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**Subject: Levy Nuclear Plant Units 1 and 2
Docket Nos. 52-029 and 52-030
Voluntary Submittal to Address NRC Question on Drilled Shaft Foundation
Design Criteria for Annex and Turbine Buildings**

Ladies and Gentlemen:

During a public meeting call on the Levy Nuclear Plant (LNP) project with the Nuclear Regulatory Commission (NRC) on July 25, 2013, the NRC staff identified a question with one of the comments provided by Duke Energy Florida (DEF) on Chapter 20 of the Advanced Safety Evaluation Report. The comment requested a change to a paragraph concerning the design requirements for the drilled shafts used to support the Annex, Radwaste and Turbine Buildings, in order to identify that the drilled shaft foundations are designed for a lateral seismic demand from site-specific analysis rather than a lateral seismic demand consistent with the AP1000 certified design demands.

A response to the NRC's question is provided in the enclosure to this letter. The enclosure also identifies changes that will be made in a future revision of the Levy Nuclear Plant Units 1 and 2 combined license application.

If you have any questions, or need additional information, please contact Bob Kitchen at (704) 382-4046, or me at (704) 382-9248.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 27th day of August, 2013.

Sincerely,

Christopher M. Fallon
Vice President
Nuclear Development

Enclosure

cc : U.S. NRC Region II, Regional Administrator
Mr. Donald Habib, U.S. NRC Project Manager

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NPD

NRC Question:

On July 9, 2013, Duke Energy Florida (DEF) provided a set of comments on Chapter 20 of the Advanced Safety Evaluation Report (ASER) for the Levy Nuclear Plant. Comment 6 of the comment package stated the following:

6. In Section 20.1.4.6.6 (page 20-22)

Change paragraph 4 to be consistent with the LNP FSAR Sections 2.5.4.10.1.1, 3.7.2.4.1.7, and 3.8.5.9

From:

"... The site-specific features, such as the RCC bridging mat and the drilled shaft foundations are designed to support seismic demands consistent with the AP1000 certified design demands, which exceed the site-specific demands at the LNP site with a substantial margin."

To:

"... The RCC bridging mat is designed (conceptual) to support seismic demands equal to or greater than the AP1000 generic seismic demand for soft rock sites, which exceed the site-specific demands at the LNP site. The drilled shaft foundations are designed (conceptual) for lateral seismic demand from site-specific analysis and vertical seismic demand from the AP1000 generic analysis."

If the change DEF is requesting to the ASER is correct, then why is this not a departure from the AP1000 DCD? The AP1000 generic design for adjacent buildings, such as the Seismic Category II portions of the Annex and Turbine Buildings, is based on the Certified Seismic Design Response Spectra (CSDRS) seismic response spectra for six soil profiles, and either the seismic Category II buildings must meet the requirements of the AP1000 CSDRS or a departure must be taken to specify the application of a site-specific seismic demand, such as that performed for the LNP site and used for the design of the drilled shaft foundations.

PGN Response:

The seismic Category II and nonsafety-related adjacent buildings (Turbine Building, Annex Building, and Radwaste Building) are supported on drilled shafts. LNP FSAR Subsection 3.8.5.9 discusses the design of the drilled shafts. However, the seismic demands used for the conceptual design of the drilled shafts are not discussed in the LNP FSAR.

LNP FSAR Figure 3.7-226 shows the conceptual design detail for the interface between the Nuclear Island (NI) and the drilled shaft supported foundation mat of the Turbine Building, Annex Building, and Radwaste Building. This design detail provides a 5.0 cm (2 in.) gap between the Turbine Building, Annex Building and Radwaste Building foundations and the NI, consistent with DCD Subsection 3.8.5.1. The standard plant (DCD) analysis for the maximum relative displacement of the Turbine Building, Annex Building, and Radwaste Building and the Nuclear Island was performed using the CSDRS seismic response spectra for six soil profiles as defined in the DCD. For LNP, a site-specific analysis for the maximum relative displacement of the Turbine Building, Annex Building, and Radwaste Building and the Nuclear Island was performed using the PBSRS response spectra, and determined that the displacement is less than the DCD limit of 5.0 cm (2 in.). This is documented in FSAR Table 3.7-206.

In the conceptual design of the drilled shafts, the vertical seismic demands are consistent with the AP1000 certified design demands. The AP1000 certified vertical seismic demands exceed the site-specific vertical seismic demands at the LNP site. As stated in FSAR Subsection 3.7.1.1.2, the Performance Based Surface Response Spectra (PBSRS), rather than the CSDRS, is used to compute the maximum relative horizontal displacements of the Turbine Building, Annex Building, and Radwaste Building drilled shaft foundations with respect to the Nuclear Island to evaluate the site-specific aspect of the seismic interaction of these buildings with the nuclear island. Thus, the drilled shafts are designed for the AP1000 certified design vertical seismic loads (e.g., CSDRS) and the site-specific horizontal seismic loads (e.g., PBSRS) to ensure that the maximum relative displacement of the foundation of these buildings and the NI remains within the DCD limit.

