BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

In the Matter of:

DOCKET NO. 20240001-EI

In re: Fuel and purchased power cost recovery clause with generating performance incentive factor.
_____/

VOLUME 1
PAGES 1 - 142

PROCEEDINGS: HEARING

COMMISSIONERS PARTICIPATING: CHAIRMAN MIKE LA ROSA
COMMISSIONER ART GRAHAM
COMMISSIONER GARY F. CLARK
COMMISSIONER ANDREWS GILES FAY
COMMISSIONER GABRIELLA PASSIDOMO

DATE: Tuesday, March 26, 2024

TIME: Commenced: 10:05 a.m.
Concluded: 10:17 a.m.

PLACE: Betty Easley Conference Center
Room 148
4075 Esplanade Way
Tallahassee, Florida

REPORTED BY: DEBRA R. KRICK
Court Reporter

PREMIER REPORTING
TALLAHASSEE, FLORIDA
(850) 894-0828

APPEARANCES:

MARIA JOSE MONCADA and DAVID M. LEE, ESQUIRES, Florida Power & Light Company, 700 Universe Boulevard, Juno Beach, Florida 33408; appearing on behalf of Florida Power & Light Company (FPL).

WALT TRIERWEILER, PUBLIC COUNSEL; CHARLES REHWINKEL, DEPUTY PUBLIC COUNSEL; PATRICIA A. CHRISTENSEN, OFFICE OF PUBLIC COUNSEL, c/o The Florida Legislature, 111 West Madison Street, Room 812, Tallahassee, Florida 32399-1400, appearing on behalf of the Citizens of the State of Florida (OPC).

SUZANNE BROWNLESS and RYAN SANDY, ESQUIRES, FPSC General Counsel's Office, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850, appearing on behalf of the Florida Public Service Commission (Staff).

KEITH HETRICK, GENERAL COUNSEL; MARY ANNE HELTON, DEPUTY GENERAL COUNSEL, Florida Public Service Commission, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850, Advisor to the Florida Public Service Commission.

I N D E X

EXHIBITS

NUMBER:		ID	ADMITTED
1	Comprehensive Exhibit List		8
2-22	As identified in the CEL		141

P R O C E E D I N G S

CHAIRMAN LA ROSA: Good morning, everybody. Today is March 26th, and I would like to call this hearing to order. This is Docket No. 20240001.

Let's go ahead and start off by, staff, will you please read the notice?

MS. BROWNLESS: Thank you.

By notice issued on March 12th, 2024 by the Commission Clerk, this time and place has been set for a final hearing in Docket No. 20240001-EI. The purpose of the hearing is more fully set forth in the notice.

CHAIRMAN LA ROSA: Thank you.

Let's move on to appearances, starting off with Florida Power & Light.

MS. MONCADA: Good morning, Mr. Chairman and Commissioners. Maria Moncada for Florida Power & Light Company. And I would like to enter an appearance for David Lee.

Thank you.

CHAIRMAN LA ROSA: Thank you.

Office of Public Counsel.

MR. REHWINKEL: Good morning, Mr. Chairman and Commissioners. Charles Rehwinkel, Patty

Christensen and Walt Trierweiler, Public Counsel, with the Office of Public Counsel, on behalf of the customers of Florida Power & Light.

CHAIRMAN LA ROSA: Thank you.

Commission staff.

MS. BROWNLESS: Suzanne Brownless and Ryan Sandy on behalf of Commission staff.

CHAIRMAN LA ROSA: Advisor to the Commission.

MS. HELTON: Mary Anne Helton. And I would also like to enter an appearance for your General Counsel, Keith Hetrick.

CHAIRMAN LA ROSA: Thank you.

Let's move on to preliminary matters. Staff, are there any preliminary matters that we need to discuss this morning?

MS. BROWNLESS: Yes, sir. The issues to be determined in this proceeding were deferred from the 2023 fuel clause docket, and are associated with nuclear power plant outages that occurred at Florida Power & Light Company's St. Lucie Units 1 and 2 and Turkey Point Units 3 and 4 between the years of 2020 and 2022.

At this time, there are only four parties to the fuel clause docket that have standing to participate in this proceeding: FPL, the Office of

Public Counsel, Florida Industrial Power Users Group and the Florida Retail Federation.

OPC and FPL have stipulated to the two issues in this case. FRF and FIPUG have stated that they take no position on the issues raised in this proceeding. For that reason, FRF and FIPUG have requested and been granted leave to be excused from this hearing.

FPL filed an unopposed motion to stay filing its rebuttal testimony on March 8th, which was granted by Order No. PSC-2024-0062-PCO-EI, issued on March 11th.

If the stipulations for the two issues are approved at this hearing, the testimony and exhibits will be moved into the record without objection and the case will be closed. If the stipulations for the two issues are not approved at this hearing, the case will be continued until a later date and a new trial schedule will be set with new filing dates for rebuttal testimony, revised prehearing statements, hearing, et cetera. No testimony or exhibits will be admitted into the record if the stipulations are not approved.

CHAIRMAN LA ROSA: Okay. Thank you.

Let's move to exhibits, staff.

MS. BROWNLESS: Staff has prepared a comprehensive exhibit list which includes all of the exhibits attached to the prefiled testimony of FPL, OPC and staff, as well as staff's hearing exhibits. The list itself is marked as Exhibit No. 1, and has been provided to the parties, Commissioners and the court reporter.

At this time, staff would request that Exhibit No. 1 be identified for the record, and that the other exhibits, Nos. 2 through 22, be marked as identified therein.

CHAIRMAN LA ROSA: Without objection, so moved, so order odd.

(Whereupon, Exhibit Nos. 1-22 were marked for identification and received into evidence.)

CHAIRMAN LA ROSA: Let's move to witnesses.

MS. BROWNLESS: The witness in this case are Daniel DeBoer and Joel Gebbie for FPL, Richard A. Polich for OPC, and Carl Vinson and Tom Ballinger for staff.

The parties have agreed that all witnesses can be excused from this hearing. All parties have also agreed that their testimony will be into -- will be inserted into the record as though read should the Commission vote to approve the

stipulations in this case. Should the Commission not to approve the stipulations, testimony of these witnesses will be given at a hearing to be scheduled at a later date.

CHAIRMAN LA ROSA: Thank you.

Let's move to opening statements. We will start with OPC. Let's try to keep it around five minutes, but obviously the floor is yours, and then we will move on to FPL.

MR. TRIERWEILER: Mr. Chairman, Commissioners, the Office of Public Counsel respectfully requests your approval of the two proposed stipulations resolving these pending issues regarding unplanned outages at FPL's nuclear power plants.

The stipulation between FPL and OPC concludes a lengthy litigation process, and I would like to thank my staff, the folks at FPL who have been involved in this process, and, of course, Commission staff, all of whom worked diligently, professionally and constructively to bring these issues to a resolution.

The stipulations reflect a negotiated compromise of positions by FPL and OPC. While we had differing views regarding staff's management audit, we certainly considered it, along with

staff's prefiled testimony.

The outcome is a win-win for the customers and the utility. Customers benefit not just from the recovery of $5 million of replacement power costs, but also from FPL's improved nuclear fleet performance, a fact acknowledged in the staff management audit back to 2021, and running through the present time.

This high level of performance benefits customers as they receive cost-effective, efficient, carbon neutral base-load nuclear power which enhances the reliability of FPL's service and help keeps FPL's electric rates lower than every other investor-owned utility in our state.

There is no doubt that FPL's transparency and self-critical analysis in addressing outages, issues and the implementation of performance improvement measures were instrumental in returning the nuclear fleet to its previous high levels of nuclear generation performance metrics at the national level.

FPL has also agreed to a follow-up staff management audit no earlier than 2030 should situations or events arise in the future that would justify the need for a management audit. Any such

audit would cover the years 2024 to 2029, essentially the same number of years addressed in the audit conducted in this docket.

The purpose of a future audit is to provide a blinking light in the future, in the distance, to remind us that these performance metrics require constant vigilance. This reminder should only further solidify FPL's commitment to maintain and build on a continued high level of power plant performance which will benefit customers. Therefore, I respectfully submit the stipulation to you for your consideration as a win-win for us all.

Thank you.

CHAIRMAN LA ROSA: Thank you.

FPL.

MS. MONCADA: Thank you, Mr. Chairman.

FPL concurs with the statement that was just given by OPC. We ask respectfully that you approve the stipulations reached by the parties.

And I would be remiss if I did not thank everyone on your staff that was involved in the diligence -- the diligent review of all the matters in this case.

CHAIRMAN LA ROSA: Thank you.

Let's -- staff, can you review the issues and

stipulations?

MS. BROWNLESS: Yes, sir.

Issue No. 1: What adjustment should be made with respect to replacement power costs associated with any unplanned outages that occurred at Turkey Point or St. Lucie during the calendar years 2020, 2021 and 2022?

The stipulation is as follows: FPL shall credit customers five million, inclusive of interest, through the fuel clause. The credit shall be included in the calculation of FPL's fuel factors the next time fuel factors are reset. The prudence, and replacement power cost calculations associated with, all forced or unplanned outages or down power events at the Turkey Point and St. Lucie nuclear facilities which occurred during the calendar years 2020, 2021 and 2022, are hereby fully resolved and shall not be subject to further challenge or litigation in the future.

Issue No. 2: Should FPL be subject to a follow-up nuclear operations and management audit conferring the 2024 to 2029 time period?

Stipulation: Yes, a follow-up audit may be conducted no earlier than 2030.

CHAIRMAN LA ROSA: Thank you.

Commissioners, I will open the floor for any discussions or questions. Questions?

I would just say this. Obviously, nuclear is an important part of the state of Florida in what it is that that we do in the production of electricity. I appreciate the parties coming together and finding the resolution. And thanks, staff, for all your hard work in guiding this and getting it prepared for today.

Commissioners, I will throw it back to us. Any discussions? Or open for a motion if we are ready to do that.

COMMISSIONER CLARK: Mr. Chairman, I move to approve the stipulation on Issue 1 and 2 as presented in the docket.

COMMISSIONER GRAHAM: Second.

CHAIRMAN LA ROSA: Hearing a motion and hearing a second.

All those in favor signify by saying yay.

(Chorus of yays.)

CHAIRMAN LA ROSA: Opposed no.

(No response.)

CHAIRMAN LA ROSA: Show that the motion is approved.

Thank you, Commissioners.

Staff, is there any other matters that need to be addressed today?

MS. BROWNLESS: Yes, sir. Excuse me.

At this time, we would like to move the prefiled testimony of witnesses DeBoer, Gebbie, Polich, Vinson and Ballinger into the record as though read.

CHAIRMAN LA ROSA: So moved.

(Whereupon, prefiled direct testimony of Daniel DeBoer was inserted.)

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

TESTIMONY OF DANIEL DeBOER

DOCKET NO. 20230001-EI

JANUARY 5, 2024

Q. Please state your name and business address.

A. My name is Daniel DeBoer. My work address is 15430 Endeavor Drive, Jupiter, Florida 33478.

Q. By whom are you employed and what is your position?

A. I am employed by Florida Power & Light Company (FPL or the Company) as the Vice President, Nuclear.

Q. Please describe your duties and responsibilities in that position.

A. I am responsible for the Nuclear fleet functional areas of engineering, training, performance improvement, regulatory affairs, security, quality assurance, online work management, outages and nuclear projects, which consists of major maintenance and modifications.

Q. Please describe your educational background and professional experience.

A. I hold a Bachelor of Science Degree in Chemical Engineering from the University of Notre Dame. I also earned a Senior Reactor Operator license from the Nuclear Regulatory Commission at the former Crystal River Nuclear Plant in Florida, and a Senior Reactor Operator Management Certification at the Browns Ferry Nuclear Station in Alabama. In addition, I completed the Institute of Nuclear Power Operations (INPO) Senior Plant Management Course.

I have spent over 35 years in the nuclear industry, beginning in the United States Navy Nuclear Submarine Force where I served as an officer for more than 24 years on active and reserve duty, retiring as a Commander. During this 35-year period, I have served in various management positions at six nuclear stations in the United States over the last 30 years and have been with FPL since 2010. While employed with FPL, I have held numerous positions of increasing responsibility including Senior Director of Fleet Outages for NextEra Energy corporate at Juno Beach, Operations Director at St. Lucie, Plant General Manager at NextEra Energy's Point Beach Nuclear Plant, and Site Vice President at St. Lucie. In 2022, I assumed my current position as the Vice President, Nuclear, where I am responsible for support and oversight of both of FPL's nuclear sites.

Q. Are you sponsoring any exhibits?

A. Yes, I am sponsoring Exhibit DD-1 – Excerpt from: FPL's Procedure 0-PME-049.0, Reactor Trip and Trip Bypass Breaker Inspection Maintenance.

Q. What is the purpose of your testimony?

A. My testimony discusses unplanned outages and down power events that occurred at the Turkey Point and St. Lucie nuclear power plants over the period from July 2020 through 2022.

Q. Aside from planned maintenance outages, does FPL project that its nuclear units will achieve 100% availability?

A. No, it does not. No nuclear plant in the industry projects 100% availability. Nuclear plants are complex industrial facilities that consist of dozens of interdependent systems, hundreds of major components, tens of thousands of

sub-components, tens of thousands of tubes, miles of piping and many redundant safety features. FPL continuously improves the physical plant, procedures and processes to improve reliability and maintain nuclear safety. However, even when prudent actions are taken, FPL's nuclear units – like all nuclear units in the industry – experience equipment failures and unplanned outages and down power events. My testimony describes outages and down power events that warrant further explanation for the Florida Public Service Commission.

2020 Unplanned Outage and Down Power Events

Q. Please describe the unplanned outage and the down power event that occurred at FPL's nuclear plants in 2020 for which FPL wishes to provide further information.

A. Beginning in July 2020, Turkey Point Unit 4 automatically shut down due to a main generator lockout followed by a turbine trip. In November 2020, Turkey Point Unit 3 reduced power to address a heater drain system. FPL's responses to the unplanned outage and down power event was prudent and efficient, and the units were returned to service safely. More details are provided below.

July 2020 Turkey Point Unit 4

Q. Please describe the circumstances related to the July 2020 outage.

A. In July 2020, Turkey Point Unit 4 automatically shut down due to a main generator lockout followed by a turbine trip. FPL conducted an investigation, which determined the permanent magnet generator (PMG) malfunctioned.

Q. What did the investigation of the PMG malfunction find?

A. FPL's investigation revealed that two factors, which individually would not result in a PMG stator winding malfunction, combined to cause the event. The malfunction of the Unit 4 PMG stator occurred due to an aged winding in combination with water intrusion. Neither an aged winding nor water intrusion occurring by itself would have resulted in failure of the stator.

Q. Was periodic maintenance performed on the Unit 4 PMG in accordance with manufacturer recommendations and industry standards?

A. Yes. FPL incorporates original equipment manufacturer (OEM) and industry operating experience into the PMG maintenance program. The PMG stator had been in service since 1986 without rewind. There was no requirement by the OEM or industry documents to perform a rewind on a specified frequency. Maintenance work on the exciter, including weather sealing, was performed by the OEM, Siemens, in accordance with its procedures. However, Siemens failed to install all the weather sealing during the last housing installation. The exciter housing vertical weather seals were missing, and gaskets were dislodged. The FPL site-specific procedure, procedure 0-GMM-090.1 'Exciter Removal, Inspection and Installation' contains the site-specific gasket and vertical weather seal guidance. However, Siemens procedure 3.2.2.1, which governs installation of the exciter housing, did not contain site-specific guidance.

Q. Describe generally the preventative maintenance work performed by Siemens.

A. Siemens is engaged to perform preventative maintenance on the exciter at least every seven and a half years during scheduled refueling outages. When the

preventative maintenance is performed, the exciter housing is completely removed, cleaned, inspected, and the seals are replaced by Siemens in accordance with their proprietary procedure.

Q. Is Siemens an appropriate vendor to perform maintenance on the exciter?

A. Yes, Siemens is the OEM for this equipment and has the proprietary information including detailed design drawings, technical specifications, and specialty tooling to perform this work. In fact, Siemens's expertise applies to every part of the centerline equipment: the turbine, the generator and the exciter, all of which work together. Siemens therefore is engaged to perform maintenance work on the entire centerline, making FPL's engagement of Siemens for exciter work particularly appropriate.

Q. In addition to being the OEM with experience maintaining exciters, what else made Siemens a qualified vendor?

A. Siemens is one of the largest turbine generator manufacturers in the world, serving both nuclear and non-nuclear plants. This has included on-going maintenance and refurbishments, power uprates at FPL's nuclear units and new installations. Siemens also supports over 50% of the existing nuclear generation sites in the United States.

Q. Did FPL review the procedures that Siemens prepared for the exciter work?

A. Yes. Whenever FPL plans work at its nuclear site that is performed by any vendor, FPL reviews the procedures and processes that the vendor will use. The reviews are performed by qualified maintenance supervisors and engineers. The

vendors use their procedures but are required to follow any FPL work control program that may apply.

Q. Please describe the exciter work that Siemens was required to perform.

A. During the work on the exciter, the housing was completely removed, cleaned, and inspected, and the seals were replaced by Siemens in accordance with its procedure. Siemens's proprietary procedure includes verification points designed to ensure the seals are properly prepared and installed. That verification step is performed by Siemens's technical director and is then further verified as part of Siemens's quality assurance review.

Q. Did these steps occur the last time Siemens performed exciter work before the July 5, 2020 event?

A. Yes. Prior to the July 5, 2020 event, the exciter housing for Unit 4 was removed in March 2019. During the inspection, Siemens noted that several seals were found to be hard or torn. All degraded seals were replaced. After the replacement was complete, Siemens inspected the work and noted that the final seals were acceptable for return to service. At that time, FPL verified that the inspection occurred.

Q. Did the procedures and inspections employed by Siemens satisfy the industry standard for exciter maintenance?

A. Yes. The procedures provided detailed guidance and satisfied industry standards for the exciter maintenance.

Q. In addition to the inspections performed by Siemens, please describe the oversight FPL provided during the exciter maintenance work.

A. Siemens is required to follow FPL's work control program. FPL confirms that appropriate verifications are included at key points in Siemens's procedures. These verification points are built into work orders which serve to confirm that all processes, including those applicable to exciter maintenance work, were completed.

