



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVE., NE, SUITE 1200  
ATLANTA, GA 30303-1257

July 19, 2011

Mr. Jon A. Franke, Vice President  
Crystal River Nuclear Plant (NA1B)  
15760 West Power Line Street  
Crystal River, Florida 34428-6708

**SUBJECT: CRYSTAL RIVER UNIT 3 – NRC INTEGRATED INSPECTION REPORT  
05000302/2011003**

Dear Mr. Franke:

On June 30, 2011, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Crystal River Unit 3. The enclosed inspection report documents the inspection findings, which were discussed on July 6, 2011, with you and other members of your staff.

The inspection examined activities conducted under your license as they related to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, one licensee identified violation, which was determined to be of very low safety significance, is listed in this report. However, because of the very low safety significance and because it is entered into your corrective action program, the NRC is treating this finding as a non-cited violation (NCV) consistent with the NRC Enforcement Policy. If you contest the non-cited violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Crystal River Unit 3 site.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document

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system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

***/RA/***

Daniel W. Rich, Chief  
Reactor Projects Branch 3  
Division of Reactor Projects

Docket No. 50-302  
License No. DPR-72

cc w/encl.: (see page 3)

Enclosure: Inspection Report 05000302/2011003  
w/Attachment: Supplemental Information

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 ADAMS: X Yes      ACCESSION NUMBER: ML112000132      X SUNSI REVIEW COMPLETE X FORM 665 ATTACHED

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SIGNATURE	GJW	TXM1 by email	RJR1 by email	NRS2 by email	GBK1 by email	AXS2 by email	DWR1
NAME	GWilson	TMorrissey	RReyes	NChilds	GKuzo	ASengupta	DRich
DATE	07/13/2011	0706/2011	07/15/2011	07/15/2011	07/13/2011	07/13/2011	07/19/2011
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Letter to Jon A. Franke from Daniel W. Rich dated July 19, 2011

SUBJECT: CRYSTAL RIVER UNIT 3 – NRC INTEGRATED INSPECTION REPORT  
05000302/2011003

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RidsNrrPMCrystal River Resource

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-302

License No.: DPR-72

Report No.: 05000302/2011003

Licensee: Progress Energy (Florida Power Corporation)

Facility: Crystal River Unit 3

Location: Crystal River, FL

Dates: April 1, 2011 – June 30, 2011

Inspectors: T. Morrissey, Senior Resident Inspector  
R. Reyes, Resident Inspector  
N. Childs, Resident Inspector  
G. Kuzo, Senior Health Physicist (Section 2RS07)  
A. Sengupta, Reactor Inspector (Section 1R07)

Approved by: D. Rich, Chief  
Reactor Projects Branch 3  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000302/2011003; 04/01/2011-06/30/2011; Crystal River Unit 3; Routine Integrated Report.

The report covered a three month period of inspection by resident inspectors, one regional senior health physicist, and one regional reactor inspector. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Revision 4, dated December 2006.

A. NRC Identified & Self-Revealing Findings

No findings were identified.

B. Licensee Identified Violations

One violation of very low safety significance, which was identified by the licensee, has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. The violation and corrective action tracking number are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status:

Crystal River 3 began the inspection period in Mode 5. On May 19, 2011, the unit entered Mode 6 in preparation for full core off-load to the spent fuel pool. Fuel off-load commenced on May 21, 2011. The unit entered a "No Mode" condition on May 28, 2011, when the last fuel assembly was placed into the spent fuel pool. The unit remained in "No Mode" for the remainder of the inspection period.

### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

#### 1R01 Adverse Weather Protection

##### .1 Adverse Weather Protection: Hurricane Season Preparation

###### a. Inspection Scope

The inspectors reviewed the licensee's hurricane season preparations using the licensee's emergency management procedure EM-220, Violent Weather. The inspectors checked that the licensee maintained the ability to protect vital systems and components from high winds and flooding associated with hurricanes. Additionally, the inspectors toured the five plant areas listed below to check for any vulnerabilities, such as inadequate sealing of water tight penetrations, or degraded barriers that could affect the associated systems. The inspectors verified that the licensee's violent weather committee had been established and that an initial preparatory walkdown had been completed. Documents reviewed are listed in the attachment. Nuclear condition reports (NCRs) were reviewed to verify that the licensee was identifying and correcting adverse weather protection issues.

- emergency diesel generator rooms
- control complex flood walls and doors
- south berm area and intake canal area
- turbine building flood walls and doors
- auxiliary building sea water room

###### b. Findings

No findings were identified.

##### .2 Adverse Weather Protection: External Flooding

###### a. Inspection Scope

The inspectors performed an inspection of the external flood protection features for Crystal River, Unit 3. The inspectors reviewed the Final Safety Analysis Report (FSAR) Chapter 2.4.2.4, Facilities Required for Flood Protection, which depicts the design flood levels and protection areas containing safety-related equipment, to

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identify areas that may be affected by external flooding. As part of NRC temporary instruction (TI) 2515/183, Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event, the inspectors accompanied maintenance personnel and observed their inspections of various watertight doors and flood gates in the auxiliary building as well as their inspection of the diesel fuel tank (DFT) 1B vent stack and manway covers. The inspectors conducted a general site walkdown of all external areas of the plant including the turbine building, auxiliary building, and berm to ensure that flood protection measures were erected in accordance with design specifications. Procedure EM-220, Violent Weather, was checked to verify that adequate measures were planned or established to protect against external flooding due to hurricanes. Specific plant attributes that were checked included: structural integrity, sealing of penetrations below the design flood line, and adequacy of watertight doors between flood areas. The documents reviewed are listed in the attachment.

b. Findings

No findings were identified.