DEF concurs with the NRC observation that the use of the LNP site-specific PBSRS to compute the maximum relative horizontal displacements of the Turbine, Annex and Radwaste Buildings is a departure from the AP1000 DCD. The following provides proposed revisions to the LNP COL application (COLA) to add discussions on the seismic demands used for the conceptual design of the drilled shafts for the seismic Category II portions of the Annex and Turbine Buildings to the FSAR and to identify and describe the departure from the DCD in the FSAR and in COLA Part 7. These revisions will be incorporated into a future revision of the LNP COLA.

Associated LNP COL Application Revision:

1. Insert the following text as the fifth line item in FSAR Table 1.8-201, Summary of FSAR Departures from the DCD:

LNP DEP 3.7-1	Departure to address use of site-specific horizontal seismic response spectra for the design of drilled shafts that support the seismic Category II portions of the Annex and Turbine Buildings.	3.7.2.8.1 3.7.2.8.3
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2. Insert the following text as the first paragraph in FSAR Subsection 3.7.2.8.1, with a LMA of LNP DEP 3.7-1:

The drilled shaft foundations supporting the buildings adjacent to the nuclear island do not conform to one of the six soil types supporting these buildings that were analyzed in the AP1000 generic analysis. In the conceptual design of the drilled shafts supporting the seismic Category II portions of the Annex Building, the vertical seismic demands are consistent with the AP1000 certified design demands. The AP1000 certified vertical seismic demands exceed the site-specific vertical seismic demands at the LNP site. The PBSRS, rather than the AP1000 CSDRS based on the envelope of the six analyzed soil profiles, is used to compute the maximum relative horizontal displacement of the Annex Building drilled shaft foundations with respect to the Nuclear Island to evaluate the site-specific aspect of the seismic interaction of the seismic Category II portions of the Annex Building with the Nuclear Island. Thus, the drilled shafts are designed for the AP1000 certified design vertical seismic loads and the site-specific horizontal seismic loads and ensure that the maximum relative displacement of the foundation of this building and the Nuclear Island remains within the limits of the AP1000 generic design.

3. Insert the following text as the first paragraph in FSAR Subsection 3.7.2.8.3, with a

LMA of LNP DEP 3.7-1:

The drilled shaft foundations supporting the buildings adjacent to the nuclear island do not conform to one of the six soil types supporting these buildings that were analyzed in the AP1000 generic analysis. In the conceptual design of the drilled shafts supporting the seismic Category II portion of the Turbine Building, the vertical seismic demands are consistent with the AP1000 certified design demands. The AP1000 certified vertical seismic demands exceed the site-specific vertical seismic demands at the LNP site. The PBSRS, rather than the AP1000 CSDRS based on the envelope of the six analyzed soil profiles, is used to compute the maximum relative horizontal displacement of the Turbine Building drilled shaft foundations with respect to the Nuclear Island to evaluate the site-specific aspect of the seismic interaction of the seismic Category II portion of the Turbine Building with the Nuclear Island. Thus, the drilled shafts are designed for the AP1000 certified design vertical seismic loads and the site-specific horizontal seismic loads and ensure that the maximum relative displacement of the foundation of this building and the Nuclear Island remains within the limits of the AP1000 generic design.

4. Insert the following text in COLA Part 7 following the information for Departure LNP DEP 3.2-1 and preceding the information for Departure LNP DEP 3.11-1:

Departure Number LNP DEP 3.7-1

Affected DCD/FSAR Sections: DCD Subsections 3.7.2.8.1 and 3.7.2.8.3

Summary of Departure:

AP1000 DCD Revision 19, Tier 2 subsections 3.7.2.8.1 and 3.7.2.8.3 for the Annex Building and the Turbine Building, respectively, states that the portions of the Annex and Turbine Buildings that are classified as seismic Category II are analyzed for the six soil profiles described in Subsection 3.7.1.4. Additionally, DCD subsection 3.7.2.8.4 states that the Seismic Category II buildings are designed using envelope response spectra for the six soil profiles based on the AP1000 CSDRS spectra input at plant grade.

The Levy plant foundation design for the adjacent buildings (Annex, Radwaste and Turbine) is based on the use of drilled shafts for vertical and horizontal support of the buildings. Although the vertical seismic demand for the Category II structures is based on the AP1000 generic analysis (e.g., CSDRS), the lateral (horizontal) seismic demand is based on site-specific analysis (e.g., PBSRS) which take advantage of the lower seismicity of the Levy site in order to meet the horizontal limitations of building interaction with the nuclear island and building foundation support requirements without having to design the drilled shafts to meet the AP1000 CSDRS.

