SCHEDULING NOTE

Title: **Hearing on Combined Licenses for Levy Nuclear Plant, Units 1 and 2: Section 189a. of the Atomic Energy Act (Public Meeting)**

Purpose: To receive testimony and exhibits regarding the application of Duke Energy Florida, LLC (Duke Energy) for two combined licenses (COLs) to construct and operate new nuclear power generation facilities at a site in Levy County, Florida. The testimony will focus on unique features of the facility or novel issues that arose as part of the review process and other significant technical or policy issues associated with aspects of the staff's review that are important for the Commission to make its final decision. The Commission will determine whether the staff's review has been adequate to support the findings in 10 C.F.R. §§ 52.97(a) and 51.107(a).

Scheduled: **July 28, 2016**
9:00 am

Duration: 1 Day

Location: Commissioners' Conference Room, 1st Floor OWFN

NOTE: Chairman to provide opening remarks, admit exhibits, and swear in witnesses. **20 mins.**

Participants: **Presentation**
(Note: Presenters seated at the table are listed, other staff available to answer questions will be seated in the well and reserved rows.)

Overview (Duke Energy) (9:20 am) **30 mins.***
At the table:
Christopher Fallon, Vice President, Nuclear Development, Duke Energy
Robert Kitchen, Director, Licensing Nuclear Development, Duke Energy
Paul Snead, Manager, Siting and Licensing Support, Duke Energy

Topic: Overview

Commission Q & A (round of questions; 6 minutes each) **18 mins.****

Overview (NRC Staff) **30 mins.***
At the table:
Jennifer Uhle, Director, Office of New Reactors (NRO)
Francis Akstulewicz, Director, Division of New Reactor Licensing (DNRL), NRO
Samuel Lee, Acting Deputy Director, DNRL, NRO

Topic: Overview, including use of the design centered review approach for the AP1000 COLs *** and summary of regulatory findings.

Commission Q & A (round of questions; 6 minutes each) **18 mins.****

BREAK **5 mins.**

NOTE: For the remaining panels, the applicant is expected to discuss the contents of the COL application while the staff is expected to discuss its review process and regulatory conclusions. Each panel should include a discussion of site-specific Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) or other license conditions associated with the subject matter of the panel.

Safety Panel * (11:05 am)**
Applicant **5 mins.***
At the table:
Robert Kitchen, Director, Licensing Nuclear Development, Duke Energy
John Thrasher, Director, Engineering Nuclear Development, Duke Energy
Lawrence Taylor, Lead, Procedure and Program Development, Nuclear Development, Duke Energy
Anand K. Singh, Technical Expert, Sargent & Lundy

Staff **15 mins.***
At the table:
Donald Habib, Project Manager, NRO
Gerry Stirewalt, Sr. Geologist, NRO
Vaughn Thomas, Structural Engineer, NRO
Boyce Travis, Reactor Systems Engineer, NRO

Topics: Relevant sections of the application and the following chapters from the Final Safety Evaluation Report (FSER):

- Chapter 2, "Site Characteristics" and Chapter 3, "Design of Structures, Components, Equipment, and Systems," including novel issues associated with geologic and geotechnical site characteristics and the roller compacted concrete foundation design
- Chapter 21, "Design Changes in Accordance with ISG-11," including novel issues associated with a design change to the passive core cooling system containment condensate return

NOTE: The panel will not have specific topics to discuss for the remainder of the FSER. If the Commission wishes to ask questions on other topics, this panel would be the appropriate time.

Commission Q & A (round of questions; 6 minutes each) **18 mins.****

BREAK (Lunch Break-Approx. 11:45 am - 1:15 pm) ***~1.5 hour***

Environmental Panel (1:15 pm)

Applicant **5 mins.***
At the table:
Robert Kitchen, Director, Licensing Nuclear Development, Duke Energy
Paul Snead, Manager, Siting and Licensing Support, Duke Energy
Lorin Young, Environmental Consultant, CH2M Hill

Staff **15 mins.***
At the table:
Mallecia Sutton, Project Manager, NRO
Andrew Kugler, Senior Project Manager, NRO

Topic: Relevant sections of the Final Environmental Impact Statement related to the two novel issues identified in its SECY paper

- U.S. Fish and Wildlife Service Biological Opinion
- Alternative Sites

NOTE: The panel will not have specific topics to discuss for the remainder of the final environmental impact statement. If the Commission wishes to ask questions on other topics, this panel would be the appropriate time.

Commission Q & A (round of questions; 6 minutes each) **18 mins.****

Closing (1:55 pm) **40 mins.**

Closing Statement by Applicant **10 mins.***

Christopher Fallon, Vice President, Nuclear Development, Duke Energy
Robert Kitchen, Director, Licensing Nuclear Development,
Duke Energy

Closing Statement by Staff **10 mins.***
Jennifer Uhle, Director, Office of New Reactors, NRO
Francis Akstulewicz, Director, DNRL, NRO
Samuel Lee, Acting Deputy Director, DNRL, NRO

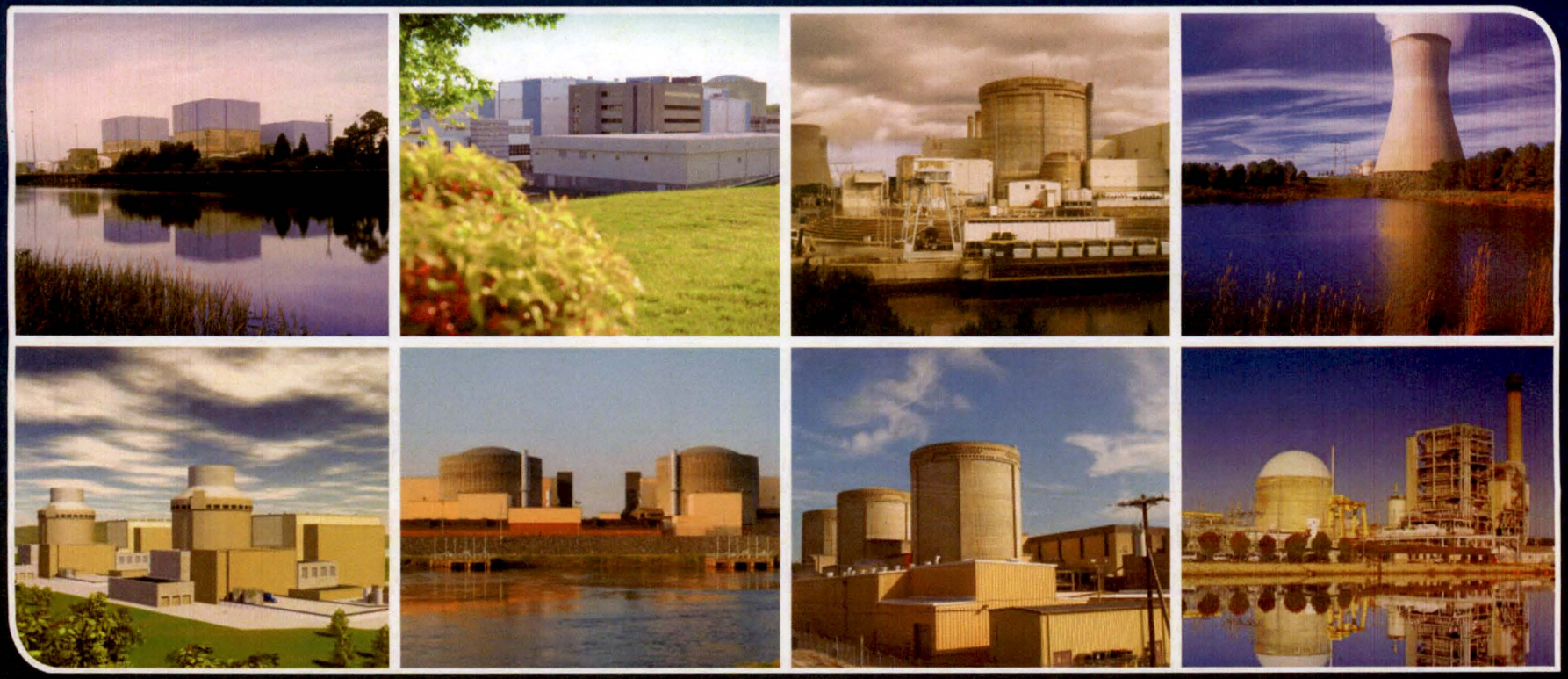
Commission Q & A and Closing Statements **18 mins.****

*For presentation only and does not include time for Commission Q & A's.