.3 Adverse Weather Protection: Offsite and Alternate AC Power System Readiness

a. Inspection Scope

The inspectors evaluated the summer readiness of both the offsite and onsite alternate AC power systems. The inspectors walked down the safety-related emergency diesel generators (EGDG-1A, 1B), non-safety-related emergency diesel generator (EGDG-1C), and the safety-related diesel driven emergency feedwater pump (EFP-3) to verify they would be available during a loss of offsite power event. The inspectors performed a walk down of the switchyard with plant personnel to verify the material condition of the offsite power sources was adequate. Open work orders (WOs) for the offsite and onsite AC power systems were reviewed to ensure degraded conditions were properly addressed. The inspectors verified that licensee and transmission system operator procedures contained communication protocols addressing the exchange of appropriate information when issues arise that could impact the offsite power system. The inspectors verified that no equipment or operating procedure changes have occurred since the last performance of this inspection that would potentially affect operation or reliability of the offsite or onsite AC power systems. The documents reviewed are listed in the attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 Partial Equipment Walkdowns

a. Inspection Scope

The inspectors performed walkdowns of the critical portions of the selected trains to verify correct system alignment. The inspectors reviewed plant documents to determine the correct system and power alignments, and the required positions of

select valves and breakers. The inspectors verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact mitigating system availability. The inspectors verified the following two partial system alignments in system walkdowns using the listed documents:

- Emergency diesel generator EGDG-1A using operating procedure OP-707, Operation of the Emergency Diesel Generators, while EGDG-1B was out of service for surveillance testing
- B train 4160 and 480 Volt Engineering Safeguard (ES) Buses and B train 480 Volt motor control centers, using OP-700A, 6900, 4160, and 480 Volt AC Buses; and OP-700B, 480 Volt AC Motor Control Centers, while EGDG-1A was out of service for planned maintenance

b. Findings

No findings were identified.

.2 Complete System Walkdown

a. Inspection Scope

The inspectors conducted one detailed walkdown/review of the alignment and condition of the emergency diesel generator EGDG-1A and its associated 4160 volt engineered safeguards (ES) Bus 3A. The inspectors utilized licensee procedures, as well as licensing and design documents to verify that the system (i.e., pump, valve, and electrical) alignment was correct. During the walkdown, the inspectors also verified that: the pumps, valves and piping associated with the diesel did not exhibit leakage that would impact its function, major portions of the systems and components were correctly labeled, hangers and supports were installed and functional; and essential support systems were operational. In addition, pending design and equipment issues were reviewed to determine if the identified deficiencies impacted the systems functions. A review of open work orders and nuclear condition reports (NCRs) was performed to verify that the licensee had appropriately characterized and prioritized equipment problems for resolution in corrective action program. Documents reviewed are listed in the attachment.

b. Findings

No findings were identified.

1R05 Fire Protection

Fire Area Walkdowns

a. Inspection Scope

The inspectors walked down accessible portions of the plant to assess the licensee's implementation of the fire protection program. The inspectors checked that the areas were free of transient combustible material and other ignition sources. Also, fire detection and suppression capabilities, fire barriers, and compensatory measures for

fire protection problems were verified. The inspectors checked fire suppression and detection equipment to determine whether conditions or deficiencies existed which could impair the function of the equipment. The inspectors selected the areas based on a review of the licensee's probabilistic risk assessment. The inspectors also reviewed the licensee's fire protection program to verify the requirements of FSAR Section 9.8, Plant Fire Protection Program, were met. Documents reviewed are listed in the attachment. The inspectors toured the following five areas important to reactor safety:

- vital battery inverter rooms
- A and B train 480 volt engineering safeguards (ES) switch gear rooms
- intermediate building 119' elevation
- offsite power transformer, backup ES service transformer, and main step-up transformer areas
- A train decay heat removal and building spray vault

b. Findings

No findings were identified.

1R06 Flood Protection Measures

Internal Flood Protection

a. Inspection Scope

The inspectors reviewed the Crystal River Unit 3, FSAR, Chapter 2.4.2.4, Facilities Required for Flood Protection, and the Crystal River Unit 3 Design Basis Documents that depicted protection for areas containing safety-related equipment to identify areas that may be affected by internal flooding. As part of NRC temporary instruction (TI) 2515/183, Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event, the inspectors accompanied engineering and observed their inspections on the circulating water pump and raw water pump encapsulation sleeve gaps and independently confirmed the licensee's conclusions. The inspectors walked down the auxiliary building 95 foot elevation sea water room area, and the turbine building 95 foot and 119 foot elevations to ensure that flood protection measures were in accordance with design specifications. Specific plant attributes that were checked included structural integrity, sealing of penetrations, and operability of sump systems.

b. Findings

No findings were identified.

## 1R07 Heat Sink Performance

### Triennial Review of Heat Sink Performance

#### a. Inspection Scope

The inspectors reviewed operability determinations, completed surveillances, vendor manual information, associated calculations, performance test results and cooler inspection results associated with the decay heat closed cycle heat exchanger (DCHE)-1B, the decay heat removal heat exchanger (DHHE)-1A and the service water heat exchanger (SWHE)-1C. These heat exchangers were chosen based on their risk significance in the licensee's probabilistic safety analysis, their important safety related mitigating system support functions and their relatively low margin.

The inspectors determined whether testing, inspection, maintenance, and monitoring of biotic fouling and macrofouling programs for DCHE-1B and SWHE-1C were adequate to ensure proper heat transfer. This was accomplished by determining whether the test method used was consistent with accepted industry practices, or equivalent, the test conditions were consistent with the selected methodology, the test acceptance criteria were consistent with the design basis values, and reviewing results of heat exchanger performance testing. The inspectors also determined whether the test results appropriately considered differences between testing conditions and design conditions, the frequency of testing based on trending of test results was sufficient to detect degradation prior to loss of heat removal capabilities below design basis values and test results considered test instrument inaccuracies and differences.