A drilled shaft design as presented in FSAR Subsection 3.8.5.9 was chosen to support the building foundations rather than improving the existing soil to meet the CSDRS criteria. This design utilizing drilled shafts was not analyzed as an acceptable support system for adjacent buildings in the AP1000 generic analysis. The site-specific analysis applied to the building support system to determine their adequacy is allowable under the requirements of DCD Subsection 3.7.2.8.4, in that the DCD discussion allows a COL applicant to perform a site-specific analysis if one or more of the four criteria discussed in the last paragraph of this Subsection are not met (the support system for the adjacent buildings is not one of the six soil types analyzed in the Westinghouse generic design).

Since the drilled shaft configuration is not one of the six soil types used in the AP1000 generic analysis, this constitutes a departure from the AP1000 generic design. In order to address this foundation design change, the following departure from the AP1000 DCD is required.

Scope/Extent of Departure:

In order to address this foundation design change, the following departure from the AP1000 DCD is required. The following paragraph will be added to DCD Subsections 3.7.2.8.1 and 3.7.2.8.3 in order to address the site-specific design of the Levy drilled shafts:

"The drilled shaft foundations supporting the buildings adjacent to the Nuclear Island do not conform to one of the six soil types supporting these buildings that were analyzed in the AP1000 generic analysis. In the conceptual design of the drilled shafts supporting the Annex (Turbine) Building foundation, the vertical seismic demands are consistent with the AP1000 certified design demands. The AP1000 certified vertical seismic demands exceed the site-specific vertical seismic demands at the LNP site. The PBSRS, rather than the AP1000 CSDRS based on the envelope of the six analyzed soil profiles, is used to compute the maximum relative horizontal displacement of the Annex (Turbine) Building drilled shaft foundation with respect to the nuclear island to evaluate the site-specific aspect of the seismic interaction of the Annex (Turbine) Building with the nuclear island. Thus, the drilled shafts are designed for the AP1000 certified design vertical seismic loads and the site-specific horizontal seismic loads and ensure that the maximum relative displacement of the foundation of this building and the nuclear island remains within the limits of the AP1000 generic design."

Departure Justification:

The critical design detail to be considered for horizontal displacement during a seismic event is the gap between the Nuclear Island and adjacent buildings in order to avoid building interaction between the Nuclear Island and the Annex, Radwaste or Turbine Buildings. Subsection 3.8.5.1 of the AP1000 DCD specifies that a minimum gap of 2 inches is provided between the Nuclear Island and adjacent seismic Category II structures (specifically the Annex and Turbine Buildings) at and below grade, and a 4-inch minimum gap is provided above grade. The analysis of the probable maximum relative displacements between the Nuclear Island and adjacent buildings using the LNP site-specific response spectra is shown in FSAR Table 3.7-206, and the maximum displacement is 0.77 inches for the Radwaste Building. FSAR Subsection 3.7.2.8.1 states that the LNP Annex Building roof displacement is expected to be less than 2.6 inches, which is substantially less than the allowable minimum gap of 4 inches.

As a result, the proposed change does not result in an adverse effect on any plant-specific DCD described design function.

Departure Evaluation:

This Tier 2 departure adds a discussion of the use of the Levy site-specific response spectra for the lateral (horizontal) seismic demand on the drilled shafts used to support the Annex, Radwaste and Turbine Buildings. This departure does not result in any adverse effects since the gaps between the Nuclear Island and the adjacent building foundations are maintained so that there are no building interactions. Therefore:

1. This change does not impact the frequency of occurrence of an accident previously evaluated in the plant-specific DCD. Therefore there is not more than a minimal increase

- in the frequency of occurrence.
2. This change does not impact the likelihood of a malfunction of an SSC. The lateral movement of the adjacent buildings to the nuclear island under the analyzed seismic event does not result in building interactions.
 3. This change maintains the minimum gaps between the nuclear island and adjacent buildings under a site-specific seismic event and does not increase the consequences of an accident previously evaluated.
 4. By maintaining the gaps between the nuclear island and adjacent buildings and preventing building interactions, there will not be more than a minimal increase in the consequences of a malfunction of a SSC important to safety.
 5. This departure does not impact the possibility of accidents, and therefore does not create a possibility for an accident of a different type than previously evaluated in the plant-specific DCD.
 6. There will not be a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD, since the gaps between the nuclear island and adjacent buildings are maintained to prevent the likelihood of building interactions.
 7. This change does not result in a design basis limit being exceeded or altered.
 8. The proposed change is based on an evaluation methodology that is consistent with the plant-specific DCD and NRC requirements, and thus is not a revision or replacement of a plant-specific DCD described evaluation methodology; nevertheless since the drilled shaft foundation is not one of the soil types considered in the DCD evaluations, the response to this question is determined to be yes. (The methodology is consistent but the inputs are selected to be site specific).

The evaluated change maintains the gaps between the Nuclear Island and adjacent buildings in order to prevent building interactions and be within bounds of the design and safety analysis; therefore the departure does not affect a resolution of an ex-vessel severe accident design feature identified in the DCD. Therefore, this departure has no safety significance.

NRC Approval Requirement:

This departure requires NRC approval pursuant to 10 CFR Part 52, Appendix D, Section VIII.B.5.