**All Commissioners will have an opportunity to ask questions after each panel. Commissioners will start the Q&A with their total time allotted to allocate as they see fit among the panels.

*** Design issues associated with the AP1000 incorporated by reference have been resolved in the context of the design certification rulemaking but are discussed here to provide context for the COL review.

Exhibit DEF-004



Levy Nuclear Plant – Overview Panel

Chris Fallon – Bob Kitchen – Paul Snead

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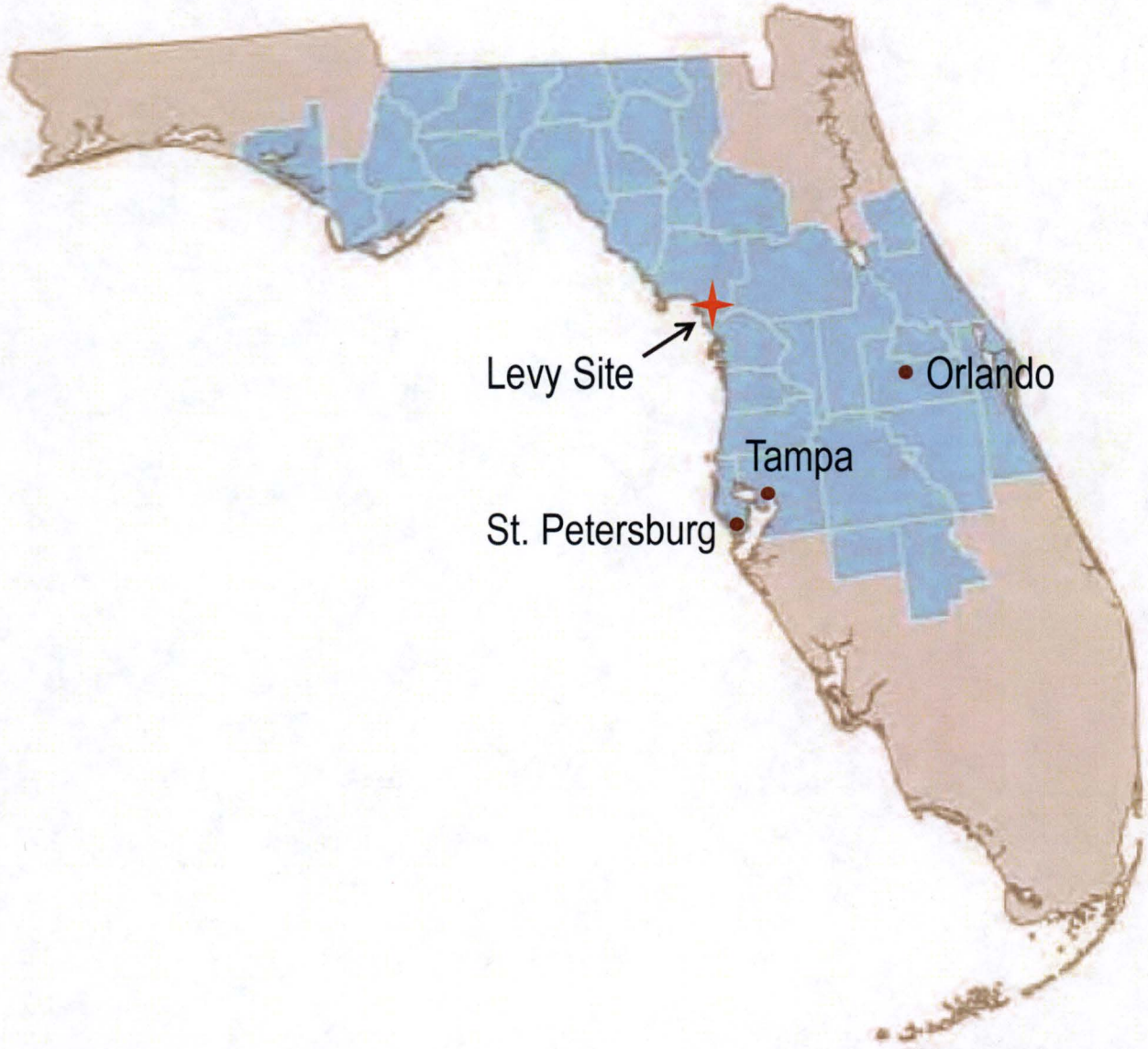
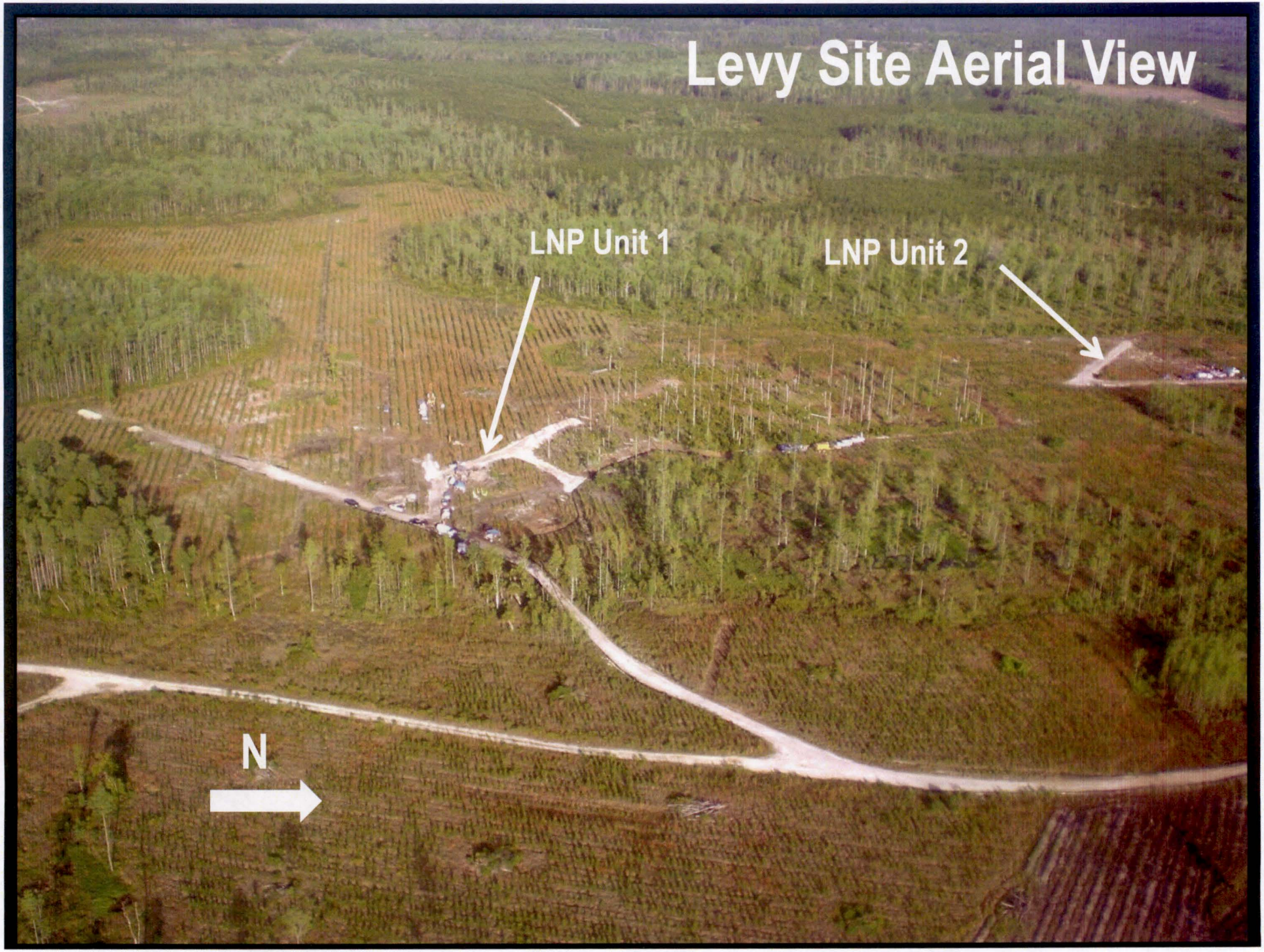
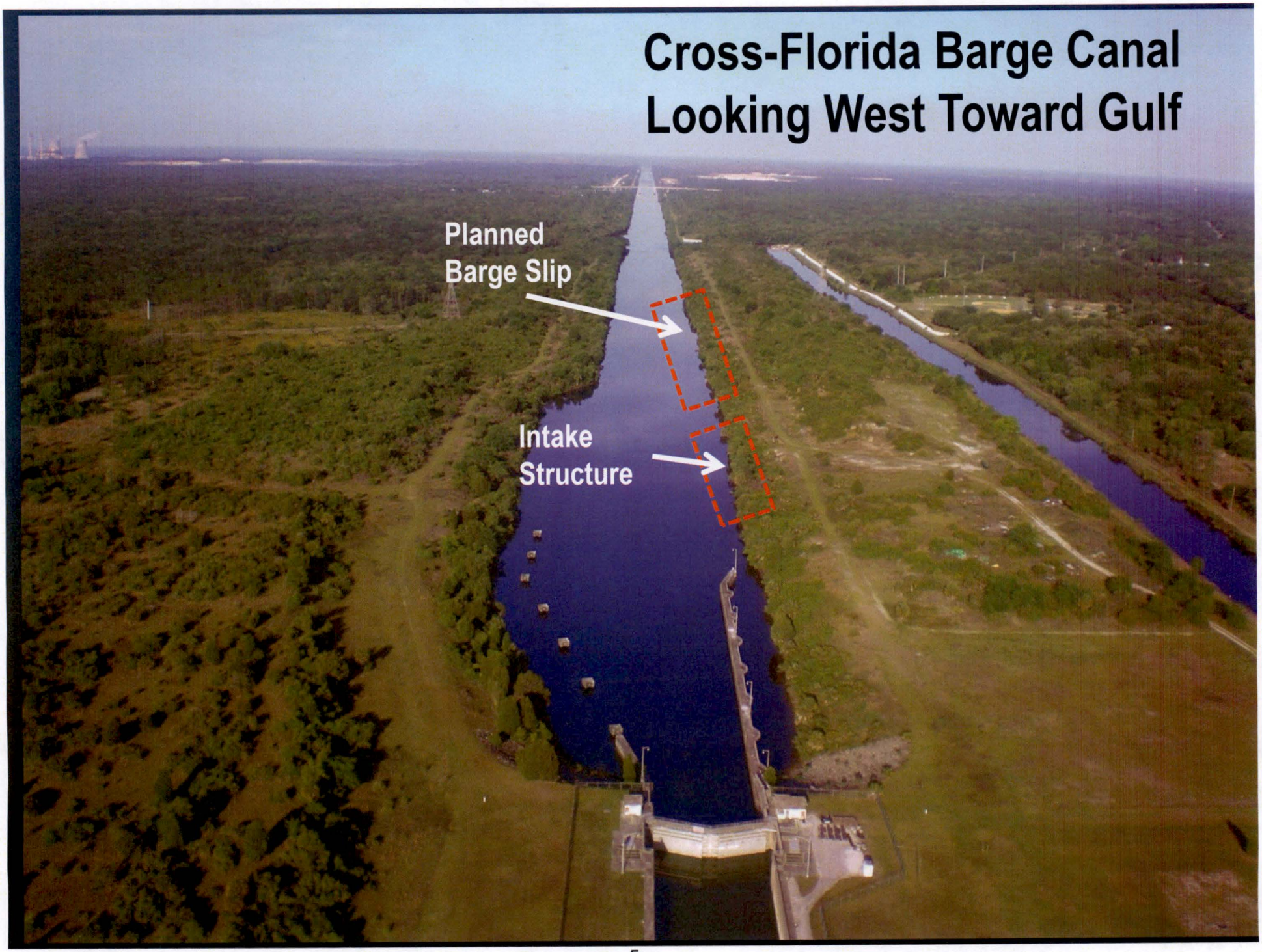
Duke Energy Florida Service Territory



