to be satisfied	

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					based on regional and site geologic evaluations described in this Subsection. This conclusion is further supported by the fact that no known recorded RIS is associated with Make Up Pond B impoundment or other Carolina Piedmont reservoirs with similar geologic conditions. Furthermore, there are no documented instances of RIS for reservoirs of similar size in rocks of similar lithologies (e.g., felsic to intermediate meta volcanic and meta sedimentary rock types). In the event that RIS associated with Make Up Pond C occurs, it is unlikely the induced magnitudes would exceed M > 4, a value well below the short period controlling earthquake. Ground motions associated with RIS events (M < 4) typically display high frequency, high peak ground acceleration with low energy. The potential for RIS associated with the Make Up Pond C impoundment is considered low with a negligible risk to safe operations for Lee Nuclear Station Units 1 and 2.	
5601	WLS	Pt 02	FSAR 02	02.05.02.02.01.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.2.1.3, eighth paragraph, is revised to read: Brunswick, NC Background (108). The Lee Nuclear Site is located 100 mi. from the Brunswick, NC Background source zone (108). Despite its name, Law Engineering source 108 does not include any portion of North Carolina. However, Law Engineering source 108 does include Brunswick, Georgia. This discrepancy is potentially misleading, and apparently is the result of a minor naming error in EPRI NP-6452-D (Reference 207). To be consistent with EPRI NP-6452-D (Reference 207), the source name "Brunswick, NC Background" is reported herein. This source represents a zone defined by a low-amplitude, long-wavelength magnetic anomaly pattern. The Law Engineering team interprets this pattern as possibly indicating a zone of Mesozoic extended crust. Law Engineering assigns a maximum Mmax value of Mb 6.8 (M 6.8) to this source.	Duke Energy Response to RAI LTR 63, RAI 02.05.02-038. WLG2009.04-03
5603	WLS	Pt 02	FSAR 02	02.05.02.04.04 02.05.02.08	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.4.4, third full paragraph, first sentence, is revised to read: To correctly model the damageability of small magnitude earthquakes to engineered facilities, the Cumulative Absolute Velocity (CAV) model of Hardy et al. (2006) (Reference 250) is used. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.8, Reference 250, is revised as follows: 250. Hardy, G., Merz, K., Abrahamson, N.A., and Watson-Lamprey, J., Program on Technology Innovation: Use of Cumulative Absolute Velocity (CAV) in Determining Effects of Small Magnitude Earthquakes on Seismic Hazard Analyses, Electric Power Research Institute (EPRI) Report 1014099, August 2006.	Duke Energy Response to RAI LTR 63, RAI 02.05.02-047. WLG2009.04-03
6772	WLS	Pt 02	FSAR 02	02.05.02.06	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.6, fourth paragraph third sentence is revised to Read: "For the V/H ratios, the stochastic point source model is used to compute both horizontal (normally incident SH-waves) and vertical (incident inclined P-SV waves) motions (References 280 and 281) using the hard rock crustal model (Table 2.5.2-221)." COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.6, fourth paragraph second to last sentence is revised to Read: The distances selected are 17 mi. (28 km), 4 mi. (7 km), and 0 mi. (0 km) to cover ratios reflecting distant, intermediate, and near source contributions. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.6, fourth paragraph third sentence is revised to Read:	Annual Update / FIRS A1 Update Submittal WLG2010.02-01.
6773	WLS	Pt 02	FSAR 02	02.05.02.07.01.01.01.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.7.1.1.1, first paragraph is revised to read: "Horizontal amplification factors are developed using hard rock spectral shapes as control motions (Reference 251). Base Case Profile A1 is placed on top of the regional hard rock crustal model (Table 2.5.2-221, Reference 273). A hard rock kappa value of 0.006 sec (Table 2.5.2-221) is used, consistent with that incorporated in the hard rock attenuation relations (Reference 273). With a hysteretic damping in concrete between 0.5% and 1.0% any additional damping in the shallow concrete profile is neglected as its impacts will be beyond the fundamental shallow column resonance, well above 50 Hz."	Annual Update / FIRS A1 Update Submittal WLG2010.02-01.

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					COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.7.1.1.1, second paragraph, second to last sentence is revised to read: "Results are shown in Figure 2.5.2-241 and reveal the shallow site resonance, median amplification of about 10% near 60 Hz to 70Hz, with a very slight difference only at 250 mi (400 km)."	
6774	WLS	Pt 02	FSAR 02	02.05.02.07.01.01.01.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.7.1.1.2, first paragraph first sentence is revised to read: "For the Lee Nuclear Station, the concrete profile is randomized between depths of 17 to 23 ft, the range in depths to hard rock conditions [shear-wave velocity exceeding, on average, 9,300 ft/sec (2.83 km/sec)] (Reference 273)."	Annual Update / FIRS A1 Update Submittal WLG2010.02-01
6775	WLS	Pt 02	FSAR 02	02.05.02.07.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.7.2, first paragraph is revised to read: The approximations of linear analysis for the vertical component and uncoupled vertical and horizontal components are validated in two ways. Fully nonlinear modeling using a 3-D soil model shows that the assumption of largely independent horizontal and vertical motions for loading levels up to about 0.5g (soil surface, horizontal component) for moderately stiff profiles is appropriate (Reference 280). Additionally, validation exercises with recorded motions have been conducted at over 50 sites that recorded the 1989 M 6.9 Loma Prieta, California earthquake (Reference 273). These validations show the overall bias and variability is low but is higher than that for horizontal motions. The vertical model does not perform as well as the model for horizontal motions (References 280 and 281). An indirect validation is also performed by comparing V/H ratios from WNA empirical attenuation relations with model predictions (Reference 281) over a wide range in loading conditions (Reference 281). The results show a favorable comparison with the model exceeding the empirical V/H ratios at high frequency, particularly at high loading levels. In the V/H comparisons with empirical relations, the model also shows a small under prediction at low frequency (≤ 1 Hz) and at large distance (≥ 12 mi.). COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.7.2, third paragraph last sentance is revised to read: "The M 5.1 distance ranges more than adequately accommodate the hazard deaggregation (Subsection 2.5.2.4.5)." COLA Part 2, FSAR, Chapter 2, Subsection 2.5.2.7.4, first paragraph is revised to read: Table 2.5.2-224 and Figures 2.5.2-244 and 245 show horizontal and vertical Unit 1 FIRS developed compared to the horizontal and vertical GMRS developed for Unit 2. Figure 2.5.2-246 shows both the horizontal and vertical FIRS. Figure 2.5.2-247 shows the horizontal and vertical UHRS at exceedance levels of 10-4, 10-5, and 10-6 yr-1. Through Approach 3, both the horizontal and vertical UHRS and Unit 1 FIRS are hazard- and performance-based consistent across structural frequency from 0.5 to 100 Hz, the frequency range over which the hard rock hazard is computed (Reference 273). For frequencies below 0.5 to 0.1 Hz, the extrapolation employed is intended to reflect conservatism, likely resulting in motions of lower probability. Table 2.5.2-224 lists discrete FIRS and UHRS horizontal and vertical spectral acceleration values for Unit 1. Section 3.7 compares the site-specific ground motions to the AP-1000 design ground motions.	Annual Update / FIRS A1 Update Submittal WLG2010.02-01
5604	WLS	Pt 02	FSAR 02	02.05.02.08	COLA Part 2, FSAR Chapter 2, Subsection 2.5.2.8 will be revised as follows: 278. Anderson, J.G. and Hough, S.E., "A Model for the Shape of the Fourier Amplitude Spectrum of Acceleration at High Frequencies," Bulletin of the Seismological Society of America 74(5): 1,969-1,993, 1984.	Duke Energy Response to RAI LTR 55, RAI 02.05.02-032. WLG2009.03-02
6653	WLS	Pt 02	FSAR 02	02.05.03.01.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.3.1.1, second paragraph is revised as follows: Detailed geologic mapping and inspection of excavations during construction for Units 1, 2, and 3 of the former Duke Cherokee nuclear site reveal no evidence of active or geologically recent faulting within the	Duke Energy Response to RAI LTR 85, RAI 02.05.03-011. WLG2009.12-09

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					site area (Subsection 2.5.1.2.5.4 provides detailed discussion of site area geology and recorded deformation events). These excavations did expose minor bedrock shears that are related to mafic intrusions (e.g., metadiorite and amphibolite rock units) in the meta granodiorite pluton (e.g., meta granodiorite to meta quartz diorite rock units). Most of this minor deformation is associated with the contact between the mafic intrusions and the meta granodiorite pluton (Figure 2.5.1 229). A more detailed discussion of the minor bedrock features is provided in Subsections 2.5.1.2 and 2.5.4.1.	
6764	WLS	Pt 02	FSAR 02	02.05.03.08	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.3.8, is revised as follows: 2.5.3.8 Potential for Surface Tectonic Deformation at the Site The potential for tectonic deformation at the site is negligible. Detailed geologic mapping and inspection of excavations during construction of the former Duke Cherokee nuclear site reveal no evidence of geologically recent or active faulting (References 201, 202, and 203). Based on reviews of updated geologic, seismic, and geophysical data from published literature, interviews with expert earth scientists, and the COL investigations, there are no Quaternary faults or capable tectonic sources within the site vicinity. The potential for non tectonic surface deformation, including reservoir induced seismicity (RIS), within the site area is negligible. There is no information suggesting the potential for non tectonic surface deformation within the site area. Rocks within the site area are igneous and metamorphic crystalline rocks (References 205 and 206) that are neither susceptible to karst type dissolution collapse nor to subsidence due to fluid withdrawal. Evaluations related to the potential of RIS associated with Make Up Pond C are described in Subsection 2.5.2.1.3. Editorial changes: COLA Part 2, FSAR, Chapter 2, Subsection 2.5.3.8, third sentence, is revised as follows: "The potential for non-tectonic surface deformation, including RIS, within the site area is negligible."	WLG2009.07-05 / ER RAI 59, 60, 96
6323	WLS	Pt 02	FSAR 02	02.05.04	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4, second paragraph, seventh bullet, is revised to read: • Response of Soil, Granular Fill, and Rock to Dynamic Loading (2.5.4.7)	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002 WLG2009.10-2
6324	WLS	Pt 02	FSAR 02	02.05.04.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.1, second paragraph, is revised to read: All of the data collected serve as the basis for evaluating excavation and backfill issues, construction excavation and dewatering, earth fill and granular fill requirements, groundwater, response of soil, granular fill, and rock to dynamic loading, liquefaction potential, static stability, techniques to improve subsurface conditions, potential requirements for, and issues related to construction. The results of these evaluations, along with methods and results of field and laboratory programs, are summarized in the following Subsections.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6765	WLS	Pt 02	FSAR 02	02.05.04.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.1, second paragraph, fourth bullet, is revised as follows: • Subsection 2.5.4.1.4, Effects of Human Activities, evaluates the effects of human activities such as mineral, or, water, oil, and gas extraction on the potential for subsidence and collapse at the Lee Nuclear Station Site. These activities are found to have not affected the site. The potential for reservoir induced seismicity (RIS) associated with Make Up Pond C is also evaluated. This activity is not expected to affect the site. Editorial changes: COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.1, second paragraph, fourth bullet, third sentence, is revised to read: "The potential for RIS associated with Make-Up Pond C is also evaluated."	WLG2009.07-05 / ER RAI 59, 60, 96

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6768	WLS	Pt 02	FSAR 02	02.05.04.01.02.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.1.2.1, is revised is revised as follows: Locally, the Lee Nuclear Station Site is underlain by a complexly deformed and metamorphosed plutonic-volcanic sequence that is mantled in most places by thick residual soils and saprolites. These soils and saprolites are evidence of a long weathering history. The relatively flat rolling plains and limited outcrop exposure are also evidence of the prolonged period of weathering. Local relief is caused by differences in the weathering resistance of bedrock and stream incision. Rock units in the site area belong to the Battleground Formation, with the exception of later Mesozoic diabase dikes (References 206 and 207). The Battleground Formation is comprised primarily of felsic meta-volcanic rocks, intermediate to mafic meta-volcanic rocks and quartz rich metasedimentary rocks of Neoproterozoic age (Reference 226). Based on textures and the similarity of composition of the plutonic and volcaniclastic units, the entire sequence is considered to be a volcaniclastic pile that has been intruded by its own parent magmas (Reference 206). The occurrence of carbonate in the metasedimentary component is indicative of a marine environment, and reworking of the pile has resulted in both clastic and chemical deposition. Locally the composition of the volcaniclastics has been altered to various degrees by hydrothermal leaching due to large-scale circulation of seawater interacting with hot volcanic rocks. The Lee Nuclear Station site itself is underlain by a metamorphosed pluton variously ascribed to intrusion of the Battleground formation by the parent magmas of the Battleground volcaniclastics (Reference 207), intrusive metatonalite containing angular xenoliths of the Battleground Formation (Reference 226), and intrusive metatonalite and volcaniclastic rocks (Reference 227). This plutonic unit is generally composed of metatonalite that exhibits spatially variable composition. Within the plutonic unit exposed by excavation at the site, meta-granodiorite is the most abundant rock type based on petrographic analyses (Reference 205). This pluton is assessed to be separate from, and younger than (or possibly coeval with), the Battleground Formation (Reference 207). Due to intense deformation, few primary features survive with which to determine stratigraphic order. Tentative inferences (References 206, 207, and 208) consider the South Fork antiform to be an upright feature and the Battleground Formation to be a homocline that "youngs" to the northwest (Reference 206). This inference is supported by the occurrence of the metasedimentary component primarily to the northwest, the expected stratigraphic relationships for deposition of marine dominated clastic and chemical precipitate rocks at the later stages of the volcanic pile accumulation. Stratigraphic relationships of the various units are shown schematically in Figure 2.5.1-224.	Annual Update -- Conforming change in terminology for consistency with response to NRC Ltr 59.
6766	WLS	Pt 02	FSAR 02	02.05.04.01.04	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.1.4, is revised by inserting the following new paragraph as follows: Reservoir-induced seismicity (RIS) associated with the filling and operation of Make-Up Pond C is considered negligible, and it is unlikely the induced magnitudes would exceed M > 4, a value well below the short-period controlling earthquake. Evaluations related to the potential of RIS associated with Make-Up Pond C are described in Subsection 2.5.2.1.3. Editorial changes: COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.1.4, second paragraph, first sentence is revised to read: "RIS associated with the filling and operation of Make-Up Pond C is considered negligible, and it is unlikely the induced magnitudes would exceed M > 4, a value well below the short-period controlling earthquake."	WLG2009.07-05 / ER RAI 59, 60, 96
6767	WLS	Pt 02	FSAR 02	02.05.04.01.05	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.1.5, fifth paragraph, is revised as follows: As noted in Subsection 2.5.3, earthquake activity with its resulting ground motion effects is judged to be the primary geologic hazard to the Lee Nuclear Station Site. The potential for tectonic surface deformation within the site area is judged to be negligible. The potential for non-tectonic surface deformation within the site area, including surface deformation associated with potential Make Up Pond C RIS, is negligible. A detailed discussion of vibratory ground motion and potential for surface faulting at the Lee Nuclear Station Site is presented in Subsection 2.5.2 and 2.5.3, respectively.	WLG2009.07-05 / ER RAI 59, 60, 96
6325	WLS	Pt 02	FSAR 02	02.05.04.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2, first and fourth paragraphs, are revised as follows:	Duke Energy

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					This subsection presents a summary of the field investigation and subsurface material properties at the Lee Nuclear Station Site. The laboratory testing and sample control procedures are discussed as well. Refer to Subsection 2.5.4.3 for drawings showing the boring and other field investigation locations and for sections of the subsurface conditions. Soil, granular fill, and rock dynamic material properties are presented in Subsection 2.5.4.7. The laboratory testing program was planned and conducted using the guidance provided by Regulatory Guide 1.138. Information from the historic field exploration program, literature, and information from the historic laboratory testing completed for the Cherokee Nuclear Station were all used as additional guidance for planning the laboratory testing program for Lee Nuclear Station. The laboratory testing program for soil included samples obtained using disturbed and undisturbed sampling methods. The testing program included a variety of tests on the significant soil and rock materials encountered during the field exploration program. Static and dynamic laboratory test methods were performed. Further details regarding the laboratory testing program are provided in Subsection 2.5.4.2.3 and Subsection 2.5.4.2.4. Liquefaction potential of the foundation materials is discussed in Subsection 2.5.4.8. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.2.1, second paragraph, is revised as follows: Fill soils in place at the site at the time of the Lee Nuclear Station explorations in 2006 and 2007 were explored in detail to assist in characterizing the backfill that was initially planned to be used around the Lee Nuclear Station Unit 1 and Unit 2 nuclear island areas. These fill soils were in-place at the time of the Lee Nuclear Station exploration in 2006 and 2007 and had been placed and compacted during site preparation work for the Cherokee Nuclear Station. These areas where fill materials were explored were designated "test fill" areas. In several borings drilled in the "test fill" areas, SPT sampling was conducted at intervals of 2 feet. For these locations a 30-inch sampler was used and was driven 24 inches with blows recorded for each six-inch interval of penetration. Sampling at these "test fill" locations started at the ground surface. Subsequent to the exploration of the "test fill" areas, a decision was made that granular fill materials instead of fill soils will be used as backfill around the Lee Nuclear Station Unit 1 and Unit 2 nuclear island areas. Therefore, the "test fill" areas have no special significance subsequent to the decision to use granular fill. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.2.4 is revised to add a new second paragraph as follows: The bulk sampling of the geotechnical test pits was for testing to characterize soils for use in constructing Group I fill. Group I fill is a term specific to the former Cherokee Nuclear Station construction documents. Group I fill is a conventional quality fill of selected soil types compacted to 95 percent of the standard Proctor (ASTM D 698-00) maximum dry density. Group I fill performs no safety function for the Lee Nuclear Station because select granular fill materials surround the nuclear islands and support the structures adjacent to the nuclear islands. No further reference to the Group I fill testing or results is contained herein. Group I fill is illustrated on selected figures to convey the backfill relationship of select granular fill and Group I fill within the existing excavation. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.3 first and third paragraphs, are revised as follows: For the Lee Nuclear Station exploration in 2006 and 2007, laboratory testing was performed on disturbed, undisturbed, and bulk soil samples, and on rock cores obtained during the subsurface investigation. Testing was performed in accordance with ASTM standards or other standards where applicable. Other standards used for laboratory testing included Environmental Protection Agency methods for chemical analysis of soils. The quantity of each test completed on each sample type is identified in Table 2.5.4-210. Test standards used for laboratory testing are listed in this Subsection. Laboratory testing was in accordance with the standard method or procedure. Additional descriptions for selected test methods are provided in Subsections 2.5.4.2.3.1 through 2.5.4.2.3.12. • Moisture content, ASTM D 2216-05	Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02

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					• Atterberg limits, ASTM D 4318-05 • Grain size testing (sieve + hydrometer and sieve), ASTM D 422-63 (2002) and ASTM D 6913-04 • Specific gravity, ASTM D 854-06 • Chemical analysis, - pH, ASTM G 51-95 (2005) - Resistivity, ASTM G 57-95a (2001) - Chloride, EPA SW-846 9056/300.0, - Sulfate, EPA SW-846 8056/300 • Unit weight of soil, ASTM D 5084 – 03 (Sections 5.7 – 5.9. 8.1, 11.3.2) • Consolidated-undrained triaxial shear, ASTM D 4767-04 • Specimen preparation – rock cores, ASTM D 4543-04 • Compressive strength and elastic moduli - rock cores, ASTM D 7012-04 • Consolidation tests, ASTM D 2435-04 COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.3.5, is revised to read: 2.5.4.2.3.5 DELETED COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.3.6, is revised to read: 2.5.4.2.3.6 DELETED COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.3.7, first paragraph to read: 2.5.4.2.3.7 Consolidated - Undrained Triaxial Shear Testing, ASTM D4767-04 Consolidated - undrained (CU) testing was performed on undisturbed test t specimens. Undisturbed specimens were extruded from sampling tubes and trimmed to appropriate dimensions. The specimens, encased in the rubber membranes, were then saturated by back-pressure prior to shearing. Drainage was allowed from the specimen during the consolidation phase, thus allowing equilibrium under the confining stress, but no drainage was allowed during the loading phase. For undisturbed specimens failure was defined at the point of maximum pore pressure. The maximum pore pressure failure criterion was investigated to compare with historic triaxial tests performed for construction of the former Cherokee Nuclear Station. Information contained in Brandon, et al. (2006) confirms the conclusion that peak pore pressure is a conservative method for assigning the failure criterion for the CU triaxial tests (Reference 210). COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.3.8, is revised to read: 2.5.4.2.3.8 DELETED COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.3.9, is revised to read: 2.5.4.2.3.9 DELETED COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.3.12, first paragraph, is revised to read: 2.5.4.2.3.12 Consolidation Tests, ASTM D 2435-04 Sections of the undisturbed samples were extruded from the sampling tube for consolidation testing. The specimen was then trimmed into a disc 2.5 inches in diameter and 1-inch thick. The disc was confined in a stainless steel ring and sandwiched between porous plates. No saturation of the samples was performed, but the samples were carefully covered to prevent loss of moisture to evaporation during the test. The specimen was then subjected to incrementally increasing vertical loads and the resulting changes in specimen height with respect to time were measured with a linear variable differential transformer (LVDT). The load increments were typically doubled with each loading phase, and deformation (consolidation) under each load increment was considered complete when the deformations versus time plot was analyzed using the log-time method.	