The inspectors reviewed the methods and results of heat exchanger performance inspections for DCHE-1B and SWHE-1C. The inspectors determined whether the methods used to inspect and clean heat exchangers were consistent with as found conditions identified and expected degradation trends and industry standards, the licensee's inspection and cleaning activities had established acceptance criteria consistent with industry standards, and the as-found results were recorded, evaluated, and appropriately dispositioned such that the as left condition was acceptable.

In addition, the inspectors determined whether the condition and operation of DHHE-1A and DCHE-1B were consistent with design assumptions in heat transfer calculations and as described in the FSAR. This included determining whether the number of plugged tubes was within pre established limits based on capacity and heat transfer assumptions. The inspectors determined whether the licensee evaluated the potential for water hammer and established adequate controls and operational limits to prevent heat exchanger degradation due to excessive flow induced vibration during operation. In addition, eddy current test reports and visual inspection records were reviewed to determine the structural integrity of the heat exchangers.

The inspectors determined whether the performance of the ultimate heat sink (UHS) and its subcomponents such as piping, intake screens, pumps and valves were appropriately evaluated by tests or other equivalent methods to ensure availability and accessibility to the in-plant cooling water systems.

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The inspectors reviewed the licensee's operation of the service water system (SWS) and UHS. This included a review of licensee's procedures for a loss of the SWS or UHS and the verification that instrumentation, which is relied upon for decision making, was available and functional. In addition, the inspectors determined whether macrofouling was adequately monitored, trended, and controlled by the licensee to prevent clogging. The inspectors determined whether the licensee's biocide treatments for biotic control were adequately conducted and whether the results were adequately monitored, trended, and evaluated. The inspectors also reviewed design changes to the SWS and UHS.

The inspectors performed a system walkdown of the service water and closed cooling water systems, which included the DCHE, DHHE, and SWHE heat exchangers, to determine whether the licensee's assessment on structural integrity was adequate. In addition, the inspectors reviewed the licensee's available testing and inspection results, licensee's disposition of any active thru wall pipe leaks, and the history of thru wall pipe leakage to identify any adverse trends since the last NRC inspection. For closed cooling water systems, the inspectors reviewed operating logs or interviewed operators or the system engineer, to identify adverse make up trends that could be indicative of excessive leakage out of the closed system. For buried or inaccessible piping, the inspectors reviewed the licensee's pipe testing, inspection, or monitoring program to determine whether structural integrity was ensured and that any leakage or degradation was appropriately identified and dispositioned by the licensee.

The inspectors performed a system walkdown of the service water intake structure to determine whether the licensee's assessment on structural integrity and component functionality was adequate and that the licensee ensured proper functioning of traveling screens and strainers, and structural integrity of component mounts. In addition, the inspectors determined whether service water pump bay silt accumulation was monitored, trended, and maintained at an acceptable level by the licensee, and that water level instruments were functional and routinely monitored. The inspectors also determined whether the licensee's ability to ensure functionality during adverse weather conditions was adequate.

In addition, the inspectors reviewed nuclear condition reports (NCRs) related to the heat exchangers and heat sink performance issues to determine whether the licensee had an appropriate threshold for identifying issues and to evaluate the effectiveness of the corrective actions. These inspection activities constituted three heat sink inspection samples as defined in IP 71111.07. The documents reviewed are listed in the attachment to this report.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification ProgramResident Inspector Quarterly Reviewa. Inspection Scope

On May 10 the inspectors observed and assessed licensed operator crew response and actions for the Crystal River Unit 3 licensed operator simulator evaluated session SES-1120. Session SES-1120 involved a loss of a spent fuel pump, a steam generator tube leak, a loss of offsite power, a station blackout condition and an emergency diesel generator fire. The inspectors observed the operators' use of abnormal procedures AP-406, Loss of Spent Fuel Cooling and AP-880, Fire Protection. The inspectors also observed operators' use of emergency operating procedures EOP-02, Vital System Status Verification; EOP-06, Steam Generator Tube Rupture; and EOP-12, Station Blackout. The operators' actions were verified to be in accordance with the above procedures. Event classification and notifications were verified to be in accordance with emergency management procedure EM-202, Duties of the Emergency Coordinator. The simulator instrumentation and controls were verified to closely parallel those in the actual control room. This completes the NRC review utilizing Operating Experience Smart Sample (OpESS) FY 2010-02 "Sample Selection for Reviewing Licensed Operator Examinations and Training Conducted on the Plant-Referenced Simulator." The inspectors evaluated the following attributes related to crew performance:

- clarity and formality of communication
- ability to take timely action to safely control the unit
- prioritization, interpretation, and verification of alarms
- correct use and implementation of abnormal and emergency operation procedures; and emergency plan implementing procedures
- control board operation and manipulation, including high-risk operator actions
- oversight and direction provided by supervision, including ability to identify and implement appropriate Improved Technical Specification (ITS) actions, regulatory reporting requirements, and emergency plan classification and notification
- crew overall performance and interactions

b. Findings

No findings were identified.

1R12 Maintenance Effectivenessa. Inspection Scope

The inspectors reviewed the licensee's effectiveness in performing routine maintenance activities. The review included an assessment of the licensee's practices associated with the identification, scope, and handling of degraded equipment conditions, as well as common cause failure evaluations and the resolution of historical equipment problems. For those systems, structures, and components within the scope of the Maintenance Rule (MR) per 10 CFR 50.65, the inspectors verified that reliability and unavailability were properly monitored and that

10 CFR 50.65 (a)(1) and (a)(2) classifications were justified in light of the reviewed degraded equipment condition. The inspectors conducted this inspection for the instrument air pump IAP-3B system that transitioned to MR (a)(2). These issues were documented in system engineer (SE) report SE11-0019 and SE11-0022.

b. Findings

No findings were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed four NCRs to verify that operability of systems important to safety was properly established, that the affected components or systems remained capable of performing their intended safety function, and that no unrecognized increase in plant or public risk occurred. The inspectors determined if operability of systems or components important to safety was consistent with ITS, the FSAR, 10 CFR Part 50 requirements, and when applicable, NRC Inspection Manual, part 9900, Technical Guidance, Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety. The inspectors reviewed licensee NCRs, work schedules, and engineering documents to verify that operability issues were being identified at an appropriate threshold and documented in the corrective action program, consistent with 10 CFR 50, Appendix B requirements; and licensee corrective action procedure CAP-NGGC-200, Condition Identification And Screening Process. Additional documents reviewed are listed in the attachment.