Site Location


Levy Site Aerial View
LNP Unit 1
LNP Unit 2
N


Cross-Florida Barge Canal
Looking West Toward Gulf
Planned
Barge Slip
Intake
Structure

Crystal River Site Discharge Canal

Levy COL Application

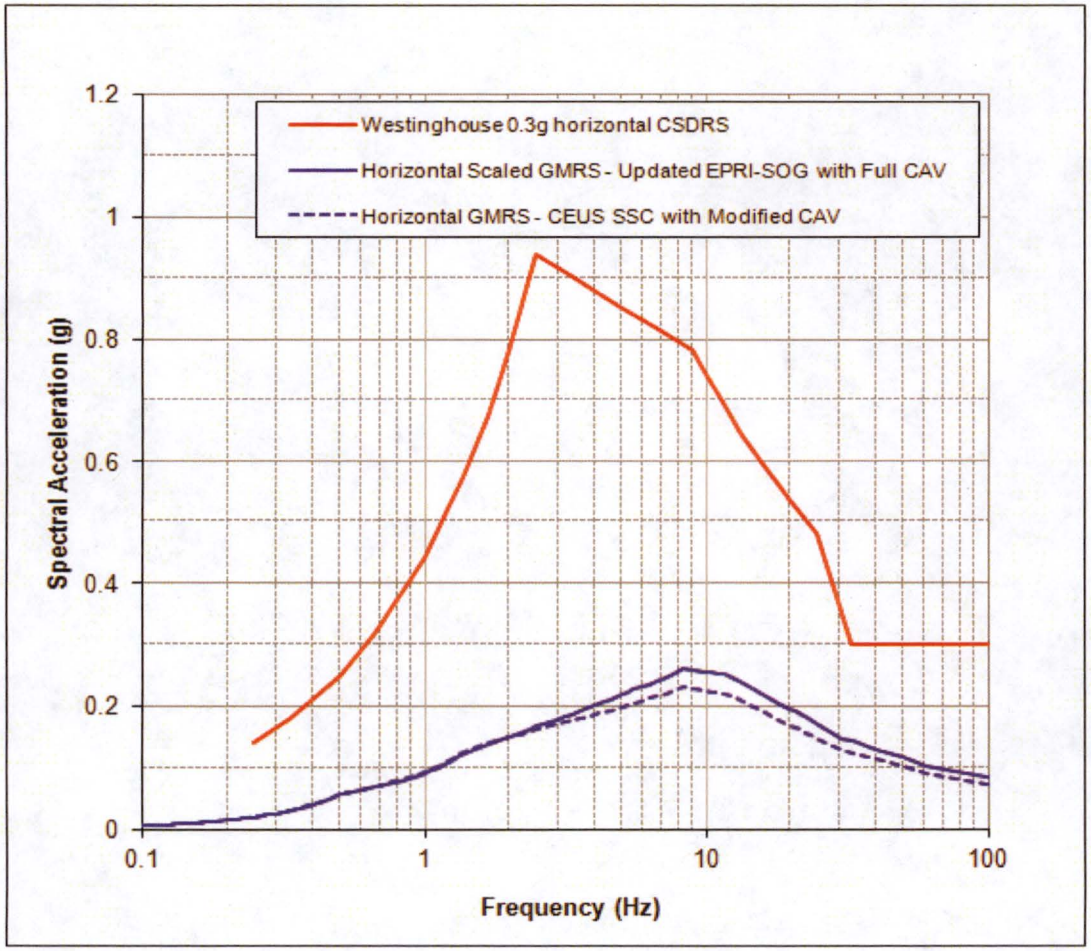
- Combined License Application (COLA) for two units
  - Submitted July 2008
  - Incorporates by Reference the AP1000 Design Control Document (DCD)
  - Adopts the R-COLA resolution of standard plant licensing issues