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					COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.3.13, is revised to read: 2.5.4.2.3.13 DELETED COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.3.14, is revised to read: 2.5.4.2.3.14 DELETED COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.4.1, is revised to read: 2.5.4.2.4.1 Geotechnical Model A geotechnical model of the site was developed in the Cherokee Nuclear Station Preliminary Safety Analysis Report document prepared in the early to mid-1970s. This model has been adopted for use at the Lee Nuclear Station Site to maintain consistency with the work completed during Cherokee Nuclear Station construction activities. The conditions at the site are amenable to being classified into a geotechnical model that consists of existing engineered fill soils, alluvial soils, residual soils, saprolite, partially weathered rock (PWR), existing concrete, and rock. Also added to the model is the granular backfill material placed around the nuclear islands. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.4.1.1, is revised to read: 2.5.4.2.4.1.1 Pre-existing Engineered Fill Soils The pre-existing site fill soils at the time of the Lee Nuclear Station geotechnical exploration in 2006-2007 were placed during the site grading activities for the Cherokee Nuclear Station project beginning in the mid 1970's and continuing until abandonment of the Cherokee Nuclear Station project in 1983. The fill soils characterized in this Subsection were constructed as Group 1 or Group 2 fills as defined in the Cherokee Nuclear Station Preliminary Safety Analysis Report. These fill soils were derived from the materials excavated from cut areas, and therefore their composition is made of the same soil types (predominantly ML and SM and relatively minor amounts of MH and CL) as the residual soil, saprolite, and partially weathered rock zones. None of these engineered fill soils will be adjacent to the walls of the nuclear islands or beneath the structures adjacent to the nuclear islands. COLA Part 2, FSAR, Chapter 2, is revised by adding a new Subsection 2.5.4.2.4.1.8 as follows: 2.5.4.2.4.1.8 Granular Backfill No safety-related structures will be placed on granular fill. Granular fill composed of select materials from a quarry rock crushing product will be placed and compacted around the walls of the nuclear islands and extending outward to form the support for the structures adjacent to the nuclear islands. These select granular materials will be compacted to a minimum relative compaction of 96 percent of the modified Proctor (ASTM D 1557-02) maximum dry density. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.4.2, second and fourth paragraphs, are revised as follows: Static geotechnical properties for the soil materials described in the Geotechnical Model are provided in Table 2.5.4-211. Table 2.5.4-211 lists soil properties used to support non-safety related structures as no safety related structures are supported on soil. No table values are listed for remolded fill soil samples these materials are not used in the vicinity of the nuclear islands or beneath the structures adjacent to the nuclear islands. Only granular backfill materials are placed around the nuclear islands. The properties of the granular materials are used as input for calculation of the static and dynamic lateral earth pressure against the nuclear island walls. Corrosion test results (pH, resistivity, chlorides, and sulfates) for soil fill are provided in Table 2.5.4-212. Static geotechnical properties for the granular backfill materials are provided in Table 2.5.4-211. Table values listed for granular backfill materials are for typical granular	

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					materials and will be verified by laboratory testing when the source of and specific materials to be used are known, as outlined in Table 2.5.4-222. Static geotechnical properties for the rock materials described in the Geotechnical Model are provided in Table 2.5.4-213. The properties reported in these tables are average properties based on the laboratory results from samples obtained during the Lee Nuclear Station Site exploration in 2006-2007. Standard deviations are reported when the amount of data was sufficient to allow calculation of this value. Data from the Cherokee Nuclear Station Preliminary Safety Analysis Report was used, only where indicated in the table, to supplement the information obtained during the Lee Nuclear Station Site exploration for soils where limited data was available, such as the partially weathered rock. Dynamic geotechnical properties for the soil, granular fill, and rock materials described in the Geotechnical Model are described in Subsection 2.5.4.7.	
6890	WLS	Pt 02	FSAR 02	02.05.04.02.04.02	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.2.4.2, third paragraph, is revised as follows: Portions of the Cherokee Nuclear, Station concrete that will remain under Lee Nuclear Station Unit 1 are described in Subsection 2.5.4.5. The existing Cherokee Nuclear Station concrete meets the strength requirements for concrete in DCD Subsection 2.5.4.1.3.	Duke Energy Submittal - Post-demolition Basemat Report WLG2009.07-03
6327	WLS	Pt 02	FSAR 02	02.05.04.03	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.3.2, is revised as follows: 2.5.4.3.2 Surrounding and Adjacent Structures Exploration Exploration of facilities beyond the power block was conducted to support an understanding of the distribution of geological features (e.g. rock, soil, extent of weathering, etc.) at the site and to characterize site condition and material properties of non-safety related site features such as cooling towers, switchyard, pipelines, and general facilities. These explorations included profile borings for characterization and siting of monitoring wells, cooling towers, switchyard, pipelines, and general facilities, and confirm previous explorations. Several test pits and trenches were also excavated. The exploration locations are shown on Figure 2.5.4-208. COLA Part 2, FSAR, Chapter 2, is revised by adding a new Subsection 2.5.4.3.6 as follows: 2.5.4.3.6 Extent of Granular Fill To indicate the extent of the granular fill to be placed around the nuclear islands and extending out to form the supporting materials for the adjacent buildings (radwaste, annex, and turbine buildings), eight geologic cross sections intersecting the Lee Nuclear Station Unit 1 and 2 nuclear islands and adjacent areas are presented. The locations of these cross sections are shown on Figure 2.5.4-208. Cross Sections B-B', C-C', E-E', F-F', U-U', V-V', Y-Y', and Z-Z' are shown on Figures 2.5.4-245, 2.5.4-246, and 2.5.4-260 through 2.5.4-265. Six of these eight geologic cross sections correspond to the geotechnical profiles presented in Subsection 2.5.4.3.5. Geologic cross sections depicting the granular fill are the following: • Figure 2.5.4-260, Planned Excavation Profile, Cross Section B-B', west-east profile through Unit 1 and Unit 2 centerline • Figure 2.5.4-261, Planned Excavation Profile, Cross Section C-C', west-east profile through the south end of Units 1 and 2 turbine building • Figure 2.5.4-245, Planned Excavation Profile, Cross Section U-U', west-east profile through the north end of the Unit 1 nuclear island • Figure 2.5.4-246, Planned Excavation Profile, Cross Section V-V', north-south profile along the west wall of the Unit 1 nuclear island • Figure 2.5.4-262, Planned Excavation Profile, Cross Section E-E', north-south profile through the Unit 1 centerline • Figure 2.5.4-263, Planned Excavation Profile, Cross Section F-F', north-south profile through the Unit 2 centerline • Figure 2.5.4-264, Planned Excavation Profile, Cross Section Y-Y', west-east profile through the north end of the Unit 1 nuclear island	Duke Energy Submittal – Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02

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					• Figure 2.5.4-265, Planned Excavation Profile, Cross Section Z-Z', west-east profile through the south end of the Unit 1 nuclear island These profiles depict the original and existing ground surface, extent of granular fill, plant and yard grade representations, nuclear island foundation and other important power block foundation features, and the location of borings and geophysical tests in the vicinity of each profile. The granular fill depicted on these cross sections extends horizontally outward from the walls of the nuclear island a distance of 100 feet or 6 feet beyond the edge of the adjacent buildings (radwaste, annex, and turbine buildings), whichever is the greater distance.	
6329	WLS	Pt 02	FSAR 02	02.05.04.05	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.5.1, is revised as follows: 2.5.4.5.1 Sources and Quantities The Lee Nuclear Station Site requires granular backfill material described in Subsection 2.5.4.5.3.5 to fill the area around the below-grade nuclear island walls out to the extents shown on Figures 2.5.4-245 and 2.5.4-246, and 2.5.4-260 through 2.5.4-265. This backfill also forms the yard elevation and supporting materials for the power block structures outside but adjacent to the nuclear island. The source for the granular fill is not identified. At a rock quarry, material is crushed to form granular product consisting of a mixture of gravel, sand, and some fines. The granular fill material will likely be obtained from an off-site source such as an operating rock quarry. Imported granular fill intended to be placed adjacent to seismic Category I structures or beneath other important adjacent facilities will be verified as compatible with Lee Nuclear Station site response calculations. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.5.2.1, sixth paragraph, is revised as follows: Excavation of soil and weathered rock materials is required to reach suitable foundation quality continuous rock material in this northwest corner area of Lee Nuclear Station Unit 1. A concept of the excavation required at the northwest corner of the Unit 1 nuclear island is shown on Figures 2.5.4-245, 2.4.5-246, and 2.5.4-264. The excavation at this location requires sloped excavation in the upper soil and partially weathered rock materials and a near vertical excavation in the weathered rock materials. Excavation support for the weathered rock in the form of rock bolts, or similar reinforcement, is used as needed to provide support for this material during construction. Excavation support also maintains the strength and density of the weathered rock material where it underlies power block structures adjacent to the Lee Nuclear Station Unit 1 nuclear island. Soil or other materials that may have been deposited on top of continuous rock or concrete materials in the time following the excavation and foundation preparation activities for Cherokee Nuclear Station Unit 1 are also removed. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.5.3.3, is revised as follows: 2.5.4.5.3.3 Foundation Materials Outside the Nuclear Island Outside the limits of the nuclear island support zone, steps are used to determine the presence of suitable foundation materials prior to placement of granular backfill materials beneath the non safety-related structures. This applies to continuous rock, existing concrete remaining from Cherokee Nuclear Station construction, weathered rock, partially weathered rock, or saprolite that remains in place below the non safety-related power block structures adjacent to the nuclear island. Steps for verification of proper foundation conditions consist of: • Removing loose soil, rock, and any organic materials. • Determine if the base of excavation consists of saprolite having N60 values, equal to or greater than 15 blows per foot, measured at a depth of 3 feet below the base of the excavation. Partially weathered rock, weathered rock, or rock would also be suitable in these areas provided it meets or exceeds the minimum criteria stated for saprolite and any loose material or soft zones are removed. • Fill any depressions or cavities in the surface of the foundation soil or rock with fill concrete, flowable fill, or properly compacted granular fill materials. This forms a uniform surface grade for the placement of additional granular fill. • Continue placing granular fill materials in layers according to the procedures described in Subsection 2.5.4.5.3.5. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.5.3.5, is revised as follows: 2.5.4.5.3.5 Granular Backfill Outside the Nuclear Island	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02

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					Outside the below grade nuclear island walls (Units 1 and 2), a granular backfill will be placed up to approximately the yard elevation or to the underside of the adjacent buildings. The backfill adjacent to the nuclear island walls and extending outward to form the foundation support of the adjacent buildings (radwaste, annex, and turbine buildings) will be an engineered granular backfill. Outside the limits of the granular fill, soil backfill will be used. This subsection describes the specifications and controls of granular fill materials. The soil backfill placed beyond the granular fill limits is non safety-related and the placement specifications will be developed as part of construction. Static properties of typical granular backfill materials are discussed in Subsection 2.5.4.2. Dynamic properties of typical granular backfill materials are discussed in Subsection 2.5.4.7. Quality control for granular backfill includes verification that the material was obtained from an approved source (e.g., an approved quarry). The maximum dry density and optimum moisture content are determined according to the modified Proctor (ASTM D 1557) method. For gradation and moisture content testing, the test samples are obtained after placing the material but before compaction. Measurement of in-place dry density of each lift after compaction is performed using the sand cone (ASTM D 1556) or rubber balloon (ASTM D 2167) method. The nuclear gauge (ASTM D 6938) method is used to augment (but not completely replace) the other methods. A quality control sampling and testing program for the granular backfill inclusive of the items provided by Table 2.5.4-222 is implemented during construction of the granular backfill. This quality control sampling and testing program verifies that the granular backfill is constructed in accordance with the parameters described in this subsection. To ensure that the engineering properties of the backfill meet the values used to calculate the static and dynamic lateral earth pressures, and the values used to establish seismic requirements for the Category II structures (annex building and turbine building bay 1), the backfill will be tested in the laboratory. Testing to be performed on granular backfill before construction begins is also provided by Table 2.5.4-222. Prior to constructing the backfill around the nuclear island structures, a test fill pad will be constructed on-site using the equipment and granular fill materials to be used in the backfill. Before the production backfill commences, an engineering report will exist that concludes that the equipment and methods used to construct the test fill are capable of producing acceptable and consistent results. The non safety-related structures adjacent to the nuclear island (radwaste, annex, and turbine buildings) will be supported on the granular fill. The following criteria are required for granular backfill placed adjacent to the nuclear island walls and extending outward to form the supporting material for the adjacent structures: • The granular fill is obtained from a quarry and will conform to the South Carolina Department of Transportation (SCDOT) gradation limits (Reference 224, SCDOT, 2007). • The material is from an approved source (e.g., a quarry) and meets the assigned gradation requirements after the material is hauled and placed (before compaction). • The coarse particles (materials retained on and above the No. 4 sieve) have an abrasion loss no more than 40 percent when subjected to the Los Angeles Abrasion Test (ASTM C 131) and has an apparent specific gravity (ASTM C 127) that is greater than or equal to approximately 2.65. • The material has a defined moisture-density relationship to allow a maximum dry density to be determined in accordance with ASTM D 1557 (modified Proctor) for compaction control. • Care is taken to prevent segregation of the materials during handling and placement. • To achieve the required degree of compaction, the moisture content is maintained at or near the optimum moisture content as determined by the modified Proctor (ASTM D 1557) laboratory compaction test. • The lift thickness is appropriate for the type of compaction equipment, but generally does not exceed about 8 inches (compacted thickness) for mechanized equipment nor about 4 inches for hand-guided compactors. Lift thicknesses may vary from the above values depending on the capability of the equipment being used. • Steel wheel tandem drum rollers weighing on the order of 10 tons are generally effective for compacting granular fill materials.	

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					• Within confined areas, or within 5 feet of the nuclear island walls, hand-guided compactors are used to prevent excessive lateral pressures against the walls from the residual soil stress caused by heavy compactors. The compactors have sufficient weight and striking power to produce the same degree of compaction that is obtained on the other portions of the fill by the rolling equipment, as specified. • The granular fill is compacted to a minimum of 96 percent of the maximum dry density determined in accordance with the modified Proctor test method (ASTM D 1557) with a moisture content that is not more than 2 percentage points above the optimum moisture content, nor less than the optimum. This relative compaction is selected to produce a granular fill equivalent to a relative density of 80 percent (Reference 225), and thus highly resistant to liquefaction. Lateral pressures applied against the below grade nuclear island walls are evaluated and discussed in Subsection 2.5.4.10.3. Evaluation and discussion of liquefaction issues related to the backfill materials is provided in Subsection 2.5.4.8.	
6891	WLS	Pt 02	FSAR 02	02.05.04.05.03.01	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.5.3.1, fifth and sixth paragraphs, are deleted per WLG2009.07-03.	Duke Energy Submittal - Post-demolition Basemat Report WLG2009.07-03
6331	WLS	Pt 02	FSAR 02	02.05.04.07	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.7, is revised as follows: 2.5.4.7 Response of Soil, Granular Fill, and Rock to Dynamic Loading This subsection provides a description of the response of soil, granular fill, and rock to dynamic loading including the following: • Investigations of the effects of historic earthquakes on soil and rock such as paleoliquefaction (Subsection 2.5.4.7.1). • Compressional and shear (P and S) wave velocity profiles from surface or borehole geophysical surveys, including data and interpretation (Subsection 2.5.4.7.2). • Foundation conditions and uniformity (Subsection 2.5.4.7.4). • Presentation of dynamic profiles (Subsection 2.5.4.7.5). The dynamic properties for the site (seismic wave velocity, shear modulus, and damping) were developed from extensive field measurements of rock. These data are compiled and statistically analyzed to develop a suite of dynamic velocity profiles to evaluate epistemic variability (uncertainty in the mean) in rock properties for general classification of the site (e.g., hard rock, DCD Subsection 2.5.4.5), develop the site GMRS (Subsection 2.5.2.6) and the Lee Nuclear Station Unit 1 FIRS (Subsection 2.5.2.7), and for comparison to the Certified Seismic Design Response Spectra (CSDRS) as presented in DCD Subsection 2.5.2.1. The GMRS and Unit 1 FIRS analysis, and comparison to the CSDRS are described in Subsections 2.5.2.6 and 2.5.2.7, and 3.7, respectively. Granular backfill material obtained from an off-site source will be placed adjacent to the nuclear islands and beneath adjacent structures. Samples of this granular backfill material will be laboratory tested to determine its dynamic properties once the off-site source has been identified. Dynamic properties, modulus, Poisson's ratio, Vp and Vs wave velocities developed for granular fill are estimates based on Menq (2003) (Reference 223). The lower range and upper range of the shear modulus values (Gmax x 1.5 and Gmax / 1.5) are considered for analysis (ASCE 4-98) (Reference 220). COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.7.2, first and fifth paragraphs, are revised as follows: The following techniques were used to measure field dynamic properties in 2006-2007: • Borehole P-S seismic velocity suspension logging surveys in 13 borings ranging in depth between about 95 to 255 feet and including rock, and soil; • Borehole downhole seismic velocity surveys in four borings (boring B-1000, B-1011, B-1024, and B-1037A) ranging in depth between about 84 to 215 feet that also were surveyed with P-S suspension logging for independent comparison of velocities measured in rock, and soil; • SASW surveys consisting of 15 linear arrays ranging in length from about 30 to 300 feet and including measurements in rock, and soil; • Seismic CPT seismic velocity surveys made in ten soundings ranging in depth between 32 to 84 feet and	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02

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					include measurements in soil. A fourth geophysical method, seismic Cone Penetrometer Test (SCPT) surveys were performed in soil. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.7.3, is revised as follows: 2.5.4.7.3 DELETED COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.7.4.1, third paragraph, is revised as follows: Rock conditions change beneath the northwest corner of the Lee Nuclear Station Unit 1 nuclear island. In this area, the Lee Nuclear Station Unit 1 nuclear island overlies a localized zone of weathered and fractured rock, extending approximately 15 to 25 feet deep, below the Unit 1 basemat footprint Elevation 550.5 feet, as shown in Figure 2.5.4-239 and Figure 2.5.4-240. This minor localized weathered zone of rock, exhibits lower Vs velocities, ranging from approximately 4500 to 6000 fps, than the underlying and adjacent sound rock with average Vs of approximately 9500 fps, and represents a different velocity profile condition. Excavation of this isolated lower velocity material to continuous rock at northwest corner of Lee Nuclear Station Unit 1 nuclear island to a depth of 15 to 25 feet below basemat subgrade removes a significant portion of the lower velocity weathered rock, and extends the excavation deeper within the support zone beyond the Lee Nuclear Station Unit 1 nuclear island footprint shown in Figures 2.5.4-245, 2.5.4-246, 2.5.4-264, and 2.5.4-265, as described in Subsection 2.5.4.10. The remaining continuous rock with Vs below 9200 fps represents less than 32 percent of the total rock volume beneath the Unit 1 nuclear island with an average Vs of 7300 fps and does not represent a potential for differential site amplification or foundation performance. The rock conditions described for the Lee Nuclear Station Unit 1 nuclear island northwest corner have no practical significance on differential shear wave velocity, site amplification or foundation performance and comply with the subsurface uniformity criteria as described in DCD Subsection2.5.4.5. The excavation backfill condition for the Lee Nuclear Station Unit 1 northwest corner is described in Subsection 2.5.4.5. The nuclear island foundation rock is characterized as sound, massive meta plutonic rock, no dipping layers exist and the rock supporting the nuclear island foundation meet DCD case 1 criteria. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.7.5 is revised as follows: 2.5.4.7.5 Dynamic Profiles This subsection presents the methodology and approach to develop site-specific dynamic velocity profiles at the Lee Nuclear Station site. Dynamic velocity profiles were compiled and applied at three locations for evaluation of site ground motion characteristics of Class I safety-related plant facilities with a fourth profile developed to evaluate generic engineered granular fill properties. These profiles are defined below. • Smoothed Dynamic Profile A, Unit 1 nuclear island centerline • Smoothed Dynamic Profile B, Unit 1, nuclear island northwest corner • Smoothed Dynamic Profile C, Unit 2 nuclear island centerline • Best Estimate Layer Velocity Profile G, Generic engineered granular fill Figure 2.5.4-247 shows the locations of the dynamic profiles (Profiles A through DC) developed for the Duke Lee Nuclear Station. Smoothed dynamic profiles, Dynamic Profiles A through DC, are shown on Figures 2.5.4-248 through 2.5.4-250, respectively. The site GMRS, discussed below and in Subsection 2.5.2, is represented by Profile A. Dynamic Profile B is applied for sensitivity site response analysis to evaluate possible ground motion variability between Profile A, Unit 1 centerline, and the Unit 1 northwest corner. Dynamic Profile C is used to evaluate possible differences in site response between Lee Nuclear Station Units 1 (Profile A) and 2 (Profile C) as a result of the spatial separation and possible lateral variability in the rock properties. A fourth, artificial generic engineered granular fill profile, identified Best Estimate Layer Velocity Profile G, was developed to represent engineered granular fill placed over the bedrock and around the plant nuclear islands to develop the plant grade. It represents a reasonable range of granular engineered fill materials, well-graded gravel (GW) (Figure 2.5.4-251a), poorly-graded gravel (GP) (Figure 2.5.4-251b), and well graded sand (SW) (Figure 2.5.4-251c) that may be placed adjacent to the AP1000 nuclear islands. These generic engineered granular fill seismic velocity profiles were constructed by estimating the maximum shear wave velocities, the elastic modulus values and the corresponding Poisson's ratio, and compression wave velocities for granular fill materials, well-graded gravel (GW) (Table 2.5.4-224a), poorly-graded gravel (GP) (Table 2.5.4-224b), and well graded sand (SW) (Table 2.5.4-224c) that may be typical of that to be placed at the site. The modulus ratio and damping ratio at various values of shear strain for generic	

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					granular fill materials, well-graded gravel (GW), poorly-graded gravel (GP), and well-graded sand (SW) are summarized in Tables 2.5.4-224d, 2.5.4-224e, and 2.5.4-224f. Shear modulus and damping ratio plots of these data are illustrated in Figures 2.5.4-253a, 2.5.4-253b, and 2.5.4-253c. Generic granular fill Profile G extends to a depth that envelops the greatest estimated depth of granular fill to be placed in the vicinity of the northwest corner of Lee Nuclear Station Unit 1. The generic granular fill is described in Subsection 2.5.4.5.3.5. Following the development of the dynamic profiles, one base case dynamic velocity profile was developed for the Lee Nuclear Station Unit 1 centerline. This base case models the Lee Unit 1 nuclear island configuration and is described below. • Base Case A1, Unit 1 Nuclear Island Centerline - Defines the GMRS and the typical relationship of the Lee Nuclear Station fill concrete (5.5 feet) overlying Cherokee Nuclear Station structural and fill concrete (composite 15 feet) above continuous rock. The model representing Dynamic Profile Base Case A1, Unit 1 Centerline is shown on Figure 2.5.4-252. Base Case A1 defined for the Lee Nuclear Station considers variability of site conditions such as material thickness and lateral variability within foundation rock, including Cherokee and Lee Nuclear Station concrete materials based on an average shear wave velocity of 7500 ft/sec. Assumed typical index properties for Cherokee Nuclear Station and Lee Nuclear Station concrete materials are summarized in Table 2.5.4-223. The site GMRS and Unit 1 FIRS (Base case profile A1) analysis are described in Subsection 2.5.2.6 and 2.5.2.7, respectively.	
6336	WLS	Pt 02	FSAR 02	02.05.04.08	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.8, is revised as follows: 2.5.4.8 Liquefaction Potential In meeting the requirements of 10 CFR Parts 50 and 100, if the foundation materials at the site adjacent to and under Category I structures and facilities are saturated soils and the water table is above bedrock, then an analysis of the liquefaction potential at the site is required. The need for a detailed analysis is determined by a study on a case-by-case basis of the site stratigraphy, critical soil parameters, and the location of safety-related foundations. All seismic Category I safety-related plant foundations for Lee Nuclear Station Units 1 and 2 will bear on rock, or fill concrete over rock. Neither fill concrete nor rock are susceptible to liquefaction. Plan maps, cross sections, and summary boring logs presented in Subsection 2.5.4.3 show the locations and rock foundation conditions of the Category I nuclear island structures that have a design subgrade elevation of 550.5 feet. The design basemat subgrade places the foundation for the Lee Nuclear Station Unit 1 nuclear island on existing concrete that was placed over a sound and cleaned rock surface remaining from the Cherokee Nuclear Station Unit 1, and directly on a newly-excavated and cleaned sound rock surface for Lee Nuclear Station Unit 2. Therefore, a liquefaction hazard does not exist that could affect the Category I plant structures and facilities. Outside the nuclear islands, compacted engineered granular fill is placed adjacent to seismic Category I structures over the exposed rock/fill concrete surfaces to the extent shown on Figures 2.5.4-245, 2.5.4-246, and 2.5.4-260 through 2.5.4-265. This granular backfill forms the supporting materials for the power block structures outside but adjacent to the nuclear islands. The typical thickness of granular fill is about 30 to 40 feet with a maximum thickness of about 80 feet. Beyond the perimeter of the granular fill as shown on the above-referenced figures, Group I engineered soil fill is placed as necessary to completely backfills the Cherokee Nuclear Station excavation, encompassing the granular backfill around the Lee Nuclear Station nuclear island structures up to yard grade Elevation 589.5 feet. As discussed in Subsection 2.5.4.6, groundwater will rise above the bedrock surface within the engineered granular fill to elevations between about 574 feet to 584 feet msl. Shallow foundations for non-Category I plant facilities adjacent to the nuclear island (i.e., seismic Category II part of the annex building, non-seismic radwaste building, and seismic Category II part of the turbine building) are completely founded on or over compacted engineered granular fill over partially weathered rock/continuous rock, or compacted engineered granular fill over fill concrete and partially weathered rock/continuous rock. The non-seismic part of the annex building and non-seismic part of the turbine building are founded on or over compacted engineered granular fill over partially weathered	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02