Q. Did FPL verify the work performed by Siemens was completed in accordance with their procedures?

A. Yes. FPL verification of work performed by Siemens focused on review of documentation that evidenced the work performed by Siemens was in accordance with its procedures. FPL relied on Siemens's vast industry and site-specific experience regarding exciter related work including verifying that all weather seals were correctly installed.

Q. Was FPL able to inspect the seals after Siemens completed its work?

A. No. After the exciter housing is installed, the seals are between two surfaces and are not only inaccessible, they are not even visible. The exciter seals cannot be inspected while the unit is online because the exciter itself is rotating and energized at high voltage. In addition, there are no recommended OEM inspection requirements while the unit is online.

Q. Does this mean FPL performs no inspections of the exciter housing seals?

A. Not at all. FPL inspects the exciter housing seals during every refueling outage, which occur every 18 months. At that time, the seals and gasketed surfaces are

inspected where accessible. FPL's inspections of the housing surfaces search for any evidence of water intrusion.

Q. What is your conclusion regarding FPL's inspection practices?

A. FPL inspects the exciter housing at reasonable intervals in a manner that is consistent with industry practice.

Q. What corrective actions were initiated to address this event?

A. After Siemens, the OEM, disassembled and inspected the PMG, Siemens replaced the PMG stator and rotating assembly due to collateral magnet damage in the PMG pole support caused by stator failure debris and heat-induced cracking.

FPL also initiated a time-based, rather than condition-based, PMG stator rewind in the preventative maintenance program. In addition, Siemens revised its procedure to require site-specific weather seals for exciter housing.

Q. Was an extent of condition performed on Turkey Point Unit 3 and St. Lucie Units 1 and 2?

A. Yes. FPL determined a similar risk exists for the other units. An action to replace exciter components with rewound spares was incorporated into the scope of work for upcoming planned refueling outages scope for each unit.

Q. How many days was Unit 4 out of service due to this event?

A. FPL moved quickly and prudently to restore the units to service safely and was able to keep the outage to approximately 15 days.

Q. What do you conclude regarding FPL's actions and decisions with respect to the work performed on the exciter prior to the July 5, 2020 event?

A. FPL engaged a highly qualified vendor to perform the maintenance and replacement work on the exciter housing pursuant to procedures that produced successful results at many sites over time. FPL acted prudently in its oversight and verification of the vendor's work on the exciter.

November 2020 Turkey Point Unit 3

Q. Please describe the circumstances related to the November 2020 down power event.

A. In November 2020, Unit 3 experienced a loss of control to several plant secondary valves due to performance anomalies from some plant secondary control system devices which resulted in a shut down of two heater drain pumps. The resulting conditions caused a 15% power reduction to the unit.

Q. What did the investigation of the performance anomalies from the affected secondary control system devices find?

A. FPL performed an investigation for this event but did not find the cause for the erratic performance of the secondary control system devices. An external forensic analysis evaluation of the affected removed components performed by a third party determined that a field control processor had faulty optocouplers.

Q. What corrective actions were initiated to address this event?

A. FPL replaced the affected components and tested them to ensure they were operating properly.

Q. How many days was Turkey Point Unit 3 at reduced power due to this event?

A. FPL moved quickly and prudently to restore the units to service safely and was able to keep the down power event to approximately 14 days.

2021 Unplanned Outage and Down Power Events

Q. Please describe the unplanned outages and down power events at FPL's nuclear plants in 2021 for which FPL wishes to provide further information.

A. Beginning in January 2021, St. Lucie Unit 2 shut down due to an unexpected deenergization of a Motor Control Center (MCC); in February 2021, Turkey Point Unit 3 reduced power due to increased sodium levels in the steam generator; in March 2021, Turkey Point Unit 3 shut down during Reactor Protection System Testing when a breaker cubicle cell failed to operate properly; in May 2021, St. Lucie Unit 1 experienced a delay in returning to service following the refueling outage associated with the Rod Control System upgrade; in August 2021, Turkey Point Unit 3 shut down to repair Turbine Control Valve No. 2; in November 2021, Turkey Point Unit 3 experienced a delay in returning to service from a refueling outage due to issues with the manipulator gripper, reactor coolant system (RCS), and an accumulation of boric acid in the core exit thermocouple (CET); and in December 2021, St. Lucie Unit 1 was manually shut down after a supply fuse blew resulting in a loss of high-pressure heater level control. FPL's responses to the unplanned outages and down power events

were prudent and efficient, and the units were returned to service safely. More details are described below.

January 2021 St. Lucie Unit 2

Q. Please describe the circumstances related to the St. Lucie Unit 2 Motor Control Center malfunction in January 2021.

A. In January 2021, Unit 2 automatically shut down due to the Reactor Protection System trip as a result of a turbine trip. The turbine trip was caused by an unexpected deenergization of the 480V MCC. The plant equipment responded as designed. The loss of the MCC caused two of the four undervoltage (UV) relays in the Diverse Turbine Trip to deenergize to their failed condition which created a turbine trip. FPL investigated the root cause and determined the legacy drawings for the UV relay assemblies in the control element drive mechanism control system (CEDMCS) were changed in 1983 and did not conform to St. Lucie Unit 2 train and channel design conventions such that design details including power supply assignments were not clearly defined. This latent legacy defect resulted in inadvertently mis-assigning power to two of the four UV relays to the incorrect train of power when the rod control system was replaced 38 years later in 2019. There was no adequate basis upon which to reasonably expect that the latent channel misassignments should have been identified during the work performed in 2019.

Q. What corrective actions have been initiated to address this event?

A. FPL redesigned the UV relay power supplies such that the loss of a single power supply will not result in a turbine trip. FPL also revised the UV Relay Assembly

drawing to show applicable train channel assignments to each UV Relay Assembly and revised the CEDMCS Power Supply drawing to show the UV Relay Assembly assignment to each power supply.

Q. How many days was St. Lucie Unit 2 out of service due to this event?

A. The Unit 2 outage due to MCC malfunction was approximately 3 days.

<u>February 2021 Turkey Point Unit 3</u>

Q. Please describe the circumstances related to the down power event that occurred in February 2021.

A. During plant operation, sodium levels in the steam generators had increased due to ingress of cooling water from the cooling canals through a leaking condenser tube. The increase in sodium levels had reached a level where actions were needed to lower the concentration of sodium in the steam generators. Mitigating actions (i.e., raising the rate of steam generator blowdown) did not immediately control the increasing sodium levels. As a result, plant power output was reduced by removing from service the two circulating water pumps which cool the condenser with the leaking tube to identify and repair the leak. The leaking tube was extracted in the Fall 2021 refueling outage and sent for further forensic analysis.

Q. What did the forensic analysis determine regarding the cause of the leak in the condenser tubes?

A. A forensic analysis performed by Structural Integrity Associates determined that the cause for the tube leak was mechanical damage induced by foreign material lodged in the hotwell side of the condenser tube bundle. FPL found that the

condenser heater lagging (metal straps) cracked and loosened which in turn mechanically damaged the tubing. Testing analysis found that no cracking in the tubing had occurred.

Q. What corrective actions have been initiated to address this event?

A. FPL removed the affected tubes from service and plugged the tubes with a mechanical plug device.

Q. How many days was Turkey Point Unit 3 at reduced power due to this event?

A. Unit 3 was at reduced power for approximately 7 days.

March 2021 Turkey Point Unit 3

Q. Please describe the circumstances related to the Reactor Protection Testing that impacted Turkey Point Unit 3 in March 2021.

A. In March 2021, Turkey Point Unit 3 operators performed a planned test of the Reactor Protection System (RPS). The test restoration phase included closing the 3B reactor trip breaker (RTB) followed by opening the reactor bypass breaker (RBB). With the 3B RTB closed, after opening the 3B RBB, the unit experienced an automatic shut down. FPL was not able to determine the exact cause, but determined the most probable cause was hardened graphite grease on the cell switch that resulted in a condition whereby the contact was closed and providing a standing turbine trip signal that could not have been identified in advance. The reactor trip breakers and switchgear cubicles were inspected in accordance with FPL procedures which provide a methodical and proven approach to maintain the equipment.

Q. Did FPL follow the manufacturer recommendations for maintaining the cell switches?

A. Yes. Procedure 0-PME-049.01 was developed using Westinghouse vendor manual V000211, and Westinghouse Maintenance Program Manual (MPM) for the reactor trip breakers and associated switchgear. All criteria in the site procedure meet vendor recommendations with the exception of cell switch investigations which are conducted more frequently by FPL than the rate recommended by the manufacturer. FPL performs these inspections every 18 months which extends the life of the cell switches well beyond the service life recommended by the manufacturer. FPL performed an industry review and determined FPL's inspection protocol is consistent with industry maintenance practices.

Q. Did FPL's decision to not follow the Westinghouse MPM contribute to the March 1, 2021 event?

A. No. The Westinghouse MPM recommendation that FPL did not follow at the time of the event – and still does not follow – is the replacement of the cell switches after 100 cycles. Because the cell switches are used only to validate the breaker position, they remain closed at all times except during testing which occurs quarterly, or four times a year. Following the Westinghouse MPM recommendation would mean that FPL would replace cell switches only once every 25 years. Therefore, implementing that practice would not have prevented the accumulation of lubricant around the cell switch.

Q. If FPL does not follow the Westinghouse MPM recommendation on cell switch life cycles, what process was in place to monitor proper function of the cell switch?

A. As previously stated, FPL tests and inspects the cell switches every 18 months. If the cell switch shows signs of deterioration, FPL would replace it at that time. This testing and inspection interval is more frequent than Westinghouse's MPM recommendation. FPL's maintenance program is more conservative than the 25-year interval for cell switch replacement recommended by Westinghouse. A review of the documentation of FPL's maintenance, provided as Exhibit DC-1, shows that the cell switches, including the one involved in the March 1, 2021 event, were reliable and had no failures.

Q. Has FPL determined why the cell switch failed on March 1, 2021?

A. As the root cause evaluation indicates, the cause remains undetermined. As part of the investigation, the RTB was sent to the OEM, Westinghouse, to conduct extensive inspections and testing to determine the root cause of the failure. However, the root cause was found to be undetermined. Overall, the RTB was found to be in excellent condition and cycled 50 times at Westinghouse without an issue. The RTB cubical cell switch was also thoroughly tested without an issue. Although all the inspection points for contacts and spring load were found satisfactory, during disassembly the cubical cell switch was found to have aged grease. The aged grease was the only anomaly identified. Therefore, it was considered a "*possible* cause of failure."

Q. What corrective actions have been initiated to address this event?

A. FPL replaced the 3B Reactor Trip Breaker and cell switch. Additionally, FPL revised the procedure to require time-based rather than condition-based cleaning and lubrication of cell switch contacts. In addition, a modification was implemented to detect a failed cell switch.

Q. How many days was Turkey Point Unit 3 out of service due to this event?

A. The Unit 3 outage due to reactor protection testing was approximately 3 days.

Q. What do you conclude regarding FPL's actions and decisions with respect to the work performed on the cell switch prior to the March 1, 2021 event?

A. FPL acted prudently with respect to the maintenance of the cell switch. FPL adhered to Westinghouse's recommended maintenance procedures and instituted even more conservative testing and inspection intervals. FPL's maintenance program was also aligned with industry standard.

<u>May 2021 St. Lucie Unit 1</u>

Q. Please describe the circumstances related to the May 2021 delay in returning St. Lucie Unit 1 back to service following the Unit's refueling outage.

A. In May 2021, while St. Lucie Unit 1 was in plant restart from a refueling outage, FPL determined the lower gripper coils for a group of Control Element Assemblies had malfunctioned. Troubleshooting revealed these coils were damaged by excessive current. While revising the firmware for the Rod Control System Coil Power Management Drawer (CPMD) for these coils, Westinghouse, the vendor who designed and installed the CPMD, inadvertently

coded an unplanned software change. This removed the overcurrent protection for the impacted Control Element Assemblies.

Q. What corrective actions have been initiated to address these events?

A. The corrected software was programmed into all CPMDs. Westinghouse validated that all software was correct. In addition, Westinghouse enhanced its software development process to mandate a structured line code difference analysis.

Q. How many days was the St. Lucie Unit 1 refueling outage delayed due to these events?

A. Returning unit 1 to service was delayed by approximately 4 days.

August 2021 Turkey Point Unit 3

Q. Please describe the circumstances related to the No. 2 Turbine Control Valve that impacted Turkey Point Unit 3 in August 2021.

A. In August 2021, Turkey Point Unit 3 reduced power to investigate the unexpected closure of the No. 2 Turbine Control Valve (TCV). FPL performed on-line verification activities before determining the unit was required to shut down to complete troubleshooting and implement repairs.

Q. What caused the unexpected closure of the No. 2 TCV?

A. FPL disassembled and inspected the TCV and found the actuator stem (rod) was found sheared right inside the threaded location inside the coupling. Testing determined that corrosion induced low cycle fatigue and potential misalignment were the most likely causes for the TCV actuator rod failure.

Q. What corrective actions have been initiated to address this event?

A. FPL replaced the actuator assembly and completed testing to ensure it was operating as designed.

Q. How many days was Turkey Point Unit 3 out of service due to this event?

A. Unit 3 was at reduced power for approximately 9 days and shut down for approximately 3 days.

November 2021 Turkey Point Unit 3

Q. Please describe the circumstances related to the Turkey Point Unit 3 return-to-service delay in November 2021.

A. Turkey Point Unit 3 experienced a delay in return to service from the refueling outage in November 2021. The largest impacts on the outage extension were associated with equipment issues due to troubleshooting and replacement of the manipulator gripper, an RCS leak, and boric acid accumulation on CET tubing identified while bringing the unit back online during reactor vessel inspections.

Q. Please describe the equipment issues related to the manipulator gripper.

A. While performing post-maintenance gripper inspections, prior to core offload, the manipulator gripper did not work as designed. Manipulator crane technicians reported having load oscillations and relay chattering. Visual inspection of the manipulator gripper assembly found that there was an issue with the latching mechanism. The manipulator gripper assembly was removed to determine the cause of the latch issue. Following plant procedure, a visual inspection was performed on malfunctioning components and checks were initiated to compare the components' dimensions to vendor drawings.

Additionally, forensic testing was performed by Framatome, at its facility. Framatome found that all components appeared to be present with no missing or loose parts noted. Since results were inconclusive, Framatome recommended replacing the manipulator gripper that malfunctioned with a new one.

Q. What corrective actions have been initiated to address this event?

A. FPL replaced the relay down slack (slack cable relay) to address the issue. Additionally, since the cause of the latch issue was not fully understood and could not be replicated, Framatome recommended replacing the manipulator gripper. FPL engaged Framatome to replace promptly the manipulator gripper.

Q. Please describe the issues due to the CET tubing.

A. During the normal operating pressure and operating temperature reactor vessel inspections, a boric acid leak was identified on CET 51 and 57 tubing. Based on initial available information, a through-wall tube leak was suspected of causing the boric acid accumulation.

The CET tubing was sent to Southwest Research Institute for a leak cause determination. No through-wall tubing pressure boundary flaw was identified. Southwest Research Institute's forensic analysis concluded that the connection fitting was the likely cause of the leakage.

Q. What corrective actions have been initiated to address this event?

A. Unit 3 was cooled down from Mode 3 to Mode 5 to perform repairs. FPL repaired the affected fitting by cutting and capping the damaged tubing. FPL confirmed no leakage was present before returning the unit back to service.

Q. How many days was Turkey Point Unit 3 out of service due to this event?

A. The Unit 3 return to service delay was approximately 14 days.

December 2021 St. Lucie Unit 1

Q. Please describe the circumstances related to the manual shut down associated with the steam generator that impacted St. Lucie Unit 1 in December 2021.

A. In December 2021, the pressure differential indicating switch (PDIS) at St. Lucie was being replaced due to a steam leak. In the process of landing the wires from the new PDIS on the terminal strip, the technician made inadvertent contact with the enclosure housing causing the supply fuse to blow and a loss of high-pressure heater level control resulting in a reduction of steam generator feed flow.

Q. What corrective actions were initiated to address this event?

A. FPL replaced the supply fuse and restored the heater level control circuit and PDIS.

Q. How many days was St. Lucie Unit 1 out of service due to this event?

A. The Unit 1 outage due to steam generator pressure levels was approximately 2 days.

2022 Unplanned Outage Event

Q. Please describe the unplanned outage at St. Lucie that occurred in 2022 for which FPL wishes to provide further information.

A. In January 2022, while St. Lucie Unit 2 operators were conducting surveillance testing on rod control, Control Element Assembly (CEA) No. 27 slipped while

being exercised for the surveillance testing. Unit 2 reduced power to attempt to move the CEA without success before the unit was manually shut down to address the issue. FPL's response to the unplanned outage was prudent and efficient, and the unit was returned to service safely. Below are details on this outage.

January 2022 St. Lucie Unit 2

Q. Please describe the circumstances related to the St. Lucie Unit 2 CEA displacement in January 2022.

A. In January 2022, Unit 2's CEA failed to remain properly engaged during testing. This displacement caused a position deviation greater than allowed according to the unit technical specifications. Westinghouse was therefore contacted for support to move the CEA back into place. Attempts were unsuccessful, and power was reduced to 70%. While the unit was at reduced power, FPL continued attempts to move the CEA back into its place. The subsequent attempts were ineffective and after time limitations established by technical specifications expired, the unit was shut down.

Q. What did FPL determine was the reason for the displacement?

A. FPL, using readings from the Rod Control System, determined that the Control Element Drive Mechanism (CEDM) had malfunctioned and was the likely cause of the CEA displacement. The CEDM is an electromagnetic jacking device mounted atop the reactor vessel head that is used to position the CEAs. FPL contracted Westinghouse to assist with removal of the CEDM motor from its housing for inspection. After removal of the CEDM, FPL identified a small

metallic object adhered to the bottom of the latch magnet. The CEDM was sent to the Westinghouse facility for further inspection.

Q. What did the Westinghouse inspection determine?

A. Westinghouse determined that the characteristics of the metallic object corresponded with an L-slot pin from a Shaft Coupling and Uncoupling Tool (SCOUT), which is used during refueling activities. The L-slot pin blocked the CEDM from inserting and caused the displacement. FPL subsequently sent the SCOUT used during refueling activities to Westinghouse for evaluation. Westinghouse confirmed that two L-slot pins were missing from the latching mechanism of the SCOUT. Westinghouse concluded that the pin had no consequence to the RCS components or the major primary system components such as the reactor vessel, steam generators, pressurizer, reactor coolant, nor reactor coolant pumps.

