



Serial: NPD-NRC-2012-030  
August 9, 2012

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555-0001

**LEVY NUCLEAR PLANT, UNITS 1 AND 2  
DOCKET NOS. 52-029 AND 52-030  
ROADMAP OF CHANGES IN COMBINED LICENSE APPLICATION, REVISION 5**

Reference: Letter from Christopher M. Fallon (PEF) to U.S. Nuclear Regulatory Commission, dated July 31, 2012, "Levy Nuclear Plant Units 1 and 2 Submittal of COL Application, Revision 5", Serial: NPD-NRC-2012-023

Ladies and Gentlemen:

The purpose of this letter is to provide information supporting the recent Progress Energy revision of the Combined License Application (COLA) for Levy Nuclear Plant, Units 1 and 2 (see referenced letter). Attached is a "roadmap" of the changes included in the July 31, 2012 submittal along with an enclosure providing an explanation of the information contained in the roadmap.

If you have any questions, or need additional information, please contact me at (919) 546-6992.

Sincerely,

A handwritten signature in black ink, appearing to read 'Robert Kitchen', written over a horizontal line.

Robert Kitchen  
Director – Nuclear Licensing  
Nuclear Development

Enclosure/Attachment

cc : U.S. NRC Region II, Regional Administrator  
Mr. Don Habib, U.S. NRC Project Manager (w/o enclosure/attachment)  
Ms. Mallecia Sutton, U. S. NRC Environmental Project Manager (w/o enclosure/attachment)

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**Levy Nuclear Plant Units 1 and 2  
Roadmap of Changes in Combined License Application Revision 5  
Explanation by Column in Attachment 1**

<b>Column</b>	<b>Explanation</b>
Change ID#	Unique identifier for tracking purposes
COLA	Identifies the change as STD (standard) or LNP specific
COLA Part	Part 1 (PT01) through Part 11 (PT11)
Chapter	FSAR or ER Chapter
Section	Section/Subsection of the Chapter or Part
Basis for Change	The source of the change
Change Summary	Short description of the change

**Attachment 1 - LNP COLA Revision 5 Roadmap of Changes**

Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
<b>Part 1</b>						
LNP-029	LNP	1		01.01	Progress Energy - Duke Energy merger	<p>Revise Section 1.1, "General Information," to replace the second through fourth paragraphs with the paragraph that follows to reflect the Progress Energy-Duke Energy merger, specifically operating companies, service areas, generating capacity and customer base:</p> <p>"On July 2, 2012, a merger occurred between Duke Energy Corporation and Progress Energy, Inc., the holding company of Progress Energy Florida, Inc. Through this merger, Duke Energy Corporation became the holding company of Progress Energy, Inc. Progress Energy, Inc. continues to be the holding company of Progress Energy Florida, Inc. Following this merger, Duke Energy Corporation, as the ultimate holding company of Progress Energy Florida, Inc., is now the largest electric power holding company in the United States with more than \$100 billion in total assets. Duke Energy Corporation is duly organized and existing under the laws of the State of Delaware. The company's general office, and principal place of business, is located in Charlotte, North Carolina, and through its subsidiaries, also transacts business on a regular basis in South Carolina, Kentucky, Ohio, Florida, and Indiana. It is an investor-owned corporation focused on electric power and gas distribution operations, and other energy services in both North and South America. Through its regulated electric and gas utility operating companies, Duke Energy Carolinas, Duke Energy Ohio, Duke Energy Indiana, Duke Energy Kentucky, Progress Energy Carolinas and Progress Energy Florida, Duke Energy Corporation operates more than 58,000 MW of regulated electric generation and 8,100 MW of unregulated electric generation in the United States. A diverse fuel mix of nuclear, coal-fired, hydro-electric and combustion-turbine generation allows Duke Energy Corporation to provide this generating capacity to more than 7 million electric and 0.5 million gas customers located in the combined service territories of these operating companies. Duke Energy Corporation is a Fortune 250 company, and its shares are publicly held and listed for trading on the New York Stock Exchange under the symbol DUK."</p>
LNP-030	LNP	1		01.01	Progress Energy - Duke Energy merger	<p>Revise Section 1.1, "General Information," to replace the fifth paragraph with the following paragraph to reflect the merged Progress Energy-Duke Energy corporation's applications for new nuclear plants:</p> <p>"In addition to this Combined License Application (COLA) for LNP 1 and 2, Progress Energy Carolinas submitted a COLA in 2008 to construct and operate two AP1000 nuclear units at the Shearon Harris Nuclear Power Plant site near Raleigh, North Carolina and Duke Energy Carolinas submitted a COLA in 2007 to construct and operate two AP1000 nuclear units at the Lee Nuclear site in Cherokee County, South Carolina."</p>
LNP-002	LNP	1		01.01.03	Progress Energy - Duke Energy merger	<p>Revise Section 1.1.3, "Description of Business Occupation of Applicant," first paragraph, to reflect the Progress Energy-Duke Energy merger, specifically to describe the merged company, as follows:</p> <p>"Progress Energy, Inc. is a holding company that includes regulated subsidiaries, Progress Energy Florida, Inc. (PEF) and Progress Energy Carolinas, Inc. (PEC). Progress Energy, Inc. is now a wholly-owned subsidiary of Duke Energy Corporation. PEF is primarily engaged in the generation, transmission, distribution, and sale of electricity in portions of central and north Florida. PEF serves approximately 1.7 million customers in a territory encompassing over 20,000 square miles, including the cities of St. Petersburg, Clearwater, and areas surrounding Orlando."</p>
LNP-031	LNP	1		01.01.03	Progress Energy - Duke Energy merger	Revise Section 1.1.3, "Description of Business Occupation of Applicant," to delete the third paragraph and associated bullets that discuss the PEC nuclear plants and only discuss the PEF nuclear plant based on the Progress Energy-Duke Energy merger.
LNP-032	LNP	1		01.01.03	Progress Energy - Duke Energy merger	Revise Section 1.1.3, "Description of Business Occupation of Applicant," fourth paragraph, first sentence, to clarify that the holding company, PGN, is being discussed by adding ", Inc.," following "Progress Energy."
LNP-065	LNP	1		01.01.03	Progress Energy - Duke Energy merger	Revise Section 1.1.3 to delete the last paragraph.
LNP-003	LNP	1		01.01.04	Progress Energy - Duke Energy merger	<p>Revise Section 1.1.4, "Organization and Management of Applicant," to reflect the Progress Energy-Duke Energy merger, specifically ownership information and update the company directors and officers, and associated titles and addresses. Revise the first two paragraphs of Section 1.1.4 to read as follows:</p> <p>"PEF is a corporation organized and existing under the laws of the State of Florida. PEF is a wholly-owned subsidiary of Progress Energy, Inc., which is a wholly-owned subsidiary of Duke Energy Corporation. The shares of common stock of Duke Energy Corporation are publicly traded and widely held. The directors and officers of Duke Energy Corporation are U. S. citizens. Neither Duke Energy Corporation, Progress Energy, Inc., nor PEF are owned, controlled, or dominated by any alien, foreign corporation, or foreign government. PEF makes this application on its own behalf and is not acting as an agent or representative of any other person.</p> <p>The names of Duke Energy Corporation directors and principal officers are listed below. The business address of the Duke Energy Corporation directors and principal officers is Duke Energy Corporation, 526 South Church Street, Charlotte, NC 28202. All persons listed are U. S. citizens."</p>