- NCR 458910, Pressurizer level strings calibrated incorrectly
- NCR 457510, Gaps on raw water RWEJ-1 encapsulation sleeves are out of tolerance
- NCR 456729, Circulating water encapsulation jacket shield flood rate not conservative
- NCR 472817, Minor concrete spalling identified in 'B' raw water flume

b. Findings

One licensee-identified violation (LIV) was identified. The regulatory aspects of this LIV are documented in section 4OA7 of this report.

1R18 Plant Modifications

Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed one temporary modification listed below and the associated 10 CFR 50.59 screening against the system design basis documentation and FSAR to verify the modification did not adversely affect the safety functions of important safety systems. Additionally, the inspectors reviewed licensee engineering procedure

EGR-NGGC-0005, Engineering Change, to assess if the modification was properly developed and implemented. Additional documents reviewed are listed in the attachment.

- EC 81364R1, Use of Temporary Hoisting Equipment with FHCR-1 for Lowering/Parking Fuel Bundle and Raising Grapple to Clear the Core

b. Findings

No findings were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors witnessed or reviewed post-maintenance test procedures or test activities, as appropriate, for selected risk significant systems to verify whether: (1) testing was adequate for the maintenance performed, (2) acceptance criteria were clear, and adequately demonstrated operational readiness consistent with design and licensing basis documents, (3) test instrumentation had current calibrations, range, and accuracy consistent with the application, (4) tests were performed as written with applicable prerequisites satisfied, and (5) equipment was returned to the status required to perform its safety function. The four post-maintenance tests reviewed are listed below:

- Performance tests PT-670, Main Fuel Handling Bridge (FHCR-1) Load Tests; and PT-532, Main Fuel Handling Bridge Electrical Interlock Test (FHCR-1), after performing maintenance per WO 1680104
- Surveillance procedure SP- 354A, Functional Test of the Emergency Diesel Generator EGDG-1A, after performing planned maintenance per WOs 1871210 and 1596079
- Preventative maintenance procedure PM-130A, Vital Bus Static Inverters and Static Switches, (Section 4.11), after performing planned maintenance on vital bus inverter VBIT-1A per WO 1400178
- SP-340D, RWP-3B, DCP-1B and Valve Surveillance; and SP-340E, DHP-1B and BSP-1B and Valve Surveillance (DHR portion only), after performing planned maintenance per WOs 1652422, 1628815, and 1592277

b. Findings

No findings were identified.



1R20 Refueling and Outage ActivitiesSteam Generator Replacement Refueling Outage (RFO16)a. Inspection Scope

On September 26, 2009, the unit was shut down for a steam generator replacement refueling outage. The previous quarter's NRC inspection activities in this area were documented in NRC integrated inspection report 05000302/2011002. During this quarter, the inspectors observed and monitored licensee controls over the refueling activities listed below. Documents reviewed are listed in the attachment.

- outage related risk assessment monitoring
- defueling activities
- controls associated with reactivity management, electrical power alignments, and spent fuel pool cooling
- implementation of equipment clearance activities

b. Findings

No findings were identified

1R22 Surveillance Testinga. Inspection Scope

The inspectors either observed or reviewed the four surveillance tests listed below to verify that ITS surveillance requirements were followed and that test acceptance criteria were properly specified. The inspectors verified that proper test conditions were established as specified in the procedures, that no equipment preconditioning activities occurred, and that acceptance criteria had been met. Additionally, the inspectors also verified that equipment was properly returned to service and that proper testing was specified and conducted to ensure that the equipment could perform its intended safety function following maintenance or as part of surveillance testing.

In-Service Test:

- SP-344B, RWP-2B, SWP-1B and Valve Surveillance
- SP-340E, DHP-1B, BSP-1B and Valve Surveillance (DHP portion only)

Surveillance Tests:

- SP-149A, Power-Operated Relief Valve LTOP Functional Test
- PT-227, Performance Test for AHD-8, -9, -10, -11, -13, -14, -15 and -16 Air Accumulators (AHD-8, -9, -13, and -14 only)

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation

Emergency Preparedness Drill

a. Inspection Scope

The inspectors observed and reviewed one emergency response activity to verify the licensee was properly classifying emergency events, making the required notifications and appropriate protective action recommendations. The inspectors assessed the licensee's ability to classify emergent situations and make timely notification to State and Federal officials in accordance with 10 CFR 50.72. Emergency activities were verified to be in accordance with the Crystal River Radiological Emergency Response Plan, Section 8.0, Emergency Classification System, and 10 CFR Part 50, Appendix E. Additionally, the inspectors verified that adequate licensee critiques were conducted in order to identify performance weaknesses and necessary improvements.

- May 10, licensed operator simulator evaluated session, SES-1120, involving a loss of spent fuel pool cooling, a steam generator tube leak, a station blackout and an emergency diesel generator fire

b. Findings

No findings were identified.