Q. Please describe how the SCOUT was used during the referenced refueling.

A. FPL employs Framatome, a highly qualified vendor, to support refueling activities with workers experienced in refueling. In the previous refueling outage, CEA coupling activities were performed by the vendor. Framatome's crew noted while coupling a CEA, there was difficulty disengaging the tool from the extension shaft L-slot. The crew was unaware that damage had occurred to the tool. In fact, the coupling activities were completed with the same tool for an additional 40 CEAs without issue. This was possible because FPL now knows that the SCOUT will function with only one pin. When the SCOUT was unable to engage onto the extension shaft to the remaining CEAs, the tool was replaced with a backup tool.

After the SCOUT was removed from the area, Framatome's crew supervisors checked the tool including looking down the head at its pins. The individuals did not recognize that the L-slot pins were missing given that these pins are inside the tool itself and cannot be examined without Westinghouse disassembling the tool.

Q. What corrective actions were initiated to address this event?

A. FPL addressed the CEDM malfunction and ensured it was working properly before returning the unit back to service. Additionally, FPL incorporated a new complex tool inspection process in its Foreign Material Exclusion Plan which will be completed prior to every use to document and ensure integrity of its equipment. Procedures used for CEA coupling have been updated to address the SCOUT failure. Prior to this event and consistent with practice throughout the nuclear operations industry, the SCOUT had not been recognized as a complex tool.

Q. Would this new complex tool inspection process have identified the missing L-slot pins had it been used prior to and after using the SCOUT?

A. No. The additional inpsections will provide the best opportunity to identify future complex tool issues. As noted previously, however, the pins in question are inside the SCOUT and therefore would not have been noticed as present or as missing even if the SCOUT was thoroughly inspected before and after use.

Q. How many days was St. Lucie Unit 2 out of service due to this event?

A. The Unit 2 outage due to displacement issues of the CEA was approximately 14 days.

Q. Does this conclude your testimony?

A. Yes, it does.

(Whereupon, prefiled direct testimony of Joel Gebbie was inserted.)

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

TESTIMONY OF JOEL GEBBIE

DOCKET NO. 20240001-EI

JANUARY 5, 2024

Q. Please state your name and title.

A. My name is Joel Gebbie. I am the President of JPG Advisory, LLC located in New Buffalo, Michigan.

Q. Please describe your job role immediately prior to your position with JPG Advisory, LLC.

A. I retired in July 2022 from American Electric Power (AEP). At the time of my retirement, I was the Chief Nuclear Officer, overseeing all nuclear operations for AEP.

Q. Please provide a summary of your professional background and nuclear industry experience.

A. I graduated from the Ohio State University in 1986 with a degree in mechanical engineering and thereafter began my career with AEP as a nuclear and coal power plant design engineer at AEP's corporate office. Among many engineering assignments, I functioned as a team leader for a project to reconstitute all of the post-construction drawings and calculations for large bore safety-related piping at Donald C. Cook Nuclear Plant (Cook Plant). After ten years, I was transferred to work on-site at the Cook Plant. At Cook Plant, I worked in plant engineering for ten years holding positions of increasing

responsibility, consisting of system engineer, engineering supervisor, engineering manager, and engineering director. As an engineering leader, I sponsored several root cause evaluations from 2000 to 2007. During my time in plant engineering I was responsible for the implementation of several plant reliability programs, including the preventive and predictive maintenance program, system performance monitoring program, and single point vulnerability programs. I also established the Plant Health Committee, a multi-disciplinary leadership team responsible for driving improvements to equipment reliability at Cook Nuclear Plant.

In 2007, I became the plant manager at Cook Plant. As plant manager, I was chairman of the station's Corrective Action Review Board. I was promoted to Site Vice President at Cook Plant in 2010. In 2016, AEP's Board of Directors approved my appointment as Chief Nuclear Officer. As the Site Vice President and Chief Nuclear Officer, I oversaw the implementation of the Cook Plant Life Cycle Management project, an investment of one billion dollars in Cook Plant's long-term operation.

Q. Have you served in nuclear industry leadership roles aside from your work with AEP?

A. Yes. From 2021-2022, I served as chairman of the Nuclear Energy Institute's Nuclear Strategic Issues Advisory Council. I also served as chairman of the board of directors for the Utility Service Alliance from 2019 to 2022. Utility Service Alliance is a strategic alliance of seven United States nuclear utilities formed to drive cost-effective performance and promote scale in nuclear

procurement. In addition, I participated on the continuous monitoring advisory committee and corporate monitoring advisory committee for the Institute of Nuclear Power Operations (INPO). Finally, I served as the executive sponsor of the World Association of Nuclear Operators (WANO) corporate oversight recovery team for a nuclear power plant in South Africa.

Q. On whose behalf are you testifying?

A. I am submitting this testimony to the Florida Public Service Commission on behalf of Florida Power & Light Company (FPL).

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to provide my opinion on the prudence of FPL's actions associated with the unplanned outages discussed in the testimony of FPL witness Daniel DeBoer.

Q. Please summarize your conclusions regarding the unplanned outages at FPL's nuclear plants.

A. FPL's actions associated with each unplanned outage were prudent. In addition, FPL's response to each unplanned outage ensured the units were returned to service in a safe and efficient manner. The supporting detail for my conclusions is included below.

Q. How is the rest of your testimony organized?

A. In Section I, I will discuss the purpose of causal evaluations as they are used in the nuclear industry. Section II presents my assessment of the two unplanned outages addressed in the testimony of Daniel DeBoer that were challenged specifically in 2022 by Richard Polich on behalf of the Office of Public Counsel (OPC). Section III presents my assessment of the unplanned outages and outage

extensions addressed in the testimony of Daniel DeBoer, which have not been specifically challenged by OPC or any other intervenor.

I. CAUSAL EVALUATIONS

Q. Why do U.S. nuclear power plants conduct causal evaluations?

A. In the U.S. nuclear power industry, United States Nuclear Regulatory Commission (NRC) regulations require that every nuclear power plant have a corrective action program to address conditions adverse to quality. An example of a condition adverse to quality can be a violation of a plant procedure, a minor leak on plant equipment, a personnel error, or an unplanned equipment failure that results in a plant outage. The NRC mandates that nuclear power plant operators find and fix conditions adverse to quality. When nuclear power plant operators find these conditions adverse to quality they enter them into their corrective action programs. United States nuclear power plant operators fix these conditions adverse to quality by using their corrective action programs. The primary way to do this is by performing a causal evaluation.

Q. Did you gain experience with causal evaluations during your career in the nuclear industry?

A. Yes. While working as a design engineer for AEP, I participated in root cause evaluator training. Thereafter, from 2000 to 2007, I sponsored multiple root cause evaluations in my role as an engineering leader. And, as I mentioned above, I was chairman of the Cook Plant's Corrective Action Review Board,

which is the body that reviews and approves all root cause evaluations conducted by plant personnel.

Q. Describe the approaches employed when performing causal evaluations.

A. A causal evaluation is a rigorous, formal analysis of the drivers, or reasons, that led to the occurrence of a condition adverse to quality. Plant personnel who conduct causal analyses undergo formal training and qualification before they can produce a causal evaluation product. Causal evaluation products are typically reviewed by an independent oversight committee, such as the Corrective Action Review Board (known at FPL as the Management Review Committee), to validate the quality and effectiveness of the product. Causal evaluations use several techniques to identify the direct, apparent, or root cause for an identified condition adverse to quality, then specify corrective actions that should preclude the condition adverse to quality from occurring again. Many of these techniques are used in other industries like the airline industry and the medical industry and have names like barrier analysis, why-staircase, and support/refute analysis. This is the straightforward manner to comply with NRC regulations.

Causal evaluations are conducted using a graded approach. A simple condition adverse to quality may only require a "broke/fix" evaluation. An equipment failure or personnel error that has the potential to jeopardize nuclear safety or reliability would require an apparent cause evaluation conducted by a single individual. A more significant condition adverse to quality, like a plant outage, requires a root cause evaluation, typically conducted by a dedicated, multi-

disciplinary team using the techniques discussed above. Root and apparent causal evaluations cannot result in an indeterminate cause. In the absence of a clear cause, evaluators will systematically refute all other possible causes to arrive at a root or one or more apparent causes. They will then specify a comprehensive set of corrective actions to ensure that specified condition adverse to quality cannot recur.

Q. Should negative findings in causal evaluations be considered admissions or proof of imprudence?

A. No, not in most circumstances. As U.S. nuclear power plants have evolved into learning organizations, causal evaluations have gone beyond compliance with NRC regulations and have become more thorough tools used to understand organizational and programmatic drivers to conditions adverse to quality, have become performance trending instruments, and have become a process to drive power plant performance to a level of excellence. The U.S. nuclear power plant industry is said to "aim for perfection but settle for excellence." This has been very successful with U.S. nuclear power plants leading the world in safety and efficiency performance.

In order for this process to enable the achievement of world-class performance, plants must utilize absolute candor and "make mountains out of mole hills" when conducting causal evaluations. What every other industry considers to be a "one-off" event or bad luck is considered by the U.S. nuclear power industry to be an opportunity to pursue perfect performance, even if the actions and pre-existing procedures met satisfactory levels of care. For this reason, nuclear

power plant causal evaluations generally should not be used to assess fault, negligence or imprudence in legal proceedings. Using causal evaluations as a generalized basis for fault would set a dangerous precedent and could motivate power plant operators to not exhibit absolute candor when conducting causal evaluations and would stifle continuous improvement.

II. OUTAGES CHALLENGED BY OPC WITNESS POLICH

July 2020 Outage at Turkey Point-4

Q. Please describe the July 5, 2020 Main Generator Lockout that caused a turbine trip and automatic reactor trip at Turkey Point-4, resulting in an approximately 15-day forced outage.

A. An electrical fault in the permanent magnet generator (PMG) of the main generator exciter caused a loss of voltage regulation for the main generator. Protective features of the main generator caused it to lockout, resulting in an automatic reactor trip and a forced outage.

The PMG stator and exciter work together to produce direct current. This direct current creates the magnetic field inside the main generator that allows it to produce electricity. The exciter is physically coupled to the main generator and rotates at the same speed as the main generator. The PMG stator is attached to the exciter and both are enclosed in a weather-resistant housing.

The main generator is on the non-nuclear side of the plant and is frequently inspected during refueling outages. On the non-nuclear side of the power plant, utilities frequently rely on inspections to determine when large components, such as main generator and exciter components should be rewound or replaced. This is known as a condition-based preventive maintenance program. The component involved in the July 5, 2020 outage was considered to be worn, but not yet in need of replacement.

All electrical components, like the main generator exciter PMG that failed, must be shielded from moisture, typically within an enclosure housing. During previous work on the main generator exciter by the original equipment manufacturer (OEM) maintenance organization, the enclosure housing that protects the exciter PMG from moisture was installed in a manner that allowed water to leak into the cabinet. This moisture combined with the worn nature of the PMG resulted in its failure and the resulting main generator lockout.

Q. Please respond to OPC witness Polich's contention that the outage was caused by FPL personnel improperly installing the seals.

A. As a threshold matter, it is important to correct witness Polich's testimony suggesting that the seals were incorrectly installed by FPL personnel. The installation was performed by the turbine OEM vendor, Siemens. Therefore, assessment of whether FPL was prudent requires examination of whether it was appropriate for FPL to rely on the vendor, Siemens; and whether FPL personnel should have detected the missing or incorrectly installed seals.

Q. Was it appropriate for FPL to rely on Siemens to install the seals on the exciter housing?

A. Yes. Utilities, like FPL, properly rely on vendor experts to conduct maintenance on their power plants. Utility personnel do not have the same level of training and experience that vendor personnel have for the equipment the OEM designed, manufactured and installed. Power plant maintenance personnel tend to be generalists, which is suitable for most maintenance, but not for maintenance of the more complex, larger equipment. The OEM vendor typically performs these inspections and maintenance activities at several fossil and nuclear power plants, making them far more proficient at this type of work than utility maintenance personnel are. This is coupled with the fact that during refueling outages utilities must bring in a large number of supplemental workers – often a workforce that is much larger than the utility power plant staff – to complete a refueling outage in a reasonable amount of time. Without the service of vendor partners, a 20 to 30-day refueling outage could take 60 to 90 days, significantly increasing costs utility customers must bear. Additionally, it would require utility workers, who do not have the same training and expertise as their vendor partners, to perform all of the maintenance work.

Q. FPL was aware of the potential for water intrusion into the main generator exciter based on a 2001 event. Was it reasonable for FPL to continue to rely on Siemens in light of the 2001 event?

A. Yes. The 2001 event was a ground fault in a main generator exciter based on water intrusion. Water was drawn in into the exciter through the enclosure and through pipes that had their plugs removed in preparation for an upcoming

outage. This ground fault did not result in a reactor trip. In response to the 2001 event FPL updated its exciter enclosure installation procedures and shared the operating experience with the industry and the OEM vendor, Siemens. It was reasonable to expect that Siemens would use the operating experience that FPL shared, along with its own OEM vendor expertise, to update its procedures for exciter installation.

Q. Should FPL personnel have detected the missing or incorrectly installed seals through periodic inspections?

A. No. When a component, like an exciter cabinet is assembled and in operation, inspecting subcomponents, like the water intrusion seals, is not possible. It would not be safe for plant personnel to disassemble the cabinet with the exciter in service. In addition, removing the exciter from service to conduct routine inspections would require removing the unit from service, thereby significantly increasing costs to utility customers.

Nuclear power plants must always balance nuclear and personnel safety with unit reliability, and reasonable refueling outage duration and cost to properly serve their customers and protect the public. When an outage such as the July 2020 event occurs, nuclear power plants use their learning organization behaviors and processes to thoroughly understand and prevent recurrence of the cause that led to the outage.

Q. Do you believe it was appropriate for FPL to have employed a condition-based maintenance approach for its PMG?

A. Yes. All U.S. nuclear power plants have increased the use of condition-based preventive maintenance programs. The primary reasons for this are that time-based preventive maintenance programs typically result in maintenance being performed on equipment that does not need any maintenance performed on it. This can cause three unintended problems:

1. Unneeded maintenance introduces the potential for unplanned latent equipment failures due to "infant mortality" of new components or human error during the work.
2. The performance of unnecessary maintenance activities on power plant equipment distracts plant operators and maintenance personnel from the vital maintenance activities needed for safety-related and important-to-unit-reliability equipment.
3. It results in additional maintenance costs to be recovered from utility customers.

Q. Why did FPL's corrective actions for the PMG failure specify a time-based preventative maintenance task for PMG stator rewind?

A. Like all nuclear power plants in the U.S., FPL's nuclear power plants use OEM and industry guidance to specify the type and frequency of preventive maintenance on plant equipment. All U.S. nuclear power plants are learning organizations, and industry and NRC standards for root cause evaluations are to prevent recurrence of significant conditions adverse to quality. In this case, even though vendor and industry standards do not require time-based rewinds of PMG

stators, the PMG stator rewind is intended to prevent recurrence of the issue that tripped Turkey Point-4 in July 2020.

Q. Please summarize your assessment of FPL's actions associated with the July 5, 2020 outage at TurkeyPoint-4.

A. FPL personnel took reasonable action to ensure that industry-standard exciter maintenance was performed by vendor experts before the unplanned outage. After the outage occurred, FPL conducted an in-depth causal analysis to understand the causes and take actions to prevent recurrence. FPL acted prudently.

March 2021 Outage at Turkey Point-3

Q. Please describe the March 1, 2021 unplanned outage at Turkey Point-3.

A. On March 1, 2021, Turkey Point personnel were performing a quarterly test that verifies the reactor trip breakers function properly. Reactor trip breakers allow control room operators to immediately shut down the unit by operating one switch to open the reactor trip breaker from the main control room. This is a safety feature that allows operators to immediately shut down the reactor if directed by operating procedure. When the reactor trip breaker is in the closed position, the control rods are kept from dropping into the reactor core. When the reactor trip breaker is in the opened position, the control rods drop into the reactor core, tripping the reactor. This test involves racking in breakers that bypass the reactor trip breakers so that cycling the reactor trip breakers open during the test does not actually allow the control rods to drop into the reactor.

When operators resumed the testing and put the reactor breaker into its normal, closed position, they proceeded to open the reactor trip bypass breaker to allow the reactor trip breaker to perform its normal function. When this occurred, a cell switch in the reactor trip breaker cubicle indicated to reactor protective systems that the reactor trip breaker was open (it was closed) causing the control rods to drop into the reactor core, and automatically trip the reactor. FPL's root cause analysis determined that the above-mentioned cell switch likely malfunctioned, actuating protective systems to trip the reactor.

Q. Explain how the FPL root cause evaluation identified the reactor trip breaker cell switches as the cause of the unplanned reactor trip.

A. FPL never found an actual "smoking gun" for the failure of the reactor trip breaker cubicle cell switches. The root cause evaluation team relied on comparing the FPL maintenance practices to one set of Westinghouse – OEM for the breaker – maintenance practices and on a conclusion drawn from the Westinghouse failure analysis of the reactor trip breaker and its cell switches. The Westinghouse failure analysis report documents the fact that FPL did not follow the Westinghouse Maintenance Program Manual (MPM) and that there was evidence of hardened graphite grease on the cell switches removed from the breaker cubicle. Westinghouse also correctly concludes that the presence of hardened graphite grease can provide a current path for the switch contacts. However, when Westinghouse tested both cell switches, the contacts that would have provided the invalid breaker position were operated 50 times and operated successfully all 50 times. The cell switches contain four sets of contacts. The

only contacts that did not operate successfully were those considered to be "extras." They were not wired to anything in the plant.

As I mentioned in Section I of my testimony, root cause evaluations conducted in the U.S. nuclear power industry must find a root cause. There is no allowance for an indeterminate cause. This often results in utility root cause analysis teams finding a most likely cause, specifying it as the root cause, then specifying a comprehensive set of corrective actions to ensure every possible cause has been bounded and addressed. In order to establish a corrective action to preclude recurrence, FPL elected to implement time-based preventive maintenance activities with specific direction to clean and lubricate the cell switches in response to the reactor trip breaker possible cell switch malfunction.