**Attachment 1 - LNP COLA Revision 5 Roadmap of Changes**

Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
						Revise Section 1.1.4, "Organization and Management of Applicant," to reflect the Progress Energy-Duke Energy merger, specifically ownership information and update the company directors and officers, and associated titles and addresses. Revise the list of company directors for the merged company to read as follows, and delete the column for individual addresses since the business address is supplied in the revised paragraph 2, above:
						John D. Baker IIJames B. Hyler, Jr.
						William Bamet IIIE. Marie McKee
						G. Alexander Bernhardt, Sr.E. James Reinsch
						Michael G. BrowningJames T. Rhodes
						Hamis. E DeLoach, Jr.James E. Rogers
						Daniel R. DiMiccoCarlos A. Saladrigas
						John H. ForsgrenPhilip R. Sharp
						Ann Maynard GrayTheresa M. Stone
LNP-033	LNP	1		01.01.04	Progress Energy - Duke Energy merger	James H. Hance, Jr.
						company directors and officers, and associated titles and addresses. Revise the list of principal officers for the merged company to read as follows, and delete the column for individual addresses since the business address is supplied in the revised paragraph 2, above:
						James E. Rogers Chairman, President, and Chief Executive Officer
						Lynn J. Good Executive Vice President - Finance and Chief Financial Officer
						Dhiaa Jamil Executive Vice President - Nuclear Generation and Chief Nuclear Officer
						Jeffrey (Jeff) J. Lyash Executive Vice President – Energy Supply
						Marc Manly Executive Vice President- General Counsel and Chief Legal Officer
						Lee Mazzocchi Senior Vice President - Innovation and Improvement/Chief Integration and Innovation Officer
						B. Keith Trent Executive Vice President - Regulated Utilities
						Bill Tyndall Senior Vice President and Special Policy Advisor
						Jennifer L. Weber Executive Vice President - Human Resources and Communications/Chief Human Resources Officer
						Lloyd M. Yates Executive Vice President - Customer Operations
LNP-034	LNP	1		01.01.04	Progress Energy - Duke Energy merger	Steven K Young Chief Accounting Officer and Controller
LNP-074	LNP	1		01.01.04	Progress Energy - Duke Energy merger	Section 1.1.4, in the table for Principal Officers revise the title to read "Principal Officers <sup>(a)</sup> " and add the following footnote at the bottom of the table:
						"a) Due to the recent merger, several principal officer positions are currently vacant. Efforts are underway to name individuals to these roles."
						Section 2.2, first paragraph, revise to read as follows:
LNP-075	LNP	1		2.02	Progress Energy - Duke Energy merger	"Progress Energy Florida, Inc. (PEF) is a wholly-owned subsidiary of Progress Energy, Inc., which is in turn a wholly-owned subsidiary of Duke Energy Corporation. Progress Energy Florida, Inc. is an electric utility as defined in 10 CFR 50.2. PEF generates and distributes electricity and recovers the cost of this electricity through cost-of-service based rates established by the FPSC, and FERC. Thus, as addressed in 10 CFR 50.33(f), estimates of operating costs for the first 5 years of operation are not required to be submitted."
Part 2						

**Attachment 1 - LNP COLA Revision 5 Roadmap of Changes**

Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
Pt 2, CH1						
LNP-036	LNP	2	1	01.01.T/T1.1-201	Progress Energy - Duke Energy merger	On Table 1.1-201, Sheet 23 of 33, delete the abbreviation "PGN Progress Energy, Inc."
LNP-037	LNP	2	1	01.01.T/T1.1-201	Progress Energy - Duke Energy merger	On Table 1.1-201, Sheet 6 of 33, add the abbreviation "DEC Duke Energy Corporation"
						On FSAR Table 1.1-201 add the following abbreviations:
						CLSM controlled low strength material
						E&I Environment and Infrastructure
						ECC-GC Extended Continental Crust-Gulf Coast
						GL ground level
						LLB Lower Lower Bound
						MESE Mesozoic and younger crustal region
						NMESE Mesozoic and older crustal region
						PEZ Paleozoic Extended Zone
						RLME repeated large magnitude earthquake
						SA Spectral Acceleration
						SECY NRC Office of the Secretary
						SSC Seismic Source Characterization
LNP-064	LNP	2	1	01.01.T/T1.1-201	Editorial	
						Revise the following activity dates to be consistent with May 1 filing of Levy Nuclear Project information with FL PSC:
						LNP 1 Start Finish
						Commence Construction (Safety-Related Activities) 3rd Quarter 2016 (or later)
						Fuel Load, Commence Start-Up 3rd Quarter 2023 (or later)
						Commence Operation 2nd Quarter 2024 (or later)
						LNP 2
						Commence Construction (Safety-Related Activities) 3rd Quarter 2016 (or later)
						Fuel Load, Commence Start-Up 1st Quarter 2025 (or later)
						Commence Operation 4th Quarter 2025 (or later)
LNP-038	LNP	2	1	01.01.05.T/T1.1-203	Update of Construction and Operation Dates per FL PSC filings	
						Revise the 2nd and 3rd paragraphs in Section 1.4.1, "APPLICANT - PROGRAM MANAGER" and add a 4th paragraph to reflect the Progress Energy-Duke Energy merger, as follows:
						"Progress Energy Florida, Inc., (PEF) is the applicant for Combined Licenses for Levy Nuclear Plant Units 1 and 2 (LNP 1 and 2) and will own and operate LNP 1 and 2. PEF is a subsidiary of Progress Energy, Inc., an energy company based in Raleigh, North Carolina. Progress Energy, Inc. is a wholly-owned subsidiary of Duke Energy Corporation, an energy company based in Charlotte, North Carolina. PEF provides electricity and related services in central and northern Florida. The company serves more than 1.7 million customers in Florida.
						Duke has over 45 years of experience in the design, construction and operation of nuclear power stations, and currently has twelve nuclear operating units.
LNP-004	LNP	2	1	01.04.01	Progress Energy - Duke Energy merger	Duke Energy Corporation (DEC), the largest electric power company in the United States, supplies and delivers energy to 7.1 million US customers. The company has over 58,000 megawatts of electric generating capacity in the Midwest, Florida and the Carolinas."
						Revise the entry for the Emergency Plan on Sheet 1 of 2 of table 1.6-201 to read as follows:
						Author/ Report Number Title Revision FSAR Section Document Transmittal ADAMS Accession Number
LNP-039	LNP	2	1	01.06.T/T1.6-201	Progress Energy - Duke Energy merger	EP LNP 1 and 2 Emergency Plan 4 13.3 July 2012 TBD
						Revise the entry for the QAPD on Sheet 2 of 2 of table 1.6-201 to read as follows:
						Author/ Report Number Title Revision FSAR Section Document Transmittal ADAMS Accession Number
LNP-040	LNP	2	1	01.06.T/T1.6-201	Progress Energy - Duke Energy merger	QAPD Progress Energy New Nuclear Plant Quality Assurance Program Description 5 17.5 July 2012 TBD