- NRC Guidance Utilized
  - Regulatory Guide 1.206 "Combined License Applications for Nuclear Power Plants"
  - NUREG-0800 "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants"
  - NUREG-1555 "Standard Review Plans for Environmental Reviews for Nuclear Power Plants"
  - RIS 2006-06 "New Reactor Standardization Needed to Support the Design-Centered Licensing Review Approach"

AP1000 Emergent Issues

- Emergent issues result from detailed design for construction
- ISG-11 evaluation to identify issues that cannot be deferred
  - Condensate Return Design Change
  - Main Control Room Dose
  - Main Control Room Heatup
  - Combustible Gas Control in Containment
  - Source Range Neutron Flux Doubling Block Permissive

Large Seismic Margin



Environmental

- ER and FEIS – SMALL to MODERATE impacts
  - No obviously superior alternative site
- Florida Site Certification under Florida Power Plant Siting Act issued August 2009 included:
  - 401 Water Quality Certification
  - Coastal Zone Management Act Certification
- US Army Corps of Engineers 404 Permit issued December 2015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Protecting People and the Environment

Combined License Application Review LNP Units 1 and 2

Overview Panel

July 28, 2016

Overview of Staff Review of LNP 1 and 2 COL Application

- LNP COL Application and Contents
- AP1000 Design Certification
- LNP COL Overview – Safety
- LNP COL Overview – Environmental
- Summary of Staff Findings – COL Application

LNP 1 and 2 COL Application

- In July 2008, Progress Energy Florida submitted the application
- In April 2013, the applicant changed its name to Duke Energy Florida, LLC (DEF)
- DEF would be licensed to construct and operate LNP 1&2

LNP 1 and 2 COL Application

- Incorporates by reference the AP1000 Design Certification, Amendment 19
- Staff safety evaluation for AP1000 documented in NUREG-1793 and its supplements

LNP 1 and 2 COL Application Contents

- LNP 1 and 2 plant-specific information
- COL Information Items
- Departures from certified design

LNP 1 and 2 COL Overview: Safety Review

- Advisory Committee on Reactor Safeguards (ACRS) Review
  - Five AP1000 Subcommittee meetings and two Full Committee meetings held on COL application and safety evaluation report (SER)

LNP 1 and 2 COL Overview: Safety Review

ACRS Reports	Staff Responses
12/7/11	1/24/12
4/25/12	5/29/12
4/18/16	5/22/16

- Final SER issued May 31, 2016

LNP 1 and 2 COL Overview: Required Findings

- Findings – 10 CFR 52.97
  - Applicable standards and requirements of the AEA and the Commission's regulations have been met
  - Required notifications to other agencies or bodies have been duly made

LNP 1 and 2 COL Overview: Required Findings

- Reasonable assurance that facility will be constructed and will operate in conformity with the license, the AEA, and NRC regulations
- Applicants are technically and financially qualified to engage in the activities authorized

LNP 1 and 2 COL Overview: Required Findings

- Issuance of the licenses will not be inimical to the common defense and security or to the health and safety of the public
- Findings required by Subpart A of 10 CFR Part 51 have been made

LNP 1 and 2 COL Overview: Environmental Review

- EIS completed in accordance with:
  - National Environmental Policy Act of 1969
  - 10 CFR Part 51
- U.S. Army Corps of Engineers was a cooperating agency

LNP 1 and 2 COL Overview: Environmental Review

- Staff follows a systematic approach to evaluate impacts
  - Solicit and reconcile scoping comments
  - Conduct technical review

LNP 1 and 2 COL Overview: Environmental Review

- Issue draft EIS for public/ stakeholder comment
- Consider and disposition comments in preparing final EIS

LNP 1 and 2 COL Overview: Environmental Review

- **Stakeholder involvement is a key aspect of the process**
- **Final EIS published April 27, 2012, as NUREG-1941**

LNP 1 and 2 COL Overview: Environmental Review

- **Record of Decision:**
  - **States the decision**
  - **Identifies all alternatives considered**

LNP 1 and 2 COL Overview: Environmental Review

- **Record of Decision, continued:**
  - **Discusses preferences among alternatives**
  - **States whether the Commission has taken all practicable measures, within its jurisdiction, to avoid or minimize environmental harm**

LNP 1 and 2 COL Overview: Environmental Review

- **Findings – 10 CFR 51.107(a)**
  - **Requirements of Section 102(2)(A),(C), and (E) of NEPA and the regulations in 10 CFR Part 51, Subpart A, have been met**

LNP 1 and 2 COL Overview: Environmental Review

- After considering the final balance among conflicting factors in the record of the proceeding, the appropriate action is issuance of the COLs

LNP 1 and 2 COL Overview: Environmental Review

- After weighing the environmental, economic, technical, and other benefits against environmental and other costs, and considering reasonable alternatives, the COLs should be issued

LNP 1 and 2 COL Overview: Environmental Review

- The staff's NEPA review has been adequate

Overview of Panel Presentations

Panel	Issues Discussed	Evaluation
Safety	• Geologic and geotechnical site characteristics • Roller compacted concrete foundation design • Condensate return design change	FSER
Environmental	• U.S. Fish and Wildlife Service Biological Opinion • Alternative Sites	FEIS

Acronyms

- ACRS – Advisory Committee on Reactor Safeguards
- AEA – Atomic Energy Act
- CFR – Code of Federal Regulations
- COL – Combined License
- DC – Design Certification
- DEF – Duke Energy Florida, LLC
- EIS – Environmental Impact Statement

Acronyms

- **FEIS – Final Environmental Impact Statement**
- **FSER – Final Safety Evaluation Report**
- **LNP – Levy Nuclear Plant**
- **NEPA – National Environmental Policy Act**
- **SER – Safety Evaluation Report**

Exhibit DEF-005

Levy Nuclear Plant – Safety Panel

John Thrasher – AK Singh – Bob Kitchen – Larry Taylor

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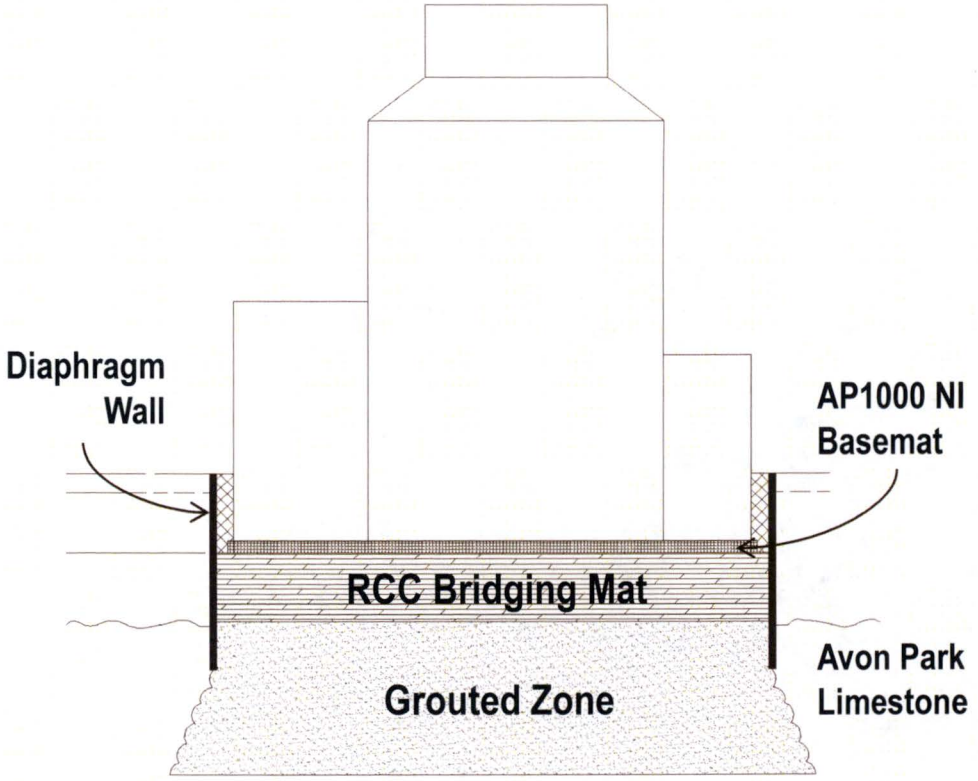
Site Investigations