Q. OPC witness Polich opines that FPL contributed to the reactor trip breaker failure, or that the reactor trip breaker problem could have been found prior to failure because FPL failed to follow the Westinghouse MPM. Do you agree that FPL's activities caused the failure?

A. No. As a starting point, even OPC witness Polich acknowledged that the cause of the reactor breaker trip malfunction "was not directly determined." (Polich 2022 testimony at 40:7). He appears to attribute fault based solely on the fact that FPL identified the different OEM maintenance practice and decided to align with it after the event. As is often the case with nuclear industry root cause evaluations, however, the root cause analysis teams find a most likely cause, specify it as the root cause, and then specify a comprehensive set of corrective actions to ensure every possible cause has been identified and addressed.

Accordingly, it appears that in order to establish corrective actions, FPL found a likely cause and elected to implement time-based preventive maintenance activities in response to the reactor trip breaker possible cell switch malfunction, even though there was no direct evidence that the existing practice was inappropriate.

Q. Was FPL's condition-based maintenance approach for the cell switches consistent with industry practice?

A. Yes. FPL's approach was consistent with industry practice and vendor requirements for extending the qualified life of the cell switches considering periodic refurbishments and FPL's inspections, combined with the fact that the exact same switch can operate for thousands of cycles in a different application on the breaker. As stated in the FPL root cause evaluation: "With proper maintenance and inspection of the circuit breaker and cell at the interval recommended the breaker and cell values can be exceeded…. The service/cycle life of the breaker and its components are based on industry standards, testing and analysis."

In fact, other nuclear power plants confirmed that use of a condition-based maintenance strategy for the cell switches was in alignment with industry practices. As I previously stated, all U.S. nuclear power plants have increased the use of condition-based preventive maintenance programs to avoid maintenance being performed on equipment that does not need it, thereby avoiding the three unintended consequences I described above.

Q. Was there any evidence to indicate that the cell switch functioned properly under FPL's condition-based maintenance practice?

A. Yes. There were at least two observations that call into question whether hardened grease on the cell switch and lack of lubrication on the spring caused the failure. First, the breaker and cell switches operated successfully several times when tested. Further, the remaining reactor trip breaker cell switches, which are located adjacent to the reactor trip breakers that failed, were operating properly under the same maintenance program and no major degradation was observed.

Q. Has the nuclear industry studied the consequences of performing equipment tests such as the type FPL was engaged in when the March 2021 event occurred?

A. Yes. U.S. nuclear utilities conduct testing on safety related components on short frequencies specified by their operating licenses, sometimes resulting in spurious failures and unit trips, similar to what occurred at Turkey Point-3. Utilities are now using industry experience and probabilistic risk assessment modeling to extend the time between these types of high-risk tests that could result in loss of generation. Initiatives like this risk-informed maintenance/testing program will result in fewer high-risk tests in the future because many of these high-generation-risk tests can be done during a refueling outage instead of while the unit is online.

Q. Is FPL following this new model that is based on industry experience?

A. Yes. FPL has begun the process of implementing a risk-informed maintenance/testing program. This should result in fewer unplanned outages during maintenance and testing in the future.

Q. Please summarize your assessment of FPL's actions associated with the March 1, 2021 outage at TurkeyPoint-3.

A. FPL followed industry-standard maintenance practices. After the outage occurred, FPL conducted an in-depth causal analysis to understand the causes and develop actions intended to prevent recurrence. FPL acted prudently.

III. REMAINING OUTAGES DISCUSSED BY FPL WITNESS DeBOER

Outage Extensions

Q. Before assessing the extended outages identified by witness DeBoer, could you please describe the purpose of refueling outages in a nuclear plant.

A. Nuclear power plants are the only form of electricity generation that can keep enough fuel on hand to run continuously for 18 months. The purpose of a refueling outage is to refuel the reactor for the next 18-month operating cycle and to complete required maintenance and modification work that can only be done when the unit is shut down. Importantly, the inspection and testing of the structures, systems, and components that had been supporting operations for the entire 18-month cycle are also completed while the unit is shut down for refueling.

Q. What is the purpose of inspections and tests conducted during refueling outages?

A. Inspections and tests are not conducted to determine that everything is fine. Their purpose is to identify failed or degraded equipment and correct it to ensure that the unit can be operated safely and reliably through the next operating cycle. Even though FPL and the rest of the U.S. nuclear industry have invested in diagnostic and predictive technology, some equipment can only be assessed using the traditional, "failure-finding" methods. Sometimes those inspections and tests reveal issues that must be corrected before returning the unit to service to ensure a safe and reliable operating cycle. Utilities like FPL devote extensive resources to the planning and scheduling of refueling outages, but sometimes the corrective actions to repair degraded or failed equipment may extend the outage duration beyond what the utility originally estimated before it had the benefit of the inspection results.

Q. Please explain the operational difference between identifying and correcting issues during refueling outages compared to doing so while the unit is on-line.

A. It is always better to identify and correct issues when the unit is shut down for a refueling outage, even if it means the length of the outage will be extended. Issues that occur while the unit is on-line may result in having to remove the unit from service. Removing the unit from service requires significant additional time and risk associated with maneuvering the plant from full power operation to shutdown conditions. And then the resources necessary to address the issue need to be acquired. During the refueling outage, the unit is already in a

condition to address issues and the additional resources, including equipment, tools, and personnel are already on-hand to support the outage.

Q. And yet, unplanned outages still occur. Please comment.

A. Yes, the U.S. nuclear power industry, including FPL's nuclear fleet, is the most reliable generation fleet in the world. Even with the best inspection and test plans, operating events still occur. But the overall safety and reliability built into the nuclear plants from all of the work that is completed during refueling outages results in a defense-in-depth approach yielding highly reliable, safe, clean, base load generation. In fact, FPL just finished a 505-day, "breaker-to-breaker" run following its Fall 2021 refueling outage at Turkey Point-3 and completed with the beginning of the Spring 2023 refueling outage, meaning the Unit had an uninterrupted online run of 505 days between refueling outages.

<u>May 2021 Outage Extension at St. Lucie-1</u>

Q. Please describe the refueling outage extension that occurred at St. Lucie in May 2021.

A. On May 8, 2021, while operators were preparing to restart St. Lucie-1 from a refueling outage, they discovered that the lower gripper coils for four control element assemblies had failed and were subsequently determined to have been damaged. Control element assemblies (CEA) are the arrays of rods that are lowered into or raised out of the reactor core to help control the nuclear reaction. CEAs are raised or lowered by electrical coils that energize and deenergize in a precise sequence to "grip" them and move them up or down.

Subsequent troubleshooting by FPL personnel determined that the lower gripper coils failed when excessive electric current was applied to them by the rod control system coil power management drawer (CPMD). The FPL troubleshooting team found that while revising CPMD firmware the OEM vendor for the CPMD made an unauthorized change that removed the overcurrent protection from the four failed lower gripper coils. The OEM vendor failed to follow its own software change requirements when making this unauthorized change to their proprietary firmware.

Q. Was it appropriate for FPL to rely on the OEM to execute software changes?

A. Yes. In this case the vendor made an unauthorized change to its proprietary software, causing the damaged coil stack that extended the refueling outage. The installation was performed by the vendor under the vendor quality assurance program and it involved the vendor's proprietary software, which FPL personnel do not have access to or permission to modify, thus bounding the scope of FPL's oversight. This conforms to FPL quality assurance and vendor oversight requirements and is consistent with standards employed at other U.S. nuclear power plants.

Q. Please summarize your assessment of FPL's actions associated with the May 2021 event at St. Lucie-1.

A. FPL's reliance on a vendor expert with proprietary software was prudent and in accordance with U.S. nuclear industry standards and practices. FPL is not at fault for this refueling outage extension.

November 2021 Outage Extension at Turkey Point-3

Q. Please describe the circumstances that led to the refueling outage extension at Turkey Point-3 in November 2021.

A. Several issues led to the subject outage extension. The two largest causes of the extension were the failure of the manipulator crane gripper and emergent work (work that that is not anticipated to have to be done before the refueling outage). The emergent work includes the leak identified on the core exit thermocouple (CET) number 57 during the Normal Operating Pressure and Temperature walkdown. Some, but not all, of the outage duration extension time was recovered by FPL personnel action to execute the outage in an efficient manner.

Q. Were FPL's actions associated with the failure of the manipulator crane gripper prudent?

A. Yes. FPL's response to the failure of the manipulator crane gripper was safe, prudent, and timely. The first issue that delayed the refueling outage was the malfunction of the manipulator crane gripper. This component latches on to irradiated fuel in the reactor core so it can be safely transported to the spent fuel pool. Irradiated fuel is highly radioactive and mishandling it can spread radioactive contamination, which could endanger the public. Nuclear power plants conduct extensive testing and maintenance of fuel handling equipment before outage refueling activities to maintain reliable operation.

When a malfunction occurs, or the reliability of the fuel handling equipment is questioned, the utility must make the conservative decision and be absolutely sure the equipment is reliable before it moves irradiated fuel. Conservative

decision-making may call for the replacement of an entire subcomponent. This takes time but ensures that the highest level of nuclear safety is maintained. FPL had fuel handling equipment maintenance personnel already on site as a contingency, and made the conservative, safe decision which resulted in an extension of the refueling outage.

Q. Were FPL's actions associated with the CET prudent?

A. Yes, FPL's actions associated with the CET were safe, prudent, and timely. During the refueling outage, FPL discovered a boric acid deposit on a core exit thermocouple tube. All pressurized water reactors maintain a boric acid corrosion control (BACC) program in compliance with American Society of Mechanical Engineers (ASME) code requirements and the site's licensing basis. The ASME code forms the basis for how nuclear power plant pressure retaining components are built, inspected, and repaired. The BACC program is an especially vital program that became more important following the reactor vessel closure head damage discovered in 2002 at the Davis Besse Nuclear Power Station. At Turkey Point, boric acid was discovered on instrumentation tubing coming out of the nuclear reactor. The tubing connection was not worked on during the refueling outage.

This tubing is one of three fission product barriers that protect the public from radioactive contamination during a nuclear accident. Nuclear power plant operators must maintain the integrity of all three fission product barriers and conduct extensive inspections of these barriers before completing a refueling outage. Pursuant to the plant's operating license, the inspection that discovered

the leaking CET has to be performed near the end of the refueling outage when the reactor coolant system has been brought to its normal operating pressure and temperature. FPL personnel documented that they conducted these required inspections. Plant personnel made the prudent, safe decision to pause reactor startup so they could investigate and repair the source of the boric acid leakage.

Other nuclear power plants have had to reverse progress in their refueling outages to repair boric acid leaks on mechanical connections that most often were not worked on during the refueling outage. If a nuclear power plant discovered a similar leak while it was online, the plant's operating license would require it to shut down within seven hours and repair the leak. The only way to prevent this would be to work on every connection each refueling outage. This would result in significantly longer, more costly, refueling outages and would introduce the possibility of equipment infant mortality or human error into the repair process.

Q. Do you have any overall observations about FPL's execution of refueling outages?

A. Yes. The FPL nuclear fleet, as part of the broader NextEra Energy, Inc. fleet, has developed a core competency for refueling outage execution. FPL conducts high-quality refueling outages and its refueling outage durations tend to be shorter than the average duration refueling outage in the U.S. nuclear power industry. According to S&P Global Commodity Insights data, reported by Platts Nuclear News on March 9, 2023, the average length of U.S. nuclear refueling outages in 2022 was 39.8 days. Most FPL nuclear plant refueling outages, even

with unplanned extensions, have a shorter duration. In fact, St. Lucie-1 recently completed a refueling outage in 28 days. This results in FPL customers paying for less refueling outage replacement power than the customers of other utilities. FPL should not be penalized for unplanned, unpreventable refueling outage extensions when they are planning and executing world-class refueling outage durations.

Unplanned Outages

November 2020 Generation De-rate at Turkey Point-3

Q. Please describe the Turkey Point-3 derate that occurred in November 2020.

A. On November 7, 2020, a component that controls valves in the secondary side of the plant failed, causing the valves it controls to fail to control secondary heat exchanger, tank, and pump recirculation parameters. By plant design, the main turbine control system automatically reduced power to 85% to prevent a turbine and reactor trip. Plant personnel worked around the clock to identify the failed component, then engaged FPL's vendor partner to conduct a failure analysis on the failed field control processor. An internal subcomponent called an optocoupler caused the field control processor to fail. On November 21, 2020, in order to isolate the correct secondary equipment to safely replace the repaired field control processor, FPL personnel reduced unit power to 25%. Following replacement of the field control processor and successful post-maintenance testing, the unit was returned to 100% power.

Q. Is 14 days a reasonable amount of time to identify and correct the malfunction that caused the 15% reduction in power?

A. Yes. Although located on the secondary side of the power plant, FPL personnel had to take great care in their troubleshooting activities to ensure they did not induce another secondary plant transient or turbine and reactor trip. This often involves complex troubleshooting that is carefully monitored by plant operators. FPL staff then engaged vendor experts to help understand and correct the cause of the component failure.

The external vendor was able to diagnose and specify a repair for the component that malfunctioned. An internal subcomponent was the cause of the malfunction and the defective part was replaced. FPL personnel performed an appropriate extent of condition, then used their corrective action program to specify corrective actions designed to prevent a similar failure from occurring again, or elsewhere.

Q. Please summarize your assessment of FPL's actions associated with the November 2020 event at Turkey Point-3.

A. FPL actions prior to and following the component failure were prudent and in alignment with U.S. nuclear power industry practices.

<u>January 2021 Outage at St. Lucie-2</u>

Q. Please describe the St. Lucie-2 outage that occurred in January 2021.

A. On January 20, 2021, St. Lucie-2 automatically tripped from 100% power. A non-safety related motor control center deenergized due to a design error that

occurred in the 1980s, resulting in the diverse turbine trip system initiating a reactor and turbine trip. In 1983, an error in a design drawing did not clearly define power supply assignments for diverse, separated channels of undervoltage protection. This error resulted in inadvertently mis-assigning power to two of four undervoltage relays to the incorrect source of power when the St. Lucie-2 rod control system was replaced with an upgraded system in 2019.

Q. Why did FPL personnel not identify the legacy drawing error that when combined with the 2019 modification resulted in a reactor trip?

A. The latent legacy defect in plant drawings occurred in the 1980s. The drawing was prepared by one of the construction contractors, Ebasco. Prior to the mid-1990s, power plant design control across the U.S. nuclear industry, especially for drawings, were not as strong as they are now. This has resulted in legacy drawing errors at several nuclear power plants, primarily in non-safety related systems. Over the years, many power plants across the country assessed the cost associated with reconstituting plant drawings to discover and resolve legacy drawing errors. Utilities decided not to proceed with these initiatives due to the excessive cost estimates. As an example, I was personally involved in an effort to reconstitute the large bore piping drawings and calculations at a power plant and can attest that very little benefit was derived from the multi-million-dollar project.

Q. Given the less stringent design control standards implemented by the industry prior to the mid-1990s, how do nuclear plants discover and correct any legacy errors?

A. At present, nuclear plants typically rely on their design change processes to discover and correct these errors.

Q. FPL's root cause evaluation notes that a large project was implemented to replace its rod control system and that the subject components and drawing were outside the scope of the project. Was such a limitation in scope consistent with industry practice?

A. Yes, it is standard industry practice to limit the scope of nuclear plant design change projects. There are three main reasons for this. First, every time a utility changes the plant design, it impacts the overall plant design and could introduce unintended consequences. Therefore, it is very difficult and expensive to change the design of a nuclear power plant system, structure, or component. This leads to the second reason that utilities limit the size of design change projects: cost. Nuclear power plant design changes are several times more expensive than other power plant design changes because of the extensive engineering, design, and procurement control that must be maintained. The final reason is that expanding design change project boundaries increases the complexity and therefore the possibility of human error when implementing a design change. This leads nuclear operators, including FPL, to limit the scope of design changes to only what is necessary.

Q. Please summarize your assessment of FPL's actions associated with the January 2021 event at St. Lucie-2.

A. FPL personnel actions to discover and address the issue that caused the outage were prudent and met industry standards. FPL personnel discovered the vulnerability point while preparing for a maintenance procedure and included correction of the issue for the next scheduled unit outage. This is standard industry practice in the U.S. nuclear power industry to avoid unnecessary cycling of unit operation.

February 2021 Power Reduction at Turkey Point-3

Q. Describe the February 2021 power reduction at Turkey Point-3.

A. On February 2, 2021, operators observed the concentration of sodium in the feedwater system begin to increase. The feedwater system supplies secondary plant water to the steam generators, which turns into steam to drive the main turbine. Because the steam generator tubes are a barrier between the reactor coolant system water on the nuclear side of the plant, and feedwater on the secondary side of the plant, great care is taken to guard against leaks. Precise control of the chemistry of the water on both sides of the plant helps accomplish this. On the secondary side of the plant, contaminants, like sodium, can accelerate the wear of steam generator tubes which could lead to a leak. Accordingly, the allowable limits for the concentration of contaminants, like sodium, are very low.

Operators used their procedures to identify the likely source of sodium entering the feedwater system, removed applicable equipment from service, and stabilized the plant at 55% power. FPL personnel then worked around the clock to identify the source of the sodium ingress, repair it, and return the unit to 100% power.

Q. Was FPL's maintenance strategy sufficient to prevent a tube leak that could result in reduced generation?

A. Yes. FPL conducts heat exchanger tube integrity testing on about one-fourth of the tubes during refueling outages, and plugs any tubes that have excessive wear, or that are adjacent to other damaged tubes. This is standard nuclear power industry practice based on the Electric Power Research Institute (EPRI) Heat Exchanger Program documents for non-safety related heat exchangers like main condensers. EPRI is the central technical authority for the power generation industry, conducts research, and publishes practical application documents to guide the efforts of utilities, like FPL, to implement standard, high quality maintenance programs for major components like heat exchangers and condensers.

FPL uses a vendor expert, Curtiss-Wright, to inspect its main condenser tubes for deficiencies like cracks using what is known as eddy current testing. Eddy current testing is the process of running electronic probes through metal tubes to look for flaws, dents, or cracks in them. The Curtiss-Wright Eddy Current Inspection Report submitted after the tube was repaired confirms that FPL's maintenance strategy was adequate.

