



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

April 10, 2018

Mr. George A. Lippard III  
Vice President, Nuclear Operations  
South Carolina Electric & Gas Company  
Virgil C. Summer Nuclear Station  
P.O. Box 88, Mail Code 800  
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION, UNIT 1 – NRC TEAM INSPECTION  
REPORT 05000395/2018011

Dear Mr. Lippard:

On March 8, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Virgil C. Summer Nuclear Station, Unit 1 facility. The NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

The inspection examined activities conducted under your license as they relate to the implementation of mitigation strategies and spent fuel pool instrumentation orders (EA-12-049 and EA-12-051) and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans, your compliance with the Commission's rules and regulations, and with the conditions of your operating license. Within these areas, the inspection involved examination of selected procedures and records, observation of activities, and interviews with station personnel.

The NRC inspectors did not identify any finding or violation of more than minor significance.

G. Lippard

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This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

*/RA/*

Shane Sandal, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Docket No.: 50-395  
License No.: NPF-12

Enclosure:  
IR 05000395/2018011

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SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION, UNIT 1 – NRC TEAM INSPECTION  
REPORT 05000395/2018011 April 10, 2018

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**ADAMS Accession No. ML18100A270**

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**U.S. NUCLEAR REGULATORY COMMISSION**  
**Inspection Report**

Docket Number: 50-395

License Number: NPF-12

Report Numbers: 05000395/2018011

Enterprise Identifier: I-2018-011-0034

Licensee: South Carolina Electric & Gas (SCE&G) Company

Facility: Virgil C. Summer Nuclear Station, Unit 1

Location: Jenkinsville, SC

Inspection Dates: March 5 - 8, 2018

Inspectors: P. McKenna, Senior Resident Inspector (Surry Power Station) (Team Leader)  
G. MacDonald, Senior Reactor Analyst  
B. Bishop, Project Engineer  
E. Hilton, Resident Inspector

Approved By: S. Sandal, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Enclosure

## SUMMARY

The NRC continued monitoring licensee's performance by conducting a Temporary Instruction 2515/191, "Implementation of Mitigation Strategies and Spent Fuel Pool (SFP) Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans," inspection (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15257A188) at Virgil C. Summer Nuclear Station, Unit 1, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

### List of Findings and Violations

No findings and more than minor violations were identified.

### Additional Tracking Items

Type	Issue number	Title	Report Section	Status
TI	TI 2515/191	Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans	Other Activities	Closed

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## INSPECTION SCOPE

Inspections were conducted using the appropriate portions of Temporary Instruction (TI) procedure 2515/191, "Implementation of Mitigation Strategies and Spent Fuel Pool (SFP) Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans," (ADAMS Accession No. ML15257A188). Documents reviewed by inspectors are listed in the documents reviewed section of this report. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

## OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

### TI 2515/191 - Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans

Inspectors verified plans for complying with NRC Orders EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12056A045) and EA-12-051, "Order Modifying Licenses With Regard to Reliable Spent Fuel Pool Instrumentation," (ML12054A679) were in place and were being implemented by the licensee. Additionally, the inspection verified implementation of staffing and communications information provided in response to the March 12, 2012, request for information letter (ML12053A340) and dose assessment information provided per COMSECY-13-0010, "Schedule and Plans for Tier 2 Order on Emergency Preparedness for Japan Lessons Learned," dated March 27, 2013 (ML12339A262).

- (1) Based on samples selected for review, the inspectors verified that the licensee satisfactorily implemented appropriate elements of the Diverse and Flexible Coping Strategies (FLEX) as described in the plant-specific submittals and the associated safety evaluation (ML17089A617) and determined that the licensee is in compliance with NRC Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12056A045). The inspectors verified the licensee satisfactorily:
  - a) developed and issued FLEX Support Guidelines (FSGs) to implement the FLEX strategies for postulated external events;
  - b) integrated their FSGs into their existing plant procedures such that entry into and departure from the FSGs were clear when using existing plant procedures;
  - c) protected FLEX equipment from site-specific hazards;
  - d) developed and implemented adequate testing and maintenance of FLEX equipment to ensure their availability and capability
  - e) trained their staff to ensure personnel proficiency in the mitigation of beyond-design basis events; and