2. RADIATION SAFETY (RS)

Cornerstone: Public Radiation Safety (PS)

2RS7 Radiological Environmental Monitoring Program (REMP)

a. Inspection Scope

REMP Status and Results: The inspectors reviewed and discussed recent and proposed changes applicable to Radiological Environmental and Meteorological Monitoring program activities detailed in the Final Safety Analysis Report (FSAR), and Offsite Dose Calculation Manual (ODCM). Environmental monitoring sample results presented in the Annual Environmental Radiological Environmental Operating Report (AREOR) documents issued for calendar year (CY) 2008, CY 2009, and CY 2010 were reviewed and discussed. REMP vendor laboratory cross-check program results and select procedural guidance for collection, processing and analysis of airborne particulate and iodine, broadleaf vegetation, surface water, and fruit samples were reviewed and discussed with vendor personnel. Detection level sensitivities for selected environmental media analyzed by the offsite vendor environmental laboratory were reviewed and discussed. The AREOR environmental measurement results were reviewed for consistency with licensee Annual Effluent Release Report data and evaluated for radionuclide concentration trends. Licensee actions for missed airborne monitoring samples were reviewed and discussed in detail.

Site Inspection: The inspectors observed implementation of selected REMP monitoring and sample collection activities for direct radiation, atmospheric particulates and iodine, and broadleaf vegetation samples as specified in the current ODCM and applicable procedures. The inspectors observed equipment material condition and verified operability, including verification of flow rates and total sample volume results for the weekly airborne particulate filter and iodine cartridge change-outs at three atmospheric sampling stations. In addition, the inspectors observed and discussed broadleaf vegetation, surface water, and fruit sampling for selected ODCM locations. Thermo-luminescent dosimeter material condition and placement were verified by direct verification at twelve locations identified in the ODCM. Land use census results, actions for missed samples including compensatory measures and/or availability of replacement equipment were discussed with vendor technicians and knowledgeable licensee staff. In addition, sample pump calibration and maintenance records for the installed environmental air monitoring equipment were reviewed.

The inspectors toured the primary meteorological tower and observed local data collection equipment readouts. The inspectors observed the physical condition of the tower and associated instruments and discussed equipment operability, maintenance history, and backup power supplies with responsible licensee staff. For the meteorological measurements of wind speed, wind direction, and temperature, the inspectors reviewed applicable primary and backup meteorological towers instrumentation semi-annual calibration records and evaluated meteorological measurement data recovery for CY 2009 and CY 2010.

The inspectors discussed previous leaks and spills attributed to degraded equipment and/or piping associated station drain tank, condensate storage tank, and emergency feedwater tank. Subsequent to direct tours of the subject systems, licensee monitoring and proposed testing activities for associated buried piping were discussed with responsible licensee representatives. Proposed changes to the licensee groundwater monitoring program based on recent investigations of groundwater intrusion into the decay heat vaults also were discussed in detail. Current status and completeness of the licensee's 10 CFR 50.75(g) decommissioning files were reviewed and discussed in detail.

Procedural guidance, program implementation, quantitative analysis sensitivities, and environmental monitoring results were reviewed against 10 CFR Part 20; 10 CFR Part 50, and Appendix I to 10 CFR Part 50; ITS Sections 5.6.1, Procedures, 5.6.2, Programs and Manuals, and 5.7.1, Routine Reports; ODCM, Rev. 32; RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operation) - Effluent Streams and the Environment; and the Branch Technical Position, An Acceptable Radiological Environmental Monitoring Program - 1979. Licensee procedures and activities related to meteorological monitoring were evaluated against: ODCM; RG 1.23, Meteorological Monitoring Programs For Nuclear Power Plants, and ANSI/ANS-2.5-1984, Standard for Determining Meteorological Information at Nuclear Power Sites. Documents reviewed are listed in Section 2RS07 of the report Attachment.

Problem Identification and Resolution The inspectors reviewed selected corrective action program (CAP) nuclear condition report (NCR) documents in the areas of environmental and meteorological monitoring. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with CAP - Nuclear Generation Group Standard Procedure (CAP-

Enclosure

NGGC)-0200, Condition Identification and Screening Process, Revision (Rev. 33) and CAP-NGGC-205, Condition Evaluation and Corrective Action Process, Rev. 12.

Documents reviewed are listed in the attachment of this report. The inspectors completed all of the specified line-items detailed in IP 71124.07.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

Daily Review

a. Inspection Scope

As required by Inspection Procedure 71152, Identification and Resolution of Problems, and in order to help identify equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's corrective action program (CAP). This review was accomplished by attending daily plant status meetings, interviewing plant operators and applicable system engineers, and accessing the licensee's computerized database.

b. Findings

No findings were identified.

4OA5 Other Activities

.1 Quarterly Resident Inspector Observations of Security Personnel Activities

a. Inspection Scope

During the inspection period, the inspectors conducted observations of security force personnel and activities to ensure that the activities were consistent with licensee security procedures and regulatory requirements relating to nuclear plant security. These observations took place during normal and off-normal plant working hours.

These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status reviews and inspection activities.

b. Findings

No findings were identified.

.2 Steam Generator Replacement Project and Containment Wall Repair (IP 50001)

a. Inspection Scope

During this quarter, the inspectors observed and monitored the licensee's actions in response to an additional delamination that was identified during the previous inspection period (documented in NRC integrated inspection report 05000302/2011002). On March 14, 2011, during containment retensioning activities, workers observed indications that were consistent with containment delamination. Through non-destructive examination (NDE), the licensee identified an "egg-shaped" area of delamination, approximately 100 ft long, in Bay 5-6 of containment. Containment re-tensioning activities were placed on hold pending further evaluation of the containment structure and the licensee's actions going forward.

On June 27, 2011, after extensive evaluation and review of various repair options, Progress Energy issued a press release which stated the licensee plans to repair the Crystal River Unit 3 concrete containment building. The licensee estimated that the unit would return to service in 2014. At the end of the inspection period, the licensee was in the early stages of completing a detailed engineering and construction analysis for the containment repairs.

b. Findings

No findings were identified.