Q. Did FPL act prudently to limit the generation loss and consequently the replacement power costs for FPL customers?

A. Yes. The unit was at reduced power for 7 days to identify and plug a leaking main condenser tube. Main condenser tube leaks are a common occurrence at all U.S. power plants. Main condensers contain tens of thousands of tubes that are subjected to harsh operating conditions. Utility personnel conduct extensive main condenser crawl-throughs and repairs during refueling outages but it is nearly impossible to identify every degraded component in a main condenser during a refueling outage. In this case, a piece of heat exchanger lagging failed and impacted a tube.

In order to protect steam generator tube integrity, FPL monitors contamination levels through precise control of the chemistry of the water that surrounds the tubes. Consistent with nuclear industry standards for contaminant levels in secondary plant systems, FPL allows less than one part per billion. Once an exceedance is observed, the process to identify and plug a leaking condenser tube is imprecise and time-consuming. FPL personnel actions to address the tube leak and return the unit to full output were timely and prudent.

<u>August 2021 Outage at Turkey Point-3</u>

Q. Please describe the August 2021 outage at Turkey Point-3.

A. On August 5, 2021 the number 2 main turbine control valve at Turkey Point-3 unexpectedly closed. Main turbine control valves control the flow of steam from the steam generators to the high-pressure turbine. Because main turbine control

valves cannot be worked on with the main turbine in service the unit was shut down to troubleshoot and repair the valve. FPL personnel determined that the actuator stem (rod) was sheared at a threaded connection inside the coupling between the actuator and valve. Further failure analysis by an offsite expert determined that the source of the failure was pitting in the stem that progressed into a crack leading to the shear failure of the stem. Pitting is a collection of small pieces of corrosion on the surface of a metallic component.

Q. Should FPL personnel have been able to identify and prevent the failure of the actuator rod that caused the control valve to close?

A. No. The Turkey Point investigation, supported by a failure analysis from an offsite expert, supports the conclusion that the failure of the rod was initiated by corrosion pitting on an area of the rod that was not coated. Turkey Point personnel would have been unable to prevent this failure until it became self-revealing. Since the subject subcomponent was part of a non-safety related system, there are no requirements for the nondestructive testing that is performed for safety-related components. Nuclear power plants focus the majority of their testing and maintenance resources on safety-related components over non-safety related components. Safety-related components have to function as designed, and as operators are trained to expect, to protect the public during off-normal or accident conditions. This is affirmed by the oversight of the NRC, who is considered to be the “safety regulator.”

As discussed in my assessment of the Turkey Point-4 July 2020 unit trip, when servicing non-safety related equipment utilities have to balance the cost/benefit

of excessively long refueling outages and costs that are recovered from their customers. This is consistent with U.S. nuclear power industry practice and results in very infrequent unplanned non-safety related equipment failures.

December 2021 Outage at St. Lucie-1

Q. Please describe the December 2021 outage that occurred at St. Lucie-1.

A. On December 10, 2021, St. Lucie-1 operators followed their procedures and manually tripped the reactor due to lowering and unrecoverable levels in the steam generators. Although not at the automatic trip setpoint, operators were maintaining precise control of the reactor as required by their training. Steam generator levels were lowering due to transient flow conditions in the secondary plant initiated during maintenance worker replacement of a pressure differential indicating switch resulted in a blown fuse and loss of a power supply to control systems.

Q. Were the appropriate procedures in place to prevent the outage from occurring?

A. Yes, the appropriate procedures were in place. The unplanned outage was caused by a properly trained FPL supervisor, whose performance had been rated as acceptable, not enforcing the proper standards for instrumentation and control technician work. FPL had all of the required human error reduction tools available for the technicians to complete the work without causing the unit to trip. FPL appropriately applied accountability actions to the supervisor for not enforcing the use of human error reduction tools with his technicians. The instrumentation and control technicians were appropriately trained and qualified

to perform the work. The plant conducted a training needs analysis for the work and determined that no further training was needed.

Q. Were FPL's actions associated with the December 2021 event at St. Lucie-1 prudent?

A. Yes. FPL had all of the required technical and human error reduction processes in place to prevent this error from occurring. This outage is an example of a supervisor not following established standards and requirements.

<u>January 2022 Outage at St. Lucie-2</u>

Q. Please describe the January 2022 outage at St. Lucie-2.

A. On January 6, 2022, operators were conducting a scheduled test of control rod movement at St. Lucie-2. During the test one control element assembly slipped, which means it did not respond to efforts to withdraw it from the core. Operators followed their procedures and reduced reactor power to 70% in accordance with the plant's operating license. FPL personnel conducted further troubleshooting, and, in compliance with the plant's operating license, shut down the reactor. After the reactor was moved to the cold shutdown condition, FPL personnel continued inspecting the control element drive mechanism and discovered a foreign object impeding the movement of the upper latch mechanism allowing the control element assembly to slip during the operational test being conducted.

Inspection of the object determined that it was a pin that had broken off a tool used to couple the control element assembly to its extension shaft during the refueling outage that occurred in September 2021 at St. Lucie Unit 2 (SL2-26).

Q. Were FPL's actions during the SL2-26 outage prudent?

A. Yes. FPL used an experienced reactor services vendor to conduct work on its reactor vessel closure head packages. This same vendor performs reactor service work at several U.S. nuclear power plants. Reactor service utility personnel and vendors are trained to not introduce foreign material into the reactor systems and are willing to stop work – even critical path refueling operations – when they encounter an unexpected condition.

During the SL2-26 refueling outage work, the vendor experts did not recognize that the tool they were using malfunctioned, resulting in a sheared pin dropping into the coil stack. The reason they did not recognize it is that the subject pin is unable to be observed when the tool is assembled.

Q. Had the nuclear industry experienced a pin dislodging from a similar tool before FPL's January 2022 event?

A. No. This was a learning for all U.S. nuclear power plants. The FPL causal analysis directed the development of new procedures that will significantly reduce the possibility of a similar event occurring again.

Q. Please summarize your assessment of FPL's actions associated with the January 2022 event at St. Lucie-2.

A. FPL personnel took the proper, industry standard precautions to prevent the equipment malfunction that led to the unplanned outage at St. Lucie-2.

Q. Does this conclude your testimony?

A. Yes.

(Whereupon, prefiled direct testimony of Richard A. Polich was inserted.)

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In Re: Fuel and Purchase Power Cost Recovery Clause with Generating Performance Incentive Factor/	DOCKET NO. 20240001-EI FILED: February 5, 2024

DIRECT TESTIMONY

OF

RICHARD A. POLICH, P.E. (STATE OF MICHIGAN)

ON BEHALF OF THE CITIZENS OF

THE STATE OF FLORIDA

TABLE OF CONTENTS

EXHIBITS

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Richard A. Polich. I am a Managing Director at GDS Associates, Inc. ("GDS"). My business address is 1850 Parkway Place, Suite 800, Marietta, Georgia, 30067.

Q. WHAT ARE YOUR DUTIES AND RESPONSIBILITIES AT GDS ASSOCIATES?

A. My primary duties are within GDS's Power Supply Planning Department. While employed by GDS, I have provided consulting services for areas such as:

- Generation Asset Management,
- Engineering analysis of generation projects,
- Engineering evaluation of waste to energy projects,
- Energy management consulting services,
- Nuclear decommissioning cost evaluation,
- Modular nuclear project cost evaluation,
- Renewable energy project cost assessment and economic evaluation,
- Testimony on rate of return, cost of service, regulatory disallowances, determination of prudence, revenue requirements and plant in service, and
- Review of generation project design and construction.

Q. MR. POLICH, PLEASE SUMMARIZE YOUR FORMAL EDUCATION.

A. I graduated from the University of Michigan - Ann Arbor in August 1979 with a Bachelor of Science Engineering Degree in Nuclear Engineering and a Bachelor of Science Engineering Degree in Mechanical Engineering.

Q. PLEASE BRIEFLY DESCRIBE YOUR PROFESSIONAL EXPERIENCE.

I have over 40 years of work experience in the energy sector, performing duties and services for a myriad of companies and organizations, and representing the interests of private and public constituencies throughout the country.

In May 1978, I joined Commonwealth Associates, Inc., located in Jackson, Michigan, as a Graduate Engineer and worked on several plant modification and new plant construction projects.

In May 1979, I joined Consumers Power Inc., (now called Consumers Energy), located in Jackson, Michigan, as an Associate Engineer in the Plant Engineering Services Department.

In April 1980, I transferred to the Midland Nuclear Project and progressed through various job classifications to Senior Engineer. I was also part of a small team that evaluated the potential to repower the nuclear steam turbine with combustion turbines. One of my responsibilities was to provide the initial thermal design for the combined cycle project, utilizing one of the two existing nuclear steam turbines while still providing process steam for Dow Chemical Company. This project is now known as the Midland Cogeneration Venture, a 12-combustion turbine and steam turbine project capable of providing 1,633 MW of capacity.

In July 1987, I transferred to the Market Services Department as a Senior Engineer and reached the level of Senior Market Representative. While in this department, I analyzed the economic and engineering feasibility of customer cogeneration projects.

In July 1992, I transferred to the Rates and Regulatory Affairs Department of Consumers Energy as a Principal Rate Analyst. In that capacity, I performed studies relating to all facets of development and design of Consumers Energy's gas, retail, electric and electric wholesale rates. During this period, I was heavily involved in the development of Consumers Energy's Direct Access program and in the development of Consumers Energy's Retail Open Access program. I also participated in the development of Consumers Energy's annual revenue forecast.

In March 1998, I joined Nordic Energy, LLC ("Nordic"), located in Ann Arbor, Michigan, as Vice President in charge of marketing and sales. My responsibilities included all aspects of obtaining new customers and enabling Nordic to supply electricity to those customers. In May 2000, my responsibilities shifted to Operations and Regulatory Affairs and my responsibilities included management of power supply purchases, transmission services, and development of new power generation projects. My Regulatory Affairs responsibilities also included overseeing regulatory and legislative issues for the company.

In March 2003, I formed Energy Options & Solutions, based in Ann Arbor, Michigan, as a consulting concern focusing on providing engineering services and regulatory support. Through my work with Energy Options & Solutions, I gained extensive experience consulting in the areas of project development and economic analysis with renewable energy companies across the country, including: Noble Environmental Power located in Centerbrook, Connecticut; Third Planet Windpower, LLC located in Palm Beach Gardens, Florida; TradeWind Energy, LLC located in Lenexa, Kansas; Windlab Developments USA located in

Canberra, Australian Capital Territory, Australia; and Matinee Energy Inc. located in Tucson, Arizona, among others.

Other examples of my consulting work include evaluation of the Arkansas Weatherization Assistance Program for the Arkansas Energy Office and providing the West Michigan Business Alliance with an evaluation of the business opportunities for Western Michigan businesses in the renewable energy sector.

In 2007, I served as primary author of a report on the economic impacts of renewable portfolio standards and energy efficiency programs for the Department of Environmental Quality – State of Michigan.

In 2011, I joined KEMA, Inc. ("KEMA") located in Burlington, Massachusetts, as a Service Line Leader responsible for developing its renewable energy consulting business. While at KEMA, I performed multiple renewable energy studies for the Electric Power Research Institute, including a renewable energy options study for the country of Saint Maarten (a constituent country of the Kingdom of the Netherlands). I also assisted Lake Erie Energy Development Corporation in its successful application to the U.S. Department of Energy for a multi-million dollar grant to develop an offshore wind project in Lake Erie.

In 2013, I joined CLEAResult, located in Little Rock, Arkansas, as Director of Operations. My primary responsibility involved supporting program operations in assisting the company's Arkansas unit to successfully meet a 400% increase in energy efficiency program goals that it managed for Entergy. I was also responsible for managing CLEAResult's natural gas energy efficiency programs in the State of Oklahoma.

In 2015, I joined the GDS Associates, Inc., a consulting group focusing on utility engineering and consulting services, as Managing Director.

I have been a registered Professional Engineer since 1983 and I am licensed in the State of Michigan. My resume is included as Exhibit No. ___ (RAP-1).

Q. HAVE YOU TESTIFIED IN OTHER REGULATORY PROCEEDINGS?

A. Yes, Exhibit No. ___ (RAP-2) contains a list of regulatory proceedings in which I have provided testimony.

Q. WHAT IS THE NATURE OF YOUR BUSINESS?

A. GDS is an engineering and consulting firm, headquartered in Marietta, Georgia and with other offices in Georgia; Austin, Texas; Auburn, Alabama; Orlando, Florida; Bedford, New Hampshire; Kirkland, Washington; Folsom, California; and Madison, Wisconsin. GDS has over 180 employees with backgrounds in engineering, accounting, management, economics, finance, and statistics. GDS provides rate and regulatory consulting services in the electric, natural gas, water, and telephone utility industries. GDS also provides a variety of other services in the electric utility industry including power supply planning, generation support services, transmission services, distribution engineering, energy efficiency, financial analysis, load forecasting, and statistical services. Our clients are primarily publicly owned utilities, municipalities, customers of privately owned utilities, groups or associations of customers, and government agencies.

Q. WHOM DO YOU REPRESENT IN THIS PROCEEDING?

A. I am representing the Florida Office of Public Counsel ("OPC").

Q. WHAT WAS YOUR ASSIGNMENT IN THIS PROCEEDING?

A. I was asked by the OPC to conduct a review of, and to evaluate Florida Power & Light Company's ("FPL") operation of the St. Lucie Nuclear Plant ("St. Lucie") and Turkey Point Nuclear Power Plant ("Turkey Point") for the period of 2019 through 2021, and to evaluate other factors that might be impacting the cost of fuel in the ongoing fuel cost recovery clause dockets. The review and evaluation included assessment of the plant operations, which led to several outages and derates (or reductions in the plant's operating capacity while it remained in operation). My testimony also includes an assessment of replacement power cost impacts for 2019, 2020 and 2021 during periods in which the units at St. Lucie and Turkey Point were not available to provide full capacity, and the cost of that replacement power that FPL is seeking to recover from its ratepayers in this proceeding. I was also asked to review FPL nuclear operations to determine if there were any circumstances and factors that impact the current estimated and projected fuel costs and ongoing fuel costs that are at issue in the current docket. After the Commission's professional management audit staff undertook a management performance audit of FPL's nuclear operations, I was asked to review the results of that audit and any fuel-related impacts that were identified therein, including outages for 2022 and 2023.

Q. DID OTHER GDS PERSONNEL ASSIST YOU IN THE ANALYSIS AND DEVELOPMENT OF YOUR TESTIMONY IN THIS MATTER?

A. Yes, Megan Morello assisted me with review of documents. Megan Morello is employed by GDS as a Project Manager in the Power Supply Planning Department. She has a Bachelors' Degree in Mechanical Engineering from the Georgia Institute of Technology and is a Registered Professional Engineer in Georgia.

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes, I am sponsoring the following exhibits:

1. Exhibit No. ___(RAP-1) Richard A. Polich, P.E. Resume
2. Exhibit No. ___(RAP-2) Richard Polich Regulatory Testimony List
3. Exhibit No. ___(RAP-3) Testimony of Richard A. Polich, filed September 14, 2022 in Florida Public Service Commission Docket No. 20220001-EI
4. Exhibit No. ___(RAP-4) The Florida Public Service Commission Office of Auditing and Performance Analysis Report, titled *"Review of Nuclear Operations Florida Power & Light Company"* (issued January 2024)
5. Exhibit No. ___ (RAP-5) Nuclear Regulatory Commission Turkey Point Units 3 and 4 – Special Inspection Report 05000250/2020050 and 05000251/2020050, dated December 9, 2020.

II. TESTIMONY SUMMARY

Q. PLEASE SUMMARIZE THE PURPOSE OF YOUR TESTIMONY.

A. In my prior testimony submitted in Docket No. 2022001-EI, attached as Exhibit No. ___(RAP-3), I identified concerns with the staffing, culture and operations at the four nuclear units of FPL that need to be addressed as they affect past, current and future fuel costs paid by FPL customers. The conditions noted in that testimony, while improved, are still a concern. On January 12, 2024, The Florida Public Service Commission Office of Auditing and Performance Analysis issued a Report, titled *"Review of Nuclear Operations Florida Power & Light Company"* (Nuclear Audit Report). This report highlighted and supported several of the operational issues at FPL's St. Lucie and Turkey Point nuclear facilities that were addressed in my prior testimony provided in Exhibit No. ___ (RAP-3).

Q. PLEASE SUMMARIZE THE AREAS OF CONCERN IN YOUR TESTIMONY.

A. Consistent with the testimony summary I provided in Exhibit No. ___ (RAP-3), my updated testimony summary here will highlight areas of concern. Market forces over the last decade have placed significant cost reduction pressure on regulated and merchant nuclear plant owners alike, driving a need to be cost competitive with low cost natural gas fuel combined cycle power generation. Nuclear power generation is a valuable carbon-free power generation resource that is critical to achieving carbon emission reduction goals for many utilities. It is critical that utilities operating nuclear power facilities, attain operational

efficiencies while ensuring correct resources and training are available to operate these facilities safely and properly. It is my understanding that FPL's nuclear operations depend, for some of its functions, on the NextEra Energy (parent company of FPL), centralized engineering organization's shared and common engineering, maintenance and operations expertise.

Review of operations at FPL's St. Lucie and Turkey Point facilities during the period 2017 - 2022, found there was an increased frequency of outage and derate hours, resulting in avoidable replacement power costs. From 2017 through the period addressed in the 2022 testimony, FPL had reduced budgeted personnel headcount at St. Lucie by 24.7% and Turkey Point by 25.2%. Actual head count at the plant sites has been reduced by 28.0% at St. Lucie and 22.3% at Turkey Point. Given the magnitude of the workforce reductions and the fact of the Staff's audit, I did not believe it was necessary to update these numbers.

Reductions in personnel alone are not automatically a red flag in the assessment of nuclear plant operations. However, there have also been a series of instances at St. Lucie and Turkey Point over recent years which are indicative of potential problems, and which call into question whether employee reductions during times of frozen base rates are in the best interests of customers who, often by default, initially end up paying for replacement power in the event of outages.