- Site investigations establish foundation design parameters
- Extensive investigations to define design requirements to address potential Karst
- No significant Karst identified on site
- Design for conservatively postulated Karst

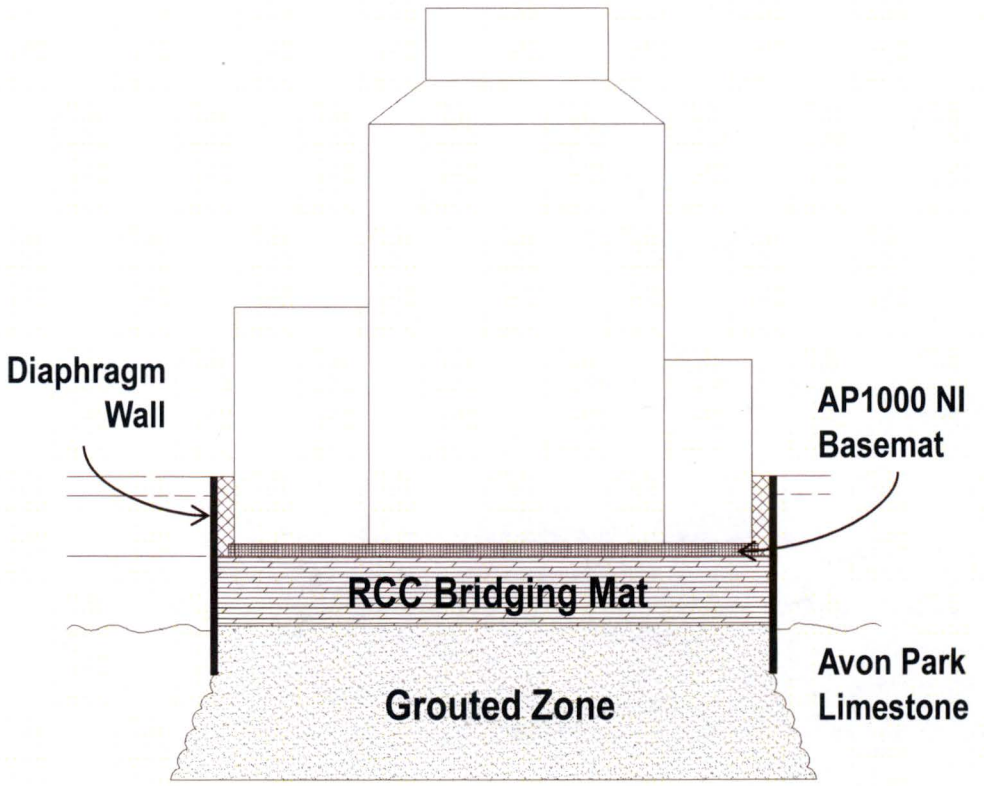
Robust Nuclear Island Foundation Design

- AP1000 Nuclear Island Basemat
- 35 foot thick RCC Bridging Mat
- 75 foot thick Grouted Zone



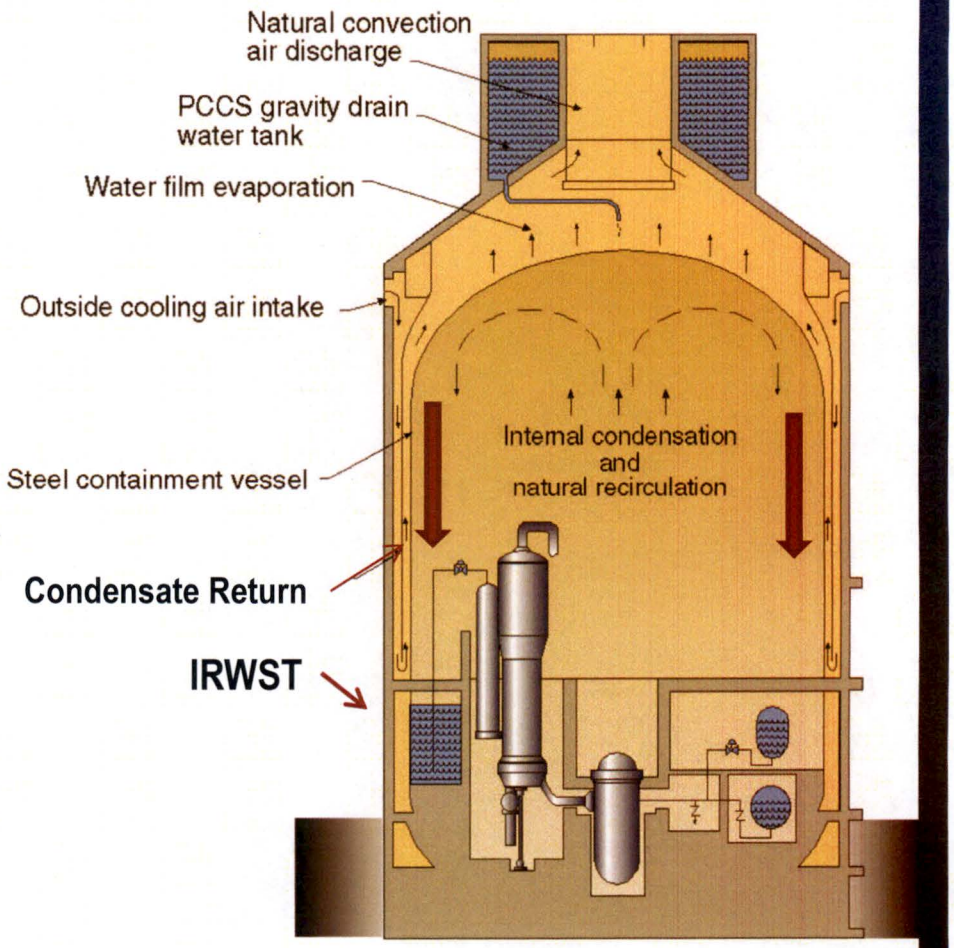
Foundation Design

- Site-Specific ITAAC
  - RCC Bridging Mat
  - Waterproof membrane
- License Conditions
  - Geologic mapping of excavations for safety related structures
  - RCC and bedding mix strength verification and constructability testing



Condensate Return
Passive Residual Heat Removal (PRHR)

- During non-LOCA events IRWST water absorbs heat from PRHR HX
- Condensate flows down Containment walls to the condensate return gutter and returns to IRWST



PRHR Performance

- PRHR removes sufficient decay heat for at least 72 hours to maintain acceptable fuel design and pressure boundary limits following a non-LOCA event
- PRHR establishes reactor coolant temperature of 420°F in less than 36 hours based on conservative, non-bounding analyses
- PRHR closed loop cooling can maintain safe shutdown for greater than14 days
- Transition to open loop cooling continues to provide defense in depth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Combined License Application Review Levy Nuclear Plant Units 1 and 2