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					rock/continuous rock, compacted engineered granular fill over fill concrete and partially weathered rock/continuous rock, or compacted engineered granular fill over saprolite soils overlying partially weathered rock/continuous rock. Subsection 2.5.4.5.1 describes the sources and extents of granular fill. The granular fill will likely have Unified Soil Classification System (USCS) classification symbol GW to GP (well-graded gravel to poorly-graded gravel) or SW (wellgraded sand). Subsection 2.5.4.5 describes material specifications and compaction for engineered granular fill. Granular fill will be compacted to 96 percent modified Proctor (ASTM D 1557) maximum dry density. Using an empirical relationship from Reference 225 (Lee and Singh, 1971), the relative density of the granular fill compacted to 96 percent of the modified Proctor maximum dry density is 80 percent. According to an empirical correlation from Reference 232 (Rollins, et al., 1998), gravel having 80 percent relative density would have a corresponding (N1)60 blow count of 45 blows per foot. According to Reference 230 (Idriss and Boulanger, 2008), sand having 80 percent relative density would have a corresponding (N1)60 blow count of 29-30 blows per foot. These (N1)60 values may be considered as (N1)60cs values owing to the low fines contents of the typical granular fill materials. Granular soils having (N1)60cs blow counts of 29-30 or higher are classified as non-liquefiable according to Figure 2 of Reference 231 (Youd, et al., 2001). Therefore the granular fill compacted to 96 percent modified Proctor relative compaction is not subject to liquefaction. Additionally, the floor of the excavation is relatively flat, and potential sloping basal surfaces do not exist adjacent to or below the granular fill that could present a potential lateral spread condition. Subsection 2.5.4.5.3.3 describes the criteria and steps for verification of proper foundation support conditions below the base of the granular fill. Figures 2.5.4-245, 2.5.4-246, and 2.5.4-260 through 2.5.4-265 depict the conditions below the base of the granular fill. No saprolite underlies the granular fill supporting the seismic Category II parts of the annex and turbine buildings for Unit 1 and Unit 2 or the non-seismic radwaste buildings for Unit 1 and Unit 2. The same is true for the northern portions of the non-seismic part of the annex buildings for Unit 1 and Unit 2, the non-seismic part of the turbine building for Unit 1, and the northern portion of the non-seismic part of the turbine building for Unit 2. Some saprolite may underlie the granular fill supporting the southernmost areas of the non-seismic part of the annex buildings for Unit 1 and Unit 2 and for the southern area of the non-seismic part of the turbine building for Unit 2. Saprolite to support the granular fill has N60 values greater than or equal to 15 blows per foot, measured at a depth of 3 feet below the base of the open excavation. Table 2.5.4-211 indicates the saprolite soils have mean fines content of 46 percent with a standard deviation of 15 percent. The mean minus one standard deviation fines content is thus 31 percent. For a fines content conservatively assumed as on the order of 15 percent, saprolite with N60 equal to 15 blows per foot at a depth of 3 feet below the base of the open excavation has (N1)60cs values equal to 26-27 blows per foot, and thus may be considered as highly resistant to liquefaction per Figure 2 of Reference 231 (Youd, et al., 2001). The preceding analysis determines that no liquefaction hazard exists to seismic Category I safety related plant structures and facilities, supported on sound rock or concrete over rock. As described above, neither fill concrete nor rock are susceptible to liquefaction. The analysis also determines that no liquefaction hazard exists for adjacent seismic Category II structures and facilities supported on compacted engineered granular fill over partially weathered rock/continuous rock, or compacted engineered granular fill over fill concrete and partially weathered rock, weathered/continuous rock. The compacted engineered granular fill, and partially weathered rock will exhibit neither potential for liquefaction and related deformation, nor potential for adverse effects attributed to cyclic strain-softening or pore pressure build-up. Thus, any structure that could affect the Lee Nuclear Station Unit 1 and Unit 2 nuclear islands (including the seismic Category II portions of both the annex building and the turbine building, the non-seismic radwaste building, the entire non-seismic turbine building for Unit 1, and the northern area of the non-seismic parts of the turbine building for Unit 2) is on compacted engineered granular fill over partially weathered rock/continuous rock or compacted engineered granular fill over fill concrete over partially weathered rock/continuous rock, and is not subject to liquefaction.	

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					The southern ends of the non-seismic portions of the annex buildings for Unit 1 and Unit 2 and the southern end of the non-seismic portion of the turbine building for Unit 2 may be founded on granular fill over saprolite. These areas will be highly resistant to liquefaction per Figure 2 of Reference 231, and will exhibit low to nil potential for liquefaction and related deformation, and low potential for adverse effects attributed to cyclic strain-softening or pore pressure build-up. These locations are also remote from the nuclear islands and thus have no potential for affecting the nuclear islands.	
6340	WLS	Pt 02	FSAR 02	02.05.04.09	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.9, third paragraph, is revised as follows: The dynamic properties of soil, granular fill, concrete, and rock at the site were determined through a program of field exploration, laboratory testing, and analysis as described in Subsections 2.5.4.2, 2.5.4.4, and 2.5.4.7. The Lee Nuclear Station site is considered a hard rock site with rock having a shear wave velocity generally greater than 8000 fps. Results of site response analysis are described in Subsection 2.5.2, and a comparison to DCD design parameters is presented in Table 2.0-201.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6343	WLS	Pt 02	FSAR 02	02.05.04.10	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.10, is revised as follows: 2.5.4.10 Static Stability The static stability of the Lee Nuclear Station nuclear island is evaluated for foundation bearing capacity, foundation settlement, and lateral pressures against below-grade walls. Evaluation of static stability includes the safety related nuclear island facilities and the non-safety related structures adjacent to the nuclear island facilities. A discussion of bearing capacity, settlement, and lateral pressure evaluations is provided in Subsections 2.5.4.10.1 through 2.5.4.10.3. Foundation materials at the location of Lee Nuclear Station Unit 1 and Unit 2 nuclear islands consist of continuous rock and fill concrete placed on top of continuous rock. The fill concrete is used where the elevation of continuous rock is below the elevation of the nuclear island foundation. Shallow foundations for non-Category I plant facilities adjacent to the nuclear island (i.e., seismic Category II part of the annex building, non-seismic radwaste building, and seismic Category II part of the turbine building) are completely founded on or over compacted engineered granular fill over partially weathered rock/continuous rock, or compacted engineered granular fill over fill concrete and partially weathered rock/continuous rock. The non-seismic part of the annex building and non-seismic part of the turbine building are founded on or over compacted engineered granular fill over partially weathered rock/continuous rock, compacted engineered granular fill over fill concrete and partially weathered rock/continuous rock, or compacted engineered granular fill over saprolite soils overlying partially weathered rock/continuous rock. The Unit 1 and Unit 2 nuclear island foundations are supported directly on continuous rock or fill concrete placed on top of continuous rock. Bearing capacity and settlement estimates of foundations supported on these materials are well within the limits provided in the DCD Subsections 2.5.4.2 and 2.5.4.3 as discussed in Subsection 2.5.4.10.1 and Subsection 2.5.4.10.2. Subsurface improvement of foundation materials is performed when necessary as described in Subsection 2.5.4.12. Cleaning and preparation of the continuous rock and fill concrete surfaces is also completed as described in Subsection 2.5.4.12 prior to placement of nuclear island foundation concrete. Instrumentation to monitor performance of the nuclear island foundations supported on the properly prepared continuous rock and on fill concrete materials supported on continuous rock is not necessary. As discussed in Subsection 2.5.4.6.1, the design groundwater elevation is 588 feet per the Design Control Document. The base mat and below-grade walls are waterproofed to accommodate hydrostatic pressure due to groundwater. Groundwater loads are depicted in Figures 2.5.4-255a, 2.5.4-255b, and 2.5.4-255c. COLA Part 2, FSAR, Chapter 2, is revised to add a new Subsection 2.5.4.10.1.1 heading after the Subsection 2.5.4.10.1 heading as follows: WLS COL 2.5-10 2.5.4.10.1 Bearing Capacity 2.5.4.10.1.1 Bearing Capacity of Nuclear Islands COLA Part 2, FSAR, Chapter 2, is revised to add a new Subsection 2.5.4.10.1.2 after the last paragraph of	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02

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					Subsection 2.5.4.10.1.1 as follows: 2.5.4.10.1.2 Bearing Capacity of Adjacent Structures The bearing capacity of the non-safety related structures adjacent to the nuclear islands [radwaste buildings, annex buildings (both non-seismic and Category II portions), and turbine buildings] is evaluated and the results are applicable to each unit. The methods used are: • Peck, Hanson and Thornburn (Reference 213) for allowable bearing pressure on the granular backfill to limit settlement, and • Ultimate Bearing Capacity based on the strength of the granular fill divided by a factor of safety equal to 3 to determine the safe bearing capacity. The method of Peck, Hanson and Thornburn (Reference 213) is used to estimate the allowable bearing pressure to limit settlement based on SPT blow count of the granular fill. The Peck, Hanson and Thornburn (Reference 213) method determines the allowable foundation loading which, if not exceeded, will result in settlements not to exceed 1 inch for smaller footings and not to exceed 2 inches for larger foundation areas (e.g., mat foundations). However, Peck, Hanson and Thornburn (Reference 213) recommend that the ultimate bearing capacity also be calculated to verify that foundations that would appear not to undergo the limiting settlement also have an acceptable margin of safety against a bearing capacity failure. The (N1)60cs values for the granular fill mentioned in Subsection 2.5.4.8 are used as the SPT (N1)60 blow counts of the potential granular fill. Peck, Hanson and Thornburn (Reference 213) published a convenient chart for proportioning shallow foundations bearing on granular soil, shown on their Figure 19.3. In the Peck, Hanson and Thornburn (Reference 213) Figure 19.3, the allowable bearing pressure is plotted on the y-axis and foundation width is plotted on the x-axis. For a given N value, the allowable bearing pressure increases as the foundation width increases until a maximum value is reached at a particular foundation width; beyond this point, allowable bearing pressure is constant, independent of foundation width. The sloping lines rising up from the origin as the width of footing increases represent the region where the safe bearing capacity governs. The horizontal lines for various N values represent the region where the allowable settlement governs. Peck, Hanson and Thornburn (Reference 213) state that footing foundations proportioned in accordance with the chart on their Figure 19.3 will, on the basis of experience, not settle more than 1 inch total, and the differential settlements between individual foundations will not exceed tolerable limits. For large mat foundations (such as those that support the project structures), Peck, Hanson, and Thornburn (Reference 213) indicate that, based on geotechnical experience, if total foundation settlement is limited to 2 inches, differential settlement will be limited to 0.75 inch, and the performance of the structure should not be impacted. Peck, Hanson, and Thornburn (Reference 213) thus determines the allowable foundation loading which, if not exceeded, will result in settlements not to exceed 1 inch for smaller footings and not to exceed 2 inches for larger foundation areas (e.g., mat foundations). If the safety factor against exceeding the ultimate bearing capacity as calculated earlier herein is adequate, the maximum applied bearing pressure to cause settlement not to exceed 1 or 2 inches according to Peck, Hanson, and Thornburn (Reference 213) is: qallowable1 inch = 0.11 (N1)60 x Cw (tsf), and qallowable_2 inches = 0.22 (N1)60 x Cw (tsf) where Cw is the effect of the water table, as discussed below. The chart on Peck, Hanson, and Thornburn (Reference 213) Figure 19.3 is for the conditions where the supporting granular material remains above the water table. If the depth of the groundwater table (Dw)	

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					will be less than the sum of the foundation depth (Df) and the width (B), then the allowable bearing pressure to limit total settlement is adjusted for water table depth using the water table correction factor (Cw): 0. 5 D w D + B + f where: Dw = depth to groundwater measured from the ground surface surrounding the foundation; and Cw = adjustment factor for depth of the groundwater table (Dw) if less than the sum of the foundation depth below the ground surface (Df) and smallest foundation dimension (B); the minimum value is 0.5; the maximum value is 1.0. Note: If Dw ≤ Df , Cw = 0.5. The future water table may be as high as an elevation of 584 ft, which would be about 5.5 ft below the yard surface at the perimeter of the buildings. For a depth to the bottom of the mat equal to 1.5 ft, this would place the future water table at a depth of 4 ft below the bottom of the perimeter foundation for computing Cw. This depth of water table, about 4 ft below the bottom of the foundation, is reasonable to apply to the foundations for the radwaste and annex buildings. The foundation bearing levels in the turbine building are at generally lower elevations than those of the radwaste and annex buildings, and Df is appropriately assigned. The ultimate bearing capacity calculation utilizes the unit weight and shear strength parameters of the potential granular fill materials found in Table 2.5.4-211 in conjunction with the bearing capacity equations by Hanson as found in Bowles (5th ed., Reference 216). The radwaste buildings, annex buildings (Category II portion), and turbine buildings have mat foundations that occupy the entire building area. Therefore, the case for limiting settlement equal to 2 inches is applicable for these buildings. The annex building (non-Category II portion) may have individual spread footing foundations. Building dimensions in Table 2.5.4-230 are based on Reference 235; the best estimates of loading of the building foundations in Table 2.5.4-230 are based on Reference 236. The calculated allowable bearing pressures (with a factor of safety of 3 against the ultimate bearing capacity) on the granular fill are shown in Table 2.5.4-228. The calculated allowable bearing pressures for settlements not to exceed 2 inches for mats are shown in Table 2.5.4-229. The results show the maximum safe bearing pressures based on the factor of safety are significantly greater than the applied pressures (Table 2.5.4-230). The allowable pressures to limit settlement are also greater than the applied pressures. The bearing capacity calculations indicate the mat foundations of the radwaste buildings, annex buildings (Category II portion), and turbine buildings will perform as intended. This is consistent with the expected performance of foundations supported on dense granular fill. The calculations demonstrate that the allowable safe bearing pressure with a factor of safety of 3 against exceeding the ultimate bearing capacity will not govern foundation performance for the mat foundations. The allowable bearing pressure for settlements not to exceed 2 inches for mat foundations will exceed the applied pressures on the foundations. The granular fill will provide acceptable support for the buildings to be placed on it (radwaste, annex (Category II portion), and turbine buildings) and anticipated settlement of these foundations are less than the published limit of 2 inches. COLA Part 2, FSAR, Chapter 2, is revised to add a new Subsection 2.5.4.10.2.1 heading after the Subsection 2.5.4.10.2 heading as follows: 2.5.4.10.2 Settlement	

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					WLS COL 2.5-12 2.5.4.10.2.1 Settlement of Nuclear Islands COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.10.2, sixth paragraph, is revised as follows: Lee Nuclear Station nuclear island structures are founded on rock and fill concrete which does not incur sufficient settlement to disrupt the operation of the structure. Settlement of Lee Nuclear Station Unit 1 and Unit 2 nuclear island structures founded on rock or fill concrete is calculated to be 1/15 of an inch or less. The maximum estimated settlement is 0.055 inches beneath Unit 1 and 0.048 inches beneath Unit 2 using the elastic modulus methods. The maximum estimated settlement is 0.023 inches beneath Unit 1 and 0.015 inches beneath Unit 2 using the empirical Rock Quality Designation based method. Differential settlement, even if equivalent to the estimated maximum total settlement, is within the limits allowed by DCD Subsection 2.5.4.3 (0.5 inch in 50 ft allowable). COLA Part 2, FSAR, Chapter 2, is revised to add a new Subsection 2.5.4.10.2.2 after the last paragraph of Subsection 2.5.4.10.2.1 as follows: 2.5.4.10.2.2 Settlement of Adjacent Structures Settlement of the structures adjacent to the nuclear islands is discussed in Subsection 2.5.4.10.1.2 as part of the evaluation of bearing capacity of the granular fill. These results indicate the mat foundations of the radwaste buildings, annex buildings (Category II portion), and turbine buildings will settle less than 2 inches. The foundation performance of these buildings supported on the granular fill will meet the DCD Subsection 2.5.4.3 criterion of 3-inch differential settlement relative to the settlement of the nuclear islands. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.10.3, is revised as follows: 2.5.4.10.3 Lateral Pressures Lateral pressures are developed against the below grade nuclear island wall resulting from the placement and compaction of granular backfill materials. Earth pressure envelopes are calculated for active, at-rest, and passive pressure conditions as developed in Figures 2.5.4-255a, 2.5.4-255b, and 2.5.4-256255c. Lateral earth pressure values based on the maximum groundwater elevations are provided in Tables 2.5.4-225a, 2.5.4-225b, and 2.5.4-226225c. Potential compaction-induced earth pressures are presented in Figure 2.5.4-256a. Numerical values of compaction-induced earth pressure are given in Table 2.5.4-226. Assumptions or references used to develop the active, at-rest, passive, and compaction-induced earth pressure envelopes are described in the following list. Earth Pressure Assumptions: • The granular fill used to backfill around the Nuclear Islands will likely come from an on-site borrow source such as an operating quarry, as described in Subsection 2.5.4.5. The granular fill will likely be USCS group symbol GW to GP (well-graded gravel to poorly-graded gravel) or SW (well-graded sand) and have material properties as described in Subsection 2.5.4.2. • Granular backfill is compacted to 96 percent of the maximum dry density determined from the modified Proctor laboratory test performed in accordance with ASTM D1557. • To achieve the required degree of compaction, the moisture content should be maintained at or near the optimum moisture content as determined by the ASTM D 1557 laboratory compaction test. • Light hand-guided compaction equipment is used to compact the granular fill within 5 feet of the nuclear island walls. Heavier compaction equipment may be used at distances greater than 5 feet from the walls. The use of light, hand-guided compaction equipment near the wall avoids excessive compaction-induced stresses against the wall. • The potential compaction-induced earth pressures are computed using the method in Peck and Mesri, 1987 (Reference 229). • The groundwater table elevation may vary over time between Elevations 584 and 574 feet. The design water table elevation from the Design Control Document is up to Elevation 588. • The nuclear island walls do not yield due to the lateral earth pressure applied to them. The at-rest pressure is the appropriate earth pressure to assume for design of the walls. The Rankine earth pressure theory is used to compute the active and passive (ultimate) earth pressure.	

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					The dynamic lateral earth pressure in Table 2.5.4-227 and plotted on Figure 2.5.4-256b is calculated in accordance with Reference 220 - ASCE 4-98, Section 3.5.3, Figure 3.5-1, "Variation of Normal Dynamic Soil Pressures for the Elastic Solution." Backfill properties for granular fill adjacent to the vertical surface of the nuclear island exterior walls and basemat for dynamic earth pressure calculation are as follows: • Saturated unit weight of backfill (y) =150 lb/ft3 (GW) 142 lb/ft3 (GP) 136 lb/ft3 (SW) (from Table 2.5.4-211) • Poisson's ratio (v) = 0.5 (see discussion below) The Poisson's ratio, ν = 0.5, is used because the granular fill is predominantly below the design groundwater table. The seismic acceleration used, (a) = 0.30g, is applied as a uniform seismic acceleration to the granular backfill along the height of the nuclear island wall.	
6344	WLS	Pt 02	FSAR 02	02.05.04.13	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.13, is revised to read: 2.5.4.13 References 221. Not used. 222. Deleted. 223. Menq, F.Y. 2003. Dynamic Properties of Sandy and Gravelly Soils, Ph.D. Dissertation, University of Texas at Austin, 364 pages. 224. South Carolina Department of Transportation (SCDOT), 2007. Standard Specifications for Highway Construction, Subsection 305.2.5.5 (Macadam Base Course) and Subsection 408.2.2 (Washed Screenings). 225. Lee, K.L., and Singh, A., 1971. Relative Density and Relative Compaction, Journal of the Soil Mechanics and Foundation Division, Proc. of the American Society of Civil Engineers, Vol. 97, No. SM7, July, pp. 1049 - 1052. 226. Horton, J.W. Jr., and Dicken, C.L., Preliminary Digital Geologic Map of the Appalachian Piedmont and Blue Ridge, South Carolina Segment, U.S. Geological Survey Open-File Report 01-298, 1:500,000 scale, 2001. 227. Nystrom Jr., P.G. Geologic Map of the Blacksburg South 7.5 Minute Quadrangle, Cherokee County, South Carolina [preliminary draft], South Carolina Department of Natural Resources Geological Survey, 1:24,000 scale, 1 sheet, 2004. 228. NAVFAC, 1986. Soil Mechanics, Design Manuals 7.01 and 7.02, Naval Facilities Engineering Command, Alexandria, VA. 229. Peck, R. B., and Mesri, G., 1987. "Discussion of Compaction - Induced Earth Pressure under K0 Conditions," Journal of Geotechnical Engineering, ASCE, 113 (11), pp. 1406-1408. 230. Idriss, I. M., and Boulanger, R. W., 2008. Soil Liquefaction during Earthquakes, Monograph MNO 12, Earthquake Engineering Research Institute, Oakland, CA, Equation (37), page 87. 231. Youd, T. L., Idriss, I. M., Andrus, R. D., Arango, I., Castro, G., Christian, J. T., Dobry, R., Finn, W. D., Harder Jr., L. F., Hynes, M. E., Ishihara, K., Koester, J. P., Liao, S. C., Marcuson III, W. F., Martin, G. R., Mitchell, J. K., Moriwaki, Y., Power, M. S., Robertson, P. K., Seed, R. B., and K. H. Stokoe II, 2001. Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 127, No. 10, American Society of Civil Engineers, October, 2001, pages 817 to 833. Also, see Errata in Closure to "Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils", Journal of Geotechnical and Geoenvironmental Engineering, Vol. 129, No. 3, American Society of Civil Engineers, March, 2003, pages 284 to 286. 232. Rollins, K. M., Evans, M., Diehl, N. and Daily, W., 1998. "Shear Modulus and Damping Relationships for Gravels," Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 124, No. 5, pp. 396 - 405, Equation (7), page 397. 235. Westinghouse Electric Company LLC. AP1000 Plant Grid Coordinates and Column Line Identification Plan, Drawing APP-0030-X4-001, Revision C.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02