**Attachment 1 - LNP COLA Revision 5 Roadmap of Changes**

Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
LNP-096	LNP	2	1	1.08.T/T1.8-202 01.09.T/T1.9-201, T1.9-203, T1.9-204	Progress Energy - Duke Energy merger	FSAR Tables 1.8-202, 1.9-201, 1.9-203, and 1.9-204 correct references references to FSAR Chapter 13 subsections due to the deletion of Subsection 13.1.2.1.2:  Subsection 13.1.2.1.3 now 13.1.2.1.2 Subsection 13.1.2.1.4 now 13.1.2.1.3 Subsection 13.1.2.1.5 now 13.1.2.1.4 Subsection 13.1.2.1.6 now 13.1.2.1.5 Subsection 13.1.2.1.7 now 13.1.2.1.6
LNP-076	LNP	2	1	01.09.T/T1.9-201	NPD-NRC-2012-029, L-0998 response	FSAR table 1.9-201, based on the need to address Regulatory Guide 1.60 spectral shape in the FSAR, add the following subsections and tables in Table 1.9-201 under the entry for RG 1.60:  Table 2.0-201, 3.7.2.4.1.7, 3.7.2.8.1, 3.7.2.8.2, 3.7.2.8.3, Table 3.7-203
LNP-077 Pt 2, CH2	LNP	2	1	01.09.T/T1.9-201	NPD-NRC-2012-029, L-0998 response	Table 1.9-201, add the following subsections under the entry for RG 1.208, based on changes added per response to NRC RAI Letter 108:  2.5.2.7.3.3, 2.5.2.7.4.3, 2.5.2.7.4.4
LNP-201	LNP	2	2	Chapter 2 (All)	Editorial	Miscellaneous editorial changes throughout Chapter 2.
LNP-005	LNP	2	2	02.00 T / Table 2.0-201	NPD-NRC-2012-029, L-0998 response	Revise table 2.0-201 to include the new CEUS SSC evaluations in response to LNP-RAH-LTR-108 seismic question.  Revise 2.5.0.2 introductory paragraphs to read as follows: The selected starting point for developing the site specific ground motion assessments for the LNP site was the Probabilistic Seismic Hazard Analysis (PSHA) conducted by the EPRI SOG in the 1980s. Following guidance in the U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 1.208, the adequacy of the EPRI SOG hazard results was evaluated in light of new data and interpretations and evolving knowledge pertaining to seismic hazard evaluation in the central and eastern United States (CEUS). PSHA sensitivity analyses were conducted to test the effect of the new information on the seismic hazard. Using these results, a PSHA analysis was performed using an updated EPRI-SOG seismic source model. The results of that analysis were used to develop the site-specific design ground motions. The site-specific ground motions were scaled upward to meet 10 Code of Federal Regulations (CFR) Part 50 Appendix S requirements.
LNP-006	LNP	2	2	02.05.00.02	NPD-NRC-2012-029, L-0998 response	Sensitivity evaluations were performed using the CEUS Seismic Source Characterization (SSC) seismic source model (NUREG-2115) and the modified cumulative absolute velocity filter (CAV) (NRC Office of the Secretary [SECY]-2012-0025 Enclosure 7 – Attachment 1 to Seismic Enclosure 1) to show that the site-specific ground response spectra obtained using the CEUS SSC model are bounded by those using the updated EPRI-SOG model scaled to meet 10 CFR Part 50 Appendix S requirements. The CEUS SSC sensitivity evaluations are described in Subsection 2.5.2.7.  Revise section 2.5.0.2.8 to read: The final assessment of the surface UHRS was based on PSHA calculations that use CAV filtering in place of a fixed minimum magnitude. These UHRS were used to develop the GMRS.  The horizontal GMRS for the LNP site were developed using the performance based approach defined in NRC Regulatory Guide 1.208 (based on UHRS developed using CAV filtering). The computed GMRS corresponds to the minimum of 0.45 times the 10 5 UHRS. The vertical GMRS were developed by multiplying the horizontal GMRS by vertical/horizontal spectral ratios derived from the ratios recommended for western United States (WUS) rock and CEUS hard rock in NUREG/CR 6728. The final step was to scale the GMRS upward by a factor of 1.212 to meet the requirement of a minimum peak horizontal acceleration of 0.1 gravity acceleration (g) for the foundation input response spectra (FIRS) at the reactor foundation level. The horizontal and vertical site scaled GMRS are enveloped by the Westinghouse Certified Seismic Design Response Spectra (CSDRS).  Performance-based surface response spectra (PBSRS) and associated soil column outcropping response (SCOR) FIRS were developed using the site response analysis of profiles that extended to the design grade elevation. These spectra were scaled upward by a factor of 1.212 to meet the requirement of a minimum peak horizontal acceleration of 0.1 g for the FIRS at the reactor foundation level. These spectra are used to develop inputs for soil structure interaction (SSI) analyses. The scaled PBSRS are also enveloped by the Westinghouse CSDRS. Design grade (elevation 15.5 m [51 ft.]) SSI input response spectra were also developed. Three SSI input soil profiles were developed from the randomized soil profiles used to compute the PBSRS. These profiles accommodate the variability in the in-situ materials and the anticipated range in fill properties.
LNP-202	LNP	2	2	02.05.00.02.06	NPD-NRC-2012-029, L-0998 response	
LNP-007	LNP	2	2	02.05.02	NPD-NRC-2012-029, L-0998 response	Revise the first paragraph of 2.5.2 as follows: This subsection provides a detailed description of vibratory ground motion assessments that were carried out for LNP 1 and LNP 2. The subsection begins with a review of the approaches outlined in NRC Regulatory Guide 1.208 for conducting the vibratory ground motion studies. Following this review of the regulatory framework used for the project, results of the seismic hazard evaluation are documented and the site specific scaled GMRS for horizontal and vertical motions are developed. Sensitivity evaluations were also performed for the CEUS SSC source model (NUREG-2115) and the modified CAV filter (SECY-2012-0025 Enclosure 7 – Attachment 1 to Seismic Enclosure 1) to show that the site-specific ground response spectra (PBSRS and FIRS [EL +11 ft.]) obtained using the CEUS SSC model are bounded by those obtained using the updated EPRI-SOG model scaled to meet 10 CFR Part 50 Appendix S requirements. The updated EPRI-SOG methodology included the updated EPRI-SOG earthquake catalog through the end of 2006, and use of the UCSS. The CEUS SSC sensitivity evaluations are described in Subsection 2.5.2.7.
LNP-206	LNP	2	2	02.05.02	NPD-NRC-2012-029, L-0998 response	Add a new bullet to the end of the section as follows: • Sensitivity Evaluations for the CEUS SSC model (FSAR Subsection 2.5.2.7)
LNP-207	LNP	2	2	02.05.02.06.03	NPD-NRC-2012-029, L-0998 response	Add a new paragraph to the end of subsection 2.5.2.6.3 as follows: For site-specific evaluations and design (liquefaction evaluations, seismic interaction of the Annex Building, Turbine Building, and Radwaste Building with the Nuclear Island, and Soil Structure Interaction analysis of the Nuclear Island), scaled PBSRS and scaled FIRS described in Subsection 2.5.2.6.6 are used. The scale factor of 1.212 was used so that the horizontal FIRS has a zero period acceleration of 0.1 g as required by 10 CFR Part 50 Appendix S. To be consistent with the site-specific evaluations and design, the horizontal GMRS was also scaled by the 1.212 factor. The scaled horizontal GMRS is listed in Table 2.5.2-226 along with the 10-5 UHRS and is shown on Figure 2.5.2-294. The scaled horizontal GMRS represents the licensing basis for the LNP site.

**Attachment 1 - LNP COLA Revision 5 Roadmap of Changes**

Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
LNP-008	LNP	2	2	02.05.02.07	NPD-NRC-2012-029, L-0998 response	Add new section 2.5.2.7 as shown in the response to NRC LTR 108 (NPD-NRC-2012-029, L-0998 response).
LNP-203	LNP	2	2	02.05 (All)	NPD-NRC-2012-029, L-0998 response	Revisions to Subsection 2.5 to be consistent with the response to NRC LTR 108. Includes referring to the GMRS as "scaled" and to the EPRI-SOG seismic sources as the "updated EPRI-SOG".
LNP-204	LNP	2	2	02.05.02 / Table T2.5.2-226	NPD-NRC-2012-029, L-0998 response	Revise Table 2.5.2-226 as shown in NRC LTR 108 response.
LNP-205	LNP	2	2	02.05.02 / Table T2.5.2-232 T2.5.2-233 T2.5.2-234 T2.5.2-235	NPD-NRC-2012-029, L-0998 response	Add new tables 2.5.2-232, 2.5.2-233, 2.5.2-234, and 2.5.2-235 as shown in NRC LTR 108 response.
LNP-009	LNP	2	2	02.05.04.05.01.02	Errata to conform this information to other Grout Test Program changes incorporated in COLA R2	<p>COLA Part 2, FSAR Chapter 2, Subsection 2.5.4.5.1.2, the last two paragraphs will be revised from:</p> <p>The Grout Program will be accomplished in two phases. Prior to the excavation of the nuclear island foundations, grout holes will be drilled from the existing ground surface to the proposed bottom of the target grouted zone (approximately 150 ft bgs). The first phase will consist of drilling and grouting on 8-ft, center-to-center spacing with a relatively low mobility grout (LMG). This LMG helps to form a perimeter to contain the second phase of grouting. The LMG grouting includes the installation of the grout curtain below the diaphragm wall. The purpose of the grout curtain is to "extend" the diaphragm wall and form a border around the grouted zone. A high mobility grout (HMG) will be drilled and grouted on split-spacing between the LMG holes. The HMG will fill in the area defined by the LMG. This is considered the second phase of the Grout Program.</p> <p>State-of-the-practice computerized monitoring of all grouting will take place, including the measurement of grout take in terms of pressure and volume. A field test will be conducted prior to construction of this grouted zone to establish appropriate mixes for both the LMG and HMG and to confirm that the grout hole spacing is adequate. The 8-ft, grout hole spacing is currently based on experience in the industry. It is noted as a good starting point to be refined with a field test prior to and during construction.</p> <p>To read:</p> <p>Grouting will be performed prior to excavation. Grout holes will be drilled from, at, or near the existing ground surface to the proposed bottom of the target grouted zone (elevation -32 m [-99 ft.] NAVD88).</p> <p>State-of-the-practice computerized monitoring of all grouting will take place, including the measurement of grout taken in terms of pressure and volume.</p>
LNP-208	LNP	2	2	02.05.04.05.01.02.01	Errata to conform this information to other Grout Test Program changes incorporated in COLA R2	<p>Replace subsection 2.5.4.5.1.2.1 with the following text:</p> <p>The grouting operation will be conducted from, at, or near the existing ground surface by drilling boreholes from the surface down to the approximate elevation of -30.2 m (99 ft.) NAVD88. The top elevation of the grouted zone will be at elevation -7.3 m (-24 ft.) NAVD88, resulting in a 22.9-m (75-ft.) thick grouted zone.</p> <p>Grouting will generally be performed by the upstage method with pneumatic packers and a suite of grout mixes that range in viscosities from 35 seconds to over 80 seconds. Primary grout holes will be spaced on a 4.8-m (16-ft.) hexagonal pattern, and split spaced with secondary grout holes to achieve "no take" conditions.</p> <p>Provisions will be in place to perform additional split spacing to tertiary grout holes, as dictated by the performance of the production grouting. Effective grouting pressures will be limited to approximately 0.5 psi/ft. of depth, monitored using a grout intensity number (GIN) curve and penetrability curve developed during the Grout Test Program (described in FSAR Subsection 2.5.4.5.1.2.2). Hole spacing, grouting pressures, and acceptable grout takes will be established with the grout program. The target residual conductivity of the production grouting will be 15 Lugeons. Grouting is non-safety related; however, it will be performed under a quality program.</p>
LNP-211	LNP	2	2	02.05.04.05.04	NPD-NRC-2012-029, L-0998 response	<p>Revise third paragraph of 2.5.4.5.4 to read:</p> <p>The RCC bridging mat has been conceptually designed to bridge a 3 m (10 ft.) air filled cavity located immediately beneath the RCC (elevation 7.3 m [24 ft.] NAVD88) at any plan location for loading conditions identified in Subsection 2.5.4.10.1.1. In addition, a base shear load of 136,000 kips based on the AP1000 generic analysis was applied at the top of the RCC bridging mat. These loads are based on generic AP1000 analyses. The 1 year specified compressive strength (f<sub>c</sub>) of the RCC is 2500 psi. The design of the RCC bridging mat has considered a nominal tensile strength of 250 psi.</p>