Safety Panel

July 28, 2016

Panelists

- **Don Habib – Project Manager**
- **Gerry Stirewalt – Senior Geologist**
- **Vaughn Thomas – Structural Engineer**
- **Boyce Travis – Reactor Systems Engineer**

Safety Panel Topics

- Geologic and geotechnical site characteristics
- Roller compacted concrete foundation design
- Condensate return design change

Key Topic - Voids Created by Dissolution of Limestone in the Foundation Rock Unit

- **Applicant identified potential for subsurface voids created by dissolution of limestone in the foundation unit (Avon Park Formation, >40 million years old) as the primary geologic hazard at the site.**

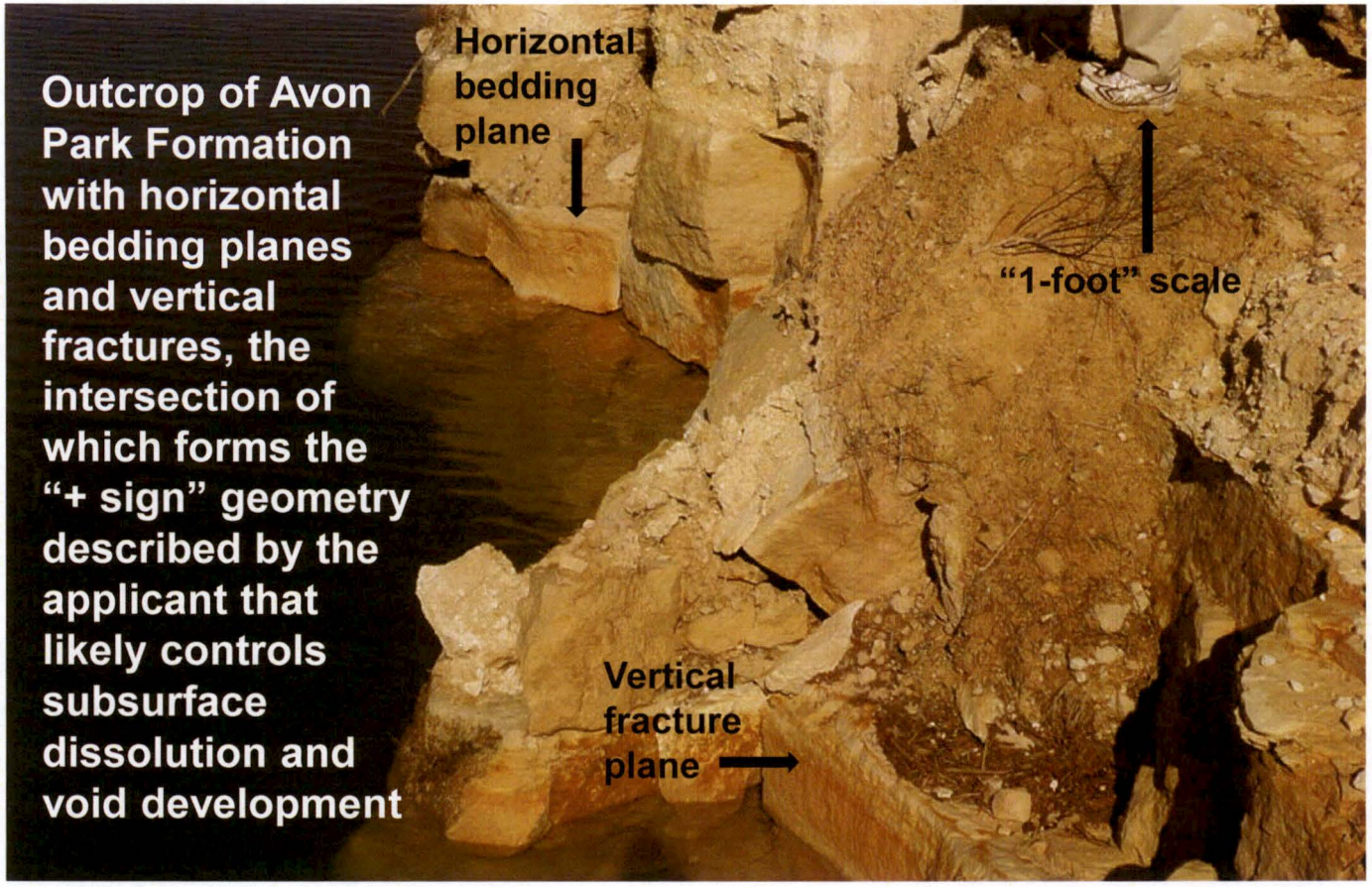
Field Data on Void Dimensions

- **Applicant determined that dissolution voids in the Avon Park Formation were <1.5m (5ft) in vertical dimension [based on measured lengths of rod drops in boreholes] with a maximum horizontal dimension of 1.6m (5.3ft) [based on grout uptakes measured during grout testing].**

Staff Assessment of Potential for Dissolution Voids

- **Staff confirmed the applicant's characterization of voids by examination of sparse rock outcrops, borehole lithologic and geophysical logs, rock core, and grout uptake test data during site audits ... and review of select publications cited in the FSAR.**

Confirmatory Field Observations by Staff



Examination of Avon Park Core Samples by Staff

Small disconnected dissolution voids.

Grouted fracture sealed against fluid flow during grout testing.

Staff Conclusions

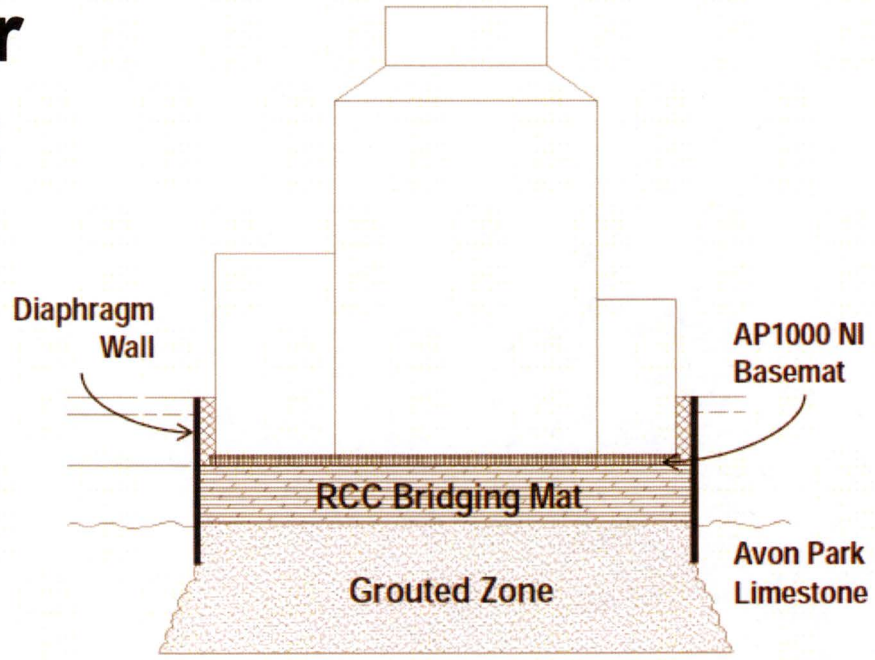
- **Field data support postulated maximum dimensions of dissolution voids in the Avon Park, and the interpretation that majority of voids are not more than 1ft in diameter.**
- **Subsurface voids will not detrimentally affect stability or suitability of the Avon Park.**

Staff Conclusions (Cont'd)

- **Grouting for groundwater control during construction (not safety-related and not credited in evaluation of safety) will likely reduce the size of, or seal, dissolution voids beneath safety-related structures and restrict flow of groundwater into foundation excavations.**