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					236. Westinghouse Electric Company LLC, 2009. APC/WLG0068, Letter to Mr. John McConaghy, Duke Energy, Subject: "RAI No. 2098: Interface Information for Differential Settlement Evaluations", dated April 8.	
6892	WLS	Pt 02	FSAR 02	02.05.04.13	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.4.13, Reference 222, is deleted per WLG2009.07-03.	Duke Energy Submittal - Post-demolition Basemat Report WLG2009.07-03
6345	WLS	Pt 02	FSAR 02	02.05.06.06 02.05.06.07	COLA Part 2, FSAR, Chapter 2, Subsection 2.5.6.6, is revised as follows: WLS COL 2.5-6 2.5.6.6 Properties of Underlying Materials This COL item is addressed in Subsections 2.5.4.2, 2.5.4.2.1, 2.5.4.3.6, 2.5.4.4, 2.5.4.5.1, 2.5.4.5.2, 2.5.4.5.3, 2.5.4.7, 2.5.4.9, and 2.5.4.10. COLA Part 2, FSAR, Chapter 2, Subsection 2.5.6.7, is revised as follows: 2.5.6.7 Excavation and Backfill WLS COL 2.5-7 This COL item is addressed in Subsections 2.5.4.3.6, 2.5.4.5.1, 2.5.4.5.2, and 2.5.4.5.3.	Duke Energy Submittal – Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6658	WLS	Pt 02	FSAR 02	02.05.F / F2.5.1-202a	COLA Part 2, FSAR Chapter 2, Figure 2.5.1-202a revised per WLG2009.12-02	Duke Energy Response to RAI LTR 86, RAI 02.05.01-053. SUPERSEDES QB 5556. WLG2009.12-02
5556	WLS	Pt 02	FSAR 02	02.05.F / F2.5.1-202a F2.5.1-202b F2.5.1-235 LOF	Revise FSAR Figures 2.5.1-202a and 2.5.1-202b; add Figure 2.5.1-235; and update the List of Figures per WLG2009.05-04, RAI 2.5.1-004.	Duke Energy Response to RAI LTR 59, RAI 02.05.01-004. WLG2009.05-04
5700	WLS	Pt 02	FSAR 02	02.05.F / F2.5.1-207	Revise Figure 2.5.1-207	Duke Energy Response to RAI LTR 59, RAI 02.05.01-010. WLG2009.05-04
5560	WLS	Pt 02	FSAR 02	02.05.F / F2.5.1-208 F2.5.1-233 F2.5.1-234	Revise Figure 2.5.1-208 Add Figure 2.5.1-233 Add Figure 2.5.1-234 Update LOF	Duke Energy Response to RAI LTR 59, RAI 02.05.01-005. WLG2009.05-04
5576	WLS	Pt 02	FSAR 02	02.05.F / F2.5.1-216	Revise Figure 2.5.1-216	Duke Energy Response to RAI LTR 59, RAI 02.05.01-024. WLG2009.05-04
5585	WLS	Pt 02	FSAR 02	02.05.F / F2.5.1-218a F2.5.1-218b	Revise Figures 2.5.1-218a and 2.5.1-218b	Duke Energy Response to RAI LTR 59, RAI 02.05.01-034. WLG2009.05-04
5586	WLS	Pt 02	FSAR 02	02.05.F / F2.5.1-219a F2.5.1-219b F2.5.1-220 F2.5.1-224	Revise Figures 2.5.1-219a, 2.5.1-219b, 2.5.1-220, and 2.5.1-224	Duke Energy Response to RAI LTR 59, RAI 02.05.01-036. WLG2009.05-04
5584	WLS	Pt 02	FSAR 02	02.05.F /	Revise Figure 2.5.1-223	Duke Energy

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				F2.5.1-223		Response to RAI LTR 59, RAI 02.05.01-032. WLG2009.05-04
5602	WLS	Pt 02	FSAR 02	02.05.F / F2.5.2-223 thru F2.5.2-230	Revise Figures 2.5.2-223 to 230	Duke Energy Response to RAI LTR 63, RAI 02.05.02-044. WLG2009.04-03
4667	WLS	Pt 02	FSAR 02	02.05.F / F2.5.2-237	Title Box: replace 'exceedence' with 'exceedance'.	Spelling
4668	WLS	Pt 02	FSAR 02	02.05.F / F2.5.2-238	Title Box: replace 'exceedence' with 'exceedance'.	Spelling
6359	WLS	Pt 02	FSAR 02	02.05.F / F2.5.4 Figures LOF	Modify the following figures: 2.5.4-207 revised 2.5.4-208 revised 2.5.4-209 revised 2.5.4-215 revised 2.5.4-247 revised Modify the LOF The following figures are deleted: 2.5.4-217 2.5.4-242 2.5.4-254 The following figures are replaced: 2.5.4-251 replaced by 2.5.4-251a, 2.5.4-251b, and 2.5.4-251c 2.5.4-253 replaced by 2.5.4-253a, 2.5.4-253b, and 2.5.4-253c 2.5.4-255 replaced by 2.5.4-255a, 2.5.4-255b, and 2.5.4-255c 2.5.4-256 replaced by 2.5.4-256a and 2.5.4-256b The following figures are new: 2.5.4-260 2.5.4-261 2.5.4-262 2.5.4-263 2.5.4-264 2.5.4-265	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
5969	WLS	Pt 02	FSAR 02	02.05.F / F2.5.4-221	Add scale to bottom of graph for Borehole Velocity on left hand side of figure.	Correct omission on Rev 0 of Figure 2.5.4-221
6777	WLS	Pt 02	FSAR 02	02.05.F / F2.5.2-240	COLA Part 2, FSAR, Chapter 2,Figure 2.5.2-240.	Annual Update / FIRS A1 Update Submittal WLG2010.02-01.
6778	WLS	Pt 02	FSAR 02	02.05.F / F2.5.2-241	COLA Part 2, FSAR, Chapter 2,Figure 2.5.2-241 is replaced.	Annual Update / FIRS A1 Update Submittal WLG2010.02-01.
6779	WLS	Pt 02	FSAR 02	02.05.F / F2.5.2-244	COLA Part 2, FSAR, Chapter 2,Figure 2.5.2-244 is replaced.	Annual Update / FIRS A1 Update Submittal WLG2010.02-01.

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
6780	WLS	Pt 02	FSAR 02	02.05.F / F2.5.2-245	COLA Part 2, FSAR, Chapter 2,Figure 2.5.2-245 is replaced.	Annual Update / FIRS A1 Update Submittal WLG2010.02-01.
6781	WLS	Pt 02	FSAR 02	02.05.F / F2.5.2-246	COLA Part 2, FSAR, Chapter 2,Figure 2.5.2-246 is replaced per attached markup.	Annual Update / FIRS A1 Update Submittal WLG2010.02-01.
6782	WLS	Pt 02	FSAR 02	02.05.F / F2.5.2-247	COLA Part 2, FSAR, Chapter 2,Figure 2.5.2-247 is replaced per attached markup.	Annual Update / FIRS A1 Update Submittal WLG2010.02-01.
5605	WLS	Pt 02	FSAR 02	02.05.F / F2.5.4-245 F2.5.4-246	Revise Figures 2.5.4-245 and 2.5.4-246	Duke Energy Response to RAI LTR 68, RAI 03.08.05-005. WLG2009.06-04
5597	WLS	Pt 02	FSAR 02	02.05.T / T2.5.1-204	Add new Table 2.5.1-204, RAI 2.5.1-046	Duke Energy Response to RAI LTR59, RAI 02.05.01-046. WLG2009.05-04
5600	WLS	Pt 02	FSAR 02	02.05.T / T2.5.2-201	Revise Table 2.5.2-201	Duke Energy Response to RAI LTR 63, RAI 02.05.02-036. WLG2009.04-03
6884	WLS	Pt 02	FSAR 02	02.05.T / T2.5.2-202 T2.5.2-203 T2.5.2-204 T2.5.2-205 T2.5.2-206 T2.5.2-207	Remove the text "New Data to Suggest Change in Source" from Tables 2.5.2-202 through 207.	Annual Review / editorial correction
6776	WLS	Pt 02	FSAR 02	02.05.T / T2.5.2-224	COLA Part 2, FSAR, Chapter 2,Table 2.5.2-224 is replaced in its entirety per attached markup.	Annual Update / FIRS A1 Update Submittal WLG2010.02-01.
6347	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-202	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-202, is revised per WLG2009.10-02.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6348	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-210	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-210, is revised per WLG2009.10-02.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6349	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-211	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-211, is revised per WLG2009.10-02.	Duke Energy Submittal - Granular

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					Also, in footnote b, change "enery" to "energy"	Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6350	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-212	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-212, is revised per WLG2009.10-02.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6351	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-222	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-222, is revised per WLG2009.10-02. See attachment	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6352	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-224	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-224, is removed and replaced with Tables 2.5.4-224a - f per WLG2009.10-02.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6353	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-225	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-225, is removed and replaced with Tables 2.5.4-225a-c per WLG2009.10-02.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6354	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-226	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-226, is revised per WLG2009.10-02.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6942	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-227	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-227, is revised in response to calculation revision.	Energy Submittal on Hydrology - Offsite Water Storage; Supplements ER RAIs 59-60-96, RAI 2680.

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
						WLG2009.12-03
6356	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-228	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-228, is added per WLG2009.10-02.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6357	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-229	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-229, is added per WLG2009.10-02.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6358	WLS	Pt 02	FSAR 02	02.05.T / T2.5.4-230	COLA Part 2, FSAR, Chapter 2, Table 2.5.4-230, is added per WLG2009.10-02.	Duke Energy Submittal - Granular Fill; Supplement to RAIs 02.05.04-001 thru 008; 02.05.04-010 thru 015, 03.07.01-002. WLG2009.10-02
6770	WLS	Pt 02	FSAR 02	APP 2AA	COLA Part 2, FSAR, Chapter 2, Appendix 2AA is modified as follows: • The number of geotechnical boring logs has been corrected to 124 from 121 on pages 1 and 2 of the Appendix. • The number of monitoring well construction logs has been corrected to 24 from 25 on page 1 of the Appendix. • The typographical error "STP-" was corrected to "SPT" on page 1 of the Appendix. • Soil Boring Logs for B-1001A, B-1003, B-1026, B-1037A, MW-1207A, MW-1216, MW-1217 and MW-1218 were erroneously omitted from Revision 0: these log forms have been inserted. • The list of Geotechnical Boring Logs on page 3 was updated to incorporate MW-1216, MW-1217 and MW-1218. • The list of Construction Logs on page 3 was updated to remove MW-1213: this monitoring well was not built. • The surface elevation on the Soil Boring Log for MW-1215 was corrected. • Groundwater depth was corrected on Well Construction Logs for MW-1216. MW-1217 and MW-1218 • Location coordinates were corrected on Well Construction Logs MW-1200, MW-1201, MW-1202, MW-1203, MW-1204, MW-1205, MW-1206, MW-1207, MW-1208, MW-1209, MW-1210, MW-1211, MW-1212 and MW-1214.	Annual Update
5798	WLS	Pt 02	FSAR 02	APP 2BB	In the 1st paragraph of Appendix 2BB, change "This Attachment..." to "This Appendix..."	Use proper designation of Appendix. Consistency with Appendix 2AA and Appendix 2CC
6654	WLS	Pt 02	FSAR 03	03.07.01.01.01	COLA Part 2, FSAR, Chapter 2, Subsection 3.7.1.1.1, is revised in accordance to add the following paragraph at the end of the subsection as follows: Subsection 2.5.4.7.4.1, including Figures 2.5.4-245, 2.5.4-246, 2.5.4-264, describe and illustrate a	Duke Energy Response to RAI LTR 87, RAI 03.07.01-005.

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					localized area of non uniform foundation conditions associated with the Unit 1 Northwest Corner, and the area adjacent to and outside the nuclear island foundation footprint. Westinghouse has evaluated (Reference 201) the potential effect of this condition on the dynamic response of the nuclear island, and has concluded that its effect on in structure response spectra is small. At the six key nuclear island locations described in AP1000 DCD Appendix 3G, significant margin exists between the site specific in structure response spectra and that resulting from the AP1000 CSDRS.	WLG2009.12-10
6785	WLS	Pt 02	FSAR 03	03.07.01.01.01	COLA Part 2, FSAR, Chapter 3, Subsection 3.7.1.1.1, 5th paragraph is revised as follows: "PGA at 100 hertz of the GMRS and Unit 1 FIRS is 0.21 g and 0.22 g, respectively."	WLG2010.02-01, Revision of FIRS A1 Report.
5988	WLS	Pt 02	FSAR 03	03.07.04.02.01	COLA Part 2, FSAR Chapter 3, Subsection 3.7.4.2.1, will be revised to add the following sentence at the end of the existing FSAR text: The trigger value is initially set at 0.01g.	Duke Energy Response to LTR 75, RAI 01-008. WLG2009.09-09
6655	WLS	Pt 02	FSAR 03	03.07.06	COLA Part 2, FSAR, Chapter 2, new Subsection 3.7.6, is added as follows: 3.7.6 REFERENCES 201. Westinghouse Electric Company Report WLG-1000-S2R-802, Revision 1, William S. Lee Site Specific Seismic Evaluation Report, December 15, 2009.	Duke Energy Response to LTR 87, RAI 03.07.01-005. WLG2009.12-10.
6666	WLS,STD	Pt 02	FSAR 03	03.09.03.04.04	COLA, Part 2, Revision 1, FSAR Chapter 3, Subsection 3.9.3.4.4, item a.1, will be revised from: A list of snubbers on systems which experience sufficient thermal movement to measure cold to hot position is included as part of the testing program after the piping analysis has been completed. To read: A list of snubbers on systems which experience sufficient thermal movement to measure cold to hot position is included in Table 3.9-201. COLA, Part 2, Revision 1, FSAR Chapter 3, Subsection 3.9.3.4.4, item a.3, will be revised per WLG2009.12-11 / BLN-RAI-LTR-007S2 from: Safety-related components which utilize snubbers in their support systems will be identified in a future revision to the FSAR in table format that will include the following: • identification of systems and components • number of snubbers utilized in each system and on that component • snubber type(s) – (hydraulic or mechanical) – and name of supplier • constructed to ASME Code Section III, Subsection NF or other snubber use such as shock, vibration, or dual purpose • snubber use such as shock, vibration, or dual purpose • those snubbers identified as dual purpose or vibration arrestor type will include an indication if both snubber and component were evaluated To read: Safety-related snubbers are identified in Table 3.9-201, including the snubber identification and the associated system or component, e.g., line number. The snubbers on the list are hydraulic and constructed to ASME Section III, Subsection NF. The snubbers are used for shock loading only. None of the snubbers are dual purpose or vibration arrestor type snubbers.	Duke Energy Submittal Concurrence with Standard Content RAIs, BLN-RAI-LTR-007S2. WLG2009.12-11
6881	WLS,STD	Pt 02	FSAR 03	03.09.06.02.02	In Subsection 3.9.6.2.2, change the text to read: ", and for motor-operated valves the JOG MOV PV study (Reference 201) and ASME Code Case OMN-1 Revision 1 (Reference 202)"	Consistency in citations of references
6667	WLS,STD	Pt 02	FSAR 03	03.09.T / T3.9-201	COLA, Part 2, FSAR Chapter 3, Table 3.9-201 will be added per WLG2009.12-11 / BLN-RAI-LTR-007S2.	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-

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						007S2. WLG2009.12-11.
6723	WLS	Pt 02	FSAR 05	05.00	The following editorial changes are made in FSAR Chapter 5: 1. Section 5.2.3.2.1, first sentence is revised to replace "In" with lower case "in". 2. Section 5.2.4, end of last sentence, delete second parenthesis. 3. Section 5.3.2.6, 2nd paragraph is divided after the first two sentences. 4. Section 5.3.2.6, 7th paragraph is divided after the first two sentences. 5. Section 5.3.2.6, 8th paragraph is divided after the second sentence; last sentence change 'and' to 'an' to read: "These data,...are used to establish an RT NDT for each material." 6. Section 5.3.6 the separator bar is moved from beneath the title line of 5.3.6.1 to above the title line of 5.3.6.	Editorial / supplemental information
6895	WLS,STD	Pt 02	FSAR 05	05.02.01.01	COL Application Part 2, FSAR Chapter 5, Section 5.2.1.1, first paragraph, will be revised from: "If a later Code edition/addenda than the Design Certification Code edition/addenda is used by the material and/or component supplier, then a code reconciliation to determine acceptability is performed as required by the ASME Code, Section III, NCA-1140. The reconciliation is performed using the methodology set forth in ASME Section XI for the repair and replacement of components. The later Code year/addenda must be authorized in 10 CFR 50.55a or in a specific authorization as provided in 50.55a(a)(3). Code Cases to be used in design and construction are identified in the DCD; additional Code Cases for design and construction beyond those for the design certification are not required." To read: "If a later Code edition/addenda than the Design Certification Code edition/addenda is used by the material and/or component supplier, then a code reconciliation to determine acceptability is performed as required by the ASME Code, Section III, NCA-1140. The later Code edition/addenda must be authorized in 10 CFR 50.55a or in a specific authorization as provided in 50.55a(a)(3). Code Cases to be used in design and construction are identified in the DCD; additional Code Cases for design and construction beyond those for the design certification are not required."	Supplemental Change to incorporate Standard Content presented in BLN RAI LTR 024 response to RAI 05.02.01.01-01
6704	WLS,STD	Pt 02	FSAR 05	05.02.04.01	COLA Part 2, FSAR, Subsection 5.2.4.1, fifth paragraph, will be revised from: The inservice inspection program is augmented for reactor vessel top head inspections by use of the ASME Code Case N-729-1, "Alternative Examination Requirements for Pressurized-Water Reactor (PWR) Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds," as modified by the NRC Staff position on the use of ASME Code Case N-729-1 shown in the proposed rulemaking dated April 5, 2007 (72 FR 16740). To read: The inservice inspection program is augmented for reactor vessel top head inspections by use of the ASME Code Case N-729-1, "Alternative Examination Requirements for Pressurized-Water Reactor (PWR) Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds," as modified by the conditions specified in 10 CFR 50.55a(g)(6)(ii)(D).	Duke Energy Submittal - Concurrence with Standard Content RAIs, SNC-COL-SER-OI-Ch05, CI 05.02-01. WLG2009.12-11
5711	WLS,STD	Pt 02	FSAR 05	05.03.02.06	FSAR Subsection 5.3.2.6 will be revised to read: Add the following information between the first and second paragraphs of DCD Subsection 5.3.2.6. Surveillance test materials are prepared from the actual materials used in fabricating the beltline region of the reactor vessel. Records are maintained of the chemical analyses, fabrication history, mechanical	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR 002S2, RAI 05.03.01-

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					properties and other essential variables pertinent to the fabrication process of the shell forging and weld metal from which the surveillance test materials are prepared. The test materials are processed so that they are representative of the material in the completed reactor vessel. Three metallurgically different materials prepared from sections of reactor vessel shell forging are used for test specimens. These include base metal, weld metal and heat affected zone (HAZ) material. Base metal test material is manufactured from a section of ring forging, either the intermediate shell course, the lower shell course, or the transition ring of the reactor pressure vessel. Selection is based on an evaluation of initial toughness (characterized by the reference temperature (RT NDT) and Upper Shelf Energy (USE)), and the predicted effect of chemical composition (nickel and residual copper) and neutron fluence on the toughness (RT NDT shift and decrease in USE) during reactor operation. The ring forging with the highest predicted adjusted RT NDT temperature (initial RT NDT plus RT NDT shift) or that with USE predicted to approach close to the minimum limit of 50 ft-lb at end-of-license (EOL) is selected as the surveillance base metal test material. The means for measuring initial toughness and for predicting irradiation induced toughness changes is consistent with applicable procedures in force at the time the material is being selected. The section of shell forging used for the base metal test block is adjacent to the test material used for fracture toughness tests. Weld metal and HAZ test material is produced by welding together sections of the forgings from the beltline of the reactor vessel. The HAZ test material is manufactured from a section of the same shell course forging used for base metal test material. The sections of shell course forging used for weld metal and HAZ test material are adjacent to the test material used for fracture toughness tests. The heat of wire or rod and lot of flux are from the same heat and lot used in making the beltline region welds. Welding parameters duplicate those used for the beltline region welds. The procedures for inspection of the reactor vessel welds are followed for the inspection of the welds in test materials. The surveillance weld and HAZ material are heat-treated to metallurgical conditions which are representative of the final metallurgical conditions of similar materials in the completed reactor vessel. Test Specimens are marked to identify the type of materials and the orientation with respect to the test materials. Drawings specify the identification system to be used and include plant identification, type of material, orientation of specimen and sequential number. Baseline test specimens are provided for establishing the baseline (unirradiated) properties of the reactor vessel materials. The data from tests of these specimens provides the basis for determining the radiation induced property changes of the reactor vessel materials. Drop weight test specimens of each of base metal, weld metal, and HAZ metal are provided for establishing the nil-ductility transition temperature (NDTT) of the unirradiated surveillance materials. These data form the basis for RT NDT determination from which subsequent radiation induced changes are determined. Standard Charpy impact test specimens each of base metal (longitudinal (tangential) and transverse (axial)), weld metal, and HAZ material are provided for developing a Charpy impact energy transition curve from fully brittle to fully ductile behavior for defining specific index temperatures for these materials. These data, together with the drop weight NDTT, are used to establish and RT NDT for each material. Tensile test specimens each of base metal (longitudinal (tangential) and transverse (axial)), weld metal, and HAZ metal are provided to permit a sufficient number of tests for accurately establishing the tensile properties for these materials at a minimum of three test temperatures (e.g., ambient, operating and one intermediate temperature) to define the strength of the material. The above described test specimens are to be used for determining changes in the strength and toughness of the surveillance materials resulting from neutron irradiation. Sufficient Charpy impact, compact tension and tensile test specimens are provided for establishing the changes in the properties the surveillance materials over the lifetime of the reactor vessel. The type and quantity of test specimens	001(a). WLG2009.05-09

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					exceed the minimum requirements of EI85-82. Reactor materials do not begin to be affected by neutron fluence until the reactor begins critical operation. Table 13.4-201 provides milestones for reactor vessel material surveillance program implementation.	
6705	WLS,STD	Pt 02	FSAR 05	05.03.02.06	COLA Part 2, FSAR, Chapter 5, Subsection 5.3.2.6 (as revised by the Supplement 2 response to BLN-RAI-LTR-002) will be revised from: The type and quantity of test specimens exceed the minimum requirements of EI85-82. To read: The type, quantity, and storage conditions (e.g., surveillance capsules backfilled with inert gas) of test specimens meet or exceed the minimum requirements of ASTM E-185.	Duke Energy Submittal - Concurrence with Standard Content RAIs, SNC-COL-SER-OI-Ch05, CI 05.03-01. WLG2009.12-11
6844	WLS	Pt 02	FSAR 06	06.00	Subsection 6.2.5.2.2, under the heading, Type B Tests (Containment Airlocks), the period is changed in the first sentence from a subscript to a regular period and parens are added around the 2nd sentence. Subsection 6.4.4.2 Remove the placement instructions immediately prior to the Subsection.	Editorial
6685	WLS,STD	Pt 02	FSAR 06	06.01.02.01.06	1. COLA Part 2, FSAR Chapter 6, Subsection 6.1.2.1.6, Service Level I and III Coatings, 1st paragraph, will be revised from: Regulatory Guide 1.54 and ASTM D5144 form the basis for the coating program. To read: Regulatory Guide 1.54 and ASTM D5144 (Reference 201) form the basis for the coating program. 2. COLA Part 2, FSAR Chapter 6, Subsection 6.1.2.1.6, Service Level I and III Coatings, 2nd paragraph, will be revised from: Coating system monitoring requirements for the containment coating systems are based on ASTM D5163, "Establishing Procedures to Monitor the Performance of Coating Service Level I Coating Systems in an Operating Nuclear Power Plant," and ASTM D7167, "Establishing Procedures to Monitor the Performance of Safety-Related Coating Service Level III Lining Systems in an Operating Nuclear Power Plant." To read: Coating system monitoring requirements for the containment coating systems are based on ASTM D5163 (Reference 202), "Standard Guide for Establishing Procedures to Monitor the Performance of Coating Service Level I Coating Systems in an Operating Nuclear Power Plant," and ASTM D7167 (Reference 203), "Standard Guide for Establishing Procedures to Monitor the Performance of Safety-Related Coating Service Level III Lining Systems in an Operating Nuclear Power Plant." 3. COLA Part 2, FSAR Chapter 6, Subsection 6.1.2.1.6 will be revised to add: Add the following after the third paragraph of the subsection titled "Service Level II Coatings" within DCD Subsection 6.1.2.1.6. Coating system inspection and monitoring requirements for the Service Level II coatings used inside containment will be performed in accordance with a program based on ASTM D5144 (Reference 201), "Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants" and the guidance of ASTM D5163 (Reference 202), " Standard Guide for Establishing Procedures to Monitor the Performance of Coating Service Level I Coating Systems in an Operating Nuclear Power Plant." Any anomalies identified during coating monitoring are resolved in accordance with applicable quality requirements.	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-VOL-LTR-Coatings. WLG2009.12-11
6686	WLS,STD	Pt 02	FSAR 06	06.01.04	COLA Part 2, FSAR Chapter 6, Add the following new subsection after subsection 6.1.3.2: The following information supplements the information provided in DCD subsection 6.1.4. 6.1.4 References 201. ASTM 5144-08, "Standard Guide for Use of Protective Coating Standards in Nuclear Power Plants" 202. ASTM D5163-05a, "Standard Guide for Establishing Procedures to Monitor the Performance of Coating Service Level I Coating Systems in an Operating Nuclear Power Plant" 203. ASTM D7167-05, "Standard Guide for Establishing Procedures to Monitor the Performance of Safety-Related Coating Service Level III Lining Systems in an Operating Nuclear Power Plant"	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-VOL-LTR-Coatings. WLG2009.12-11