**Attachment 1 - LNP COLA Revision 5 Roadmap of Changes**

Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
LNP-212	LNP	2	2	02.05.04.08.04	NPD-NRC-2012-029, L-0998 response	<p>Revise section 2.5.4.8.4 to read: Earthquake-induced cyclic stresses within soils considered for liquefaction analysis were computed from the site response analyses used to develop the site amplification functions for the PBSRS profiles described in Subsection 2.5.2.5. The site response analyses were performed using 60 randomized soil profiles representing each PBSRS shear wave velocity profile and 30 acceleration time histories representing each deaggregation earthquake (DE) listed in Table 2.5.2.225. In each individual site response analysis effective cyclic shear strains and iterated shear modulus were computed for each layer of the profile. The effective cyclic shear stress for each layer was then taken as the product of the effective cyclic shear strain and the iterated shear modulus. The results of the 180 analyses (60 randomized profiles times three deaggregation earthquakes) were then used to compute a weighted mean effective cyclic shear stress for each layer within each of the three PBSRS soil profiles and for the 10-4 and 10-5 exceedance level input motions. The weights used were the relative weights assigned to the DEs that are listed in Table 2.5.2.225.</p> <p>The results of the site response analyses were used to produce peak ground acceleration (PGA) seismic hazard results at the finished graded elevation computed without CAV for the 10-4 and 10-5 exceedance levels. These values were used to compute a performance based PGA at the finished grade elevation using Equations 2.5.2-215 through 2.5.2-217. The resulting acceleration value is 0.118g. The corresponding PGA at the base of the excavation (-24 ft. NAVD88) is 0.071g. These values along with the site class and the value of Fa based on the International Building Code (2006) are shown in Table 2.5.4.8-201.</p> <p>The development of the cyclic shear stress complies with the guidance in Regulatory Position 3.3.2 of Regulatory Guide 1.198 because an ensemble of time histories was used that represent the earthquakes contributing to the hazard at the LNP site. The development of the ensemble of time histories is described in Subsection 2.5.2.5.2. The time histories used to represent the DE were taken from NUREG/CR-6728 (Reference 2.5.2-263). The weighted mean magnitude for the earthquake time histories representing the high frequency (HF) 10-4 and 10-5 DEs are 6.8 and 6.1, respectively. Thus, these time histories also satisfy the acceptance criteria in SRP Section 2.5.2 in that weighted mean magnitudes for the ensembles of time histories exceed magnitude 6. The associated number of equivalent cycles of loading was estimated using the relationship between earthquake magnitude and number of loading cycles provided in Reference 2.5.4.8-203. The mb magnitudes listed in Table 2.5.2-225 for the HF DEs were converted to moment magnitudes using the relationships given in Subsection 2.5.2.4.2.3 and the resulting average moment magnitude was used to estimate the number of cycles for each DE using Figure 12 in Reference 2.5.4.8-203. The resulting weighted mean values are 9.4 cycles and 6.5 cycles for the HF 10-4 and 10-5 hazard levels, respectively.</p>
LNP-010	LNP	2	2	02.05.04.08.07	NPD-NRC-2012-029, L-0998 response	<p>Add new section 2.5.4.8.7 as follows: 2.5.4.8.7 Liquefaction Potential Evaluations for CEUS SSC</p> <p>The soils under the Nuclear Island will be excavated and backfilled with RCC; therefore, no liquefaction potential exists under the Nuclear Island foundation. For design basis evaluations of liquefaction potential of soil under the adjacent Annex, Turbine and Radwaste Buildings, earthquake-induced cyclic stresses in the soil column were based on ground motions computed for the PBSRS profile using the updated EPRI-SOG model. The associated PGA at the finished grade elevation is 0.118g (Table 2.5.4.8-201) and is based on the surface hazard curves computed without CAV. The PGA at the finished grade elevation computed without CAV using the CEUS SSC model is 0.091g. As the computed equivalent cyclic shear stresses are proportional to the PGA at the finished grade, the equivalent cyclic shear stresses based on the CEUS SSC model would be lower than those computed based on the updated EPRI-SOG model. Therefore, the liquefaction evaluations based on the updated EPRI-SOG LNP ground motions bound those from the CEUS SSC ground motions.</p> <p>For the site specific seismic margins evaluation presented in Subsection 19.55.6.3, liquefaction potential of soils under the adjacent Annex, Turbine and Radwaste Buildings, earthquake-induced cyclic stresses in the soil column, based on ground motions consistent with the updated EPRI-SOG finished grade 10-5 UHRS, were used. As shown in Figures 3.7-228 and 3.7-229, 1.67*GMRS and 1.67*PBSRS developed using the CEUS SSC methodology and modified CAV filter are enveloped by the updated EPRI-SOG finished grade 10-5 UHRS. Furthermore, the PGA for the 10-5 PBSRS profile surface motions computed without CAV using the CEUS SSC model are lower than those computed using the updated EPRI-SOG model. Thus, the High Confidence Low Probability of Failure (HCLPF) capacity for liquefaction potential of soil under the Annex, Turbine, and Radwaste Buildings exceeds the 1.67*GMRS goal for the plant level HCLPF for the CEUS SSC ground motions.</p>
LNP-213	LNP	2	2	02.05.02 / Table T2.5.4.8-201	NPD-NRC-2012-029, L-0998 response	<p>Update Table 2.5.4.8-201 as shown in RAI LTR 108 response: The amax is revised to "0.118." The amax note is revised to read: "amax = Horizontal peak acceleration at ground surface for the PBSRS profile with no CAV or scaling."</p>
LNP-214	LNP	2	2	02.05.07	NPD-NRC-2012-029, L-0998 response	Add a new reference 2.5.4.8-203 to Section 2.5.7 as follows: Seed H.B., Idriss I.M., Makdisi F., & Banerjee N., Representation of Irregular Stress Time Histories by Equivalent Uniform Stress Series in Liquefaction Analyses, Report No. EERC 75-29, October, 1975.
LNP-011	LNP	2	2	02.05.02 F / Figure(s)	NPD-NRC-2012-029, L-0998 response	Revise Figure 2.5.2-294 to show the Scaled GMRS.
LNP-209	LNP	2	2	02.05.02 F / Figure F2.5.2-296	NPD-NRC-2012-029, L-0998 response	Revise Figure 2.5.2-296 to show the Scaled GMRS.
LNP-210	LNP	2	2	02.05.02 F / Figures F2.5.2-312 through F2.5.2-358	NPD-NRC-2012-029, L-0998 response	Insert Figures 2.5.2-312 through 2.5.2-358 as shown in the NRC LTR 108 response.
LNP-012	LNP	2	2	02.05.04 F / Figure 02.05.04.05-201B	Consistency with FSAR text	Revise figure for consistency with FSAR text concerning boreholes; FSAR text does not require angled boreholes. Also clarify rock socket to show as continuous with rest of the drilled shaft.
LNP-013	LNP	2	2	02.05.04 F / Figure 02.05.04.05-202B	Consistency with FSAR text	Revise figure for consistency with FSAR text concerning boreholes; FSAR text does not require angled boreholes. Also clarify rock socket to show as continuous with rest of the drilled shaft.
LNP-014	LNP	2	2	02.05.04 F / Figure 02.05.04.08-201B	Consistency with FSAR text	Revise figure for consistency with FSAR text concerning boreholes; FSAR text does not require angled boreholes.