- f) developed the means to ensure the necessary off-site FLEX equipment would be available from off-site locations.
- (2) Based on samples selected for review, the inspectors verified that the licensee satisfactorily implemented appropriate elements of the FLEX strategy as described in the plant specific submittals and the associated safety evaluation (ML17089A617) and determined that the licensee was in compliance with NRC Order NRC Order EA-12-051, "Order Modifying Licenses With Regard to Reliable Spent Fuel Pool Instrumentation" (ADAMS Accession No. ML12054A679). The inspectors verified that the licensee satisfactorily:
- a) installed the SFP instrumentation sensors, cabling and power supplies to provide physical and electrical separation as described in the plant specific submittals and safety evaluation;
  - b) installed the SFP instrumentation display in the location, environmental conditions and accessibility as described in the plant specific submittals;
  - c) trained their staff to assure personnel proficiency with the maintenance, testing, and use of the SFP instrumentation; and
  - d) developed and issued procedures for maintenance, testing and use of the reliable SFP instrumentation.
- (3) The inspectors reviewed information provided in the licensee's dose submittal and in response to the NRC's March 12, 2012, request for information letter (ML12053A340), and verified that the licensee satisfactorily implemented enhancements pertaining to Near-Term Task Force (NTTF) Recommendation 9.3 response to a large-scale natural emergency event that results in an extended loss of all alternating current (ac) power (ELAP) to all site units and impedes access to the site. The inspectors verified the following:
- a) the licensee satisfactorily implemented required staffing changes to support a ELAP scenario;
  - b) EP communications equipment and facilities are sufficient for dealing with a ELAP scenario; and
  - c) the licensee implemented dose assessment capabilities (including releases from SFPs) using the licensee's site-specific dose assessment software and approach.

The inspectors verified that noncompliances with requirements, and standards identified during the inspection were entered into the licensee's corrective action program as appropriate.



## **INSPECTION RESULTS**

No findings were identified.

## **EXIT MEETINGS AND DEBRIEFS**

No proprietary information was retained by the inspectors or documented in this report.

On March 8, 2018, the inspectors presented the inspection results to Mr. G. Lippard and other members of the licensee's staff.

On April 10, 2018, the lead inspector presented the final inspection results to Mr. M. Moore, Nuclear Licensing Manager.

## DOCUMENTS REVIEWED

### Condition Reports Initiated as a Result of the Inspection

CR-18-00988, FX 4160/7.2 KV Transformer Listed in VCS-ERP-0012 as credited for FLEX  
CR-18-01018, FLEX SFPLI Primary Remote Transmitter Calibration Frequency Changed  
CR-18-01021, SW Pump House Not Evaluated for Heat-up when running FLEX Alternate EFW  
Suction Pumps