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
6674	WLS,STD	Pt 02	FSAR 06	06.03.08.01	COLA Part 2, FSAR Chapter 6, Subsection 6.3.8.1 will be revised from: 6.3.8.1 Containment Cleanliness Program Insert the following information at the end of DCD Subsection 6.3.8.1: This COL Item is addressed below. Administrative procedures implement the containment cleanliness program. Implementation of the program minimizes the amount of debris that might be left in containment following refueling and maintenance outages. The program is consistent with the containment cleanliness program used in the evaluation discussed in DCD Subsection 6.3.8.2. The program includes as a minimum the following: Responsibilities The program defines the organizational responsibilities for implementing the program; defines personnel and material controls; and defines the inspection and reporting requirements. Implementation Containment Entry • Controls to account for the quantities and types of materials introduced into the containment. • Limits on the types and quantities of materials, including scaffolding and tools, for a particular entry. • Defined prohibited materials and limits on quantities of materials that may generate hydrogen when exposed to the containment environment. • Personnel responsible for authorizing the types and quantities of material that may be introduced into containment, and approving the leaving of these materials unattended in containment. • Controls for loose items, such as keys and pens, which could be inadvertently left in containment. • Methods and controls for securing any items and materials left unattended in containment. Containment Exit • Controls for accounting for tools, equipment and other material left unattended in containment necessary for ongoing work. • Controls for accounting of the permanent removal of materials previously introduced into the containment. • Limits on the types and quantities of materials, including scaffolding and tools, that may be left unattended in containment during outages and power operation. Types of materials considered are tape, labels, plastic film, and paper and cloth products. • Requirements and actions to be taken for unaccounted for material. • Requirements for final containment cleanliness inspections. • Record keeping requirements for entry/exit logs. To read: 6.3.8.1 Containment Cleanliness Program Insert the following information at the end of DCD Subsection 6.3.8.1: This COL Item is addressed below. Administrative procedures implement the containment cleanliness program. Implementation of the program minimizes the amount of debris left in containment following personnel entry and exits. The program is consistent with the containment cleanliness program limits discussed in DCD Subsection 6.3.8.1. The program includes, as a minimum, the following: Responsibilities The program defines the organizational responsibilities for implementing the program; defines personnel and material controls; and defines the inspection and reporting requirements. Implementation Containment Entry/Exit • Controls to account for the quantities and types of materials introduced into the containment. • Limits on the types and quantities of materials, including scaffolding and tools, to ensure adequate accountability controls. This may be accomplished by the work management process. Storage of aluminum is prohibited without engineering authorization. Cardboard boxes or miscellaneous packing material is not brought into containment without approval. • If entries are made at power, prohibited materials and limits on quantities of materials that may generate hydrogen are established. • Controls for loose items, such as keys and pens, which could be inadvertently left in containment. • Methods and controls for securing any items and materials left unattended in containment. • Administrative controls for accounting for tools, equipment and other material are established.	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-030S2, RAI 06.02.02-01. WLG2009.12-11

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
					• Administrative controls for accounting of the permanent removal of materials previously introduced into the containment. • Limits on the types and quantities of materials, including scaffolding and tools, that may be left unattended in containment during outages and power operation. Types of materials considered are tape, labels, plastic film, and paper and cloth products. • Requirements and actions to be taken for unaccounted for material. • Requirements for final containment cleanliness inspections consistent with the design bases provided in DCD Subsection 6.3.8.1. • Record keeping requirements for entry/exit logs. Housekeeping Housekeeping procedures require that work areas be maintained in a clean and orderly fashion during work activities and returned to original conditions (or better) upon completion of work. Sampling Program A sampling program is implemented consistent with NEI Guidance Report 04-07, "Pressurized Water Reactor Sump Performance Evaluation Methodology" as supplemented by the NRC in the "Safety Evaluation by The Office of Nuclear Reactor Regulation Related to NRC Generic Letter 2004-02, Nuclear Energy Institute Guidance Report (Proposed Document Number NEI 04-07), 'Pressurized Water Reactor Sump Performance Evaluation Methodology."' Latent debris sampling is implemented before startup. The sampling is conducted after containment exit cleanliness inspections to provide reasonable assurance that the plant latent debris design bases are met. Sampling frequency and scope may be adjusted based on sampling results. Results are evaluated post-start up and any nonconforming results will be addressed in the Corrective Action Program.	
5607	WLS	Pt 02	FSAR 07	07.05	Change Section 7.5 to read: WLS SUP 7.5-1 FSAR Table 7.5-201 supplements the site specific information noted in "Remarks" column of DCD Table 7.5-1 and in the "Variable" column of DCD Table 7.5-8.	Duke Energy Response to RAI LTR 4S1, RAI 07.05-001WLG2009.03-18
5833	WLS	Pt 02	FSAR 07	07.05	Section 7.5, change newly revised text to read "...site specific information noted in the ..."	Editorial
5608	WLS	Pt 02	FSAR 07	07.05.T / T7.5-202	Revise Table 7.5-201 Delete Table 7.5-202	Duke Energy Response to RAI LTR 4S1, RAI 07.05-001. WLG2009.03-18
5834	WLS	Pt 02	FSAR 07	07.05.T / T7.5-201	Note 'a' of Table 7.5-201 is revised from "Table" to "Tables" and from "...information noted in "Remarks" column..." to "...information noted in the "Remarks" column..."	Editorial
6730	WLS	Pt 02	FSAR 08	08.00	Editorial changes as follows: FSAR Section 8.2.1.1 paragraph 3, divide to form two separate paragraphs following the first sentence. FSAR Section 8.2.1.3 revise "40 ft x 60 ft." to read "40 ft. x 60 ft.".	Editorial
5686	WLS	Pt 02	FSAR 08	08.02.01.02.02	FSAR Chapter 8, Subsection 8.2.1.2.2 will be revised to add the following paragraph at the end of the subsection: The protective devices controlling the switchyard breakers are set with consideration given to preserving the plant grid connection following a turbine trip.	Duke Energy Response to RAI LTR 74, RAI 08.02-009. WLG2009.08-05
5984	WLS	Pt 02	FSAR 08	08.02.02	COLA Part 2, FSAR Chapter 8, Subsection 8.2.2, will be revised by adding the following paragraph after the third paragraph: The Lee Nuclear Station grid stability analysis and criteria are summarized below: • The steady-state load is 78,234 kW and 41,888 kVAR; • The inrush kVA for motors is 56,712 kVA 1; • The nominal voltage is 1.00 pu for both the 525 kV and 230 kV switchyards; • The allowable voltage regulation is 0.95 - 1.05 pu (steady state); • The nominal frequency is 60 Hz; • The allowable frequency fluctuation is ± ½ Hz (steady state);	Duke Energy Response to RAI LTR 75, RAI 01-008. WLG2009.09-09

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					• The maximum frequency decay rate is 5 Hz/sec; and • The limiting under frequency value for RCP is greater than 57.7 Hz. 1 Based on the inrush of a single 10,000 HP feedwater pump, assuming efficiency = 0.95, pf = 0.9, inrush = 6.5 X FLA, and locked rotor power factor=0.15.	
6676	WLS,STD	Pt 02	FSAR 08	08.03.01.01.02.04	COLA Part 2, FSAR Chapter 8, Section 8.3.1.1.2.4 will be revised from: Operation, inspection and maintenance procedures consider both the diesel generator manufacturer's recommendations and industry diesel working group recommendations. To read: Operation, inspection and maintenance (including preventive, corrective, and predictive maintenance) procedures consider both the diesel generator manufacturer's recommendations and industry diesel working group recommendations.	Duke Energy Submittal - Concurrence with Standard Content RAIs BLN-RAI-LTR-149, RAI 08.03.01-002. WLG2009.12-11
5713	WLS,STD	Pt 02	FSAR 08	08.03.01.01.06	COLA Part 2, FSAR Chapter 8, Subsection 8.3.1.1.6 will be revised from: Procedures implement periodic testing of protective devices that provide penetration overcurrent protection. A sample of each different type of overcurrent device is selected for periodic testing during refueling outages. Testing includes: • Verification of thermal and instantaneous trip characteristics of molded case circuit breakers. • Verification of long time, short time, and instantaneous trips of medium voltage air circuit breakers. • Verification of long time, short time, and instantaneous trips of low voltage air circuit breakers. To read: Procedures implement periodic testing of protective devices that provide penetration overcurrent protection. A sample of each different type of overcurrent device is selected for periodic testing during refueling outages. Testing includes: • Verification of thermal and instantaneous trip characteristics of molded case circuit breakers. • Verification of long time, short time, and instantaneous trips of medium voltage vacuum circuit breakers. • Verification of long time, short time, and instantaneous trips of low voltage air circuit breakers. • Verification of Class 1E and non-Class 1E dc protective device characteristics (except fuses) per manufacturer recommendations, including testing for overcurrent interruption and/or fault current limiting. Penetration protective devices are maintained and controlled under the plant configuration control program. A fuse control program, including a master fuse list, is established based on industry operating experience	Duke Energy Submittal - Concurrence with Standard Content RAIs BLN-RAI-LTR-138, RAI 08.03.01-001. WLG2009.05-09
6678	WLS,STD	Pt 02	FSAR 08	08.03.01.04	COLA Part 2, FSAR Chapter 8, will be revised to add the following paragraph at the end of Subsection 8.3.1.4. 8.3.1.4 Inspection and Testing Add the following text at the end of DCD Subsection 8.3.1.4 Procedures are established for periodic verification of proper operation of the Onsite AC Power System capability for automatic and manual transfer from the preferred power supply to the maintenance power supply and return from the maintenance power supply to the preferred power supply. Add LMA = STD SUP 8.3-2	Duke Energy Submittal - Concurrence with Standard Content RAIs BLN-RAI-LTR-151, RAI 08.02-10(b). WLG2009.12-11
6428	WLS	Pt 02	FSAR 09	09 TOC	Chapter 9 Appendix 9A page numbering revised to read "9A-X"	Editorial
6946	WLS	Pt 02	FSAR 09	09.01.05 9.05.01.08.02.02.01.d	Subsection 9.1.5 is revised to reflect capitalization of the first word of each bullet at the end of Subsection 9.1.5. Subsection 9.5.1.8.2.2.1.d is revised to reflect capitalization of the first word of each bullet in Subsection 9.5.1.8.2.2.1.d.	Editorial

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6683	WLS,STD	Pt 02	FSAR 09	09.01.06 09A.03.03	Subsection 9.1.6 will be revised from: STD COL 9.1-7 A spent fuel rack Metamic coupon monitoring program is to be implemented when the plant is placed into commercial operation. This program includes tests to monitor bubbling, blistering, cracking, or flaking; and a test to monitor for corrosion, such as weight loss measurements and or visual examination. To read: STD COL 9.1-7 A spent fuel rack Metamic coupon monitoring program is to be implemented when the plant is placed into commercial operation. This program includes tests to monitor bubbling, blistering, cracking, or flaking; and a test to monitor for corrosion, such as weight loss measurements and / or visual examination. The program will also include tests to monitor changes in physical properties of the absorber material, including neutron attenuation and thickness measurements. Subsection 9A.3.3 will be modified to change "byproducts" to "by-products".	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-165S1, RAI 09.01.02-01, WLG2009.12-11
6843	WLS	Pt 02	FSAR 09	09.02	Editorial changes to Sections 9.2 as follows: 1. Subsection 9.2.1.2.2, first paragraph, "Service Water System" is added to introduce the full form of the acronym, SWS. 2. Subsection 9.2.6.2.1, first paragraph, first sentence "(SDS)" is added to introduce the acronym for sanitary drainage system. 3. Subsection 9.2.8, first paragraph "(CWS)" is added to introduce the acronym for circulating water system. "(RWS)" is added to introduce the acronym for raw water system. 4. Subsection 9.2.8.1.2, second paragraph, "turbine building closed cooling water system" is replaced with the acronym "TCS". 5. Subsection 9.2.8.1.2, fourth paragraph the full forms of the acronyms "TCS", "CWS", and "RWS" are replaced by their acronyms, respectively. 6. Subsection 9.2.8.2.1, first paragraph, last sentence, the full forms of "TCS", "CWS", and "RWS" are replaced by their acronyms. 7. Subsection 9.2.8.2.2, under the heading Heat Exchangers, second paragraph, "turbine building closed cooling water system" is replaced with the acronym, "TCS". 8. Subsection 9.2.8.2.3, under the heading Startup, the full forms of TCS and DWS are replaced by their acronyms, respectively. 9. Subsection 9.2.11.1.2, in 2nd paragraph, added "(CCS)" after "component cooling water system". 10. Subsection 9.2.11.3.1, in 1st paragraph, inserted spaces before and after hyphen. 11. Subsection 9.2.11.3.3, in 1st paragraph, inserted spaces before and after hyphen. 12. Subsection 9.2.11.3.7, in 2nd paragraph, corrected typo in "storage". 13. Subsection 9.2.11.4.6, in 2nd paragraph, use "SWS" instead of "service water system".	Editorial
5802	WLS	Pt 02	FSAR 09	09.02.06.02.01	FSAR Subsection 9.2.6.2.1 is revised to identify WLS SUP 9.2-1.	Capture supplemental information
5613	WLS	Pt 02	FSAR 09	09.02.11	Subsection 9.2.11 is revised as reflected on Duke Energy Response to RAI LTR 64, RAI 09.02.01-006, item 2. Editorial changes to that response are as follows: 1. Subsection 9.2.11.1.2, title case on Clarified Water Supply is changed to lower case, 2 instances. 2. Subsection 9.2.11.2.1, first sentence, the full form of the acroynm RWS is replaced by the acronym. 3. Subsection 9.2.11.2.1, fourth paragraph, the full form of the acronym CWS is replaced by the acronym. 4. Subsection 9.2.11.2.1, fifth paragraph, title case on Clarified Water Supply is changed to lower case; the full forms of the acronyms DTS, TCS, and CWS are replaced by the acronyms, respectively. 5. Subsection 9.2.11.2.2, first paragraph, last sentence 'are' is replaced by 'is' to read: "..., the Broad River is used to maintain a normal level in Make-Up Pond A." 6. Subsection 9.2.11.2.3, system names shown under 'Raw Water Supply Subsystem', 'Clarifier Subsystem', and 'Clarified Water Supply Subsystem' are changed from title case to lower case. 7. Subsection 9.2.11.3.2, under 'Make-Up Pond B Pumps', last sentence is revised to show "drawdown" as one word.	Duke Energy Response to RAI LTR 64, RAI 09.02.01-006. WLG2009.05-08

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					8. Subsection 9.2.11.3.2, under 'Valves', "motor-operated valves" is revised to show a hyphen. 9. Subsection 9.2.11.3.3, under 'Intake', first and second paragraph, the full form of the acronym RWS is replaced by the acronym, 2 instances. 10. Subsection 9.2.11.3.3, under 'Raw Water Supply Pumps', third paragraph, first sentence, the system name, raw water supply is changed from title case to lower case; second sentence, motor-operated is changed to reflect the hyphen; last paragraph, 'flowpaths' is separated to two words to read 'flow paths'. 11. Subsection 9.2.11.3.3, under 'Piping', first and second sentences, the system name 'raw water supply' is revised to eliminate the title case. 12. Subsection 9.2.11.3.3, under 'Valves', first sentenece, 'Motor-operated' is revised to reflect the hyphen; second paragraph, first sentence, the system names are revised to eliminate title case on 'raw water supply', 'clarified water supply'; first sentence, the full form of the acronym SWS is replaced with the acronym; second sentence, the title case is revised to eliminate the title case on 'raw water supply.' 13. Subsection 9.2.11.3.4, under 'Clarifier Equipment', third sentence 'clarified water supply' is revised to eliminate the title case. 14. Subsection 9.2.11.3.5, under 'Storage', last sentence is revised to eliminate title case on 'clarifier subsystem'. 15. Subsection 9.2.11.3.5, under 'Piping', first paragraph, second sentence is revised to eliminate title case on 'raw water supply'; second paragraph, second sentence is revised to separate 'flowpath' to read 'flow path'. 16. Subsection 9.2.11.3, under 'Valves', second sentence is revised to eliminate title case on 'clarified water supply'. 17. Subsection 9.2.11.3.6 the full form of the acronym TSS is replaced by the acronym. 18. Subsection 9.2.11.4, title case is eliminated from 'raw water supply' and 'clarified water supply'. 19. Subsection 9.2.11.4.1, title case is eliminated from 'river water', raw water supply, clarifier subsystem, and clarified water supply. 20. Subsection 9.2.11.4.2, the full form for the acroynm CWS is replaced by the acronym. 21. Subsection 9.2.11.4.3, first paragraph, the full form for the acroynm CWS is replaced by the acronym; title case is removed from 'clarifier' subsystem. 22. Subsection 9.2.11.4.3, third paragraph is revised to remove title case from 'clarifier' subsystem. 23. Subsection 9.2.11.4.5, first sentence, the full form of the acronym WWS is replaced by the acronym; second sentence, title case is removed from 'The clarifier and clarified water supply'. 24. Subsection 9.2.11.4.6, first paragraph, second sentence, 'motor-operated' is revised to reflect the hyphen; second paragraph, the full form of the acronym SWS is replaced by the acronym; third paragraph, first sentence, the full form of the acronym SWS is replaced by the acronym; last sentence title case is removed from 'raw water supply'. 25. Subsection 9.2.11.4.7, first sentence, the title case is removed from 'clarified water supply' and 'raw water supply'; 'Subsection' is capitalized. 26. Subsection 9.2.11.5, the full form of the acronym RWS is replaced by the acronym.	
6493	WLS	Pt 02	FSAR 09	09.02.11	Subsection 9.2.11 is revised as reflected on Duke Energy's revised response to RAI Letter 64, RAI 09.02.01-006, Attachment 1, impact of addition of Make-up Pond C to the Raw Water System. Editorial change: 9.2.11.3.6 the full form, "total suspended solids" is changed to use the acronym, "TSS".	Duke Energy Response to RAI LTR 64 S1, RAI 09.02.01-006. WLG2009.11-04
5985	WLS	Pt 02	FSAR 09	09.02.11.02.01	Subsection 9.2.11.2.1, will be revised by adding a new third paragraph: The RWS is designed based on an average total suspended solids (TSS) of 75 mg/l and a maximum TSS of 300 mg/l. Editorial correction: Remove 'total suspended solids' from the sentence.	Duke Energy Response to RAI LTR 75, RAI 01-008. WLG2009.09-09
5614	WLS	Pt 02	FSAR 09	09.02.F / F9.2-201 thru 205	Figures 9.2-201 thru 9.2-205 are revised as reflected on Duke Energy Response to RAI LTR 64, RAI 09.02.01-006	Duke Energy response to RAI LTR 64, RAI

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						09.02.01-006, RAI 09.02.01-006. WLG2009.05-08
6494	WLS	Pt 02	FSAR 09	09.02.F / F9.2-203 F9.2-206 F9.2-207	Figure 9.2-203 is revised as reflected on Duke Energy Response to RAI LTR 64 S1, RAI 09.02.01-006, Attachment 2. FSAR Figures 9.2-206 and 9.2-207 as reflected on Duke Energy Response to RAI LTR 64 S1, RAI 09.02.01-006, Attachment 3. List of Figures updated to include new Figures 9.2-206 and 9.2-207.	Duke Energy Response to RAI LTR 64 S1, RAI 09.02.01-006. WLG2009.11-04
5803	WLS	Pt 02	FSAR 09	09.03.07	Section 9.3.7, 2nd paragraph, first sentence the extra space between "procedures" and the period is removed.	Editorial
5804	WLS	Pt 02	FSAR 09	09.05.01.09.07	Subsection 9.5.1.9.7, title, correct spelling of "Maintenance". Automatic conforming change to Table of Contents.	Editorial
6940	WLS	Pt 02	FSAR 09	09A.03.03	Subsection 9A.3.3, third sentence is revised from: The three intake structures (river water, Make-Up Pond A, and Make-Up Pond B) are non-safety-related, do not contain any safety-related equipment, and are remotely located from safety-related structures, systems and components. To read: The four intake structures (river water, Make-Up Pond A, Make-Up Pond B, and Make-Up Pond C) are non-safety-related, do not contain any safety-related equipment, and are remotely located from safety-related structures, systems and components.	Conforming change to Duke Energy response to RAI LTR 64 S1, RAI 09.02.01-006. WLG2009.11-04
6668	WLS,STD	Pt 02	FSAR 10	10.01.03.01	COLA Part 2, FSAR Subsection 10.1.3.1 is revised from: The FAC program obtains actual thickness measurements for highly susceptible FAC locations for new lines as defined in EPRI NSAC-202L-R3. At a minimum, a Pass 1 analysis is used for low and highly susceptible FAC locations and a Pass 2 analysis is used for highly susceptible FAC locations when the Pass 1 analysis results warrant. To read: The FAC program obtains actual thickness measurements for highly susceptible FAC locations for new lines as defined in EPRI NSAC-202L-R3 (Reference 201). At a minimum, a CHECWORKS type Pass 1 analysis is used for low and highly susceptible FAC locations and a CHECWORKS type Pass 2 analysis is used for highly susceptible FAC locations when Pass 1 analysis results warrant.	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-018S2, RAI 10.03.06-002. WLG2009.12-11
6669	WLS,STD	Pt 02	FSAR 10	10.01.04	COLA Part 2, FSAR Section 10.1, will be further revised to include a new Subsection 10.1.4, References, following Subsection 10.1.3: Add the following after DCD Subsection 10.1.3: 10.1.4 References 201. EPRI NSAC-202L-R3, Recommendations for an Effective Flow-Accelerated Corrosion Program (NSAC-202L-R3), Electric Power Research Institute (EPRI) Technical Report 1011838, Palo Alto, CA, 2006.	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-018S2, RAI 10.03.06-02. WLG2009.12-11
5971	WLS	Pt 02	FSAR 10	10.04.05.02.02	1. For DCD consistency, revise Section 10.4.5.2.2, first paragraph under Circulating Water Chemical Injection, remove 'system' to read: "Circulating water chemistry is maintained by a local chemical feed skid at the CWS cooling tower. 2. Section 10.4.5.2.2 following the first paragraph, insert paragraph "WLS CDI - Circulating water system chemical feed equipment injects the required chemicals into the circulating water at the CWS cooling tower basin area." 3. Section 10.4.5.2.2, seventh paragraph correct spelling "Wyle" with "Wylie". 4. Section 10.4.5.2.2 pg.10.4-6 following the tenbth paragraph, insert parpraph "WLS CDI - Chemical	Capture Bracketed DCD information