Roller Compacted Concrete (RCC) Foundation Design

- 6 foot thick AP1000 Nuclear Island Basemat
- 35 foot thick RCC Bridging mat
- 75 foot thick Grouted Zone



RCC Foundation Design

- The RCC design will follow standard industry guidance
- Nominal strength capacities are established during conceptual design phase using ACI 349-01, ACI 318-08 and USACE EM 1110-2-2006 guidance

RCC Foundation Design

- **Finite Element Modeling of the RCC Bridging Mat was used to confirm capacities greater than expected design demands**
- **The applicant demonstrated that the stresses in the RCC bridging mat will remain within code allowable limits**

Construction of the RCC Foundation

- The RCC construction will follow standard industry guidance
- The applicant provided a detail test plan describes the quality control and inspection to occur during construction

Construction of the RCC Foundation

- Post-COL RCC and bedding mix strength verification and constructability testing will be performed on a large test pad
- License Condition for post-COL RCC strength verification and construction testing
- ITAAC for RCC

Condensate Return Design Change

- In the event of a non-LOCA transient, AP1000 uses PRHR HX submerged in IRWST to cooldown
- For long term operation, water from IRWST boils to containment, and some is returned via gutters

Condensate Return Design Change

- **Applicant determined analysis involving condensate return in certified design could not be met**
- **Proposed design change to improve guttering, add further routing to capture more water**

Condensate Return Design Change

- Staff reviewed design change and new analysis against GDC 34
- Analysis accounts for increased condensate losses from testing
- Staff confirmatory analysis supports the results determined by applicant's analysis

Condensate Return Design Change

- Staff found the revised design meets requirements of GDC 34
- Containment peak pressure and Chapter 15 analyses not impacted
- Achieves 420 F in 36 hours
- Transition to open loop cooling via ADS maintained as backup

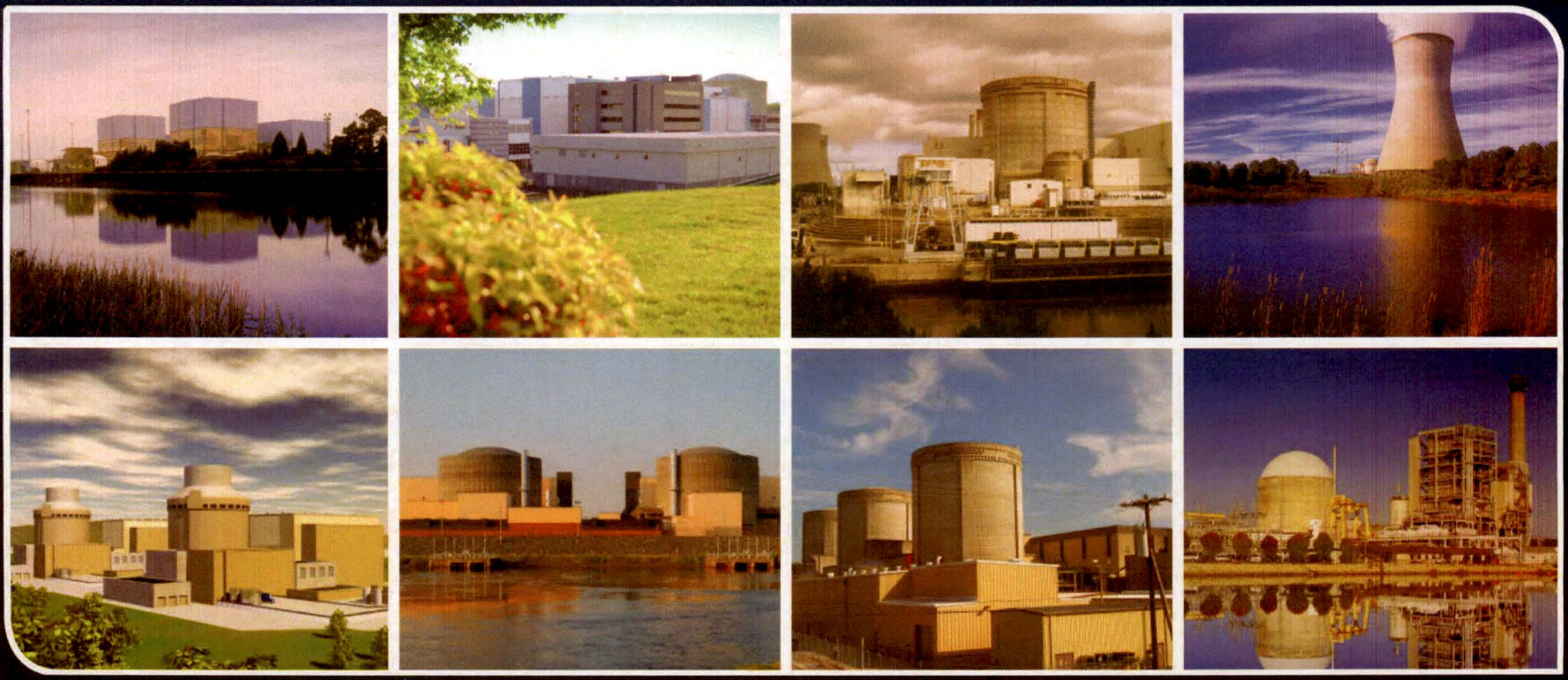
Acronyms

- ACI – American Concrete Institute
- ADS – Automatic Depressurization System
- FSAR – Final Safety Analysis Report
- GDC – General Design Criterion
- IRWST – In-containment Refueling Water Storage Tank

Acronyms

- **ITAAC – Inspections, Tests, Analyses, and Acceptance Criteria**
- **LOCA – Loss of Coolant Accident**
- **PRHR HX – Passive Residual Heat Removal Heat Exchanger**
- **USACE EM – US Army Corps of Engineers Engineering Manual**

Exhibit DEF-006



Levy Nuclear Plant – Environmental Panel

Paul Snead – Lorin Young – Bob Kitchen

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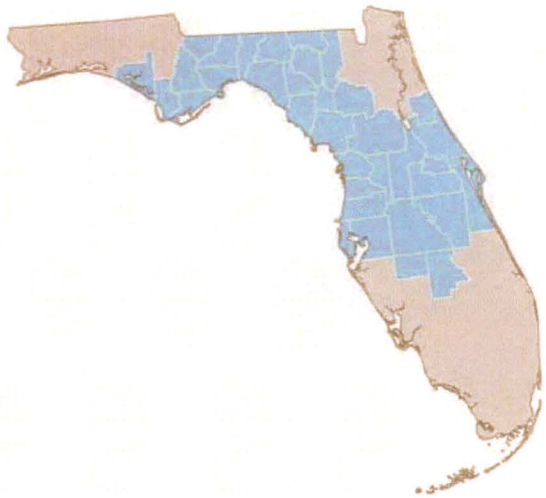
Summary of Environmental Review

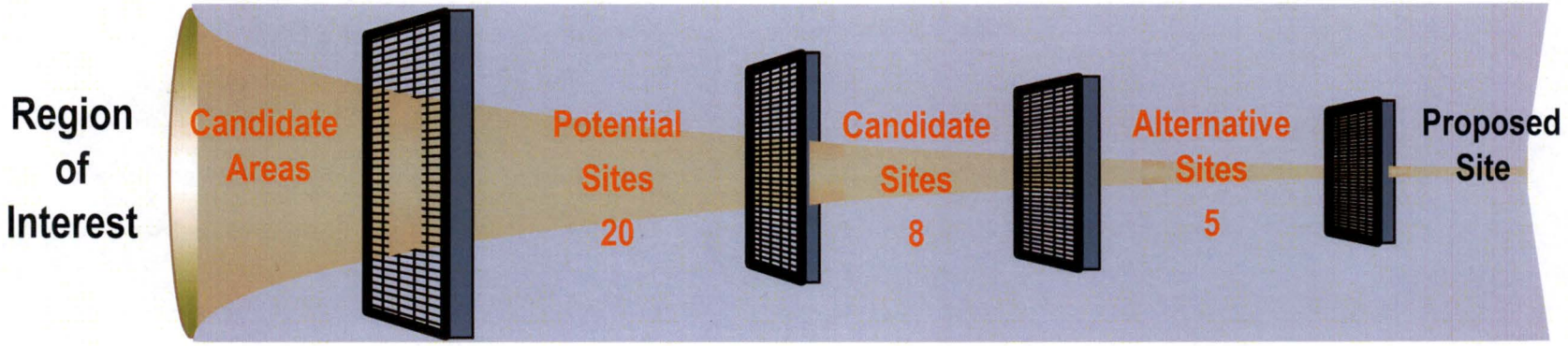
- Environmental Report (ER) completed in 2009
  - Thorough NRC staff audits of ER and alternative site analysis
  - Public outreach
  - Consultations with Federal, Tribal, State, and Local Government entities
- FEIS published – April 2012
- New and significant information reviews conducted