### Procedures

AOP-123.1, Decreasing Level in the Spent Fuel Pool or Refueling Cavity during Refueling,  
Rev. 6  
AOP-123.2, Decreasing Boron Concentration in the Spent Fuel Pool or Refueling Cavity, Rev. 1  
AOP-123.3, Potential Fuel Assembly Damage While Handling Fuel, Rev. 3  
AOP-123.4, Loss of Spent Fuel Pool Cooling, Rev. 5  
AOP-123.5, Decreasing Level in the Spent Fuel Pool with Fuel Transfer Tube Valve Closed,  
Rev. 4  
AOP-304.4 ARG-4 Loss of ESF AC Power While on RHR Cooling, Rev. 5  
EOP-6.0 ECA-0.0 Loss of all ESF AC Power, Rev. 35  
ERMP-100.032, FLEX 5500 Watt Diesel Generator Preventative Maintenance, Rev. 0  
ERMP-100.021, FLEX Transformer Preventative Maintenance, Rev.0  
ERMP-100.016, FLEX RCS Makeup Pump Preventative Maintenance, Rev. 1 Change A  
ERMP-100.015, FLEX SG Feed Pump Preventative Maintenance, Rev. 0  
ERMP-100.014, FLEX Booster/Transfer Pump Preventative Maintenance, Rev. 0  
ERMP-100.012, FLEX Heat Sink Lift and Main Pumps Preventative Maintenance, Rev. 0  
ERMP-100.011, FLEX 1MW Combustion Turbine Generator Preventative Maintenance, Rev. 1  
Change A  
ERTP-100.005, FLEX Hose Test Procedure, Rev. 1  
ERTP-100.002, FLEX Combustion Turbine Generator Test Procedure, Rev. 0  
ERTP-100.001, FLEX Pump Test Procedure, Rev. 0  
EPP-005, Offsite Calculation, Rev. 21  
FSP-2.0, Alternate EFW Suction Source, Rev. 0  
FSP-4.0 ELAP DC Bus Load Shed Management, Rev. 0  
FSP-5.0, Initial Assessment and Flex Equipment Staging, Rev. 2  
FSP-6.0, Alternate CST Makeup, Rev. 1  
FSP-9.0, Low Decay Heat Temperature Control, Rev. 1  
FSP-11.0, Alternate Spent Fuel Pool Makeup and Cooling, Rev. 1  
FSP14.0 Shutdown RCS Makeup, Rev. 1  
FSP-20.1, Vital Area Emergency Ventilation, Rev.1  
FSP-20.3.2, Staging the FX SG Feed Pump Using the West Strategy, Rev. 1  
FSP-20.3.1, Staging the FX SG Feed Pump Using the East Strategy, Rev. 1  
FSP-20.4.1, Staging the FX UHS Pumps, Rev. 1  
FSP-20.5.1, Staging the FX RCS MU Pump, Rev.1  
FSP-20.6.1, Staging the FX BSTR XFER Pump, Rev. 1  
FSP-20.7, FLEX Combustion Turbine Generator Operation, Rev. 0  
ICP-390.012, Spent Fuel Level ILT09780 and ILT09781 Calibration, Rev. 1, Change A  
NL-121, Regulatory Commitment Management, Rev. 9  
OAP 100.6, Control Room Conduct and Control of Shift Activities, Rev. 4  
OAP-106.1, AB Upper Tech SPEC Rounds Attachment IV, Rev. 17f  
OAP-109.1 Guidelines for Severe Weather, Rev. 4  
SAP-107, Applicability Determination (AD), Attachment 1, Rev. 7

SOP-211, Emergency Feedwater, Rev. 14  
VCS-EPP-0032, Alternate Emergency Response Facility, Rev. 0  
VCS-ERP-0012, BDB Equipment Availability Monitoring, Rev. 1  
VCS-ERP-0050, Emergency Response Procedure, ERU Equipment Inventory, Rev. 3  
VCS-ERP-0111, ERU BDB Debris Clearing, Rev. 0  
VCS-ERP-0112, BDB Equipment Availability Monitoring, Rev. 1  
VCS-ERP-0113, ERU BDB Refueling Operations, Rev. 0  
VCS-ERP-0114, ERU BDB Lighting and Communications Support, Rev. 0  
VCS-ERP-0115, ERU Communications Tower Deployment, Rev. 0  
VCS-SAP-0130, BDB Flex Program, Rev. 0

#### Drawings

C-317-322, Sh. 15, Vega Waveguide Isometric Southwest, Rev. 0  
C-317-322, Sh. 14, Vega Waveguide Isometric Northwest, Rev. 0  
E-215-080, Conduit Layout Aux Building North above Elev. 463', Rev. 48  
E-215-161, Conduit Layout Fuel Handling Building above Elev. 435', Rev. 27  
E-215-162, Conduit Layout Fuel Handling Building above Elev. 453', Rev. 29  
E-811-014, Instrument Location Layout Aux Building Open Floor above Elev. 463', Rev. 21  
E-811-033, Instrument Location Layout Fuel Handling Area Mezzanine Floor, Rev. 10  
E-811-034, Instrument Location Layout Fuel Handling Area Operating Floor, Rev. 13  
Simplified Drawings Depicting FLEX Strategies and Connection Capabilities:  
Restoration of DC power  
Steam Generator Feed FLEX Lineup  
Condensate Storage Tank Makeup FLEX Lineup  
RCS Boration and Inventory Control  
Containment Integrity  
Spent Fuel Pool Makeup/Cooling  
Alternate EFW Suction FLEX Lineup  
VC Summer Unit 1 FLEX Strategy Simplified Mechanical Diagram  
VC Summer Unit 1 FLEX Strategy Simplified Electrical Diagram