There are events that I believe have a bearing on the outages that occurred during 2019-2022 and that may well be continuing to impact FPL's operations and ongoing fuel costs when viewed in connection with the workforce trends. While the circumstances related to certain of these events may have improved,

given the regression after initial improvement documented in the 2024 Nuclear Audit Report, they should be the subject of scrutiny in this hearing and any ensuing monitoring of FPL's nuclear operations. In one instance, for example, the United States Nuclear Regulatory Commission ("NRC") determined that FPL's Regional Vice President ("VP") – Operations, deliberately caused a contract employee's assignment to be cancelled the week of March 13, 2017, because the employee raised a nuclear safety concern via the submission of a condition report. The NRC determined that the deliberate actions of the now former FPL Regional VP – Operations, caused FPL to be in violation of 10 C.F.R. § 50.7, which is significant because of the potential that individuals might not raise safety issues for fear of retaliation. The NRC also assessed a civil penalty of $232,000 for a Severity Level II violation.

In another instance, at Turkey Point, three FPL employees (who were mechanics) falsified information on work orders in January 2019 (see Exhibit No. ___ (RAP-3, Exhibit 4)). In July 2019, two FPL Instrumentation and Control ("I&C") technicians at Turkey Point deliberately provided incomplete or inaccurate information in maintenance records. The FPL I&C technicians, an FPL I&C Supervisor, and the FPL I&C Department Head deliberately failed to immediately notify the main control room of a mispositioned plant component, as required by plant procedures. The NRC investigation into these three apparent violations resulted in a Notice of Violation and a proposed civil penalty of $150,000 (see Exhibit No. ___ (RAP-3, Exhibit 5)).

The NRC also determined that in the first quarter of 2021, review of Turkey Point performance indicated that unplanned reactor scrams[1] had exceeded the Unplanned Scrams per 7,000 Critical Hours performance indicator, resulting in a performance rating change of green to white for Turkey Point (see Exhibit No. ___ (RAP-3, Exhibit 4)). Green to white denotes a degradation of operational performance.

These events, coupled with decreased headcount and increased outage and derate hours, are potential indications of deficient nuclear operations culture at St. Lucie and Turkey Point facilities. FPL's overall effort at reducing operational costs through personnel reductions has the potential to cause stress to be placed on personnel to do more work with less time and resources. As a result, mistakes can occur, tasks may not be performed in accordance with company procedures, and projects are rushed to be completed, all of which can lead to avoidable increase plant derates and outages, and imprudent fuel costs for customers. My review of the causes of plant outages finds that lower head count, coupled with inadequate training, may be contributing factor to lower plant performance. As such, it is recommended the Commission disallow fuel cost recovery associated with several derates and outages as discussed in my testimony. As discussed below, I also urge the Commission to consider ordering a limited and targeted follow-up review that informs the Commission of the status of the nuclear operations insofar as it affects the costs submitted for recovery in the Fuel Clause and other matters within the Commission's jurisdiction.

[1] These are described in Section VII of RAP-3.

Q. CAN YOU SUMMARIZE THE CONCLUSIONS OF YOUR TESTIMONY?

A. Yes. In developing my testimony, my review took a holistic look at FPL's operating practices at its nuclear plants that created circumstances which may be causing an unnecessary number and duration of outages and impacting the ongoing costs of fuel needed to replace the output of the four FPL nuclear units when they are unavailable. This effort indicates that FPL customers may still be at risk of paying excessive costs of replacement power in 2022 and 2023. This wider view of FPL's nuclear operations involved an evaluation of factors and operational conditions, as mentioned above and discussed below, that may be having an ongoing impact on the replacement power costs of FPL that are at issue in the current docket and in the ongoing level of fuel costs to be recovered in the future.

The Nuclear Audit Report contains findings and data that is consistent with my position. It provides evidence that FPL operation, maintenance and management practices at St. Lucie and Turkey Point nuclear plants were a significant contributor to increased plant derates and outages, resulting in increased power supply costs to FPL customers. I am recommending that the Commission disallow certain fuel costs for recovery from customers due to the imprudence on FPL's part in operating their nuclear units. Further, the Commission should conduct a targeted follow-up review of FPL's nuclear operations in two years to ensure that current nuclear operation are improved and are no longer negatively impacting customers' fuel rates.

III. DESCRIPTION OF FPL NUCLEAR POWER PLANTS

Q. PLEASE PROVIDE A GENERAL DESCRIPTION OF THE PLANT ST. LUCIE NUCLEAR GENERATING STATION.

A. St. Lucie has two separate pressurized water reactor ("PWR") nuclear units, capable of a net electrical output of about 981 MW for Unit 1 and 987 MW for Unit 2.[2] The nuclear steam supply system was designed by Combustion Engineering and provides steam to Westinghouse steam turbine-generators. Unit 1 entered commercial operation in December 1976 and Unit 2 entered commercial operation in August 1983. The current Nuclear Operating License for Unit 1 expires in March 2036 and Unit 2's license expires in April 2043.

Q. PLEASE PROVIDE A GENERAL DESCRIPTION OF THE TURKEY POINT NUCLEAR UNITS.

A. Turkey Point has two separate PWR nuclear units, capable of a net electrical output of at least 837 MW for Unit 3 and 844 MW for Unit 4.[3] The nuclear steam supply system was designed by Westinghouse and provides steam to Westinghouse steam turbine-generators. Unit 3 entered commercial operation in December 1972 and Unit 4 entered commercial operation in September 1973. The NRC had initially approved Turkey Point's Nuclear Operating License extension in 2019, but on February 24, 2022 the NRC reversed the extension for further

[2] This capacity is based on FPL capacity contained in FPL GPIF reports.
[3] *Ibid.*

environmental impact review. The current Nuclear Operating Licenses expire in 2032 for Unit 3 and 2033 for Unit 4.

IV. NUCLEAR AUDIT REPORT DISCUSSION

Q. DID YOU REVIEW THE FLORIDA PUBLIC SERVICE COMMISSION OFFICE OF AUDITING AND PERFORMANCE ANALYSIS REPORT, TITLED *"REVIEW OF NUCLEAR OPERATIONS FLORIDA POWER & LIGHT COMPANY"* (ISSUED JANUARY 2024)?

A. Yes, I reviewed this Nuclear Audit Report as part of my current review of pertinent information related to FPL's nuclear operations and its impact on customer fuel rates in preparation for filing this updated testimony. I have attached the Nuclear Audit Report as Exhibit RAP-4 and below discuss my opinions of the relevant evidence contained in this report.

Q. WHAT WERE THE SCOPE AND OBJECTIVES OF THE COMMISSION'S NUCLEAR AUDIT REPORT?

A. The primary objectives of the Nuclear Audit Report were to review, evaluate, and document FPL's internal controls and procedures governing FPL's nuclear plants, including the following:

- Execution and Management,
- Outage management practices for both planned and forced outages,
- Internal monitoring and reporting,

- monitoring and use of operational performance indicators, internal and external audit reports, consultant reports, and QA/QC reviews, and
- programmatic monitoring and inspection of FPL's nuclear performance, its compliance with 10 CFR Part 50, and management's response to NRC input.[4]

Q. WHAT IS YOUR OVERALL ASSESSMENT OF THE NUCLEAR AUDIT REPORT AS IT AFFECTS THE SCOPE OF YOUR TESTIMONY?

A. The Nuclear Audit Report demonstrated that the audit team performed and presented a thorough and candid assessment of FPL's nuclear operations. It appears FPL provided the audit team substantial access to FPL's nuclear operations records, internal assessment, and documents.[5] The conclusions reached by the audit team illustrated some of the problems FPL has had at its nuclear facilities and provided explanations for those problems. The audit team identified significant operational performance problems that led to an erosion of St. Lucie and Turkey Point operational performance and resulted in reduced plant availability and increased derates and plant outages. As I discussed in my previous testimony, Exhibit No. ___ (RAP-3), the reduced availability of the units at FPL's nuclear plants caused an increase in FPL customer fuel costs, due to the need for replacement power purchases. As noted in the audit, the circumstances that led to degradation of FPL's nuclear plant performance after 2017 were largely the result of FPL internal operations of the plants and appear to have been avoidable.

[4] Nuclear Audit Report, page 1, Section 1.1.
[5] The only exception was access to confidential Institute of Nuclear Operations reports.

The Nuclear Audit Report also discusses FPL's efforts to correct the operational problems at its nuclear plants. I commend FPL's use of high management level oversight of nuclear operations and the frank nature of the Company Nuclear Review Board ("CNRB") reports. It is clear that FPL's efforts after 2017 have resulted in improving overall availability, operational performance, and reduced plant outages and derates at St. Lucie and Turkey Point, even if there have been occasional subsequent setbacks.

Q. WHAT IS YOUR OBSERVATION BASED ON THE REVIEW OF THE NUCLEAR AUDIT REPORT?

A. The Nuclear Audit Report found that FPL management team was aware of material operational problems at its nuclear plants at least as early as 2018. The Nuclear Audit Report provided the following cite in FPL's CNRB July 26, 2018 Chairman's Report:

> *The station [PSL] is not meeting fleet expectations for execution of the attributes of active leadership resulting in risk not being recognized, acceptance of poor equipment performance and failures to call out substandard leadership behaviors.*[6]

The CNRB Chairman's January 23, 2019 report contained the following statement regarding Turkey Point:

> *Station leadership [PTN] is not engaged with the workforce or processes at the right level to ensure consistent and sustainable results. As a result, performance in engineering is declining (indicated by poor equipment reliability including multiple repeat equipment issues) and there have been multiple Maintenance*

[6] Ibid, page 7, Section 2.1.1.

human errors and near misses. Additionally, the station is behind in their outage preparations…[7]

The information contained in the Nuclear Audit Report, coupled with the findings contained in my testimony in Exhibit No. ___ (RAP-3), Sections VI – VII, provide evidence as to why FPL nuclear plant performance suffered. The audit found numerous instances in which the CNRB found significant issues with the following:

- Integrity issues,[8]
- Deficiencies in Root Cause Evaluations,[9]
- Operations Department standards degraded to the point of impacting control room operations,[10]
- St. Lucie had the worst Operational Focus of US Nuclear plants,[11]
- Failure to address specific adverse conditions resulting in NRC non-cite violations,[12]
- Inadequate Nuclear Culture leading to NRC Notice of Violations,[13]
- Poor outage planning and execution,[14]
- Lack of cooperation with Nuclear Assurance resulting in reduced improvement,[15] and

[7] Ibid, page 7, Section 2.1.1.

[8] Ibid, page 9, CNRB Meeting #690, 1/22/2020.
[9] Ibid, page 8, CNRB Meeting #690, 1/22/2020 and page 11, CNRB Meeting #693, 12/02/2020.
[10] Ibid, page 7, CNRB Meeting #680, 1/22/2019.
[11] Ibid, page 9, CNRB Meeting #690, 1/22/2020.
[12] Ibid, page 8, CNRB Meeting #690, 1/22/2020.
[13] Ibid, page 9, CNRB Meeting #690, 1/22/2020.
[14] Ibid, page 10, CNRB Meeting #693, 12/02/2020.
[15] Ibid, page 11, CNRB Meeting #695, 3/23/2021.

- Performance gaps leading to a 16-day extension of Turkey Point 2021 refueling outage schedule.[16]

It is clear from FPL's internal evaluations of St Lucie and Turkey Point nuclear plants' performance that inadequate operations and management caused degradation of plant availability/reliability and increased frequency and duration of outages/derates. These deficiencies in turn led to increased power/fuel costs. The CNRB noted in Meeting #695 (3/23/2021) that Turkey Point had incurred three preventable reactor trips.[17] In addition, the CNRB further noted that preventable water intrusion had resulted in multiple rector trips.[18] The CNRB also observed that lessons learned from corrections for problems that had occurred in previous outages were not timely applied and resulted in recurrence of the same problems in subsequent outages, with the gripper problems being a good example.[19]

The Nuclear Audit Report contains information that indicates multiple reactor trips, forced outages and outage delays were the result of preventable problems stemming from failures of FPL management and leadership. This was imprudent in these instances. As such, I conclude that payment of increased replacement power costs resulting from these preventable problems should be presumptively FPL's responsibility and not FPL ratepayers.

[16] Ibid, pages 12-13, CNRB Meeting #697, 12/02/2021.
[17] Ibid, page 12, CNRB Meeting #695, 3/23/2021.
[18] Ibid, page 14, CNRB Meeting #697, 12/01/2021.
[19] Ibid, pages 12-13, 15-16, CNRB Meeting #697, 12/01/2021 and CNRB Meeting #699, 5/04/2022.

Q. HOW DOES THE NUCLEAR AUDIT REPORT AFFECT YOUR ASSESSMENT OF FPL'S REPLACEMENT POWER COSTS?

A. The Nuclear Audit Report findings introduce information that provides a basis to conclude that FPL could be responsible for all nuclear plant derates, forced outages and outage extensions during the period of 2017 – 2022. However, I am recommending that in this portion of the docket, that the correctly calculated replacement power costs be limited to the outages identified in this testimony. These costs are attributable to some of the same outages identified in the Nuclear Audit Report, Section 3.1, and should not be recovered from FPL ratepayers and instead should be disallowed in this proceeding. It should be noted that the testimony provided to date by FPL in this proceeding is still treating the outages I discussed in my last testimony, Exhibit No. ___ (RAP-3), as if these incidents were outside their control.

V. SUMMARY OF PORTIONS OF PREVIOUS TESTIMONY

Q. WHAT PLANT OPERATING FACTORS ARE AN INDICATION OF A PLANTS RELIABILITY PERFORMANCE?

A. There are five factors contained in the Generation Performance Incentive Factor ("GPIF") reports that FPL files with the Commission, that contains indicates overall plant reliability performance:[20]

1. Equivalent Availably Factor ("EAF"),
2. Forced Outage Hours ("FOH"),

[20] Exhibit No. ___RAP-3, page 11, line 13 through page 12, line 16.

3. Effective Forced Outage Rate ("EFOR"),
4. Planned Outage Hours ("POH"),
5. Partial Planned Outage Hours ("PPOH"), and
6. Capacity Factor ("CF").

Q. PLEASE DESCRIBE THE BASIS FOR COLOR CODING OF THE PERFORMANCE FACTORS IN TABLES 1-5 AND RAP-3, EXHIBIT 10.

A. I color coded the plant performance factor to illustrate periods of concern as follows:

EAF Performance Factor	
>95%	
90% - 95%	
85% - 90%	
80% - 85%	
<80%	

EFOR Performance Factor	
<3.0%	
3.0% - 5.0%	
>5.0%	

Q. PLEASE DESCRIBE THE OPERATING HISTORY OF THE ST. LUCIE UNITS 1 AND 2 OVER THE 2017 – 2021 PERIOD. [21]

A. Table 1 presents the GPIF Report five performance factors for St. Lucie Unit 1 for the period of 2017 – 2021. The data in the table indicates St. Lucie Unit 1's 2019 plant performance was poor, and below average in 2021.

[21] Ibid, page 13, line 8 through page 14, line 13.

LINE	St. Lucie 1	2017	2018	2019	2020	2021
1	EAF	97.4%	90.8%	70.1%	99.8%	88.6%
2	FOH + PFOH	246.7	74.5	1,810.1	12.8	153.7
3	EFOR %	2.8%	0.9%	20.7%	0.1%	1.8%
4	POH + PPOH	8.6	809.4	888.2	6.3	840.8
5	Capacity Factor	99.1%	92.2%	71.3%	101.3%	89.8%

Table 1 - St. Lucie Unit 1 Performance Factors

Table 2 presents the GPIF five performance factors for St Lucie Unit 2 on the same basis for the period of 2017 -2019. St Lucie Unit 2 had below average performance in 2017, 2018, and 2019.

LINE	St. Lucie 2	2017	2018	2019	2020	2021
1	EAF	89.7%	87.8%	100.0%	91.1%	89.5%
2	FOH + PFOH	110.2	252.2	-	60.0	90.6
3	EFOR %	1.3%	2.9%	0.0%	0.7%	1.0%
4	POH + PPOH	884.5	873.5	0.7	721.3	827.2
5	Capacity Factor	91.7%	88.6%	102.7%	93.2%	91.5%

Table 2 - St Lucie Unit 2 Performance Factors

Q. PLEASE DESCRIBE THE OPERATING HISTORY OF THE TURKEY POINT UNITS 3 AND 4 OVER THE 2017 – 2021 PERIOD.[22]

A. Table 3 presents the GPIF five performance factors for Turkey Point Unit 3 for the period of 2017 - 2019. Turkey Point Unit 3's performance factors were below

[22] Ibid, page 15, line 1 through page 17, line 3

average in 2017 and 2018 based on EAF, and poor in 2020 and 2021 due to the high forced outage rate.

LINE	Turkey Point 3	2017	2018	2019	2020	2021
1	EAF	85.2%	88.6%	99.1%	85.3%	84.0%
2	FOH + PFOH	407.6	1.6	84.5	535.2	658.3
3	EFOR %	4.7%	0.0%	1.0%	6.1%	7.5%
4	POH + PPOH	906.2	1,001.0	-	681.8	743.9
5	Capacity Factor	86.9%	90.6%	102.8%	89.3%	86.3%

Table 3 -- Turkey Point Unit 3 Performance Factors

Table 4 presents the GPIF five performance factors for Turkey Point Unit 4 on the same basis for the period of 2017 - 2019, indicating below average performance in 2017 and poor performance in 2020.

LINE	Turkey Point 4	2017	2018	2019	2020	2021
1	EAF	89.5%	99.6%	90.6%	83.0%	99.5%
2	FOH + PFOH	213.4	3.1	10.0	494.2	49.2
3	EFOR %	2.4%	0.0%	0.1%	5.6%	0.6%
4	POH + PPOH	705.7	28.1	815.5	1,001.2	-
5	Capacity Factor	91.2%	101.4%	91.9%	84.3%	102.7%

Table 4 - Turkey Point Unit 4 Performance Factors

Q. WHAT CHANGES HAS FPL MADE IN PERSONNEL HEAD COUNT SINCE 2017 AT ITS NUCLEAR PLANTS?[23]

[23] Ibid, page 17, line 4 through page 19, line 3.