Alternative Sites



Region of Interest

Service Territory + One County

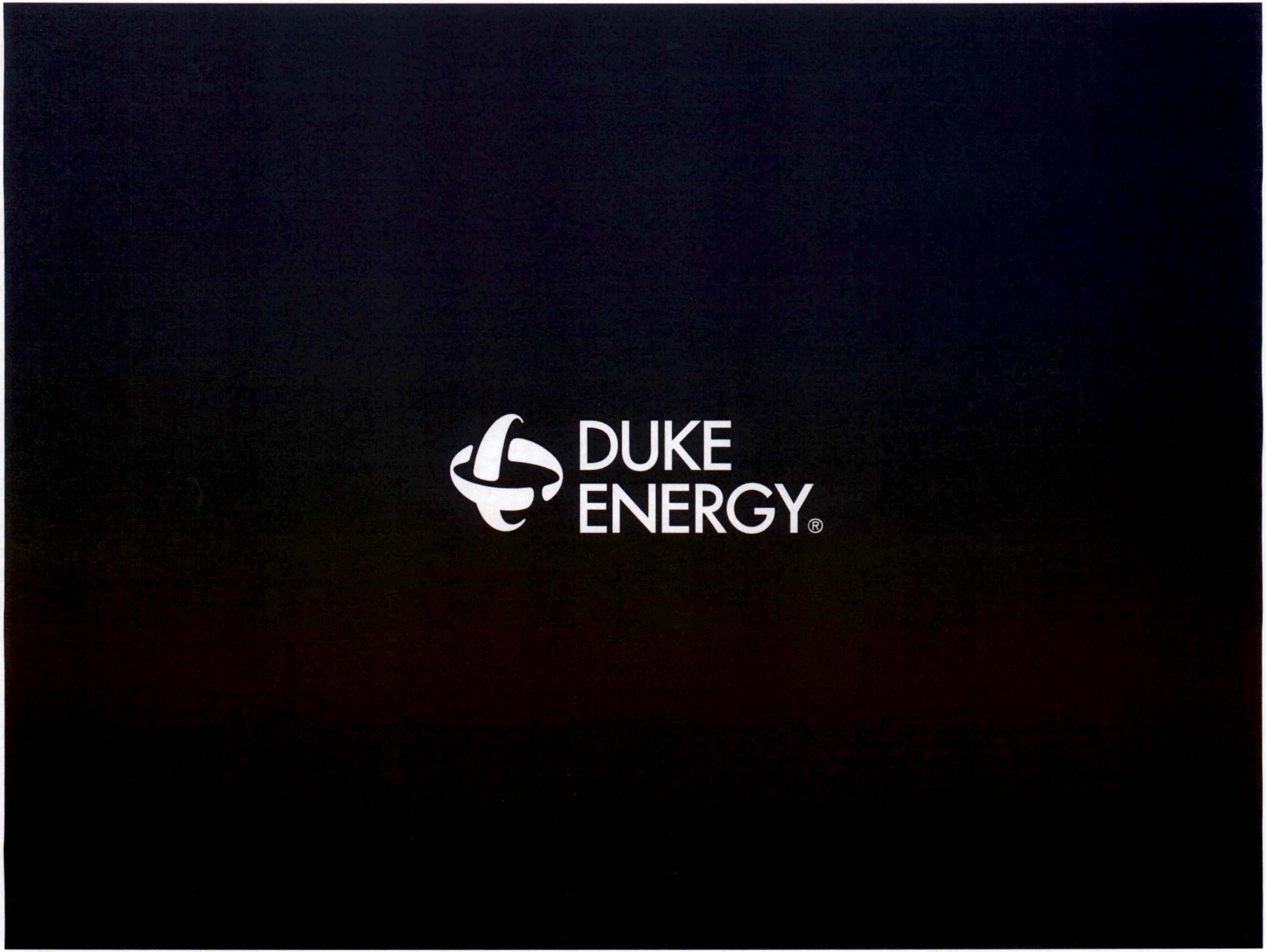


US Army Corps of Engineers Permitting

- USACE was cooperating agency with NRC in preparation of FEIS
- Wetland Mitigation Plan developed to support permitting
- 404 Permit issued by the USACE in December 2015

USFWS Biological Opinion

- No federally threatened or endangered species identified onsite as likely to be adversely affected
- Only species subject to potentially adverse effects is the Florida scrub jay in transmission line corridors
- USFWS issued a Biological Opinion in December 2011
  - Includes an incidental take statement for the Florida scrub jay
  - Requires T&E surveys to be re-conducted within 2 years of construction or land clearing operations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Combined License Application Review Levy Units 1 and 2

Environmental Panel

July 28, 2016

Endangered Species Act Consultation

- **In November 2008 NRC initiated consultation under Section 7 of the ESA with U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS)**

Endangered Species Act Consultation

- NRC developed and submitted Biological Assessments:
  - NMFS concluded consultation with NRC
  - FWS indicated additional surveys may need to be completed before consultation is complete

FWS Biological Opinion

- **FWS issued Biological Opinion (BO)**

- **Measures identified in the BO support the FWS conclusion that building and operating the LNP facility would not jeopardize the existence of the Florida scrub-jay or adversely affect other species**

Scope of BO

- NRC staff contacted the FWS Jacksonville field office to confirm the conditions necessary to close Section 7 consultation:
  - Developed conditions that would meet the needs of both agencies

NRC and FWS Coordination

- NRC and FWS coordinated to develop conditions based on the BO and incidental take statement to include in the EPP
- EPP conditions support the NRC staff's conclusions in the final EIS

LNP Alternative Sites

- Staff concluded the site selection process was reasonable, consistent with NRC guidance, and identified sites among the best in region
- Two issues identified after the draft EIS
  - Highlands site water availability
  - Crystal River site practicability

Highlands Site

- South Florida Water Management District (SFWMD) commented that water was limited
- Staff concluded that this was consistent with MODERATE impact in the EIS

Highlands Site

- **Highlands Site was retained:**
  - **Removal from the EIS would serve no useful purpose**
  - **SFWMD concern confirms the site is not preferable**
- **SFWMD later stated it may be possible to obtain water for another site in the area**

Crystal River Site

- Adjacent to existing 5-unit site
- Applicant told the Corps of Engineers the site was not practicable under the Clean Water Act (CWA)
  - Business decision - high concentration of generation
  - Corps agreed

Crystal River Site

- Staff retained in EIS
  - Site rated well from environmental perspective
  - Still a viable site for new nuclear units
  - Different standards for CWA and NEPA

Acronyms

- **BO – Biological Opinion**
- **CWA – Clean Water Act**
- **EIS– Environmental Impact Statement**
- **EPP – Environmental Protection Plan**

Acronyms

- **FWS – Fish & Wildlife Service**
- **LNP – Levy Nuclear Plant**
- **NEPA – National Environmental Policy Act**
- **NMFS – National Marine Fisheries Service**
- **SFWMD – South Florida Water Management District**