#### Work Orders

1613554-001, Spent Fuel Pool Level ILT09780 Check/Calibration, 1/31/17  
1605636-001, Spent Fuel Pool Level ILT09780 Check/Calibration, 8/10/16  
1613555-001, Spent Fuel Pool Level ILT09781 Check/Calibration, 1/31/17  
1605637-001, Spent Fuel Pool Level ILT09781 Check/Calibration, 8/11/16  
1615160-001, FLEX RCS Makeup Pump Annual Preventative Maintenance, 05/04/17  
1703946-001, Combustion Turbine Generator Annual Preventative Maintenance, 10/02/17  
1705485-001, FLEX Heat Sink Lift and Main Pump Annual Preventative Maintenance, 01/15/18  
1706212-001, FLEX Booster/Transfer Pump Annual Preventative Maintenance, 11/25/17  
1706461-001, FLEX SG Feed Pump Annual Preventative Maintenance, 01/30/18

#### Design Changes

DC 00080-002 Site Hazard Design Parameters for Flex, Rev. 1  
ECR 50890 External Flooding Door Modifications, Excerpts from 60% Design Package  
ECR 51001, Flex Spent Fuel Pool Level Indication, Rev. 0  
ECR 51001 Supporting Documentation Part 1, Rev. 0  
ECR 51001 Supporting Documentation Part 2, Rev. 0  
ECR 51003B, FLEX EFW Alternate Suction Source, Rev. 2  
ECR 51003K, FLEX EFW Alternate Suction Source, Rev. 0

Minor Change Form ECR51001B EC02  
Minor Change Form ECR51001B EC03

Condition Reports

CR-12-01098 CR-12-01102 CR-13-05162 CR-14-01307 CR-14-03196 CR-15-03191  
CR-15-03206 CR-15-05662 CR-15-05934 CR-15-06611 CR-15-06858 CR-16-00149  
CR-16-02624 CR-16-04082 CR-16-04089 CR-16-04206 CR-16-05260 CR-16-05568  
CR-16-05797 CR-16-05957 CR-17-00452 CR-17-00453 CR-17-01273 CR-17-01479  
CR-17-01584 CR-17-02287 CR-17-02632 CR-17-04011 CR-17-04379 CR-17-05620  
CR-18-00056 CR-18-00546 CR-18-00551 CR-18-00642

Training Documents and Records

QA Periodic Reading Flex Response Strategies, ERU Personnel, 9/21/15  
ERU FLEX Training Attendance Records, Test Unit FLEX 2 Year Requalification, Q-ERU-BDB-02, 03, 04, 13 conducted 9/13/17, 9/19/17, 9/20/17, and 9/12/17  
Course FLEX-1.0, Introduction to FLEX Fundamentals, training attendance/completion records for ERU personnel supervisors and ERO leaders  
Training attendance records for Operations/Emergency Response Unit personnel for IC-FLEX-SFPLI  
Operations Training, FLEX 1.0, Introduction to FLEX Fundamentals Lesson Plan, Rev. 0  
Operations Training, FLEX 2.0, FLEX Implementing Procedures Lesson Plan, Rev. 0  
Operations Training, FLEX 3.0, FLEX Equipment Procedures Lesson Plan, Rev. 0  
Operations FLEX Training Records, Flex Fundamentals, 9/14/15  
Operations FLEX Training Records, FLEX for Operators, 6/29/16  
Mechanical Maintenance Training Records, Introduction to FLEX Fundamentals, 8/5/15 and 8/11/15  
Electrical Maintenance Training Records, Electrical Maintenance-FLEX, 6/12/17  
Q-AP-EM-337-Flex, Maintain Disconnect /FLEX Links Disconnect Switch Maintenance, 5/17/17  
FLEX-SFPLI-V, Spent Fuel Pool Level Indicator FLEX, Training attendance, 5/27/15