A. In January 2017, the St. Lucie station's (encompassing Units 1 & 2) actual head count was 636, and its budgeted head count was 649. Based on data provided by FPL in response to OPC's Interrogatory Nos. 39 and 40, Attachment 1 (Exhibit No. ___ (RAP 3, Exhibit 7)), St. Lucie's head count had fallen to 458 by the end of 2021 and the budgeted head count had fallen to 489. This represents a 28.9% reduction in the actual head count and a 24.7% reduction in budgeted head count.

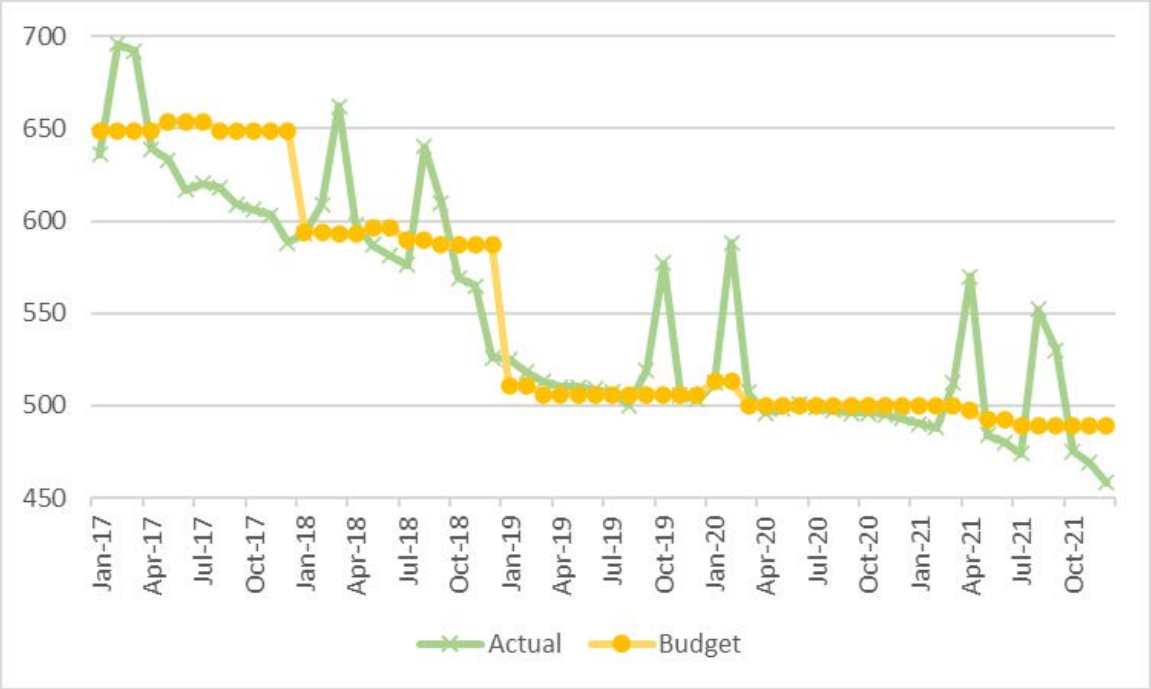


Figure 1- St. Lucie Head Count

St. Lucie Head Count Figure 1 presents a graph of the monthly changes in St. Lucie' actual and budgeted headcount since 2017. St. Lucie's actual head count declined by 28.9% and budgeted head count by 24.7% between 2017 and 2021. Figure 2 presents a graph of the monthly changes in Turkey Point's actual and budgeted headcount since 2017. This shows a 22.3% reduction in actual head count and a 25.2% reduction in budgeted head count.

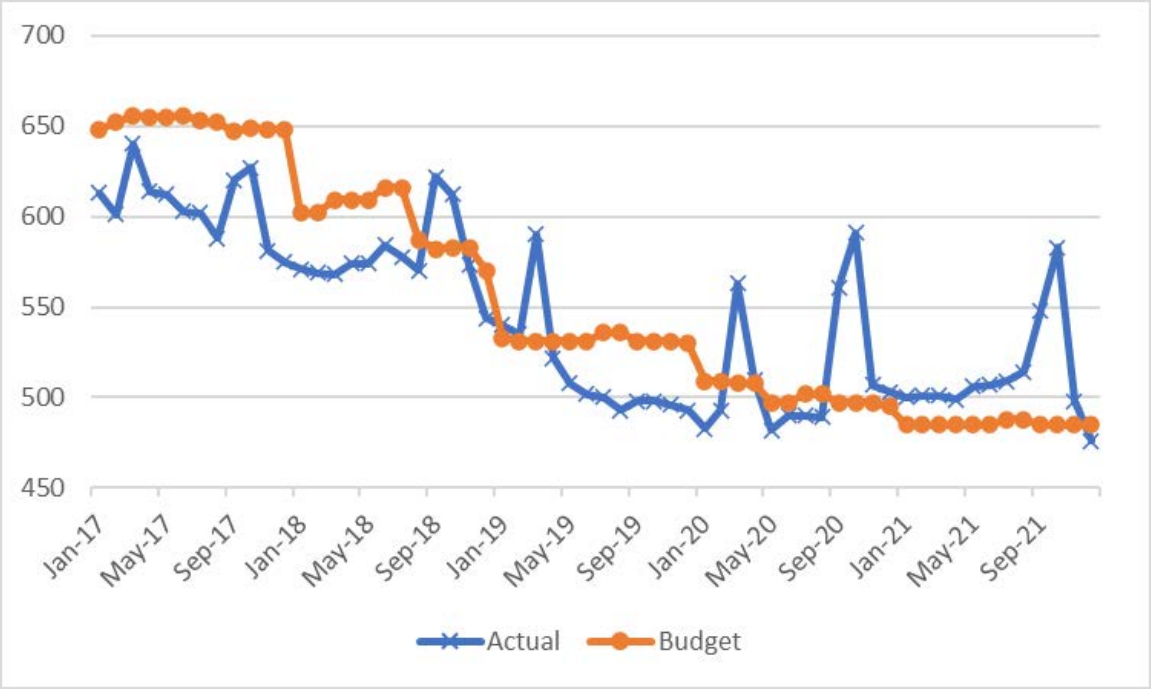


Figure 2- Turkey Point Head Count

Q. BRIEFLY EXPLAIN THE NRC INVESTIGATIONS AND CIVIL PENALTIES RELATED TO THE FPL OPERATIONS AT ST. LUCIE AND TURKEY POINT.[24]

A. The following is a list of NRC actions discussed in my previous testimony:

1. March 13, 2017 incident leading to the NRC issuing the September 12, 2019 Notice of Violation and imposition of a $232,000 civil penalty;[25]
2. April 6, 2021 Notice of Violation and imposition of a $150,000 civil penalty;[26]

[24] Exhibit RAP-3 page 19, line 4 through page 31, line14.
[25] Ibid, page 20, line 1 through page 21, line 14 and Exhibit No.___ (RAP-3, Exhibit 4).
[26] Ibid, page 24, line 12 though page 25, line 8 and Exhibit No.___ (RAP-3, Exhibit 5).

3. NRC downgrade of Turkey Point Unit 3's performance indicator from green to white in May 2021;[27]
4. NRC's findings from the March 1, 2019 problem identification and resolution inspection at Turkey Point Units 3 and 4;[28] and
5. NRC's findings from the February 11, 2021 integrated inspection report at Turkey Point Units 3 and 4.[29]

Q. ARE THE CONCERNS YOU EXPRESSED IN YOUR PREVIOUS TESTIMONY STILL VALID FOR THE 2017-2022 PERIOD?

A. Yes, my review of the various plant performance parameters, headcount history, NRC findings, and outages present areas of concern regarding FPL's plant operations. The St. Lucie units have been in operation for over 39 years and Turkey Point units have been in operation for over 49 years. The sequence of reactor unplanned scrams in August of 2020 appears to be an indication of deficient training, inadequate staffing, and potential lack of experience among plant personnel. The past evidence of falsification of maintenance records and of FPL managers taking punitive actions on contractors, raise concerns that these actions indicate the potential of negative cultural issues emanating from cost pressures in a way that can impact plant operations and performance. Any one of these items in isolation may not necessarily constitute an indication of bigger issues. However, when aggregated and evaluated against the backdrop of a

[27] Exhibit RAP-3 , page 25, line 9 through page 29, line 5 and Exhibit No.___ (RAP-3, Exhibit 6).
[28] Ibid, page 29, line 6 thorough page 30, line 18 and Exhibit No.___ (RAP-3, Exhibit 8).
[29] Ibid, page 30, line 19 thorough page 31, line 14 and Exhibit No.___ (RAP-3, Exhibit 9).

significant reduction in headcount at both plants, as well as against recent NRC findings, agreed violations and a reclassification to "white" for a period of time, these factors may point toward employees' workload increases resulting in lower performance and more errors. Reduction in plant headcount of more than 20% without a corresponding reduction in workload raises concerns with how the work is being accomplished.

In addition to the NRC reports cited earlier, review of St. Lucie and Turkey

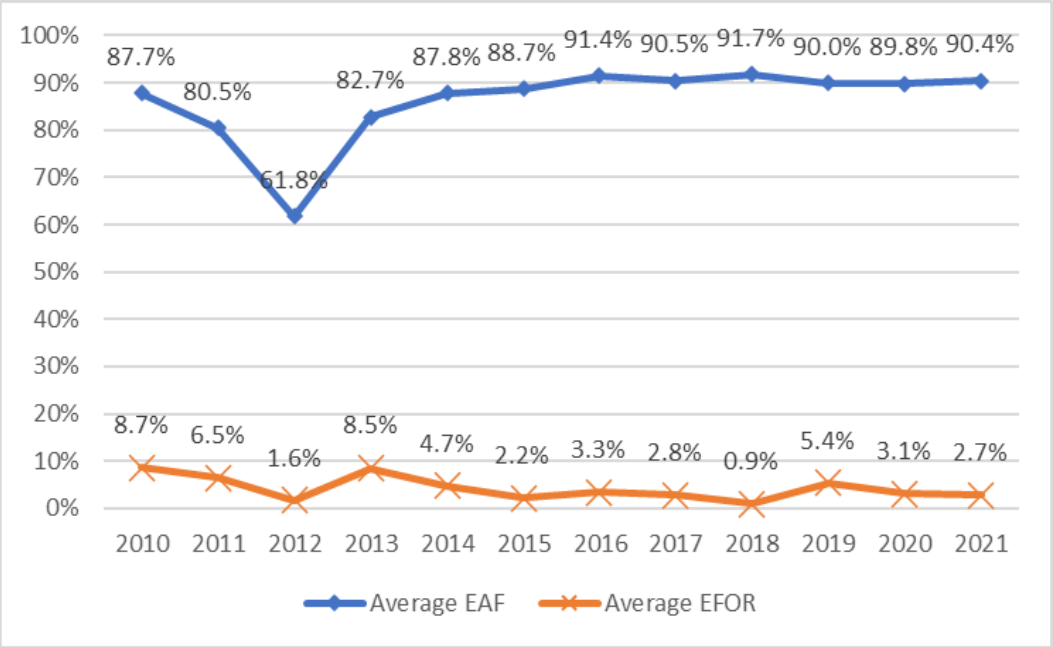


Figure 3 - Average Nuclear Plant EAF and EFOR

Point GPIF reports contains some indication that in recent years, plant performance has degraded. Exhibit No. ___(RAP-3, Exhibit 10), provides the five performance indicators discussed earlier, for St. Lucie and Turkey Point for the 11-year period of 2010 – 2021. The data shows that between 2012 and 2016, overall average plant EAF and EFOR show some improvement. Figure 3 provides a graph of the average EAF and EFOR for all four of FPL's nuclear units. Since 2018, average EAF and EFOR have declined. This degradation generally

corresponds with FPL's headcount reduction shown in Figures 1 and 2, assuming some lagging effect as the reductions were implemented. The data in Exhibit No. ___ (RAP-3, Exhibit10) show that Turkey Point Unit 3 EAF and EFOR for 2020 and 2021 were the worst since about 2014, which again generally corresponds with FPL's headcount reduction.

Q. WHAT RECOMMENDATION DO YOU HAVE FOR THE COMMISSION TO POTENTIALLY ADDRESS THIS ISSUE?

A. My first recommendation contained in my previous testimony has already been performed with the Nuclear Audit Report.[30] Changes implemented by FPL has led to some improvement in FPL nuclear plant performance, but I would recommend continued vigilance by the Commission and some level of targeted periodic follow-up audits of the company's nuclear operations every two years to ensure the changes result in sustained and continuing improvement in nuclear plant performance. At a minimum, there should be a targeted follow-up review to determine that the improvements that FL has shown in recent times continue without regression.

[30] Ibid, page 34,line 18 through page 35, line 8.

VI. ASSESSMENT OF OUTAGES AND DERATES IMPACT ON REPLACEMENT POWER COSTS

Q. PLEASE DESCRIBE THE EVENTS OF JULY 5, 2020 AT TURKEY POINT UNIT 4 THAT LED TO THE AUTOMATIC SHUTDOWN DUE TO MAIN GENERATOR LOCKOUT AND TURBINE TRIP.

A. During heavy thunderstorms, several alarms occurred involving the generator and exciter monitoring systems. The generator reactive load was observed to oscillate between 115 MVAR and 200 MVAR, and the exciter field voltage was also found to oscillate. The reactor then tripped due to a main generator lockout. The Main Generator Lockout was caused by the actuation of the Voltage Regulator Lockout relay due to loss of the Voltage Regulator Power Supplies #1 & #2 (and thus loss of excitation). FPL then initiated a failure investigation process and developed actions to identify, inspect and test any component that could have been affected by the failure of the PMG stator. The investigation team determined the unit trip was caused by failure of the generator exciter permanent magnet generator ("PMG").

Q. PLEASE DESCRIBE A GENERATOR EXCITER, ITS FUNCTION IN POWER PRODUCTION, AND THE PURPOSE OF THE PMG.

A. The generator exciter creates a DC current by rotating the PMG inside of exciter windings (wire coil). This DC current is fed to the rotor of the synchronous generator to create a magnetic field which is rotated inside the generaor to create electricity. The exciter is connected to the generator shaft as shown in Figure 4.

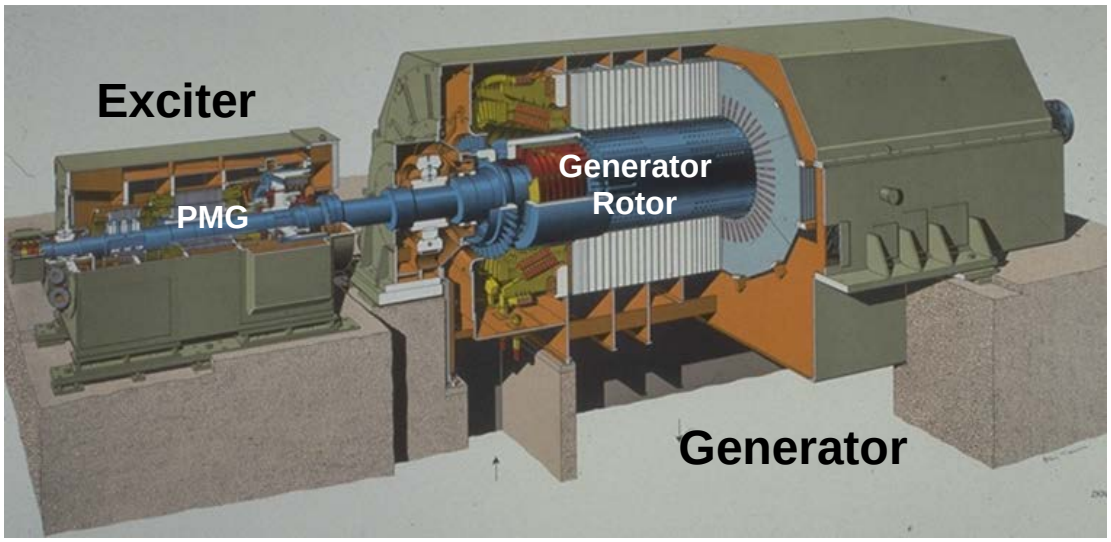


Figure 4 - Generator Exciter Configuration

The exciter PMG is what initiates the process of energizing the generator for production of electricity. Without the exciter, the generator is simply a rotating mass and cannot produce power because there is no magnetic field.

Q. DID FPL CONDUCT A ROOT CAUSE EVALUATION ("RCE")?

A. Yes. Exhibit No. 11 of my testimony in Exhibit No. ___ (RAP-3) is a copy of the Turkey Point Nuclear Unit 4 Reactor Trip Due to Gen Lockout from Loss of Exciter RCE.

Q. WHAT DID FPL'S INVESTIGATION TEAM DETERMINE TO BE THE CAUSE OF THE EXCITER FAILURE?

A. Upon disassembling the exciter the investigation revealed water intrusion and found that the PMG was damaged. The root cause team found the failure of the PMG was likely due to a culmination of age-related breakdown of the PMG stator winding insulation, along with water intrusion due to inadequate sealing of the

Exciter housing. The RCE claims the overall root cause to be weakness in the Exciter PM program resulting from a failure to fully assess the risk of PMG stator winding age, thus making it more susceptible to failure when exposed to water/moisture. Contibuting factors to the failure were found by FPL to include:

1. SCC #1) Weakness in Exciter PM Program based on existing Original Equipment Manufacturer ("OEM") and Industry recommendations which were CONDITION BASED, and did not require TIME-BASED PMG stator rewind, thereby increasing susceptibility to failure from other stressors; and
2. SCC #2) OEM procedure 3.2.2.1 did not include site specific weather sealing requirements based on OEM specifications.

Q. WHAT WAS DETERMINED TO BE THE CAUSE OF THE WATER INTRUSION INTO THE EXCITER?

A. The first occurrence of water intrusion into the Exciter occurred in 2001 and led to a ground fault in the exciter. This event resulted in FPL installing additional weather seals on the exciter. While FPL did modify the Maintenance Support Package for the exciter to incorporate the new seals and inspection, it failed to incorporate the seals requirement into the OEM procedures. During the event investigation, it was found that water had accumulated inside the PMG and pedestal bolt holes. The following degradation of seals were also discovered:

1. The partition seal between the AC Exciter compartment and PMG compartment;
2. Housing floor gaskets which were found dislodged in sections around the perimeter of the PMG compartment; and
3. The site-specific vertical foam weather seal designed under MSP 02-055 and required in site procedure 0-GMM-090.1 was not installed.