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Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
LNP-015	LNP	2	2	02.05.04 F / Figure 02.05.04.08-202B	Consistency with FSAR text	Revise figure for consistency with FSAR text concerning boreholes; FSAR text does not require angled boreholes.
LNP-016	LNP	2	2	02.05.04 F / Figure 02.05.04.08-208	Consistency with FSAR text	Revise figure for consistency with FSAR text concerning boreholes; FSAR text does not require angled boreholes.
LNP-017	LNP	2	2	02.05.04 F / Figure 02.05.04.08-210	Consistency with FSAR text	Revise figure for consistency with FSAR text concerning boreholes; FSAR text does not require angled boreholes.
<b>Pt 2, CH3</b>						
LNP-018	LNP	2	3	03.07.01.01.01 03.07.01.01.02	NPD-NRC-2012-029, L-0998 response	Revise FSAR Subsections 3.7.1.1.1 and 3.7.1.1.2 as identified in the L-0998 response to NRC RAI Letter 108, letter number NPD-NRC-2012-029.
						<p>Add new FSAR Subsection 3.7.2.4.1.7:</p> <p>3.7.2.4.1.7 Sensitivity Evaluations for Regulatory Guide 1.60 Spectra FIRS</p> <p>The Regulatory Guide 1.60 Foundation Input Response Spectra (FIRS) is anchored at peak ground accelerations for the scaled site-specific FIRS in Table 2.5.2-236 (0.1g horizontal and 0.0695g vertical). The scaled site-specific FIRS was developed using the updated EPRI SOG methodology and scaled to meet 10 CRF Part 50 Appendix S requirements. Tables 3.7-203 and 3.7-204 present the 5% damped site specific FIRS, the 5% damped Regulatory Guide 1.60 FIRS, and the ratio of the Regulatory Guide FIRS and the site specific FIRS at various frequencies for horizontal and vertical spectra respectively.</p> <p>Sensitivity evaluations were performed to assess whether the FRS at the six key locations using the Regulatory Guide 1.60 FIRS instead of the scaled site-specific FIRS remains bounded by the Certified Seismic Design Response Spectra (CSDRS) FRS. The sensitivity evaluations were performed using conservative simplified methodology by scaling the entire site specific FRS by the ratio of the Regulatory Guide 1.60 FIRS and the scaled site specific FIRS at the predominant response frequency at the node/direction. The predominant response frequency was determined from the peaks in the site specific FRS at each of the six nodes in the X, Y, and Z directions. The site specific FRS at the six nodes in the X, Y, and Z directions are shown in Figures 3.7-214, 3.7-215, 3.7-216, 3.7-217, 3.7-218, and 3.7-219. For this evaluation the lowest predominant response frequency is used because it will yield a larger scaling factor and is thus conservative. Table 3.7-205 presents the predominant response frequencies at the six key nodes in the X, Y, and Z directions, the ratio of the Regulatory Guide 1.60 FIRS and the scaled site specific FIRS at the predominant response frequency (scaling factor), and the minimum margin for site specific FRS with respect to the CSDRS FRS when the whole site specific FRS is scaled by the scaling factor for the predominant response frequency for the node and direction. Because the scaling factors to develop the Regulatory Guide 1.60 FRS are always smaller than the available margin with respect to the CSDRS FRS, the Regulatory Guide 1.60 FRS will be bounded by the CSDRS FRS. In addition, because the Regulatory Guide 1.60 spectra has only a small frequency content above 20 Hz. and no frequency content above 33 Hz., the Regulatory Guide 1.60 FRS peaks in the high frequency range (&gt;20 Hz.) will be lower than that obtained by the simple scaling used, thus providing additional margin with respect to the CSDRS FRS.</p> <p>As stated in Subsections 2.5.4.5.4 and 2.5.4.10.1.1, the conceptual design of the RCC bridging mat is based on a bearing pressure of 8.9 kips per square foot [ksf] for static loading and 24.0 ksf for dynamic loading. The static bearing pressure is based on DCD Tier 1 Table 5.0.1. The dynamic bearing pressure is the maximum subgrade pressure at the AP1000 basemat that results from the generic AP1000 analysis for soft rock sites. For the subsurface rock bearing capacity calculations, the RCC self weight was included as an additional bearing pressure load of 5.16 ksf. The buoyancy effects due to the hydrostatic pressure acting at the bottom of the RCC were considered in this analysis. A base shear load of 136,000 kips based on the AP1000 generic analysis was applied at the top of the RCC bridging mat. Because the AP1000 generic analyses are based on the CSDRS (0.3g Regulatory Guide 1.60 spectra enhanced in the high frequency region), the RCC design is conservative for the Regulatory Guide 1.60 FIRS.</p>
LNP-089	LNP	2	3	03.07.02.04.01.07	NPD-NRC-2012-029, L-0998 response	FSAR Subsection 3.7.2.8.1, add the following at the end of the sixth sentence of the second paragraph:
LNP-090	LNP	2	3	03.07.02.08.01	NPD-NRC-2012-029, L-0998 response	"for both the scaled Performance Based Surface Response Spectra (PBSRS) or the Regulatory Guide 1.60 spectra anchored at peak ground acceleration of 0.1g applied at the foundation elevation of the Annex Building as shown in Table 3.7-206."
LNP-091	LNP	2	3	03.07.02.08.02	NPD-NRC-2012-029, L-0998 response	<p>FSAR Subsection 3.7.2.8.2, second paragraph, revise the first sentence to read:</p> <p>"The computed probable maximum relative displacement between the NI and the Radwaste Building foundation mat is less than 2.5 cm (1 in.) for both the scaled PBSRS or the Regulatory Guide 1.60 spectra anchored at peak ground acceleration of 0.1g applied at the foundation elevation of the Radwaste Building as shown in Table 3.7-206."</p>
LNP-092	LNP	2	3	03.07.02.08.03	NPD-NRC-2012-029, L-0998 response	FSAR Subsection 3.7.2.8.3, second paragraph, revise the first sentence to read:
LNP-019	LNP	2	3	03.07.02.08.04	NPD-NRC-2012-029, L-0998 response	"The computed probable maximum relative displacement between the NI and the Turbine Building foundation mat is less than 2.5 cm (1 in.) for both the PBSRS or the Regulatory Guide 1.60 spectra anchored at peak ground acceleration of 0.1g applied at the foundation elevation of the Turbine Building as shown in Table 3.7-206."
LNP-093	LNP	2	3	03.07 T / Table T3.7-203, T3.7-204, T3.7-205, T3.7-206	NPD-NRC-2012-029, L-0998 response	Revise FSAR Section 03.07.02.08.04 as identified in the L-0998 response to NRC RAI Letter 108, letter number NPD-NRC-2012-029.
LNP-020	LNP	2	3	03.07 F / Figure(s)	NPD-NRC-2012-029, L-0998 response	<p>Insert new Tables 3.7-203, 3.7-204, 3.7-205, and 3.7-206</p> <p>Add FSAR Figures 3.7-228 and 3.7-229 as identified in the L-0998 response to NRC RAI Letter 108, letter number NPD-NRC-2012-029. Also update the Chapter 3 Table of Contents and List of Figures as necessary.</p>

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Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
LNP-041 Pt 2, CH8	LNP	2	8	08.02.01	Consistency with DCD Rev 19	Revise the reference in Section 8.2.1 to refer directly to the National Electric Safety Code referenced in the DCD. Specifically, revise the 1st paragraph on page 8.2-2 from: The LNP 1 and LNP 2 transmission lines are designed to meet NESC C2 2007, "National Electrical Safety Code" (Reference 201). To read: The LNP 1 and LNP 2 transmission lines are designed to meet or exceed the requirements of the ANSI C2 National Electrical Safety Code (DCD Section 8.2.6 Reference 1).
LNP-042	LNP	2	8	08.02.01.01.03	Progress Energy - Duke Energy merger	In the first paragraph of Section 8.2.1.1.3, change "Transmission Operations and Planning Department" to "Transmission Department".
LNP-043	LNP	2	8	08.02.01.04	Progress Energy - Duke Energy merger	In the second paragraph of Section 8.2.1.4, change "Transmission Operations and Planning Department" to "Transmission Department".
LNP-044	LNP	2	8	08.02.01.04	Progress Energy - Duke Energy merger	Revise the third paragraph of FSAR Subsection 8.2.1.4 to read:  An individual is assigned from the LNP engineering organization to serve as the Switchyard System Engineer (SSE) and an individual is assigned from the LNP maintenance organization to serve as the Plant Transmission Activities Coordinator (PTAC). The oversight responsibilities described below are coordinated and extend beyond the switchyard boundary to include the transmission lines, structures, and relaying from the nuclear plant out to and including the first remote circuit breakers at the opposite end of the transmission lines. The responsibilities include, but are not limited to the following:  <ul style="list-style-type: none"> <li>• Serve as the single point of contact for transmission maintenance activities impacting LNP 1 and 2 . (PTAC)</li> <li>• Interface with the local transmission area maintenance and Transmission Asset Management personnel. Monitor inspection schedules, results of inspections and tests, equipment material conditions, and maintenance backlogs to ensure that (SSE): <ul style="list-style-type: none"> <li>- Appropriate inspections and testing are performed on schedule to ensure reliability.</li> <li>- Results are analyzed and appropriately prioritized actions are taken to resolve any negative findings.</li> <li>- Defective equipment is replaced or repaired before reliability is affected.</li> </ul> </li> <li>• Serve as the liaison regarding transmission maintenance interfaces between the nuclear plant organizations and other organizations. (PTAC)</li> <li>• Coordinate transmission engineering activities requiring pre-planning and scheduling among various nuclear and non-nuclear organizations including, but not limited to (SSE): <ul style="list-style-type: none"> <li>- Transmission Engineering</li> <li>- Power System Operations</li> </ul> </li> <li>• Provide system engineering oversight of the switchyard, off-site transmission lines through the next remote circuit breakers, and on-site equipment (transformers, circuit breakers, etc.) that Transmission services. (SSE)</li> </ul>
LNP-045	LNP	2	8	08.02.01.04	Errata	Revise the 1st bullet in the 8th paragraph of Section 8.2.1.4 from: Maintenance and testing interval schedules have been developed for maintenance of substation equipment. The equipment/programs included are as follows: • Air break switches and ground switches To read: Maintenance and testing interval schedules have been developed for maintenance of substation equipment. The equipment/programs included are as follows: • Air break switches
LNP-046 Pt 2, CH11	LNP	2	8	08.03.04	Consistency with DCD Rev 19	Delete Reference 201 in Section 8.3.4 and replace with "Not used" since Section 8.2.1 is being revised to refer to the DCD reference directly.
LNP-047	LNP	2	11	11.04	Progress Energy - Duke Energy merger	In the last paragraph on page 11.4-2, change "Progress Energy" to "Duke Energy"
LNP-048	LNP	2	11	11.05	Progress Energy - Duke Energy merger	In the last paragraph on page 11.5-1, change "Progress Energy" to "Duke Energy"
LNP-049	LNP	2	11	11.05	Progress Energy - Duke Energy merger	In the last paragraph on page 11.5-1, change "Progress Energy Nuclear Generation Group fleet program" to "Duke Energy program"
LNP-050 Pt 2, CH13	LNP	2	11	11.05	Progress Energy - Duke Energy merger	In the first paragraph on page 11.5-2, change "Progress Energy" to "Duke Energy"
LNP-097	LNP	2	9	09.05.01.08.01.02 09.05.01.08.07 09.05.T/T9.5-201	Progress Energy - Duke Energy merger	References to Chapter 13 subsections have been revised due to the deletion of Subsection 13.1.2.1.2. The references to Subsection 13.1.2.1.4.9 are revised to 13.1.2.1.3.9 and the references to Subsection 13.1.2.1.7 are revised to 13.1.2.1.6.