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					injections are interlocked with each circulating water pump to prevent chemical injection when the circulating water pumps are not running."	
6885	WLS,STD	Pt 02	FSAR 11	11.02.01.02.04	Add new FSAR Subsection 11.2.1.2.4 as follows: 11.2.1.2.4 Controlled Release of Radioactivity Replace the last paragraph in DCD Subsection 11.2.1.2.4 with the following information: DCD "The monitored radwaste discharge pipeline is engineered to preclude leakage to the environment. This pipe is routed from the auxiliary building to the radwaste building (the short section of pipe between the two buildings is fully available for visual inspection as noted above) and then out of the radwaste building to the licensed release point for dilution and discharge. The discharge radiation monitor and isolation valve are located inside the auxiliary building. The exterior piping is designed to preclude inadvertent or unidentified releases to the environment. No valves, vacuum breakers, or other fittings are incorporated outside of buildings. This greatly reduces the potential for undetected leakage from this discharge to the environment at a non-licensed release point, and supports compliance with 10 CFR 20.1406 (Reference 5)." LMA WLS SUP 11.2-3 "The exterior radwaste discharge piping is enclosed within a guard pipe and monitored for leakage. Liquid radwaste effluent will be discharged to the Broad River with plant discharge."	R-COLA conformance
5986	WLS	Pt 02	FSAR 11	11.02.03.03	COLA Part 2, FSAR Chapter 11, Subsection 11.2.3.3, will be revised by adding a new paragraph at the end of the subsection: WLS SUP 11.2-2 The only liquid effluent site interface parameter outside the Westinghouse scope is the release point to the Broad River at the Ninety-Nine Islands Dam.	Duke Energy Response to RAI LTR 75, RAI 01-08. WLG2009.09-09
5987	WLS	Pt 02	FSAR 11	11.03.03	COLA Part 2, FSAR Chapter 11, Subsection 11.3, will be revised to add the following subsection: 11.3.3 Radioactive Releases STD SUP 11.3-2 There are no gaseous effluent site interface parameters outside of the Westinghouse scope.	Duke Energy Response to RAI LTR 75, RAI 01-08. WLG2009.09-09
6429	WLS	Pt 02	FSAR 11	11.03.03.04.04	In the fifth sentence, delete the space between 'exposure' and '-related'	Editorial
6691	WLS,STD	Pt 02	FSAR 11	11.04.06	COLA Part 2, FSAR Chapter 11, Subsection 11.4.6, will be revised from: This section adopts NEI 07-10 (Reference 201) which is currently under review by the NRC staff. The Process Control Program (PCP) describes the administrative and operational controls used for the solidification of liquid or wet solid waste and the dewatering of wet solid waste. To read: A Process Control Program (PCP) is developed and implemented in accordance with the recommendations and guidance of NEI 07-10A (Reference 201). The PCP describes the administrative and operational controls used for the solidification of liquid or wet solid waste and the dewatering of wet solid waste.	Duke Energy Submittal - Concurrence with Standard Content, BLN-VOL-NEI-07-09A / 10A. WLG2009.12-11
6692	WLS,STD	Pt 02	FSAR 11	11.04.07	2. COLA Part 2, FSAR Chapter 11, Subsection 11.4.7, will be revised from: 201. NEI 07-10, "Generic FSAR Template Guidance for Process Control Program (PCP) Description," Revision 2, February 2008. To read: 201. NEI 07-10A, "Generic FSAR Template Guidance for Process Control Program (PCP)," Revision 0, March 2009.	Duke Energy Submittal - Concurrence with Standard Content, BLN-VOL-NEI-07-09A / 10A. WLG2009.12-11
6689	WLS,STD	Pt 02	FSAR 11	11.05.07	COLA Part 2, FSAR Chapter 11, Subsection 11.5.7, will be revised from: This section adopts NEI 07-09 (Reference 202), which is currently under review by NRC staff. The ODCM program description contains the methodology and parameters used for calculating doses resulting from liquid and gaseous effluents. The ODCM program description addresses operational setpoints, including planned discharge rates, for radiation monitors and monitoring programs (process and effluent monitoring	Duke Energy Submittal - Concurrence with Standard Content, BLN-VOL-NEI-07-

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					and environmental monitoring) for the control and assessment of the release of radioactive material to the environment. The ODCM program description provides the limitations on operation of the radwaste systems, including functional capability of monitoring instruments, concentrations of effluents, sampling, analysis, 10 CFR Part 50, Appendix I dose and dose commitments, and reporting. The ODCM program description will be finalized prior to fuel load with site-specific information. To read: An ODCM is developed and implemented in accordance with the recommendations and guidance of NEI 07-09A (Reference 202). The ODCM contains the methodology and parameters used for calculating doses resulting from liquid and gaseous effluents. The ODCM addresses operational setpoints, including planned discharge rates, for radiation monitors and monitoring programs (process and effluent monitoring and environmental monitoring) for the control and assessment of the release of radioactive material to the environment. The ODCM provides the limitations on operation of the radwaste systems, including functional capability of monitoring instruments, concentrations of effluents, sampling, analysis, 10 CFR Part 50, Appendix I dose and dose commitments, and reporting. The ODCM will be finalized prior to fuel load with site-specific information.	09A / 10A. WLG2009.12-11
6690	WLS,STD	Pt 02	FSAR 11	11.05.08	2. COLA Part 2, FSAR Chapter 11, Subsection 11.5.8, will be revised from: 202. NEI 07-09, "Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description," Revision 1, February 2008. To read: 202. NEI 07-09A, "Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description," Revision 0, March 2009.	Duke Energy Submittal - Concurrence with Standard Content, BLN-VOL-NEI-07-09A / 10A. WLG2009.12-11
6955	WLS	Pt 02	FSAR 11	Table 11.5-201 Table 11.5-202	Add LMA to Table 11.5-201 and Table 11.5-202. Table 11.5-201, entry 'Quarterly, a composite sample for SR-89 and SR-90' add LMA WLS COL 11.5-2; the remainder of the table retains STD COL 11.5-2. Table 11.5-202, entry 'SR-89 and SR-90' add LMA WLS COL 11.5-2 Separator Bars are applied accordingly.	Editorial -- Capture plant specific COL item
6971	WLS	Pt 02	FSAR 12	12 LOF	COLA Part 2, FSAR Chapter 12, The following figures are modifed to reflect corrected titles: 12.3-201 Radiation Zones Normal Operations/Shutdown Annex Building Elevation 100'0" & 107"-2" 12.3-203 Radiological Access Controls, Normal Operations/Shutdown Annex Building Elevation 100'0" & 107"-2"	
6719	WLS,STD	Pt 02	FSAR 12	12.01	COLA Part 2, FSAR Chapter 12, Section 12.1, will be revised from: This section incorporates by reference NEI 07-08, Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA), Revision 3, which is currently under review by the NRC staff. See Table 1.6-201. ALARA practices are developed in a phased milestone approach as part of the procedures necessary to support the Radiation Protection Program. Table 13.4-201 describes the major milestones for ALARA procedures development and implementation. To read: This section incorporates by reference NEI 07-08A, Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA), Revision 0. See Table 1.6-201. ALARA practices are developed in a phased milestone approach as part of the procedures necessary to support the Radiation Protection Program. Table 13.4-201 describes the major milestones for ALARA procedures development and implementation. COL Part 2 FSAR Chapter 12, Section 12.1, will be revised to add new text (with an LMA of STD COL 12.1-1) that reads:	Duke Energy Submittal - Concurrence with Standard Content RAIs, SER-OI-CH12S1, RAI 12.01-01. WLG2009.12-11

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
					Revise the last sentence of NEI 07-08A Subsection 12.1.2 to read: ALARA procedures are established, implemented, maintained and reviewed consistent with 10 CFR 20.1101 and the quality assurance criteria described in Part III of the Quality Assurance Program Description, which is discussed in Section 17.5.	
6720	WLS,STD	Pt 02	FSAR 12	12.01.03	7. COL Part 2 FSAR Chapter 12, Section 12.1.3, will be revised from: This COL item is addressed in NEI 07-08 and Appendix 12AA. To read: This COL item is addressed in NEI 07-08A and Appendix 12AA.	Duke Energy Submittal - Concurrence with Standard Content RAIs, SER-OI-CH12S1, RAI 12.01-01. WLG2009.12-11
6712	WLS,STD	Pt 02	FSAR 12	12.03.05.01	COLA Part 2, FSAR Chapter 12, Section 12.3.5.1, will be revised from: This COL item is addressed in Appendix 12AA. To read: This COL item is addressed in Subsection 12.5.4 and Appendix 12AA.	Duke Energy Submittal - Concurrence with Standard Content RAIs, SNC-SER-CI-Ch12, CI 12.01-01. WLG2009.12-11
6875	WLS	Pt 02	FSAR 12	12.03.05.03	Subsection 12.3.5.3, Title line, correct spelling of "Program"	Editorial
6708	WLS,STD	Pt 02	FSAR 12	12.04.01.09.06	COLA Part 2, FSAR Chapter 12, Subsection 12.4.1.9, will be revised to include the following new subsection (12.4.1.9.4.5 for VEGP) at the end of the section with a Left Margin Annotation (LMA) of STD SUP 12.4-1: STD SUP 12.4-1 12.4.1.9.x Operating Unit Radiological Surveys The operating unit conducts radiological surveys in the unrestricted and controlled area and radiological surveys for radioactive materials in effluents discharged to unrestricted and controlled areas in implementing 10 CFR 20.1302. These surveys demonstrate compliance with the dose limits of 10 CFR 20.1301 for construction workers.	Duke Energy Submittal - Concurrence with Standard Content RAIs, SNC-SER-OI-CH12, RAI 12.04-01. WLG2009.12-11
6713	WLS,STD	Pt 02	FSAR 12	12.05.04	COLA Part 2, FSAR Chapter 12, Section 12.5, will be revised to add new text after Section 12.5.2.2 (with an LMA of STD COL 12.3-1) that reads: 12.5.4 Controlling Access and Stay Time Add the following text to the end of DCD Subsection 12.5.4. A closed circuit television system may be installed in high radiation areas to allow remote monitoring of individuals entering high radiation areas by personnel qualified in radiation protection procedures.	Duke Energy Submittal - Concurrence with Standard Content RAIs, SNC-SER-CI-Ch12, CI 12.01-01. WLG2009.12-11
6714	WLS,STD	Pt 02	FSAR 12	APP 12AA	COLA Part 2, FSAR Appendix 12AA is revised in its entirety as shown on Attachment 12.001-01A to SER-CI-CH12, CI 12.001-01, including Change No. 5 previously identified in TVA response to BLN-RAI-LTR-142 dated January 27, 2009.	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-142, RAI 01-11, SNC-SER-CI-Ch12, CI 12.01-01. WLG2009.12-11
6721	WLS,STD	Pt 02	FSAR 12	APP 12AA	1. COLA Part 2, FSAR Chapter 12, Appendix 12AA, text after the last bullet of NEI 07-03 Subsection 12.5.4.8 will be revised from: This subsection adopts NEI 08-08 (Reference 201), which is currently under review by the NRC staff, for discussion of compliance with 10 CFR 20.1406. To read: This subsection adopts NEI 08-08A (Reference 201), for a description of the operational and	Duke Energy Submittal - Concurrence with Standard Content RAIs, SNC-SER-OI-CH12S1, RAI 12.01-

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					programmatic elements and controls that minimize contamination of the facility, site, and the environment, to meet the requirements of 10 CFR 20.1406. 2. COL Part 2 FSAR Chapter 12, Appendix 12AA 5.4.14 last paragraph, will be revised from: This subsection adopts NEI 08-08 (Reference 201), which is currently under review by the NRC staff, for the Groundwater Monitoring Program description. To read: This subsection adopts NEI 08-08A (Reference 201) for the Groundwater Monitoring Program description. 3. COL Part 2 FSAR Chapter 12, Appendix 12AA.5.4.15, will be revised from: This subsection adopts NEI 08-08 (Reference 201), which is currently under review by the NRC staff, for discussion of record keeping practices important to decommissioning. To read: This subsection adopts NEI 08-08A (Reference 201) for discussion of record keeping practices important to decommissioning. 4. COL Part 2 FSAR Chapter 12, Appendix 12AA reference to NEI 07-03 References will be revised from: 201. NEI 08-08, Generic FSAR Template Guidance for Life Cycle Minimization of Contamination, Revision 0. To read: 201. NEI 08-08A, Generic FSAR Template Guidance for Life Cycle Minimization of Contamination, Revision 0, October 2009.	01: WLG2009.12-11
6715	WLS,STD	Pt 02	FSAR 12	APP 12AA.T / T 12AA-201	COLA Part 2, FSAR Chapter 12, Appendix 12AA, add new Table 12AA-201 (with an LMA of STD COL 12.3-1) per WLG2009.12-11 / COL-SER-OI-CH12 CI See attached markup.	Duke Energy Submittal - Concurrence with Standard Content RAIs, SNC-SER-CI-Ch12, CI 12.01-01. WLG2009.12-11
6897	WLS	Pt 02	FSAR 13	13.01	FSAR Section 13.1.1 is editorially revised as follows: Section 13.1.1.2.12, 1st pararaph, correct spelling to "executive" Section 13.1.2.1, 2nd paragraph, spacing is corrected between Regulatory Guide 1.33 and the comma. Section 13.1.2.1.2.7, last line of subsection, correct spelling of "auxiliary".	Editorial
6789	WLS	Pt 02	FSAR 13	13.01.01.01	COLA Part 2, FSAR, Chapter 13, Subsection 13.1.1.1, is revised from: Line responsibilities for those functions are assigned to the chief nuclear officer. The CEO is assisted by the chief nuclear officer, and other executive staff in the nuclear division of the corporation. To read: Line responsibilities for those functions are assigned to the chief generation and chief nuclear officer.The CEO is assisted by the chief generation and chief nuclear officer, and other executive staff in the nuclear division of the corporation.	Duke Energy organizational and planning update
6962	WLS	Pt 02	FSAR 13	13.01.01.02	FSAR Subsection 13.1.1.2.12, first paragraph is revised to change "...executive in charge of plant support" to "...senior executive chief procurement officer"	Duke Energy organizational and planning update
6791	WLS	Pt 02	FSAR 13	13.01.01.02 13.01.01.03	1. 13.1.1.3.1.1 First paragraph, last sentence change from "The CEO is assited by the chief nuclear officer..." to read "The CEO is assited by the chief generation and chief nuclear officer..." 2. Replace text for Subsections 13.1.1.3.1.2 thru 13.1.1.3.1.14 with the following:	Duke Energy organizational and planning update

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					13.1.1.3.1.2 Chief Generation and Chief Nuclear Officer The group executive in charge of nuclear generation is the chief generation and chief nuclear officer. The chief generation and chief nuclear officer report to the chief executive officer. The chief generation and chief nuclear officer has responsibility for overall plant nuclear safety and takes the measures needed to provide acceptable performance of the staff in operating, maintaining, and providing technical support to the plant. The chief generation and chief nuclear officer delegates authority and responsibility for the operation and support of the sites through the executives in charge of nuclear operations to the site executive in charge of plant management. The executive in charge of office of nuclear development, and executive in charge of nuclear plant development report to the chief generation and chief nuclear officer. It is the responsibility of the chief generation and chief nuclear officer to provide guidance and direction such that safety-related activities, including engineering, construction, operations, maintenance, and planning are performed following the guidelines of the quality assurance program. The Independent Nuclear Oversight Committee reports directly to the chief generation and chief nuclear officer. Also reporting to the chief generation and chief nuclear officer are executives for the areas regulated fleet generation, and generation support and procurement supply chain. 13.1.1.3.1.3 Senior Executive in Charge of Operations - McGuire and Catawba Nuclear Stations The senior executive in charge of nuclear operations for McGuire and Catawba nuclear operations is responsible for oversight of operations at each of the stations. The executive in charge of nuclear engineering and the functional manager in charge of nuclear support report to the senior executive in charge of McGuire and Catawba nuclear stations. The site executives in charge of management of the McGuire and Catawba operating plants report to the senior executive in charge of McGuire and Catawba nuclear stations. 13.1.1.3.1.4 Senior Executive in Charge of Operations - Oconee Nuclear Station The senior executive in charge of nuclear operations for Oconee nuclear operations is responsible for oversight of operations at the Oconee Nuclear Station. The site executive in charge of management at the Oconee operating plant reports to the senior executive in the Oconee Nuclear Station. The executive for major projects and the centers of excellence also report to the senior executive in Charge of Operations - Oconee Nuclear Station. The Manager for Employee Concerns also reports to the senior executive in charge of Operations - Oconee Nuclear Station. 13.1.1.3.1.5 Site Executive In Charge of Plant Management The site executive in charge of plant management reports to their respective senior executive in charge of nuclear operations. The site executive in charge of plant management is directly responsible for management and direction of activities associated with the efficient, safe, and reliable operation of the nuclear station, except for those functions delegated to the executive in charge of nuclear support. The site executive in charge of plant management is assisted in management and technical support activities by the plant manager, and managers in charge of nuclear safety assurance, engineering, training, site services, and site business. The site executive in charge of plant management is responsible for the site fire protection program through the engineer in charge of fire protection and engineering management. 13.1.1.3.1.6 Executive in Charge of Nuclear Plant Development The executive in charge of nuclear plant development is responsible for development of the licensing actions needed in support of new nuclear site development. Responsibilities also include engineering oversight of contractors, site layout, staffing and program development. The executive in charge of nuclear plant development is assisted by a support staff and reports directly to the chief generation and chief nuclear officer.	

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					13.1.1.3.1.7 Executive In Charge of Nuclear Engineering The executive in charge of nuclear engineering reports to the senior executive in charge of operations - McGuire and Catawba Nuclear Station and is responsible for directing activities associated with fuel management, core design, and Chapter 15 analysis. Activities include the scheduling and procurement of uranium concentrates, conversion, enrichment, and fabrication services. The organization is also responsible for the preparation of fuel cycle economic studies, fuel cost and amortization analysis, fuel performance support, fuel inventory accountability and management and market analysis and strategic development. The department provides expertise and support for high-level waste disposal management. 13.1.1.3.1.8 Executive in Charge of Major Projects The executive in charge of major projects provides project management, engineering, and vendor oversight for selected large projects at the nuclear sites. Providing oversight for these significant projects provides more focus and continuity for upgrades and eliminates distractions for site management. The executive in charge of major projects reports to the senior executive in charge of operations - Oconee Nuclear Station. 13.1.1.3.1.9 General Manager In Charge of Nuclear Support The general manager in charge of nuclear support has the responsibility for support functions including licensing, quality assurance and oversight, technical services, emergency planning, performance improvement and workforce in-processing. The technical systems manager, manager of plant support and manager of independent nuclear oversight report to the general manager in charge of nuclear support. The general manager in charge of nuclear support reports to the senior executive in charge of operations - McGuire and Catawba Nuclear Stations. 13.1.1.3.1.10 Functional Manager In Charge of Plant Support The functional manager in charge of plant support is responsible for the direction and guidance of the functions associated with maintaining the operating license. Other responsibilities include performance improvement, NGO training, emergency planning and radiation protection and chemistry. The functional manager in charge of plant support reports to the general manager in charge of nuclear support. 13.1.1.3.1.11 Functional Manager In Charge of Independent Nuclear Oversight The functional manager in charge of nuclear QA and oversight is responsible for the direction and guidance of the QA programs, corporate safety review committee support, audits and performance assessment activities, quality control inspections, vendor audits, and operating experience assessment. The manager in charge of nuclear QA and oversight reports to the general manager in charge of nuclear support. 13.1.1.3.1.12 Functional Manager in Charge of Nuclear Fuels The functional manager in charge of nuclear fuels is responsible for providing nuclear fuel and related business and technical support consistent with the operational needs of the plant. Activities include the scheduling and procurement of uranium concentrates, conversion, enrichment, and fabrication services. The department provides expertise and support for high-level waste disposal management. The functional manager in charge of nuclear fuels is assisted by an engineering staff and reports directly to the executive in charge of nuclear engineering. 13.1.1.3.1.13 Functional Manager in Charge of Safety and Engineering Analysis The functional manager in charge of safety and engineering analysis is responsible for development and maintenance of accident analysis activities and programs. The manager is also responsible for probabilistic risk assessment (PRA) studies, risk programs	

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					and evaluations for maintenance activities when needed, and outage planning risk programs and evaluations when needed. The manager in charge of safety and engineering analysis is assisted by an engineering staff and reports directly to the executive in charge of nuclear engineering. 13.1.1.3.1.14 Functional Manager In Charge of Materials, Purchasing, and Contracts The functional manager in charge of materials, purchasing, and contracts is responsible for providing direction and guidance to site-located personnel, for providing sufficient and proper materials to support the material needs of the plant, and performing related activities including materials storage, supply system database maintenance, and meeting quality assurance and internal audit requirements. The functional manager in charge of materials, purchasing, and contracts reports to the senior executive chief procurement officer. A conforming change to FSAR Subsectin 13.1.1.2 was made to change the cross-reference to the modified sections.	
6793	WLS	Pt 02	FSAR 13	13.01.02.01.01.05	COLA Part 2, FSAR, Chapter 13, Subsection 13.1.2.1.1.5, is revised from: The functional manager in charge of radiation protection reports indirectly to and receives support from the corporate functional manager in charge of technical services. To read: The functional manager in charge of radiation protection reports indirectly to and receives support from the corporate general manager in charge of nuclear support.	Duke Energy organizational and planning update
6795	WLS	Pt 02	FSAR 13	13.01.02.01.01.08	COLA Part 2, FSAR, Chapter 13, Subsection 13.1.2.1.1.8, last sentence is revised from: The functional manager in charge of chemistry reports indirectly to and receives support from the corporate located functional manager in charge of technical services. To read: The functional manager in charge of chemistry reports indirectly to and receives support from the corporate located general manager in charge of nuclear support.	Duke Energy organizational and planning update
6786	WLS	Pt 02	FSAR 13	13.01.F / F13.1-201	COLA Part 2, FSAR, Chapter 13, Figure 13.1-201, is revised to reflect organizational changes	Duke Energy organizational and planning update
6787	WLS	Pt 02	FSAR 13	13.01.F / F13.1-203	COLA Part 2, FSAR, Chapter 13, Figure 13.1-203, is revised to reflect organizational changes.	Duke Energy organizational and planning update
6874	WLS	Pt 02	FSAR 13	13.01.F / F13.1-204	Revise FSAR Figure 13.1-204 to reflect new organization.	Duke Energy organizational and planning update
6960	WLS	Pt 02	FSAR 13	13.01.T / T13.1-201	FSAR Table 13.1-201 is revised to correct an editorial. Change "Rad Waste" to "Radwaste"	Editorial
5806	WLS	Pt 02	FSAR 13	13.02	Revise 13.2 as follows: 1) Change LMA to "STD COL 13.2-1" 2) Change LMA in 13.2.1 to STD COL 13.2-1 3) Remove Reference 202	Restore standard text
6688	WLS,STD	Pt 02	FSAR 13	13.02	COLA Part 2, FSAR Chapter 13, Section 13.2, will be revised from: This section incorporates by reference NEI 06-13A, Technical Report on a Template for an Industry Training Program Description. To read: This section incorporates by reference NEI 06-13A, Template for an Industry Training Program	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-VOL-NEI-