.3 (Closed) NRC Temporary Instruction 2515/183, "Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event"

a. Inspection Scope

The inspectors assessed the activities and actions taken by the licensee to assess its readiness to respond to an event similar to the Fukushima Daiichi nuclear plant fuel damage event. This included (1) an assessment of the licensee's capability to mitigate conditions that may result from beyond design basis events, with a particular emphasis on strategies related to the spent fuel pool, as required by NRC Security Order Section B.5.b issued February 25, 2002, as committed to in severe accident management guidelines, and as required by 10 CFR 50.54(hh); (2) an assessment of the licensee's capability to mitigate station blackout (SBO) conditions, as required by 10 CFR 50.63 and station design bases; (3) an assessment of the licensee's capability to mitigate internal and external flooding events, as required by station design bases; and (4) an assessment of the thoroughness of the walkdowns and inspections of important equipment needed to mitigate fire and flood events, which were performed by the licensee to identify any potential loss of function of this equipment during seismic events possible for the site.

b. Findings

Inspection Report 05000302/2011010 (ML111330166) documented detailed results of this inspection activity. Following issuance of the report, the inspectors conducted detailed follow-up on selected issues. One finding, a licensee identified violation

(LIV), was identified during this follow-up inspection. The LIV is documented in section 4OA7 of this report.

.4 (Closed) NRC Temporary Instruction 2515/184, "Availability and Readiness Inspection of Severe Accident Management Guidelines (SAMGs)"

On May 27, 2011, the inspectors completed a review of the licensee's severe accident management guidelines (SAMGs), implemented as a voluntary industry initiative in the 1990's, to determine: (1) whether the SAMGs were available and updated; (2) whether the licensee had procedures and processes in place to control and update its SAMGs; (3) the nature and extent of the licensee's training of personnel on the use of SAMGs; and (4) licensee personnel's familiarity with SAMG implementation.

The results of this review were provided to the NRC task force chartered by the Executive Director for Operations to conduct a near-term evaluation of the need for agency actions following the Fukushima Daiichi fuel damage event in Japan. Plant-specific results for Crystal River Unit 3 were provided as an Enclosure to a memorandum to the Chief, Reactor Inspection Branch, Division of Inspection and Regional Support, dated June 02, 2011 (ML111530328).

4OA6 Meetings, Including Exit

Exit Meeting Summary

On July 06, 2011, the resident inspectors presented the inspection results to Mr. J. Franke, Site Vice President, and other members of licensee management. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

4OA7 Licensee Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy, for being dispositioned as a Non-Cited Violation.

10 CFR 50 Appendix B, Criterion III, Design Control, requires, in part, that measures shall be established to assure that applicable regulatory requirements and design basis for those structures, systems, and components are correctly translated into specifications, drawings, procedures and instructions. Licensee corporate engineering procedures EGR-NGGC-0005, Engineering Change; and Administrative Corporate procedure ADM-NGGC-0116, Nuclear Planning, implement those requirements. Contrary to the above, the licensee failed to translate the design basis requirements of modifications MAR 86-09-15, Raw Water Joint Encapsulation Sleeve, and MAR 90-08-16, Circulating Water Joint Encapsulation Sleeve, into work orders or procedures to ensure continued maintenance of design basis requirements. As a result, the raw water and circulating water encapsulation sleeves were found to have a larger gap than allowed by design, and consequently would have caused a greater internal flood rate into the auxiliary building had the expansion joints failed.

The performance deficiency of failing to maintain the gaps within the required tolerances on the raw water and circulating water encapsulation sleeves is more than minor because, if left uncorrected, would have the potential to lead to a more significant safety concern during a rupture of a raw water or circulating water expansion joint. The licensee's corrective actions include revising maintenance procedures to add acceptance criteria for the encapsulation sleeve gaps. The finding was determined to be of very low safety significance (Green) because after performing additional engineering evaluations and calculations, it was concluded that the auxiliary building internal design basis flood requirements were not exceeded. This issue was documented in the licensee's corrective action program as NCRs 456729, 457510, and 457181.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## KEY POINTS OF CONTACT

### Licensee personnel:

J. Franke, Vice President, Crystal River Nuclear Plant  
J. Holt, Plant General Manager  
B. Akins, Superintendent, Radiation Protection  
S. Cahill, Director, Engineering  
P. Dixon, Manager Training  
D. Douglas, Manager, Maintenance  
J. Huegel, Manager, Nuclear Oversight  
C. Poliseno, Supervisor, Emergency Preparedness  
D. Westcott, Supervisor, Licensing  
I. Wilson, Manager Outage and Scheduling  
B. Wunderly, Manager Operations

### State of Florida

Jennifer Middlebrook, Florida Bureau of Radiation Control, Environmental Specialist

### NRC personnel:

D. Rich, Chief, Branch 3, Division of Reactor Projects

## LIST OF ITEMS CLOSED

### Closed

2515/183	TI	Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event (Section 4A05.3)
2515/184	TI	Availability and Readiness Inspection of Severe Accident Management Guidelines (SAMGs) (Section 4A05.4)

## LIST OF DOCUMENTS REVIEWED

### Section 1R01: Adverse Weather Protection

#### Procedures

AP-730, Grid Instability  
AI-513, Seasonal Weather Preparations  
NGGM-IA-0003, Transmission Interface Agreement for Operation, Maintenance, and Engineering Activities at Nuclear Plants  
AP-1040, Aux Building Flooding  
AP-1050, Turbine Building Flooding

#### Work Orders

WO 1735879, PM – Inspect Watertight Doors & Flood Gates



NCRs

NCR 456801, WO instructions have insufficient detail to perform an adequate inspection

**Section 1R04: Equipment Alignment**Procedures

OP 707, Operation of the ES Emergency Diesel Generators  
OP-700A, 6900, 4160, and 480 Volt AC Buses