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Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
LNP-081	LNP	2	13	13.01.01.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.1, add the following sentence after the third sentence in the first paragraph: "The Executive Vice President - Energy Supply is responsible for implementing the quality policy and program for the activities associated with the construction of new nuclear generation plants as defined in the interface agreement between Nuclear Generation and Energy Supply."
LNP-082	LNP	2	13	13.01.01.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.1, add the following sentences to the end of the second to last paragraph: "Organizational control and responsibility for systems, structures and components transfers from Energy Supply to Nuclear Generation at system turnover following completion of construction activities. All construction activities must be complete and control transferred from Energy Supply to Nuclear Generation prior to loading of fuel."
Do 33	LNP	2	13	13.01.01.02	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2, first paragraph, insert "Senior" in front of "Vice President - Nuclear Engineering"
Do 34	LNP	2	13	13.01.01.02.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.1, second paragraph, insert "Senior" in front of "Vice President - Nuclear Engineering"
Do 35	LNP	2	13	13.01.01.02.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.1, first paragraph, second sentence replace "These groups are" with "This organization is"
LNP-072	LNP	2	13	13.01.01.02.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.1, fourth paragraph change "Reactor fuels engineering" to "Nuclear fuels engineering"
LNP-068	LNP	2	13	13.01.01.02.06	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.6, first paragraph, last sentence, change "the Plant General Manager" to "the Vice President -Corporate Governance & Operations Support"
LNP-069	LNP	2	13	13.01.01.02.08	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.8, add the following sentence after the first sentence in the first paragraph: "The functional manager in charge of maintenance is responsible for monitoring maintenance programs for overall performance and effectiveness." In addition, in the last sentence of the first paragraph revise "the Plant General Manager" to read "the Vice President - Corporate Governance and Operations Support"
LNP-070	LNP	2	13	13.01.01.02.08	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.8, move the second and third sentences in the first paragraph to become the new second paragraph and revise the second sentence (first sentence of the new second paragraph) to read: "The site maintenance organizations including planners, schedulers, and parts specialists prepare work packages, acquire proper parts, and develop procedures that provide for the successful completion of maintenance tasks."
LNP-071	LNP	2	13	13.01.01.02.08	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.8, add the following sentence to the end of the new second paragraph referred to in LNP-070: "The site Manager - Maintenance reports to the Plant General Manager."
Do 5	LNP	2	13	13.01.01.02.10	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.10, first paragraph, fifth sentence, change "Supervisor" to "supervisor"
Do 6	LNP	2	13	13.01.01.02.10	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.10, first paragraph, sixth sentence, change "Supervisor" to "supervisor"
Do 7	LNP	2	13	13.01.01.02.10	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.10, first paragraph, seventh sentence, change "Lead Engineer" to "lead engineer"
Do 8	LNP	2	13	13.01.01.02.11	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.11, first paragraph, fifth sentence, change "Supervisor" to "supervisor"
Do 1	LNP	2	13	13.01.01.02.11	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.2.11, first paragraph, fifth sentence, change "Functional Manager" to "functional manager"
LNP-083	LNP	2	13	13.01.01.03.01.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.1, add the following to the end of the last sentence: "and the Executive Vice President - Energy Supply via an interface agreement with Nuclear Generation."
LNP-084	LNP	2	13	13.01.01.03.01.02	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.2, revise the third sentence to read: "The CNO is responsible for oversight of activities at each of the operating nuclear units in the system and new nuclear plants under construction."
LNP-085	LNP	2	13	13.01.01.03.01.03	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.3, replace the second sentence with the following sentence: The Executive Vice President - Energy Supply has overall responsibility for the construction of new nuclear generation plants in accordance with this QAPD as defined in the interface agreement between Energy Supply and Nuclear Generation.
LNP-086	LNP	2	13	13.01.01.03.01.04	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.4, delete "directly" from the second sentence.
LNP-087	LNP	2	13	13.01.01.03.01.06	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.6, replace the first sentence with the following sentences: "Nuclear Oversight reports the results of their activities directly to the Executive Vice President - Nuclear Generation and Chief Nuclear Officer for Nuclear Generation Department activities. Nuclear oversight reports the results of their activities to both the Executive Vice President - Nuclear Generation and Chief Nuclear Officer and the Executive Vice President - Energy Supply for nuclear construction related activities."