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					Description.	06-13A. WLG2009.12-11
6695	WLS,STD	Pt 02	FSAR 13	13.04.T / T13.4-201	1. COLA Part 2, FSAR Chapter 13, Section 13.4, Table 13.4-201, item 8, Fire Protection Program, will be revised (to add the following new milestone): (portions applicable to SNM) 10 CFR 30.32 10 CFR 40.31 Prior to initial receipt of byproduct source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18) 10 CFR 40.31(a) 10 CFR 30.32(a) 2. COLA Part 2, FSAR Chapter 13, Section 13.4, Table 13.4-201, item 11, Non Licensed Plant Staff Training Program, will be revised (to add the following new milestone): (portions applicable to SNM) 10 CFR 30.32 10 CFR 40.31 Prior to initialreceipt of byproduct source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18) 10 CFR 30.32(a) 10 CFR 40.31(a) 3. COLA Part 2, FSAR Chapter 13, Section 13.4, Table 13.4-201, item 14, Emergency Planning, will be revised (to add the following new milestone): (portions applicable to SNM) 10 CFR 30.32 10 CFR 40.31 Prior to initial receipt of byproduct source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18) 10 CFR 30.32(a) 10 CFR 40.31(a)	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-109, RAI 12.05-02; COL-SER-OI-CH01, SER 01.05-01. WLG2009.12-11

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					4. COLA Part 2, FSAR Chapter 13, Section 13.4, Table 13.4-201, item 15, Security Program, will be revised (to add the following new milestone): (portions applicable to SNM) 10 CFR 30.32 10 CFR 40.31 Prior to initial receipt of byproduct source, or special nuclear materials (excluding Exempt Quantities as described in 10 CFR 30.18) 10 CFR 30.32(a) 10 CFR 40.31(a)	
6722	WLS,STD	Pt 02	FSAR 13	13.04.T / T13.4-201	COL Part 2 FSAR Chapter 13, Table 13.4-201 (Sheet 3 of 7) Item 10 will be revised to add a reference to 10 CFR 20.1406 to the Program Source (Required by) column. COL Part 2 FSAR Chapter 13, Table 13.4-201 (Sheet 3 of 7) Item 10 will be revised to add a new sub-bullet "• Minimization of Contamination" to the Program Title column.	Duke Energy Submittal - Concurrence with Standard Content RAIs, SNC-COL-SER-OI-CH12 S1 SER 12.03-01. WLG2009.12-11
6847	WLS,STD	Pt 02	FSAR 13	13.06 13.06.02	FSAR Section 13.6 is modified by deleting the 2nd paragraph in Section 13.6. FSAR Section 13.6.2 is modified by removing Reference 201 and listing "Not used."	Duke Energy Voluntary Submittal Fitness for Duty. WLG2009.06.05
6848	WLS,STD	Pt 02	FSAR 13	13.07	FSAR Section 13.7 is modified to read as follows: 13.7 FITNESS FOR DUTY The Fitness for Duty (FFD) Program is implemented and maintained in two phases; the construction phase program and the operating phase program. The construction and operations phase programs are implemented as identified in Table 13.4-201. The construction phase program is consistent with NEI 06-06 (Reference 201). The workforce population subject to random testing during construction is determined on a weekly basis by averaging the total number of active construction badges over the preceding seven-day period. The random selection from each week's workforce population is identified by a standard computer-generated random number generator using the number of active badges as the range of numbers considered in the weekly random testing selection. The operations phase program is consistent with 10 CFR Part 26. 13.7.1 REFERENCES 201. Nuclear Energy Institute "Fitness for Duty Program Guidance for New Nuclear Power Plant Construction Sites", NEI 06-06, Revision 4, February 2009.	Duke Energy Voluntary Submittal Fitness for Duty. WLG2009.06.05
5807	WLS	Pt 02	FSAR 13	APP 13AA.1.1.1.5	Change format of Reference 13.1.5-201 to red, hyperlinked text.	Editorial, format
5716	WLS,STD	Pt 02	FSAR 14	14.02	FSAR Sections 14.2 and 14.4 are revised as shown on TVA's response to RAI Letter 139, RAI 14.02-12,	Duke Energy

Change ID#	COLA REP	COLA Part A	Chapter A	Section / Page A	Complete Change Description	Basis for Change
				14.04	Attachment 14.02-12A. Editorial changes are made as follows: 1. Subsection 14.2.2.3, first sentence is revised to remove the full form of the acronym, JTWG and the parenthesis surrounding it. 2. Subsection 14.2.2.4, second bullet, the first sentence is revised to include the full form of the acronym, BOP; fifth bullet, first sentence is revised to reflect the removal of the title case from 'accordance'. 3. Subsection 14.2.3 is revised to relfect the addition of STD COL 14.4-3. 4. Subsection 14.2.3.1, first paragraph is revised to capitalize 'Procedure'. 5. Subsection 14.2.3.1.2, second sentence is revised to remove 'a' before 'site-specific'. 6. Subsection 14.2.3.2.1, last paragraph is revised to remove the full form of the acronym JTWG. 7. Subsectin 14.2.3.3.1 is revised to add STD COL 14.4-4. 8. Subsection 14.2.8, second paragraph, first sentence is revised to include the full form of the acronym, SSC. 9. Subsection 14.2.8, second bullet, fifth paragraph is revised to remove the full form of the acronym, 'SSC'.	Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-139, RAI 14.02-12. WLG2009.05-09
5719	WLS,STD	Pt 02	FSAR 14	14.02 14.04	COLA Part 2, FSAR Chapter 14, Subsection 14.2.11, as shown in letter 139, will be renumbered and added to Subsection 14.2.5, Utilization of Reactor Operating and Testing Experience in the Development of Test Program, as shown below: 1) Add the following Subsections after DCD Subsection 14.2.10.5: 14.2.11 change to new last paragraph of 14.2.5 14.2.11.1 change to 14.2.5.1 14.2.11.2 change to 14.2.5.2 14.2.11.3 change to 14.2.5.3 14.2.11.4 change to 14.2.5.4 14.2.11.5 change to 14.2.5.5 2) COLA Part 2, FSAR Chapter 14, Subsections 14.2.12 through 14.2.15, as shown in letter 139, will be renumbered and added to Subsection 14.2.3.1, , Conduct of Test Program, as shown below: Add the following Subsections after DCD Subsection 14.2.3.1: 14.2.12 change to 14.2.3.1.1 14.2.13 change to 14.2.3.1.2 14.2.14 change to 14.2.3.1.3 14.2.15 change to 14.2.3.1.4 3) COLA Part 2, FSAR Subsection 14.2.3.2.1, fourth paragraph will be changed from: Each area of startup testing is reviewed and evaluated by the PT&O organization and the JTWG. The test results at each power ascension testing power plateau are reviewed and evaluated by the PT&O organization and the JTWG and approved by the plant manager before proceeding to the next plateau. Startup test reports are prepared in accordance with the guidance in position C.1.a of Regulatory Guide 1.16, "Reporting of Operating Information -- Appendix A Technical Specifications." To read: Each area of startup testing is reviewed and evaluated by the PT&O organization and the JTWG. The test results at each power ascension testing power plateau are reviewed and evaluated by the PT&O organization and the JTWG and approved by the plant manager before proceeding to the next plateau. Startup test reports are prepared in accordance with the guidance in position C.1.a of Regulatory Guide 1.16, "Reporting of Operating Information -- Appendix A Technical Specifications" and position C.9 of Regulatory Guide 1.68, "Initial test Programs for Water-Cooled Nuclear Power Plants."	Duke Energy Submittal - Concurrence with Standard Content RAIs, BLN-RAI-LTR-139S1, RAI 14.02-12. WLG2009.05-09

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					4) COLA Part 2, FSAR Chapter 14, Subsection 14.2.8, last paragraph, as shown in letter 139, will be revised from: The milestone schedule for developing plant operating procedures is presented in Table 13.4-201 and discussed in FSAR Subsection 13.5.2.1. The operating and emergency procedures are available prior to start of licensed operator training and, therefore, are available for use during the ITP. Required or desired procedure changes may be identified during their use. Administrative procedures describe the process for revising plant operating procedure. To read: The milestone schedule for developing plant operating procedures is presented in Table 13.4-201 and discussed in FSAR Subsection 13.5.2.1. The operating and emergency procedures are available prior to start of licensed operator training and, therefore, are available for use during the ITP. Required or desired procedure changes may be identified during their use. Administrative procedures describe the process for revising plant operating procedures. 5) COLA Part 2, FSAR Chapter 14, Subsection 14.4.2, as shown in letter 139, will be revised from: Preoperational and startup procedures are provided for the NRC in accordance with the requirements of DCD Subsection 14.2.3. The controls for development of test specifications and procedures are also described in Subsection 14.2.3. A cross reference list is provided between ITAACs and test procedures and/or sections of test procedures. To read: Preoperational and startup test specifications and procedures are provided to the NRC in accordance with the requirements of DCD Subsection 14.2.3. The controls for development of test specifications and procedures are also described in Subsection 14.2.3. A cross reference list is provided between ITAACs and test procedures and/or sections of test procedures.	
6887	WLS	Pt 02	FSAR 14	14.02.02	Subsection 14.2.2, third paragraph is revised to include the word 'the' to read: "in the Startup..."	Editorial
6837	WLS,STD	Pt 02	FSAR 14	14.02.03.02.01	COLA Part 2, FSAR Subsection 14.2.3.2.1, fourth paragraph will be changed from: Startup test reports are prepared in accordance with the guidance in position C.1.a of Regulatory Guide 1.16, "Reporting of Operating Information -- Appendix A Technical Specifications" and position C.9 of Regulatory Guide 1.68, "Initial test Programs for Water-Cooled Nuclear Power Plants." To read: Startup test reports are prepared in accordance with the guidance in position C.9 of Regulatory Guide 1.68, "Initial test Programs for Water-Cooled Nuclear Power Plants."	Regulatory Guide 1.16 withdrawn by NRC 8-11-2009 via 74 FR 40244. This modifies the change in RAI LTR 139 S1 response to RAI 14.02-012, item 3 SER with Open Items Confirmatory Item 14.2-5
6894	WLS	Pt 02	FSAR 14	14.02.03.03.01	COLA Part 2, FSAR Subsection 14.2.3.3.1, first paragraph, second sentence is revised from: "A startup report is submitted per Regulatory Guide 1.16 at the earliest of:" To read: "A startup report is submitted at the earliest of:"	R-COLA Conformance, Regulatory Guide 1.16 withdrawn by NRC 8-11-2009 via 74 FR 40244.
6888	WLS	Pt 02	FSAR 14	14.02.05	Revise Subsection 14.2.5 to add a Header: 14.2.5 UTILIZATION OF REACTOR OPERATING AND TESTING EXPERIENCE IN THE DEVELOPMENT OF TEST PROGRAM	Editorial

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6889	WLS	Pt 02	FSAR 14	14.02.10.04.29	Subsection 14.2.10.4.29 is revised to add LMA STD COL 14.4-5.	R-COLA Conformance
6672	WLS,STD	Pt 02	FSAR 14	14.03.T / T14.3-201	In Table 14.3-201, change all existing "XX" to "XX" (underlined) except for the entry in the ZBS system. Change the text associated with the existing XX legend to read "Site-specific system selected for ITAAC – title only, no entry for COLA" Then make addition below. (see BLN FSAR Table 14.3-201 for example)COLA Part 2, Section 14.3, Table 14.3-201 legend, is revised to read: XX = Selected for ITAAC	Duke Energy Submittal - Concurrence with Standard Content RAIs BLN-RAI-LTR-027 S1, RAI 14.03-01. WLG2009.12-11
6838	WLS	Pt 02	FSAR 14	14.04.03	Subsection 14.4.3, is revised to reflect the change to title case "Startup Administrative Manual (Procedure)".	R COLA Conformance
6839	WLS	Pt 02	FSAR 14	14.04.04	Subsection 14.4.4, is revised to reflect the correction to tense 'are addressed'.	Editorial
5808	WLS	Pt 02	FSAR 15	15	FSAR Chapter 15 add chapter title, ACCIDENT ANALYSES	Editorial, consistency
6431	WLS	Pt 02	FSAR 15	15.TOC	FSAR Chapter 15, Table of Contents revise page number listing for 15A.3.3, Atmospheric Dispersion Factors from 15.A-1 to read 15A-1.	Editorial, consistency
6432	WLS	Pt 02	FSAR 16	16.01	FSAR Chapter 16, Subsection 16.1, third paragraph, correct spelling of 'technical'.	Editorial, spelling
6873	WLS,STD	Pt 02	FSAR 16	16.01	COLA Part 2, FSAR Chapter 16, Section 16.1, last two sentences, will be revised from: However, the generic technical specifications and bases provided with Chapter 16 of the DCD are incorporated by reference into the plant-specific technical specifications provided in Part 4 of this COL application. In addition, a full information set of the plant-specific technical specifications and bases are provided in Part 4 of this COL application. To read: However, the generic technical specifications and bases provided with Chapter 16 of the DCD are incorporated directly into the plant-specific technical specifications and bases provided in Part 4 of this COL application.	Editorial
6677	WLS,STD	Pt 02	FSAR 17	17.04	COLA Part 2, FSAR, Chapter 17, Section 17.4 "Design Reliability Assurance Program" will be revised from: This section of the referenced DCD is incorporated by reference with no departures or supplements. To read: This section of the referenced DCD is incorporated by reference with the following departures and/or supplements. STD SUP 17.4-1 The quality assurance requirements for non-safety related SSCs within the scope of D-RAP is in accordance with the Quality Assurance Program Description (QAPD), Part III.	Duke Energy Submittal - Concurrence with Standard Content RAIs BLN-RAI-LTR-150, RAI 17.04-02. WLG2009.12-11
6893	WLS	Pt 02	FSAR 17	17.05	Section 17 is revised to remove the statement regarding renumbering at the beginning of the section.	Editorial change to conform to format used in R-COLA.
6702	WLS,STD	Pt 02	FSAR 17	17.05	6. Revise FSAR Subsection 17.5 to include the following new paragraph following the existing first paragraph (with the same LMAs as the existing first paragraph): Conformance statements for QA-related Regulatory Guides (including Regulatory Guides 1.28, 1.30, 1.33, 1.38, 1.39, 1.94, and 1.116) are provided in Appendix 1AA. While many Regulatory Guide positions can be identified as applicable to the scope of work identified and addressed by the DCD and others can be identified as applicable to the scope of work identified and addressed by the COLA, some QA guidance related positions could be accomplished by either scope of work and thus be addressed in either the DCD or the COLA. These positions are primarily dependent on who performs the work. The DCD conformance statement indicates an exception to apply NQA-1. The COLA identifies an exception to apply NQA-1. Per DCD Section 17.3, WEC work performed up to March 15, 2007 applied a 1991 version of the standard. A	Duke Energy Submittal - Concurrence with Standard Content RAIs, SNC-COL-SER-OI-Ch01 S1, SER 01.04-02. WLG2009.12-11

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					1994 version of the standard is applied for work performed after that date by WEC. If the work is performed under the applicant's COL program, the 1994 version of NQA-1 identified in the COLA QAPD is applied. Thus, DCD scope (identified in DCD Appendix 1A) and "remaining scope" differentiate the application of the guidance identified in these Regulatory Guides.	
6845	WLS	Pt 02	FSAR 17	17.06	FSAR 17.6 is revised from "This section incorporates by reference NEI 07-02A, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52," with the following supplemental information." To read: "This section incorporates by reference NEI 07-02A, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52," (Reference 204) with the following supplemental information."	R-COLA Conformance
5809	WLS	Pt 02	FSAR 17	17.08 201	Remove LMA "STD SUP 17.8-1" from Reference 201.	R-COLA conformance
6883	WLS	Pt 02	FSAR 17	17.08 201	COLA, Part 2, Revision 1, FSAR Chapter 17, Section Reference 201 is revised to reflect document revision as follows: 201 Enercon Services, Inc., "Enercon Quality Assurance Project Planning Document," PPD No DUK010, Revision 8, May 2009.	Reflect current document revision
6882	WLS	Pt 02	FSAR 17	17.08 203	COLA, Part 2, Revision 1, FSAR Chapter 17, Section Reference 203 is revised to reflect document revisions as follows: 203. Nuclear Energy Institute, "Quality Assurance Program Description," NEI 06-14A, Revision 5, May 7, 2008.	Reflect current document revision
5671	WLS	Pt 02	FSAR 19	19.58	FSAR Chapter 19, Section 19.58 is revised to read: This section of the referenced DCD is incorporated by reference with the following departures and/or supplements. 19.58.3 Conclusion Add the following information at the end of DCD Subsection 19.58.3: WLS SUP 19.58-1 Table 19.58-201 documents the site-specific external events evaluation that has been performed for WLS Units 1 and 2. This table provides a general explanation of the evaluation and resultant conclusions and provides a reference to applicable sections of the COL where more detailed supporting information (including data used, methods and key assumptions) regarding the specific event is located. Based upon this evaluation, it is concluded that the WLS Units 1 and 2 site is bounded by the High Winds, Floods and Other External Events analysis documented in DCD Section 19.58 and APP-GW-GLR-101 (Reference 201) and no further evaluations are required at the COL application stage. 19.58.4 References 201. Westinghouse Electric Company LLC, "AP1000 Probabilistic Risk Assessment Site- Specific Considerations," Document Number APP-GW-GLR-101, Revision 1, October 2007.	Duke Energy Response to RAI LTR 71, RAI 19-2. WLG2009.08-03
5672	WLS	Pt 02	FSAR 19	19.58.T / T19.58-201	Add new Table 19.58-201. Set LMA to WLS SUP 19.58-1	Duke Energy Response to RIA LTR 71, RAI 19-3. WLG2009.08-03
6680	WLS,STD	Pt 02	FSAR 19	19.59.10.05	1. COLA Part 2, FSAR Chapter 19, subsection 19.59.10.5, STD COL 19.59.10-1, first three sentences will be changed from: A review of the differences between the as-built plant and the design used as the basis for the AP1000	Duke Energy Submittal - Concurrence with

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					seismic margins analysis will be completed prior to fuel load. A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated to determine if there is a significant adverse effect on the seismic margins analysis results. To read: A review of the differences between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis will be completed prior to fuel load. A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated and the seismic margins analysis modified as necessary to account for the plant-specific design, and any design changes or departures from the certified design. 2. COLA Part 2, FSAR Chapter 19, Subsection 19.59.10.5, STD COL 19.59.10-3 will be revised from: A review of the differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analysis will be completed prior to fuel load. Differences will be evaluated to determine if there is significant adverse effect on the internal fire and internal flood analysis results. To read: A review of the differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analyses will be completed prior to fuel load. Plant specific internal fire and internal flood analyses will be evaluated and the analyses modified as necessary to account for the plant-specific design, and any design changes or departures from the certified design.	Standard Content RAIs BLN-RAI-LTR-152, RAI 19-20. WLG2009.12-11
5675	WLS	Pt 02	FSAR 19	19.59.10.05	FSAR Chapter 19, Subsection 19.59.10.5, fourth paragraph will be revised to read: As discussed in Subsection 19.58.3, it has been confirmed that the Winds, Floods and Other External Events analysis documented in DCD Section 19.58 is applicable to the site. The site-specific design has been evaluated and is consistent with the AP1000 PRA assumptions. Therefore, Section 19.58 of the AP1000 DCD is applicable to this design.	Duke Energy Response to RAI LTR 71, RAI 19-3. WLG2009.08-03
6879	WLS	Pt 02	FSAR 19	19.59.10.05	FSAR Section 10.59.10.5, third paragraph (next to STD COL 19.59-2) revise 'plant specific' to read 'plant-specific'.	Editorial
6880	WLS	Pt 02	FSAR 19	19.59.10.06	FSAR Section 19.59.10.06, first paragraph under the heading "Process for Maintenance and Upgrades of the PRA" is revised from 'plant specific' to read 'plant-specific'.	Editorial
6877	WLS	Pt 02	FSAR 19	19.59.10.06	Add "(Reference 201)" {red, hyperlinked text} under heading "PRA Input to the Reactor Oversight Process" at the end of the first paragraph to read - "The mitigating systems performance indicators (MSPI) are evaluated based on the indicators and methodologies defined in NEI 99-02 (Reference 201)."	Editorial
6878	WLS,STD	Pt 02	FSAR 19	19.59.11	Add the following to include new Reference 201: 19.59.11 References [separator bar] Add the following text to the end of DCD Subsection 19.59.11: 201. NEI 99-02, Nuclear Energy Institute, "Regulatory Assessment Performance Indicator Guideline," Technical Report NEI 99-02, Revision 5, July 2007.	Editorial
Pt 04						**3 COLA Changes**
6850	WLS	Pt 04		A.2 GTS 5.2.2	COLA Part 4, Technical Specifications, PSTS Section A.2, Item GTS 5.2.2 (Unit Staff), will be revised as follows: The bracketed information in the GTS reads: [The unit staff organization shall include the following: A non-licensed operator shall be assigned to each reactor containing fuel and an ... b., c., d., e., f. ...Policy Statement on Engineering Expertise on Shift.] Remove the brackets and adopt the bracketed information in the GTS except that 5.2.2.d is omitted. Re-letter Items e and f as follows: d. The operations manager or assistant operations manager shall hold an SRO license.	Duke Energy Voluntary Submittal FFD, Attachment 2. WLG2009.06.05

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					e. An individual shall provide advisory technical support to the unit operations shift crew in the areas of thermal hydraulics, reactor engineering, and plant analysis with regard to the safe operation of the unit. This individual shall meet the qualifications specified by the Commission Policy Statement on Engineering Expertise on Shift. Justification: Generic TS bracketed information, except Item d, is applicable and adopted. Item d is superseded by the revised final rule for 10 CFR Part 26.	
6851	WLS	Pt 04		B, 5.2.2	COLA Part 4, Technical Specifications, PSTS Section B, Specification 5.2.2, Paragraph b, will be revised as follows: b. Shift crew composition may be less than the minimum requirement of 10 CFR 50.54(m)(2)(i) and 5.2.2.a and 5.2.2.e for a period of time not to exceed 2 hours in order to accommodate unexpected absence of on-duty shift crew members provided immediate action is taken to restore the shift crew composition to within the minimum requirements. Justification: Conforming change with change to re-lettering of subparagraphs in GTS 5.2.2.	Duke Energy Voluntary Submittal, FFD, Attachment 2. WLG2009.06.05
6896	WLS	Pt 04		TOC	Minor Editorial changes to Part 4: Update TOC for 3.1.7 and 5.2 to FSAR 2. On Page B 3.1.6 - 3 replace the copyright symbol in the 4th paragraph with "(c)"	Editorial
Pt 07						**2 COLA Changes**
6876	WLS	Pt 07			The following editorial changes are made in Part 7: 1. Change format of footers from 'X of Y' to 'Page X of Y' 2. A, First paragraph, first sentence, revise to read "...10 CFR Part 52, Appendix D, Sections VIII and X.B.1." 3. A.1 / DEP 1.1-1, under "Affected DCD/FSAR Sections" revise to include the parenthetical sentence in the first sentence. 4. A.1 / DEP 1.1-1, under "Departure Justification" add the acronym '(SRP)' after 'Standard Review Plan' 5. A.2 / DEP 18.8-1, under "Scope / Extent of Departure:" replace with the sentence "This Departure is identified in FSAR Subsection 18.8." 6. A.2 / DEP 18.8-1, under "Departure Evaluation" first pargraph, second sentence, add ':' after "...and therefore this Departure does not" before the bulleted list 7. B, second sentence, revise to read "...are provided in the following pages." 8. B.2, revise the first full paragraph, second sentence to remove the comma following "William States Lee III Nuclear Station".	Editorial
6849	WLS	Pt 07		Section B	COLA Part 7, Departures and Exemptions, Section B and Paragraph B.1, will be revised as follows: B. Lee Nuclear Station Exemption Requests Duke requests the following exemption related to: 1) Not used 2) Combined License Application Organization and Numbering Discussion and justifications for this request is provided in the following pages. 1) Withdrawn. This exemption is no longer required.	Duke Energy Voluntary Submittal Fitness for Duty. WLG2009.06.05