Other

AREVA Customer Service Bulletin 15-04, Spent Fuel Pool Level Instrument (SFPLI) Sensor Mounting Outdoors  
AREVA Document No. 38-9238014-001, SAFER Response Plan for Virgil C. Summer Nuclear Station, Rev.1  
Beyond Design Basis Program Manual Virgil C. Summer Nuclear Station, Rev. 0  
Calculation DC00080-002, Site Hazards Design Parameters For FLEX, Rev. 1  
IMS-94B-1752, Through Air Radar Spent Fuel Pool Level Instrument (SFPLI) Instruction Manual for VC Summer, Doc. No. 01-9225772-002  
JG40733, FLEX Tornado Study – CR-14-00911 Action 6, 04/29/15  
NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Rev. 2  
NEI 12-01, Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities  
NEI 10-05, Assessment of On-Shift Emergency Response Organization Staffing and Capabilities  
PM Revision, RPM Revision 1801928, ICP0390.012 Frequency Change from 6 Months to 18 Months ILT09780 and ILT09781 Calibration per ICP-390.012  
Power Point Presentation slides for FLEX Response and Strategies NRC TI-191 Inspection RC-13-0119, South Carolina Electric and Gas Company's Response to Requests for Additional Information – Overall Integrated Plan in Response to Commission Order Modifying License

Requirements for Reliable Spent Fuel Pool Level Instrumentation (Order Ea-12-051)  
RC-14-0173, South Carolina Electric and Gas Company's Response to Requests for Additional Information – Overall Integrated Plan in Response to Commission Order Modifying License Requirements For Reliable Spent Fuel Pool Level Instrumentation (Order Ea-12-051)  
RC-15-0093, Response to Request for Additional Information Regarding Phase 2 Staffing submittals Associated with Near-Term Task Force Recommendation 9.3 Related to the Fukushima Dai-ichi Nuclear Power Plant Accident  
RC-16-0001, Report of Full Compliance with March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Level Instrumentation (Order EA-12-051) and Responses to Requests for Additional Information  
RC-16-0143, Report of Full Compliance and Final Integrated Plan in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Bases External Events (Order EA-12-049) for Virgil C. Summer Nuclear Station Unit 1  
Regulatory Commitment Evaluation Worksheet for SFP Level Indication and Battery Replacement, 03/28/18  
Regulatory Commitment Change Request for SFP Level Indication and Battery Replacement, 03/28/18  
SA16-EP-03, FLEX Program – NRC Inspection Manual Self-Assessment, Rev. 1  
TR02060-001, Verification Walkdown Report for VCSNS Plant Flood Protective Features, Rev. 0  
TR02060-003, Flood Hazard Reevaluation Report for VCSNS, Rev. 1  
TR02060-005, External Flooding Focused Evaluation Summary for VCSNS, Rev. 0  
TR00080-001, Engineering Services Technical Report, Guidance for Development of Specifications for Flex Equipment, Rev. 3  
TR00080-003, FLEX Equipment Ventilation and Habitability Assessment, Rev. 2  
TR00080-006, FLEX Timeline Constraint Basis, Rev. 1  
TR00080-007 VCS Unit 1 Flex Validation Document, Rev. 1  
V-100, Vantran Industries Operation and Maintenance Manual for Padmount and Substation Transformers (Single and Three Phase), 02/12  
VC Summer Unit 1 NEI-12-01 Report, Rev. 1, NEI 12-01 Phase 2 Extended Loss of AC Power (ELAP) ERO Staffing Analysis Report  
VCSNS Warehouse Storage Database Information for FLEX SFPLI batteries