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Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
Do 19	LNP	2	13	13.01.01.03.01.06 13.01.01.03.02.07	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.6, second sentence, replace "VP - NO" with "Vice President - Nuclear Oversight (VP - NO)"
Do 36	LNP	2	13	13.01.01.03.01.07	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.7, second paragraph, first sentence, change "Functional Supervisors" to "functional supervisors"
Do 24	LNP	2	13	13.01.01.03.01.07	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.7, last sentence, change "NG" to "nuclear"
Do 37	LNP	2	13	13.01.01.03.01.08	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.8, first paragraph, last sentence, delete "engineering"
Do 20	LNP	2	13	13.01.01.03.01.08	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.8, second paragraph, change "Supervisor" to "supervisor"
Do 25	LNP	2	13	13.01.01.03.01.09	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.9, first sentence, add "(CNO)" after "Chief Nuclear Officer"
Do 38	LNP	2	13	13.01.01.03.01.09	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.9, last paragraph, change "Vice President - LNP" to "Site Executive - LNP," change "Manager - Engineering Support" to "functional manager in charge of Engineering" and delete the Director - Site Operations (DSO)"
Do 26	LNP	2	13	13.01.01.03.01.10	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.1.10, change "chief nuclear officer" to "CNO"
Do 9	LNP	2	13	13.01.01.03.02.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.1, first paragraph, first sentence, change "Functional Superintendents" to "functional superintendents"
Do 10	LNP	2	13	13.01.01.03.02.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.1, first paragraph, second sentence, change "Functional Superintendents" to "functional superintendents"
Do 11	LNP	2	13	13.01.01.03.02.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.1, first paragraph, last sentence, change "Functional Superintendents" to "functional superintendents"
Do 12	LNP	2	13	13.01.01.03.02.01.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.1.1, first paragraph, first sentence, change "Functional Superintendents" to "functional superintendent"
Do 13	LNP	2	13	13.01.01.03.02.01.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.1.1, second paragraph, first sentence, change "Functional Superintendents" to "functional superintendent"
LNP-073	LNP	2	13	13.01.01.03.02.01.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.1.1, first paragraph, revise last sentence from:  "Plant engineering staff includes reactor engineering as discussed in Subsection 13.1.1.2.1."  To read:  "Plant engineering staff includes reactor engineering with technical support available from nuclear fuels engineering as discussed in Subsection 13.1.1.2.1."
Do 14	LNP	2	13	13.01.01.03.02.01.02	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.1.2, first sentence, change "Functional Supervisors" to "functional supervisors"
Do 15	LNP	2	13	13.01.01.03.02.02	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.2, third sentence, change "Functional Supervisors" to "functional supervisors"
Do 2	LNP	2	13	13.01.01.03.02.03.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.3.1, last paragraph, change "Functional Manager" to "functional manager"
Do 23	LNP	2	13	13.01.01.03.02.03.02	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.3.2, add "Functional" in front of "Supervisor" in last sentence.
Do 39	LNP	2	13	13.01.01.03.02.03.03, 13.01.01.03.02.06	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.3.3, in title add "Functional" in front of "Supervisor"
Do 21	LNP	2	13	13.01.01.03.02.03.03	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.3.6, last sentence change "corporate Director - Nuclear Protective Services" to "functional corporate manager in charge of Protective Services"
Do 22	LNP	2	13	13.01.01.03.02.03.04	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.3.3, add "Functional" in front of "Supervisor" in last sentence.
Do 16	LNP	2	13	13.01.01.03.02.05	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.3.4, add "Functional" in front of "Supervisor" in last sentence.
Do 17	LNP	2	13	13.01.01.03.02.05	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.5, first paragraph, first sentence, change "Functional Supervisors" to "functional supervisors"
Do 18	LNP	2	13	13.01.01.03.02.07	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.5, last sentence, change "Functional Supervisors" to "functional supervisors"
Do 40	LNP	2	13	13.01.01.03.02.07	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.7, first paragraph, first sentence, change "Functional Supervisors" to "functional supervisors"
Do 41	LNP	2	13	13.01.02.01.01	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.1.3.2.7, last sentence add "Nuclear" in front of "Information Technology"
Do 42	LNP	2	13	13.01.02.01.02	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.2.1.1, change section number from "13.1.1.3.1.7" to "13.1.1.3.1.8"
Do 43	LNP	2	13	13.01.02.01.03	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.2.1.2, last paragraph change section number from "13.1.2.1.4.4" to "13.1.2.1.3.4"
Do 44	LNP	2	13	13.01.02.01.03	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.2.1.3, third paragraph change first section number from "13.1.2.1.4.4" to "13.1.2.1.3.4"
						FSAR Subsection 13.1.2.1.3, third paragraph change the second section number from "13.1.2.1.4.8" to "13.1.2.1.3.8"

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Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
Do 45	LNP	2	13	13.01.02.01.03.07	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.2.1.3.7, last paragraph change section number from "13.1.2.1.5" to "13.1.2.1.4"
Do 27	LNP	2	13	13.01.02.01.03.09	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.2.1.3.9, last paragraph change "Vice President – LNP" to "Site Executive – LNP"
Do 46	LNP	2	13	13.01.02.01.03.09	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.2.1.3.9, revise the first sentence of the last paragraph to read: "The Supervisor – Fire Protection reports independently to the Site Executive – LNP who has ultimate responsibility for fire protection of the plant."
Do 47	LNP	2	13	13.01.02.01.03.09	Progress Energy - Duke Energy merger	FSAR Subsection 13.1.2.1.3.9, add the following sentence before the first sentence of the last paragraph: "The Supervisor – Fire Protection reports to the functional superintendent in charge of Design Engineering"
Do 48	LNP	2	13	13.01.T/T13.1-201	Progress Energy - Duke Energy merger	Table 13.1-201 (sheet 1) – under "Nuclear Plant Position (Site-Specific) column "Senior in front of "Vice President – Nuclear Plant Development"
Do 31	LNP	2	13	13.01.T/T13.1-201	Progress Energy - Duke Energy merger	Table 13.1-201 for Plant Management, Executive – change "Vice President – LNP" to "Site Executive – LNP"
Do 49	LNP	2	13	13.01.T/T13.1-201	Progress Energy - Duke Energy merger	Table 13.1-201 (sheet 1) – "Expected Positions Single Unit" column for Functional Manager in charge of Levy Engineering change "1" to "2"
Do 50	LNP	2	13	13.01.T/T13.1-201	Progress Energy - Duke Energy merger	Table 13.1-201 (sheets 2 through 7) change column heading from "Expected Addition Positions Single Unit" to "Expected Positions Single Unit"
Do 51	LNP	2	13	13.01.T/T13.1-201	Progress Energy - Duke Energy merger	Table 13.1-201 (sheet 2) – "Expected Positions Single Unit" column for Functional Superintendent in charge of Design Engineering change "0" to "1"
Do 52	LNP	2	13	13.01.T/T13.1-201	Progress Energy - Duke Energy merger	Table 13.1-201 (sheet 2) – "Expected Positions Single Unit" column for Functional Superintendent in charge of Technical Services change "1" to "0"
Do 53	LNP	2	13	13.01.T/T13.1-201	Progress Energy - Duke Energy merger	Table 13.1-201 (sheet 2) – "Nuclear Plant Position" column for "Functional Superintendent in charge of Technical Services" change to "Functional Superintendent in charge of Levy Engineering"
LNP-051	LNP	2	13	13.01.F/F13.1-201	Progress Energy - Duke Energy merger	Revise Plant Management organization chart to reflect positions and titles associated with merged Progress Energy-Duke Energy organization
LNP-052	LNP	2	13	13.01.F/F13.1-202	Progress Energy - Duke Energy merger	Revise Shift Operations organization chart to reflect positions and titles associated with merged Progress Energy-Duke Energy organization
LNP-053	LNP	2	13	13.01.F/F13.1-203	Progress Energy - Duke Energy merger	Revise Corporate and Engineering organization chart to reflect positions and titles associated with merged Progress Energy-Duke Energy organization
						FSAR Subsection 13AA.1.1.1.1.8, add the following sentence as the new second sentence:
LNP-088	LNP	2	13	13AA.01.01.01.01.08	Progress Energy - Duke Energy merger	"The Executive Vice President - Energy Supply is responsible for establishing and implementing the quality policy and program for the activities associated with the construction of new nuclear generation plants as defined in the interface agreement between Nuclear Generation and Energy Supply."
Do 32	LNP	2	13	13AA.01.01.01.02.01	Progress Energy - Duke Energy merger	FSAR Subsection 13AA.1.1.1.2.1, change "Manager – Engineering and Support" to "Functional Superintendent – Design Engineering"
LNP-054	LNP	2	13	13AA.F/F13AA-201	Progress Energy - Duke Energy merger	Revise Construction Management organization chart to reflect positions and titles associated with merged Progress Energy-Duke Energy organization
LNP-055	LNP	2	13	13.01	Progress Energy - Duke Energy merger	Revise Section 13.1 to reflect positions, titles, and functional descriptions associated with merged Progress Energy-Duke Energy organization
LNP-056	LNP	2	13	13.07	Progress Energy - Duke Energy merger	Change PGN to Duke in bulleted paragraphs at the bottom of page 13.7-1 and the top of page 13.7-2
LNP-057	LNP	2	13	13AA	Progress Energy - Duke Energy merger	Revise Section 13AA to reflect positions, titles, and functional descriptions associated with merged Progress Energy-Duke Energy organization
LNP-058	LNP	2	14	14.02.02.01.01	Progress Energy - Duke Energy merger	Change "VP-Operational Readiness" to "VP-Nuclear Development"
Pt 2, CH14						
LNP-059	LNP	2	14	14.02	Progress Energy - Duke Energy merger	In the first paragraph on page 14.2-15, change "VP-LNP" to "Site Executive in charge of LNP"
Pt 2, CH19						
LNP-021	LNP	2	19	19.55.06.03	NPD-NRC-2012-029, L-0998 response	Revise FSAR Section 19.55.6.3 as identified in the L-0998 response to NRC RAI Letter 108, letter number NPD-NRC-2012-029
LNP-022	LNP	2	19	19.55 T / Table 19.55-201	NPD-NRC-2012-029, L-0998 response	Revise FSAR Section 19.55, Table 19.55-201 as identified in the L-0998 response to NRC RAI Letter 108, letter number NPD-NRC-2012-029
Part 5						
LNP-061						
LNP-078	LNP	5			Progress Energy - Duke Energy merger	Revise the LNP Emergency Plan to update position titles and organizational alignments to post-merger structure.
Part 9						
LNP-035	LNP	1		9.01	Progress Energy - Duke Energy merger	Revise Part 1, Section 2.01 (Part 9, Section 9.1) to address that PEF is a wholly owned subsidiary of Duke Energy Corporation. This information is withheld under 10 CFR 2.390 and is incorporated in Part 9 of the COLA.
LNP-066	LNP	9		09.01	Progress Energy - Duke Energy merger	Revise Part 1, Section 2.01 (Part 9, Section 9.1), first bullet, to address updated construction cost estimates that are consistent with the April 30, 2012 Florida Public Service Commission Filing. This information is withheld under 10 CFR 2.390 and is incorporated in Part 9 of the COLA.
LNP-067	LNP	9		09.01	Progress Energy - Duke Energy merger	Section 9.1 – Add a the following to the end of the last bullet at the bottom of page 2-2 (page 3 of 6): the latest published Duke Energy Annual Report as of 12/31/11 is available at <a href="http://www.duke-energy.com/pdfs/DukeEnergy_2011_AR-10k.pdf">http://www.duke-energy.com/pdfs/DukeEnergy_2011_AR-10k.pdf</a>