Nuclear Condition Reports

NCR 465799, EDG generator bearing oil analysis results show high FE  
NCR 457697, B ES 4160V switchgear room temperature low  
NCR 432552, Delay in return to service A EDG  
NCR 428893, Test instrument setup for SP354B for max load testing incorrect  
NCR 428881, EGDG 1B in 30 min rating for > 3.5 min during surveillance testing  
NCR 414139, EGDG 1A speed control unstable

**Section 1R05: Fire Protection**Procedures

AI-2205A, Pre Fire Plan – Control Complex  
AI-2205B, Pre Fire Plan – Turbine Building  
AI-2205C, Pre Fire Plan – Auxiliary Building  
AI -2205F, Pre Fire Plan – Miscellaneous buildings and Components  
SP-804, Surveillance of Plant Fire Brigade Equipment

**Section 1R07: Heat Sink Performance**Procedures

AP-406, Loss of Spent Fuel Pool Cooling, Rev. 1  
AAG-04, Decay Heat Removal using Spent Fuel Pumps, Rev. 0  
AP-330, Loss of Nuclear Service Cooling, Rev. 22  
AP-404, Loss of Decay Heat Removal, Rev. 13  
CH-400, Nuclear Chemistry Master Scheduling program, Rev. 52  
CP-160, Closed Cooling Water Systems Chemistry Program Guidelines, Rev. 11  
EM-220, Violent Weather, Rev. 46  
MP-299, Heat Exchanger Tube Plugging and Tube Removal/Replacement, Rev. 9  
MP-300, DC, SC, and SW Heat Exchanger Channel Head Removal/Installation, Rev. 5  
OP-103B, Plant Operating Curves, Rev. 40  
OP-404, Decay Heat Removal System, Rev. 155  
OP-408, Nuclear Services Cooling System, Rev. 154  
OP-604, Circulating Water System, Rev. 73  
PM-164, Raw Water Pipe Lining Inspection, Rev. 8  
PM-165, Raw Water Pit Inspection/Cleaning, Rev. 4  
PM-275, General Preventative maintenance Work, Rev. 29  
PM-192, Clamtrol BD-1 Spectrus CT1300 Chemical Injection for RW, Rev. 12  
SP-300, Operating Daily Surveillance Log, Rev. 224

SP-340A, RWP-3A, DCP-1A, and Valve Surveillance, Rev. 62  
 SP-340-B, DHP-1A, BSP-1A and Valve Surveillance, Rev. 64  
 SP-340D, RWP-3B, DCP-1B, and Valve Surveillance, Rev. 46  
 SP-340-E, DHP-1B, BSP-1B and Valve Surveillance, Rev. 44  
 SP-344A, RWP-2A, SWP-1A, and Valve Surveillance, Rev. 55  
 SP-344B, RWP-2B, SWP-1B and Valve Surveillance, Rev. 51

### Corrective Action Documents

CR 296761, SWHE-1C Blockage in Region B of OP-103 Curve, 9/18/2008  
 CR 479095, Paint Exterior of RW-71F Spoolpiece, 4/1/2011  
 CR 1910596, Coating Aux Building, 4/4/2011  
 CR 341860, SWHE-1C Tubesheet Blockage, 6/22/2009  
 CR 469144, SW System Chloride Increasing with time since 10/21/2010, 6/2/2011

### Other

Calculation M97-0133, SW Heat Loads During LBLOCA and SW Temperature Decay Times, 11/17/06  
 Calculation M95-0020, DCHE Performance Evaluation, 1/29/2008  
 Calculation M95-0034, RW/DC/DH Thermal Analysis, Rev. 1, 9/3/2002  
 WO 01592965 01, Q, PM, DCHE-1B Drain Valve, UT Per, 12/14/2009  
 WO 01378318 01, Q, PM, SWHE-1A, B, C, D, UT NOCS 90458, M, 11/17/2008  
 WO 01583820 01, Q, PM, Raw Water UT Inspection, 12/28/2009  
 WO 01763352 01, M, PM, B, RW Intake, Video, RW Pit "B" In, 08/10/2010  
 WO 01854771 01, RW Inspection and Repair of Urethane, 12/08/2011  
 WO 01510856 01, M, PM, RWV-38, MP-550, Check Valve Insp, 9/10/2010  
 WO 01843844 07, M, PM, SWHE-1C, Pick/ Shoot & Clean, 2/24/2011  
 WO 01621404 02, M, PM, DCHE-1B, Decay Heat Exch Pick/, 8/21/2010  
 WO 01864771 01, Clamtrol Injection, 4/4/2011  
 Report PEARN-PRJ10-0002, Nondes. Pipeline Condition Assess. of the Raw Water Piping, 07/2010  
 Report 08-262a, Eddy Current Inspection Report DCHE-1B, 7/23/2008  
 Report 06-245, Eddy Current Inspection Report SWHE-1C, November 14, 2006  
 Report 339380 & 339401, Accident Condition Investigation-Equipment Report  
 Report 77477R, Engineering. Change, Rev. 0  
 Dwg E-304-611, Sh 1 of 1, Sea Water Underground Piping  
 Dwg L-001-012, Layout Plan above Reactor  
 Design Basis for Decay Heat Sea Water System, 5/23/1990  
 Design Basis for Nuclear Services Closed Cycle Cooling Water System, 7/29/1991  
 Design Basis for Decay Heat Closed Cycle Cooling Water System, 11/1/1990  
 GL89-13 Response, Service Water System Problems Affecting Safety-Related Equipment, 12/6/1995  
 Program Health Report, RW Service Water, 1/1/2011-3/31/2011  
 Program Health Report, SW/DC-Primary CCW, 1/1/2011-3/31/2011

### **Section 1R12: Maintenance Effectiveness**

NCR 271468, IAP-3B was found tripped  
 NCR 307838, IAP-3B tripped twice after start  
 NCR 367387, Unplanned entry into CP-500 on IAP-3B Trip