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Pt 09						**2 COLA Changes**
6913	WLS	Pt 09		09.01 01.00.T / T1.0-1	Part 9, Section 9.1, Table 1.0-1 is revised to reflect Duke Energy organizational, financial, and planning update	Duke Energy Organizational update
6914	WLS	Pt 09		09.01 01.00.T / T1.0-2	Part 9, Section 9.1, Table 1.0-2 is revised in its entirety to reflect Duke Energy organizational, financial, and planning update	Duke Energy Organizational update
Pt 10						**15 COLA Changes**
6684	WLS,STD	Pt 10		LC#02 09.01-07	- COLA Part 10, License Conditions, COL Item No. 9.1-7 will be revised from: A spent fuel rack Metamic coupon monitoring program is to be implemented when the plant is placed into commercial operation. This program includes tests to monitor bubbling, blistering, cracking, or flaking; and a test to monitor for corrosion, such as weight loss measurements and or visual examination. To read: A spent fuel rack Metamic coupon monitoring program is to be implemented when the plant is placed into commercial operation. This program includes tests to monitor bubbling, blistering, cracking, or flaking; and a test to monitor for corrosion, such as weight loss measurements and / or visual examination. The program will also include tests to monitor changes in physical properties of the absorber material, including neutron attenuation and thickness measurements	Duke Energy Submittal - Concurrence with Standard Content, BLN-RAI-LTR-165 S1, RAI 09.02.01-01. WLG2009.12-11
4615	WLS,STD	Pt 10		LC#02 14.04-03	3. COLA Part 10 will be revised from: COL Item No. / Subject / From DCD Tier 2 Subsection / Implementation Milestone 14.4-3 / Conduct of Test Program / 14.4.3 / Prior to initiating test program A site-specific startup administration manual (procedure), which contains the administration procedures and requirements that govern the activities associated with the plant initial test program, as identified in DCD Subsection 14.2.3 and as described in APP-GW-GLR-038 (DCD Reference 2), is provided prior to initiating the plant initial test program. To read: COL Item No. / Subject / From DCD Tier 2 Subsection / Implementation Milestone 14.4-3 / Conduct of Test Program / 14.4.3 / Prior to initiating test program A site-specific startup administration manual (procedure), which contains the administration procedures and requirements that govern the activities associated with the plant initial test program, as identified in FSAR Section 14.2, is provided prior to initiating the plant initial test program.	Duke Energy Submittal - Concurrence with Standard Content, BLN-RAI-LTR-139, RAI 14.02-012. WLG2009.05-09
6681	WLS,STD	Pt 10		LC#02 19.59.10-01 19.59.10-02 19.59.10-03	COLA Part 10, License Conditions and ITAAC, Proposed License Condition 2, COL Holder Items, will be revised to read: 19.59.10-1 / As-Built SSC HCLPF Comparison to Seismic Margin Evaluation / 19.59.10.5 / Prior to initial fuel load The Combined License holder referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis prior to fuel load.	Duke Energy Submittal - Concurrence with Standard Content, BLN-RAI-LTR-152 RAI 19-20. WLG2009.12-11

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					A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated and the seismic margins analysis modified as necessary to account for the plant specific-design, and any design changes or departures from the certified design. Spacial interactions are addressed by COL information item 3.7-3. Details of the process will be developed by the Combined License holder. 19.59.10-2 Evaluation of As-Built Plant Versus Design in AP1000 PRA and Site-Specific PRA External Events 19.59.10.5 Prior to initial fuel load The Combined License holder referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 PRA and Table 19.59-18 prior to fuel load. The plant specific PRA-based insight differences will be evaluated and the plant specific PRA model modified as necessary to account for the plant specific-design and, any design changes or departures from the design certification PRA. 19.59.10-3 Internal Fire and Internal Flood Analyses 19.59.10.5 Prior to initial fuel load The Combined License holder referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analyses prior to fuel load. Plant specific internal fire and internal flood analyses will be evaluated and the analyses modified as necessary to account for the plant-specific design, and any design changes or departures from the certified design	
6682	WLS,STD	Pt 10		LC#02 19.59.10-4	COLA Part 10, License Conditions and ITAAC, Proposed License Condition 2, COL Holder Items, will be revised to read: 19.59.10-4 / Implement Severe Accident Management Guidance / 19.59.10.5 / Prior to startup testing	Duke Energy Submittal - Concurrence with Standard Content, BLN-RAI-LTR-152, RAI 19-21. WLG2009.12-11
6696	WLS,STD	Pt 10		LC#03	COLA Part 10, Proposed License Condition 3, Operational Program Implementation, will be revised to add the following new milestones: C.2 – Fire Protection Program (applicable portions) C.3 – Non Licensed Plant Staff Training Program (applicable portions) C.4 – Emergency Planning (applicable portions) C.5 – Security Program (applicable portions)	Duke Energy Submittal - Concurrence with Standard Content, COL-SER-OI-CH01, SER OI 01.05-01. WLG2009.12-11
6854	WLS	Pt 10		LC#04	COLA Part 10, License Conditions and ITAAC, Proposed License Condition 4 will be revised as follows: 4. EMERGENCY PLANNING ACTIONS: PROPOSED LICENSE CONDITION: A. The licensee shall submit a fully developed set of site-specific Emergency Action Levels (EALs) to the NRC in accordance with the NRC-endorsed version of NEI 07-01, Rev. 0, with no deviations. These fully developed EALs shall be submitted to the NRC for confirmation not less than 180 days prior to the date scheduled for initial fuel load.	Duke Energy Response to RAI LTR 083, RAI 13.03-078. WLG2009.12-06
6855	WLS	Pt 10		LC#04	COLA Part 10, License Conditions and ITAAC, Proposed License Condition 4, will be revised to include: PROPOSED LICENSE CONDITION: Prior to the full participation exercise to be conducted in accordance with the requirements of Appendix E to 10 CFR Part 50, Duke Energy shall identify the specific locations of the reception centers and relocation sites and shall obtain Letters of Agreement for locations not under Duke Energy's control.	Duke Energy Response to RAI LTR 083, RAI 13.03-080. WLG2009.12-06
6706	WLS,STD	Pt 10		LC#06	COLA Part 10, proposed License Condition 6, will be revised from: 6. OPERATIONAL PROGRAM READINESS: The NRC inspection of operational programs will be the subject of the following license condition in accordance with SECY-05-0197.	Duke Energy Submittal - Concurrence with Standard Content,

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					PROPOSED LICENSE CONDITION: The licensee shall submit to the appropriate Director of the NRC, a schedule, no later than 12 months after issuance of the COL, that supports planning for and conduct of NRC inspections of operational programs listed in the operational program FSAR Table 13.4-201. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operational programs in the FSAR table have been fully implemented or the plant has been placed in commercial service, whichever comes first. a. This schedule shall include a submittal schedule for the emergency planning implementation procedures to the NRC consistent with 10 CFR Part 50, Appendix E, Section V. b. This schedule shall include a schedule for the development of the site specific Severe Accident Management Guidance. c. This schedule shall include a submittal schedule for the reactor vessel pressurized thermal shock evaluation at least 18 months prior to initial fuel load. d. This schedule shall include a submittal schedule for approved preoperational and startup test procedures in accordance with FSAR Section 14.2.3. To read: 6. OPERATIONAL PROGRAM READINESS: The NRC inspection of operational programs will be the subject of the following license condition in accordance with SECY-05-0197. PROPOSED LICENSE CONDITION: The licensee shall submit to the appropriate Director of the NRC, a schedule, no later than 12 months after issuance of the COL, that supports planning for and conduct of NRC inspections of operational programs listed in the operational program FSAR Table 13.4-201. The schedule shall be updated every 6 months until 12 months before scheduled fuel loading, and every month thereafter until either the operational programs in the FSAR table have been fully implemented or the plant has been placed in commercial service, whichever comes first. This schedule shall include a submittal schedule for: a. the emergency planning implementation procedures to the NRC consistent with 10 CFR Part 50, Appendix E, Section V. b. the implementation of site specific Severe Accident Management Guidance. c. a reactor vessel pressurized thermal shock evaluation at least 18 months prior to initial fuel load. d. approved preoperational and startup test procedures in accordance with FSAR Subsection 14.2.3. e. an emergency response data system (ERDS) implementation program plan consistent with 10 CFR Part 50, Appendix E, Section V. f. a flow accelerated corrosion (FAC) program implementation schedule, including the construction phase activities.	COL-SER-OI-CH10, SER OI 10.01-01. WLG2009.12-11
6673	WLS,STD	Pt 10		LC. / APP B	COLA Part 10, Appendix B, is revised to include the following new site-specific ITAAC from: Add the following information to the information provided in the referenced DCD Tier 1 following Section 2.6.11: 2.6.12 Transmission Switchyard and Offsite Power System No entry for this system. To read: Add the following information to the information provided in the referenced DCD Tier 1 following Section 2.6.11: 2.6.12 Transmission Switchyard and Offsite Power System Inspection, Test, Analysis and Acceptance Criteria Table 2.6.12-1 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria for the offsite power system. COLA Part 10, Appendix B, is revised to insert a new Table 2.6.12-1 per WLG2009.12-11 / BLN-RAI-LTR-027	Duke Energy Submittal - Concurrence with Standard Content, BLN-RAI-LTR-027 S1, RAI 14.03-01. WLG2009.12-11
6852	WLS	Pt 10		LC. /	COLA Part 10, Proposed License Conditions (Including ITAAC), Appendix B. Inspections, Tests, Analysis,	Duke Energy

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				APP B	and Acceptance Criteria will be revised as follows: Appendix B. Inspections, Tests, Analysis and Acceptance Criteria AP1000 DCD Tier 1 ITAAC The Tier 1 information (including the ITAAC) of the referenced DCD is incorporated by reference with the following departures and/or supplements. Plant Specific ITAAC Add the following after the information addressing Plant Specific ITAAC: Physical Security ITAAC The physical security ITAAC that are in the scope of the Westinghouse AP1000 standard design are included in the referenced DCD Tier 1 Subsection 2.6.9 as incorporated by reference above. Site-specific physical security ITAAC that are outside the scope of the Westinghouse AP1000 standard design in DCD Tier 1 Subsection 2.6.9 are provided in the attached Table 2.6.9-2. Include these ITAAC after the DCD Tier 1 Table 2.6.9-1 ITAAC. Emergency Planning ITAAC The emergency planning ITAAC are included in the attached Table 3.8-1. Include these ITAAC after DCD Tier 1 Section 3.7.	Voluntary Submittal - Fitness For Duty. WLG2009.06.05
6853	WLS	Pt 10		Table 2.6.9-2	COLA Part 10, Proposed License Conditions (Including ITAAC), Appendix B. Inspections, Tests, Analysis, and Acceptance Criteria will be revised to add new Table 2.6.9-2 per WLG2009.06-05.	Duke Energy Voluntary Supplement Fitness For Duty. WLG2009.06.05
6856	WLS	Pt 10		Table 3.8-1	COLA Part 10, License Conditions and ITAAC, Table 3.8-1, will be revised per Duke Energy Response to RAI Letter 083 RAI 13.03-083, WLG2009.12-06. Editorial: Move item on Sheet 26 "[**References..." to the first sheet of Table 3.8-1. This information was added in QB 6859.	Duke Energy Response to RAI LTR 083, RAI 13.03-083. WLG2009.12-06
6858	WLS	Pt 10		Table 3.8-1	COLA Part 10, License Conditions and ITAAC, Table 3.8-1, will be revised per Duke Energy Response to RAI Letter 083 RAI 13.03-085, WLG2009.12-06.	Duke Energy Response to RAI LTR 083, RAI 13.03-085. WLG2009.12-06
6857	WLS	Pt 10		Table 3.8-1	COLA Part 10, License Conditions and ITAAC, Table 3.8-1, will be revised per Duke Energy Response to RAI Letter 083 RAI 13.03-084, WLG2009.12-06.	Duke Energy Response to RAI LTR 083, RAI 13.03-084. WLG2009.12-06
6859	WLS	Pt 10		Table 3.8-1	COLA Part 10, License Conditions and ITAAC, Table 3.8-1, will be revised per Duke Energy Response to RAI Letter 083 RAI 13.03-086, WLG2009.12-06. Editorial: Move discussion information in 2nd column of 9.1 "[**References in brackets..." to the same location in the table on sheet 1. This modifies the text changed in QB6859.	Duke Energy Response to RAI LTR 083, RAI 13.03-086. WLG2009.12-06
Pt 11						**1 COLA Change**
6939	WLS	Pt 11		QAPD, Part II, Section 1	Part 11, QAPD, Part II, Section 1 is modified to reflect organzation changes as follows: PART II QAPD DETAILS SECTION 1 ORGANIZATION This Section describes the Duke organizational structure, functional responsibilities, levels of authority and interfaces for establishing, executing, and verifying QAPD implementation. The organizational structure includes corporate support, offsite and onsite functions for Nuclear Plant Development including interface responsibilities for multiple organizations performing quality-related functions. Implementing documents assign more specific responsibilities and duties, and define the organizational interfaces involved in conducting activities and duties within the scope of this QAPD. Management gives careful consideration to the timing, extent and effects of organizational structure changes.	Annual update / Organization Changes

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					Duke management is responsible to size the Quality Assurance organization commensurate with the duties and responsibilities assigned. The Duke Nuclear Plant Development organization is responsible for new nuclear plant licensing, engineering, procurement, construction, startup and operations development activities. There are several organizations within Duke that implement and support the QAPD. These organizations include, but are not limited to Nuclear Plant Development, Corporate Services and Quality Assurance. Organization charts for various departments/locations are contained in Chapter 13 of the respective Station FSAR and describe organizational positions of the nuclear station and associated functions and responsibilities. Design, engineering and environmental services are provided to the Duke Nuclear Plant Development organization by a contract that identifies the Engineer and Constructor and invokes the applicable quality program requirements described in this document to applicable contractors and subcontractors. The following sections describe the reporting relationships, functional responsibilities and authorities for organizations implementing and supporting the Nuclear Plant Development QA Program. 1.1 Duke Corporate Organization The Chairman, President, and Chief Executive Officer (CEO) has overall responsibility for design, construction, and operation of generation and transmission facilities. The CEO reports to the Duke Board of Directors with respect to all matters. The QAP Policy Statement issued by the CEO establishes mandatory expectations for all organizations and personnel to comply with the QAPD and its implementing documents while performing quality affecting activities covered by the QAP. Reporting to the CEO is the Chief Generation and Nuclear Officer who has the overall authority and responsibility for the QAP and directs several activities including the operation of the nuclear sites through the Senior Vice President, Nuclear Operations. Also reporting to the CEO is the Group Executive, President, and Chief Operating Officer of US Franchised Electric and Gas who is responsible for electrical transmission, distribution, laboratory services, and switchyard maintenance and technical support; the Senior Vice President and Chief Sustainability Officer who supports the emergency response communications; the Group Executive and Chief Legal Officer and Corporate Secretary who is responsible for Information Technology Services, and document control and record management activities; and the Senior Vice President and Chief Human Resources Officer is responsible for administration of the Access Authorization, Fitness for Duty, and Fatigue Rule programs. As such, the attainment of quality rests with those assigned the responsibility of performing the activity. The verification of quality is assigned to qualified personnel independent of the responsibility for performance or direct supervision of the activity. The degree of independence varies commensurate with the activity's importance to safety. Figure 1 shows the overall Corporate Organization. 1.2 Nuclear Generation Nuclear Generation has direct line responsibility for all Duke Energy Carolinas nuclear station operations. Nuclear Generation is responsible for achieving quality results during engineering, preoperational testing, operation, testing, maintenance and modification of the Corporation's nuclear stations and with complying with applicable codes, standards and NRC regulations. The functions of Nuclear Generation are directed by the Chief Nuclear Officer. The Chief Nuclear Officer formulates, recommends, and carries out plans, policies, and programs related to the nuclear generation of electric power. The Chief Nuclear Officer is informed of significant problems or occurrences relating to safety and QA through established administrative procedures, and participates directly in their resolution, as necessary. 1.2.1 Nuclear Site Organization The Senior Vice Presidents, Nuclear Operations, report to the Chief Nuclear Officer. The Nuclear Site Vice Presidents report to two Senior Vice Presidents of Nuclear Operations. The Oconee Site Vice President reports to one of the Senior Vice Presidents of Nuclear Operations, while the McGuire and Catawba Site Vice Presidents report to the other Senior Vice President of Nuclear Operations. The Site Vice President is	

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					responsible for the administration, implementation, and assessment of the QAP as it applies to station operation. In the discharge of their responsibilities, the Site Vice President directs the activities of the station organizations. Reporting to the Site Vice President for each nuclear station is a Nuclear Station Manager who is assigned the direct responsibility for the safe operation of the facility. 1.2.2 Nuclear General Office The Nuclear General Office (NGO) is organized into three divisions. The activities of each division are directed by a vice president or senior vice president who reports to the Chief Nuclear Officer. The three divisions within the Nuclear General Office are: Nuclear Operations (Oconee), Nuclear Operations (McGuire and Catawba), and Nuclear Plant Development. 1. Nuclear Plant Development is responsible for development of the licensing actions needed in support of new nuclear site development. Responsibilities also include engineering oversight of contractors, site layout, staffing and program development. The executive in charge of nuclear plant development is assisted by a support staff and reports directly to the CNO. Nuclear Plant Development responsibilities include the establishment and execution of a contract or contracts for the engineering, procurement, construction, and startup activities of new nuclear plants up to the transition point when a Site Executive is named to assume those responsibilities. Figure 3 shows the Nuclear Plant Development/Construction Organization. As a new nuclear plant development approaches startup, the site organization transitions from the development focused organization in Figure 3 to the Operating Plant Site Organization shown in Figure 2. 2. Nuclear Operations (Oconee) is organized into two General Office subgroups, consisting of Major Projects and Centers of Excellence. Nuclear Operations (Oconee) also provides management oversight to the Oconee nuclear site. a. Major Projects is responsible for contracts, engineering and management related to major projects. b.Centers of Excellence promote fleet consistency and industry best practices among the Duke nuclear plants. 3.Nuclear Operations (Catawba and McGuire) is organized into three subgroups, consisting of Nuclear Engineering, Employee Concerns, and Nuclear Support. Nuclear Operations (Catawba and McGuire) also provides management oversight to the Catawba and McGuire nuclear sites. a.Nuclear Engineering provides support to the stations in severe accident analysis, safety analysis, nuclear design, core mechanical and thermal hydraulic analysis, fuel management, switchyard support, metallurgical laboratory services, material aging program, steam generator maintenance, ISI program support, QC inspector training and certification, procurement engineering, welding and radiological engineering. b.Employee Concerns investigates concerns identified through the Employee Concerns Programs to determine their validity and initiate corrective actions as appropriate. Employee Concerns also promotes the Safety Conscious Work Environment (SCWE) Program and is sensitive to SCWE concerns during investigations performed. c.Nuclear Support is divided into three subgroups consisting of Independent Nuclear Oversight (INOS), Shared Mechanical Craft, and Plant Support. 1) INOS provides support and leadership to the general office and stations with QA program audits, performance assessment, procurement quality, supplier verification, and QA, QC, NDE, and in¬service inspection (ISI), as applicable. In addition, INOS provides an advisory function to senior management through the NSRB. The Manager, INOS has the authority and organizational freedom to: Identify quality problems, initiate, recommend or provide solutions to quality problems through designated channels, verify the implementation of solutions to quality problems, and ensure cost and schedule do not influence decision making involving quality. The Manager, INOS has unfettered access to the Chief Nuclear Officer to communicate QA program concerns and issues. The Manager, INOS is delegated primary ownership of the department QA program description and is responsible for day¬-to-¬day administration of the program and resolution of QA issues. 2) Shared Mechanical Craft supports the nuclear stations by performing corrective maintenance for rotating equipment. 3) Plant Support provides technical support to the nuclear stations in the areas of licensing, emergency	

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					planning, radiation protection, chemistry, calibration services, NGO training, performance improvement, operations experience and workforce inprocessing. 1.3 U. S. Franchised Electric and Gas 1.3.1 Power Delivery Power Delivery provides electrical transmission, distribution and switchyard engineering, maintenance, and testing support. 1.3.2 Environmental Health and Safety Engineering and Technical Services provides environmental and laboratory support services. 1.4 Office of General Counsel 1.4.1 Information Technology Enterprise Business Services provides a variety of services and technical support to Nuclear Generation for critical information technology applications and systems such as equipment databases, applications, infrastructure, and plant process information systems. They are also responsible for the development and maintenance of selected information technology services and support, including electronic document management, some of which support QA Condition activities. 1.4.2 Enterprise Operations Services Enterprise Operations Services provides record storage and document management services for Nuclear Generation. 1.5 Sustainability and Corporate Communications 1.5.1 Corporate Communications Corporate Communications provides support for the nuclear site's emergency response organization. 1.6 Human Resources 1.6.1 Nuclear Access and Fitness for Duty (FFD) Human Resources provides support for the nuclear sites by administering the Access Authorization, FFD, and Fatigue Rule programs. 1.7 Generation 1.7.1 Supply Chain Supply Chain supports the nuclear site by providing procurement services, storage, inventory control, and receipt inspection/testing. 1.7.2 Regulated Fleet Generation Regulated Fleet Generation provides relay engineering and switchyard maintenance support services to the nuclear sites. 1.7.3 Generation Support Generation Support provides support for the nuclear sites in the areas of decommissioning, workforce planning and development, IT strategies, document management, technology planning, and project control leadership. 1.8 Department Interfaces Departmental interfaces are identified in QAP manuals. Quality related activities performed by departments other than Nuclear Generation are identified by and conducted in accordance with approved departmental interface agreements. 1.9 Agents and Contractors Duke may contract various activities such as engineering, procurement, and construction. These contracts will identify QAP requirements that are applicable to the contractors and their subcontractors, consistent with the requirements of Part II, Sections 4 and 7. 1.10 Authority to Stop Work	

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					Quality assurance and inspection personnel have the authority, and the responsibility, to stop work in progress which is not being done in accordance with approved procedures or where safety or SSC integrity may be jeopardized. This extends to off-site work performed by suppliers furnishing safety-related materials and services to Duke Energy. 1.11 Quality Assurance Organizational Independence Independence shall be maintained between the organization or organizations performing the checking (quality assurance and control) functions and the organizations performing the functions. This provision is not applicable to design review/verification. 1.10 NQA-1-1994 Commitment In establishing its organizational structure, Duke commits to compliance with NQA-1-1994, Basic Requirement 1 and Supplement 1S-1.	