**Attachment 1 - LNP COLA Revision 5 Roadmap of Changes**

Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
LNP-080	LNP	9		09.01	Progress Energy - Duke Energy merger	Revise Part 9 as follows:  (1) Section 9.1 (page 1 of 7) – change "two" pages to "three" pages. (2) Section 9.1 – Revise Section 2.1, 2nd bullet, PEF Nuclear Financing Plan, to reflect the merger between Progress Energy and Duke Energy.
LNP-079	LNP	9		09.02	Incorporation of updated FL State Emergency Preparedness Annex	Replace the State of Florida Radiological Emergency Preparedness Annex A dated July 2008 with the revised State of Florida Radiological Emergency Preparedness Annex dated November 2011. Section 9.2 (page 5 of 7): Revise the 4th bullet to read: "State of Florida Radiological Emergency Preparedness Annex (Annex to State Comprehensive Emergency Management Plan)" to be consistent with the cover page for this document and delete reference to revision date consistent with the other bullets. Also, add this change to the roadmap.
<b>Part 10</b>						
LNP-025	LNP	10		LC #12	NPD-NRC-2012-014 & NPD-NRC-2012-019	Add the following to COLA Part 10 License Conditions after item 11, Emergency Planning Actions, to support addition of new license conditions proposed in response to LNP-RAI-LTR-108 in PGN letters NPD-NRC-2012-014 and NPD-NRC-2012-019:  12. FUKUSHIMA RESPONSE ACTIONS: The implementation of applicable Fukushima response actions not completed prior to license issuance will be the subject of the following license condition: PROPOSED LICENSE CONDITION: Add proposed new license condition 12.A for mitigation strategies for beyond-design-basis external events in accordance with NPD-NRC-2012-014 (L-0999 response): 12.A. MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS  Prior to initial fuel load, PEF shall address the following requirements:  a. PEF shall develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment and spent fuel pool cooling capabilities following a beyond-design-basis external event. b. These strategies must be capable of mitigating a simultaneous loss of all ac power and loss of normal access to the normal heat sink and have adequate capacity to address challenges to core cooling, containment, and spent fuel pool cooling capabilities at all units on the LNP site. c. PEF must provide reasonable protection for the associated equipment from external events. Such protection must demonstrate that there is adequate capacity to address challenges to core cooling, containment, and spent fuel pool cooling capabilities at all units on the LNP site. d. PEF must be capable of implementing the strategies in all modes. e. Full compliance shall include procedures, guidance, training, and acquisition, staging, or installing of equipment needed for the strategies.  PEF shall within one (1) year after issuance of the LNP COL, submit to the NRC for review an overall integrated plan, including a description of how compliance with the requirements described in this license condition will be achieved.
LNP-026	LNP	10		LC #12	NPD-NRC-2012-014, L-0999 response (modified based on later NRC input)	PEF shall provide to the NRC an initial status report sixty (60) days following issuance of the LNP COL and at six (6) month intervals following submittal of the overall integrated plan described above which delineates progress made in implementing the requirements of this license condition.

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Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
						<p>Add proposed new license condition 12.B for reliable spent fuel pool level instrumentation in accordance with NPD-NRC-2012-014 (L-1000 response):</p> <p><b>B. RELIABLE SPENT FUEL POOL LEVEL INSTRUMENTATION</b></p> <p>Prior to initial fuel load, PEF will fully implement the following requirements for spent fuel pool level indication.</p> <p>a. The spent fuel pool level instrumentation shall include the following design features:</p> <ol style="list-style-type: none"> <li>1. Arrangement: The spent fuel pool level instrument channels shall be arranged in a manner that provides reasonable protection of the level indication function against missiles that may result from damage to the structure over the spent fuel pool. This protection may be provided by locating the safety-related instruments to maintain instrument channel separation within the spent fuel pool area, and to utilize inherent shielding from missiles provided by existing recesses and corners in the spent fuel pool structure.</li> <li>2. Qualification: The level instrument channels shall be reliable at temperature, humidity, and radiation levels consistent with the spent fuel pool water at saturation conditions for an extended period.</li> <li>3. Power supplies: Instrumentation channels shall provide for power connections from sources independent of the plant alternating current (ac) and direct current (dc) power distribution systems, such as portable generators or replaceable batteries. Power supply designs should provide for quick and accessible connection of sources independent of the plant ac and dc power distribution systems. Onsite generators used as an alternate power source and replaceable batteries used for instrument channel power shall have sufficient capacity to maintain the level indication function until offsite resource availability is reasonably assured.</li> <li>4. Accuracy: The instrument shall maintain its designed accuracy following a power interruption or change in power source without recalibration.</li> <li>5. Display: The display shall provide on-demand or continuous indication of spent fuel pool water level.</li> </ol> <p>b. The spent fuel pool instrumentation shall be maintained available and reliable through appropriate development and implementation of a training program. Personnel shall be trained in the use and the provision of alternate power to the safety-related level instrument channels.</p> <p>PEF shall within one (1) year after issuance of the LNP COL, submit to the NRC for review an overall integrated plan, including a description of how compliance with the requirements described in this license condition will be achieved.</p>
LNP-027	LNP	10		LC #12	NPD-NRC-2012-014, L-1000 response	<p>PEF shall provide to the NRC an initial status report sixty (60) days following issuance of the LNP COL and at six (6) month intervals following submittal of the overall integrated plan described above which delineates progress made in implementing the requirements of this license condition.</p>
						<p>Add proposed new license condition 12.C for emergency planning actions in accordance with NPD-NRC-2012-019 (L-1002 response):</p> <p><b>C. EMERGENCY PLANNING ACTIONS</b></p> <p>Communications:</p> <p>At least two (2) years prior to scheduled initial fuel load, PEF shall have performed an assessment of on-site and off-site communications systems and equipment required during an emergency event to ensure communications capabilities can be maintained during prolonged station blackout conditions. The communications capability assessment will be performed in accordance with NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities", Revision 0.</p> <p>At least one hundred eighty (180) days prior to scheduled initial fuel load, PEF shall complete implementation of corrective actions identified in the communications capability assessment described above, including any related emergency plan and implementing procedure changes and associated training.</p> <p>Staffing:</p> <p>At least two (2) years prior to scheduled initial fuel load, PEF shall have performed assessments of the on-site and augmented staffing capability to satisfy the regulatory requirements for response to a multi-unit event. The staffing assessments will be performed in accordance with NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities", Revision 0.</p>
LNP-028	LNP	10		LC #12	NPD-NRC-2012-019, L-1002 response (modified based on later NRC input)	<p>At least two (2) years prior to scheduled initial fuel load, PEF shall revise the LNP Emergency Plan to include the following:</p> <ul style="list-style-type: none"> <li>• Incorporation of corrective actions identified in the staffing assessments described above.</li> <li>• Identification of how the augmented staff will be notified given degraded communications capabilities.</li> </ul>
LNP-062	LNP	10		Table 3.8-1, EP ITAAC, Sheet 29 of 29	Errata noted by NRC reviewer	<p>In the Acceptance Criteria column for ITAAC 14.0, Responsibility for the Planning Effort:</p> <p>Revise            "14.1.1 The LNP emergency response plan was forwarded to Florida Emergency Management, Citrus County Emergency Management, Levy County Emergency Management and Marion County Emergency Management."</p> <p>To Read:            "14.1 The LNP emergency response plan was forwarded to Florida Emergency Management, Citrus County Emergency Management, Levy County Emergency Management and Marion County Emergency Management."</p>
Part 11						
LNP-063	LNP	11		QAPD	Progress Energy - Duke Energy merger	Revise QAPD for changes to organization descriptions and associated figures for merger-related changes
LNP-094	LNP	11		QAPD	Progress Energy - Duke Energy merger	On page i update the QAPD revision to "Revision 5"

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Change ID#	COLA	COLA Part	Chapter	Section	Basis for Change	Change Summary
LNP-095	LNP	11		QAPD	Progress Energy - Duke Energy merger	Part 11A – Starting on the second page of this file, replace NGGM-PM-0033 Revision 4 with NGGM-PM-0033 Revision 5