**Section 1R15: Operability Evaluations**Calculation

Design Analysis and Calculation M91-0019, Allowable gaps for the raw water expansion joint encapsulation sleeves

**Section 1R18: Plant Modifications**Procedures

FP-601T, Use of Temporary Clamping Restraints to Secure And Lower FHCR-1 Load

**Section 1R20: Refueling and Outage Activities**Procedures

AI-504, Guidelines for Cold Shutdown and Refueling  
 WCP-102, Outage Risk Management  
 WCP-103, Station Readiness For Reduced Inventory, Mode 4/3 Entry, and Mode 2/1 Entry  
 SP-406, Refueling Operations Daily Data Requirements  
 FP-601A, Operations of main fuel handling Bridge  
 FP-601C, Operations of Spent Fuel handling Bridge FHCR-3  
 FP-601D, Operation of fuel Transfer Carriages and Upenders (FHCR-4A and 4B)  
 FP-203, Off Loading and Refueling Operations

**Section 2RS07: Radiological Environmental Monitoring Program (REMP)**Procedures and Guidance Documents

Crystal River Unit 3, Off-Site Dose Calculation Manual, Revision (Rev.) 32  
 Surveillance Procedure (SP) 153, Primary Meteorological Tower Calibration, Rev. 18  
 Sampling Procedure 1, Collection of Air Particulates and Radioiodines, Rev. 10  
 Design Basis Document for the Meteorological Measurement System, Rev 6  
 Health Physics Procedure (HPP)-230, Record Keeping for Decommissioning Planning, Rev. 1  
 Commitment 01933, Regarding FPC Letters 3F0186-24, 3F0384-14 and 3F0382-20, describing long-term controls for secondary system releases.  
 Corrective Action Program - Nuclear Generation Group Standard Procedure (CAP-NGGC)-0200, Condition Identification and Screening Process, Rev. 33  
 CAP-NGGC-205, Condition Evaluation and Corrective Action Process, Rev. 12.

Records and Data Reviewed

Work Order Package (WO) 01796819, SP0153, Primary System Met Monitoring Instrument Calibration, 02/17/2011  
 WO 01723257, SP0153, Primary System Met Monitoring Instrument Calibration, 07/07/2010  
 WO 01833564, SP0158, Backup System Met Monitoring Instrument Calibration, 03/29/2011  
 WO 01764848, SP0158, Backup System Met Monitoring Instrument Calibration, 10/25/2010  
 WO 01927508, Primary Meteorological System Monthly PM-157B, 06/14/2011  
 Crystal River Unit 3 – Groundwater Protection – Data Collection Questionnaire, Letter J. W.

Holt, Plant General Manager, Crystal River Nuclear Plant, dated March 31, 2011  
 Crystal River Unit 3 – 2008 Annual Radiological Environmental Operating Report, 5/13/2009  
 Crystal River Unit 3 – 2009 Annual Radiological Environmental Operating Report, 4/29/2010  
 Crystal River Unit 3 – 2010 Annual Radiological Environmental Operating Report, 4/28/2011  
 Gas Meter Calibration Worksheet Data: Serial Number (No) 2547149, 5/31/2011, and No. 1695321, 5/31/2011  
 2010 Annual X/Q Comparison to ODCM values for the Crystal River Plant, 03/08/2011  
 Calendar Year (CY) 2007, CY 2008, CY 2009, & CY 2010 Fourth Quarter Radiological Surveillance of Progress Energy Florida Crystal River Site Settling Pond Sediment and Surface Water Tritium and Gamma-Emitter results  
 10 CFR 50.75g Decommissioning Files, Book 1; Records Up to 1999  
 10 CFR 50.75g Decommissioning Files, Book 2; Records Year 2000 and Later  
 Drawing P 304-821, Rev. 1, DDEFW Suction and Discharge Piping – Yard Piping and Intermediate Building  
 Drawing G-736-003, Plot Plant North Underground Piping & Conduit,  
 Drawing 14774-CUUU-S3305, Rev 5, Underground Utilities, Units 1& 2 Plant Area Plan  
 Drawing 14774-CUUU-S3306, Rev 4, Underground Utilities, Units 1& 2 Plant Area Plan

#### Corrective Action Program (CAP) Documents

State of Florida Department of Health, Environmental Radiation Control, Semi-Annual Self-Assessment, March 2009  
 State of Florida Department of Health, Environmental Radiation Control, Semi-Annual Self-Assessment, January through June 2009  
 State of Florida Department of Health, Environmental Radiation Control, Semi-Annual Self-Assessment, July through December 2009  
 State of Florida Department of Health, Environmental Radiation Control, Semi-Annual Self-Assessment, July through December 2010  
 Action Request NCR 448181, Apparent Cause Evaluation of Source of Tritium in the Decay Heat  
 (DH) Vault and Tendon Pits  
 NCR 00443392, Elevated Tritium on A-Decay Heat Vault Water Intrusion,  
 NCR 00420056, As-found Data Out of Specification on Back-up Meteorological Tower 33 Foot Wind Direction  
 NCR 00402868, REMP Air Sample Station C40 Found Without Power  
 NCR 00379191, REMP Air Sample Station C-40 Has No Power  
 NCR 00353293, REMP Air Sample Station C-40 Without Power  
 NCR 00347696, REMP Vegetation Sample Location C48A Has Been Moved,  
 NCR 00341994, Increase in Low Level Tritium Seen at Well No.5  
 NCR 00336767, Percolation Pond Analysis of Soil and Vegetation  
 NCR 00320964, REMP Air Sample Station C-40 Found Not Running  
 NCR 00309643, REMP Surface Water Sample (C14H) Collected in close Proximity to Unit 1 Outfall

#### **Section: 40A2 Problem Identification and Resolution**

CAP-NGGC-0200, Condition Identification And Screening Process  
 ADM-NGGC-0101, Maintenance Rule Program