As a result, the investigation team determined the most probable path of water ingress was through the missing vertical foam seal and the degraded and dislodged floor gaskets. ***The RCE concluded that the failure of the PMG stator was due to insulation degradation coupled with additional stressors; water intrusion being the likely cause.***

Q. WHAT IS FPL'S POSITION ON THE CAUSE OF THE WATER INTRUSION AND SUBSEQUENT EXCITER FAILURE-CAUSED OUTAGE?

A. FPL witness, Mr. Daniel DeBore's testimony on pages 3-9 in this proceeding, states that during March 2019, Siemens removed the exciter housing to inspect the exciter and found several seals to be hard and torn. Siemens failed to install exciter housing seals which allowed water intrusion into the exciter. Mr. Debore's testimony claims that FPL followed procedures and inspection requirements during the March 2019 outage and as such feel this outage was not FPL's responsibility.

Q. DID ANY FPL ACTIVITIES CONTRIBUTE TO THE EXCITER FAILURE OR COULD THE EXCITER PROBLEM HAVE BEEN FOUND PRIOR TO FAILURE?

A. Yes. FPL was aware of the potential for water intrusion into the exciter based on the 2001 event. FPL personnel had not properly reviewed Siemens' exciter maintenance procedures to ensure that the procedure included installation of the

site-specific seals, inspections of those seals and included hold points for FPL Quality Control ("QC") personnel to verify seal installation.[31] In addition, FPL staff failed to inspect the seals during periodic exciter inspections to ensure they performed their intended function of preventing water intrusion. The Turkey Point steam turbines, generators and exciters are located outdoors and exposed to the ambient weather conditions. Prudent utility maintenance requires that seals required to maintain equipment and prevent water intrusion be inspected on a regular basis. FPL did not adhere to this standard. FPL had prior experience with water intrusion and had modified exciter seals installed to prevent water intrusion. Knowing that water intrusion into the exciter was a potential problem, prudent maintenance practice would be to ensure all exciter seals were properly in place and oversee and inspect exciter seal installation by the OEM. This is an example of lessons learned not being applied to future outages, as was discussed in the CNRB reports.

Q. WHAT WERE THE REPLACEMENT POWER COSTS FOR THE OUTAGE?

A. According FPL response to Staff Interrogatory No.4 (Exhibit No. ___ (RAP-3, Exhibit 12)), the replacement power cost for the outage from the July 2020 of Turkey Point Unit No. 4 was $1,453,970. At this point, it is my opinion that the calculation of the replacement power costs related to specific outages caused by imprudent action or decision-making of FPL should be based on the practice

[31] Nuclear Audit Report, page 26, Reactor Trip Due to Gen Lockout From Loss of Exciter.

established by the Commission. Under the circumstances of this case, I would defer to the Commission staff to recommend the proper replacement power costs for disallowance based on the events determined by the Commission to be imprudently caused. FPL should be required to calculate replacement power costs on this basis and refunds or credits to customers should be ordered by the Commission accordingly.

Q. WHAT IS YOUR RECOMMENDATION ON FPL'S RECOVERY OF THOSE REPLACEMENT POWER COSTS?

A. It is my recommendation that the Commission disallow recovery of the $1,453,970 in replacement power costs associated with the outage caused by the exciter failure because the event was preventable.

Q. PLEASE DESCRIBE THE EVENTS OF AUGUST 19, 2020 AT TURKEY POINT UNIT 3, WHICH RESULTED IN AN UNPLANNED AUTOMATIC REACTOR TRIP.

A. During startup of Turkey Point Unit 3, the unit experienced an unplanned reactor trip caused by N-3-31 source range instrument out of range.

Q. WHAT WAS DETERMINED TO BE THE CAUSE OF THIS EVENT?

A. The cause of the reactor trip was reactor personnel conducting reactor control rod withdrawal in a manner in which the reactor exceeded the startup rate of 1.0 decade/minute, violating reactor startup procedures. According to the NRC's

December 9, 2020 Special Inspection Report (Exhibit No. ___ (RAP-5), there were multiple human performance errors leading to the reactor trip, including:[32]

- Experience Level of the Crew,
- Just-in-time training,
- Operator Fundamentals breakdowns,
- Oversight and Control of the Startup Evolution,
- Confusing Indications, and
- Distractions.

The NRC also determined that personnel had not followed numerous plant procedures.[33]

Q. WHAT WAS THE OUTAGE LENGTH AND REPLACEMENT POWER COST FOR THIS EVENT?

A. This event resulted in a one day outage for Turkey Point Unit 3. This event was discussed in Nuclear Audit Report, Section 3.1.3. At this point, it is my opinion that the calculation of the replacement power costs related to specific outages caused by imprudent action or decision-making of FPL should be based on the practice established by the Commission. Under the circumstances of this case, I would defer to the Commission staff to recommend the proper replacement power costs for disallowance based on the events determined by the Commission to be imprudently caused. FPL should be required to calculate replacement power costs

[32] Exhibit No. ___(RAP_5), pages 9-10.
[33] Ibid, Page 10 & 11.

on this basis and refunds or credits to customers should be ordered by the Commission accordingly.

Q. PLEASE DESCRIBE THE EVENTS OF JANUARY 20, 2021 AT ST. LUCIE UNIT 2, WHICH RESULTED IN AN UNPLANNED AUTOMATIC REACTOR TRIP.

A. St. Lucie Unit 2 incurred a reactor trip on January 20, 2021 by the reactor protection system as a result of a steam turbine trip. The turbine trip was caused by an unexpected de-energization of the 480V motor control center, which resulted in the loss of relays used to control the steam turbine.

Q. WHAT WAS FPL'S DETERMINATION OF THE CAUSE OF THE JANUARY 2020 EVENT AT ST. LUCIE UNIT 2?

A. FPL's investigation into the loss of the relays determined that "legacy drawings" associated with the control element drive mechanism control system ("CEDMCS") were changed in 1983 and did not conform to St. Lucie Unit 2 train and channel design conventions. The "legacy defect" resulted in mis-assignment of two of the four relays to the incorrect power train.

Q. WHAT ADDITIONAL FINDINGS ON THE JANUARY 2020 EVENT WAS IDENTIFIED IN THE NUCLEAR AUDIT REPORT?

A. The Nuclear Audit Report determined this event was similar to events which occurred in 1983 and 1987 and thus, meets the definition of Repeat Event provided in PI-AA-104-1000. FPL's RCE states:

> *Even though the previous event occurred at St. Lucie over thirty years ago, the corrective actions from the 1983 and 1987 events should have been expected to prevent this event.*

Thus, this event was preventable and FPL did not follow its own prudent operating practices.[34]

Q. WHAT WAS THE OUTAGE LENGTH AND REPLACEMENT POWER COSTS FOR THIS EVENT?

A. This event resulted in a three-day outage for St. Lucie Unit 2. This event was discussed in Nuclear Audit Report, Section 3.1.4. At this point, it is my opinion that the calculation of the replacement power costs related to specific outages caused by imprudent action or decision-making of FPL should be based on the practice established by the Commission. Under the circumstances of this case, I would defer to the Commission staff to recommend the proper replacement power costs for disallowance based on the events determined by the Commission to be imprudently caused. FPL should be required to calculate replacement power costs on this basis and refunds or credits to customers should be ordered by the Commission accordingly.

[34] Nuclear Audit Report, Section 3.1.4, pages 34-35.

Q. PLEASE DESCRIBE THE EVENTS OF MARCH 1, 2021 AT TURKEY POINT UNIT 3 WHICH RESULTED IN AN UNPLANNED AUTOMATIC REACTOR TRIP.

A. Turkey Point Unit 3 experienced an unplanned scram of the reactor during restoration from Reactor Protection System Testing. The reactor shutdown safely and there was not any damage to the equipment.

Q. DID FPL CONDUCT A ROOT CAUSE INVESTIGATION?

A. Yes, Exhibit No. ___ (RAP-3, Exhibit13) is a copy of the Turkey Point Nuclear Unit 3 Trip During Restoration from RPS Testing RCE.

Q. WHAT WAS DETERMINED TO BE THE CAUSE OF THE REACTOR TRIP?

A. The reactor trip was caused by improper operation of the reactor trip breaker ("RTB"). The cause of the RTB malfunction was not directly determined but multiple contributing causes were found. One of the main culprits was hardened grease on the cell switches. The breaker was a Westinghouse breaker and Westinghouse performed an extensive investigation to determine the cause of the problem. In their investigation, Westinghouse found that FPL had not properly maintained the cell switches in the breaker and that the hardened lubrication could cause the stationary contacts to become dislodged. The Maintenance Program Manual for Westinghouse Safety Related Type DB Circuit Breakers and Associated Switchgear, Revision 1, July 2011 defines the DB cell switch as a

Category B item and the interval for conducting the procedure provided should not exceed 5 Years. In addition, Westinghouse MPM recommended a service life of 100 cycles for cell switches, which was not included in FPL preventative maintenance (which only requires inspection every 18 months). FPL incorrectly planned or conducted maintenance of the switch on a conditional or "as found" basis instead of the method required or prescribed by Westinghouse. ***The RCE determined the root cause to be timing for cleaning and lubricating cell switch contacts was condition-based, rather than prescriptive.***

Q. DID ANY FPL ACTIVITIES CONTRIBUTE TO THE RTB MALFUNCTION?

A. Yes, FPL failed to follow Westinghouse recommendations, which resulted in a lack of proper cleaning of the cell switch and relies on skill of the craft and judgement of the journeyman performing the inspection.

Q. WHAT WERE THE REPLACEMENT POWER COSTS FOR THE OUTAGE?

A. According FPL response to Staff Interrogatory No.4 (Exhibit No. ___ (RAP-3, Exhibit 12)), the replacement power cost for the outage from the March 2021 outage of Turkey Point Unit No. 3 was $1,206,743. At this point, it is my opinion that the calculation of the replacement power costs related to specific outages caused by imprudent action or decision-making of FPL should be based on the practice established by the Commission. Under the circumstances of this case, I

would defer to the Commission staff to recommend the proper replacement power costs for disallowance based on the events determined by the Commission to be imprudently caused. FPL should be required to calculate replacement power costs on this basis and refunds or credits to customers should be ordered by the Commission accordingly.

Q. WHAT IS YOUR RECOMMENDATION ON FPL'S RECOVERY OF THOSE REPLACEMENT POWER COSTS?

A. It is my recommendation that the Commission disallow recovery of the $1,206,743 in replacement power costs associated with the outage caused by the RTB failure because the event was preventable.

Q. PLEASE DESCRIBE THE EVENTS OF MAY 14, 2021 AT ST. LUCIE UNIT 1 WHICH RESULTED IN OUTAGE EXTENSION.

A. An outage at St. Lucie Unit 1 was extended by four days due to control rod coil gripper problems caused by vendor software. During restart of the unit, personnel determined the lower gripper coils for a group of control element assemblies had malfunctioned.

Q. WHAT WAS FPL'S DETERMINATION OF THE CAUSE OF THE MALFUNCTION?

A. The coils were damaged by excessive current due to vendor software changes which removed overcurrent protection of the coils. FPL determined that the vendor was at fault and that FPL had acted prudently.

Q. WHAT ADDITIONAL INFORMATION ON THIS EVENT IS INCLUDED IN THE NUCLEAR AUDIT REPORT?

A. The Nuclear Audit Report discusses FPL's lack of oversight and verification of the vendor following vendor protocols for vendor's Standard Rod Control Systems Software Development Process' (WNA-IG-00874-GEN). It also appears that FPL had not tested the operation of the control rod assemblies prior to startup. Thus, FPL inaction contributed to the control rod assembly malfunction.[35]

Q. WHAT IS YOUR RECOMMENDATION ON FPL'S RECOVERY OF THOSE REPLACEMENT POWER COSTS?

A. At this point, it is my opinion that the calculation of the replacement power costs related to specific outages caused by imprudent action or decision-making of FPL should be based on the practice established by the Commission. Under the circumstances of this case, I would defer to the Commission staff to recommend the proper replacement power costs for disallowance based on the events determined by the Commission to be imprudently caused. FPL should be required to calculate replacement power costs on this basis and refunds or credits to customers should be ordered by the Commission accordingly.

[35] Nuclear Audit Report, Section 3.1.6, page 36.

Q. PLEASE DESCRIBE THE EVENTS OF DECEMBER 10, 2021 AT ST. LUCIE UNIT 1, WHICH RESULTED IN AN UNPLANNED MANUAL REACTOR TRIP.

A. The event was caused by a manual shutdown of St. Lucie Unit 1 due to loss of high pressure heater level control resulting in a reduction of steam generator flow.

Q. WHAT WAS FPL'S DETERMINATION OF THE CAUSE OF THE EVENT?

A. A pressure indicating switch was being replaced due to a steam leak. While wiring the terminal strip, the technician inadvertently contacted the enclosure, causing the supply fuse to blow and loss of the high pressure heater control. The Supervisor had chosen to deviate from the fix-it-now ("FIN") work management process and failed to validate readiness to perform FIN work prior to work execution. The project planner used historical work orders and did not properly review the control drawings to identify potential interactions between the circuit being repaired and other devices affected by that circuit.[36] FPL had similar events occur with personnel at St. Lucie in August 2020. This avoidable event caused insufficient feedwater flow to one of the steam generators and a two-day outage.

Q. WHAT IS YOUR RECOMMENDATION ON FPL'S RECOVERY OF THOSE REPLACEMENT POWER COSTS?

[36] Nuclear Audit Report, Section 3.1.7, page37.

A. At this point, it is my opinion that the calculation of the replacement power costs related to specific outages caused by imprudent action or decision-making of FPL should be based on the practice established by the Commission. Under the circumstances of this case, I would defer to the Commission staff to recommend the proper replacement power costs for disallowance based on the events determined by the Commission to be imprudently caused. FPL should be required to calculate replacement power costs on this basis and refunds or credits to customers should be ordered by the Commission accordingly.

Q. PLEASE DESCRIBE THE EVENTS OF JANUARY 6, 2022 AT ST. LUCIE UNIT 2, WHICH RESULTED IN A 14-DAY PLANNED OUTAGE EXTENSION.

A. A control element drive mechanism ("CEDM") failed during testing due to a broken pin from a Shaft Coupling and Uncoupling Tool 4 ("SCOUT") tool which was not discovered during reassembly of the CEDM.

Q. WHAT WAS FPL'S DETERMINATION OF THE CAUSE OF THE EVENT?

A. Inspection by Westinghouse found a metallic object in the CEDM latch magnet. The metallic object corresponded with an L-slot pin from a SCOUT 4, which is used during refueling activities. Inspection of the SCOUT tool found two L-slot pins missing.

Q. WHAT ADDITIONAL INFORMATION ON THIS EVENT WAS INCLUDED IN THE NUCLEAR AUDIT REPORT?

A. FPL personnel had not properly managed foreign material intrusion during refueling outages. It is prudent to inspect devices used in the refueling process after completion of task to ensure parts have not failed or are not missing. Any parts from tools left in the reactor can contribute to operational problems. Part of the planning, controlling and executing work orders includes ensuring foreign materials do not enter reactor environment. FPL failed to follow proper foreign Material Intrusion Risk process for complex tools and establish proper inspection of the SCOUT after completion of use.

Q. WHAT IS YOUR RECOMMENDATION ON FPL'S RECOVERY OF THOSE REPLACEMENT POWER COSTS?

A. At this point, it is my opinion that the calculation of the replacement power costs related to specific outages caused by imprudent action or decision-making of FPL should be based on the practice established by the Commission. Under the circumstances of this case, I would defer to the Commission staff to recommend the proper replacement power costs for disallowance based on the events determined by the Commission to be imprudently caused. FPL should be required to calculate replacement power costs on this basis and refunds or credits to customers should be ordered by the Commission accordingly.

Q. DOES THE FACT THAT YOU ARE NOT RECOMMENDING DISALLOWANCES OR MAKING A RECOMMENDATION ON ALL OF THE FORCED OUTAGES DURING THE PERIOD OF 2019-2022 INDICATE THAT YOU HAVE DETERMINED THAT FPL WAS NOT IMPRUDENT IN ALL ASPECTS OF THOSE EVENTS AND YOU ARE NOT RECOMMENDING THE NEED FOR AND AMOUNT OF REPLACEMENT POWER ASSOCIATED WITH THEM?

A. No. Although I have made an effort to review the available material related all outage events, it was not possible for me to discern in every event whether I had all information or that FPL had met its burden to demonstrate that it was reasonable and prudent in all of its actions. My silence on any particular outage does not mean that I have formed an opinion that customers should pay the associated replacement power costs related to those outages.

I also want to make it clear that FPL has the burden of demonstrating that it has calculated replacement power costs for all outages. At this point, it is my opinion that the calculation of the replacement power costs related to specific outages caused by imprudent action or decision-making of FPL should be based on the practice established by the Commission. Under the circumstances of this case, I would defer to the Commission staff to recommend the proper replacement power costs for disallowance based on the events determined by the Commission to be imprudently caused. FPL should be required to calculate replacement power costs on this basis and refunds or credits to customers should be ordered by the Commission accordingly.

Q. WHAT OBSERVATIONS OR CONCLUSIONS DO YOU HAVE TO ASSIST THE COMMISSION IN THEIR DECISIONS IN THIS MATTER?

A. In this testimony I have addressed some concerns associated with FPL nuclear plant operations and I commend the Commission and its Staff for taking this issue seriously. The record in this case and the Nuclear Audit Report indicates that FPL has taken measures to address the concerns that I have observed. There was some evidence that improvements occurred in the 2018 to 2020 time frame. There was also evidence of subsequent nuclear plant performance regression up through 2022, and perhaps has been followed by some operational improvement in recent times. *I would urge the Commission to consider what action, if any, might be necessary -- based on the record and the Commission's findings – for a follow-up review or action.* I think such a future "look-back" will help provide the rate paying public with confidence that the Commission is fully aware of the relevant circumstances of the FPL nuclear operations that are within their regulatory purview as it affects customers' rates.

Q. DOES THAT CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

(Whereupon, prefiled direct testimony of Carl Vinson was inserted.)

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 20240001-EI - Fuel and purchased power cost recovery clause with generating performance incentive factor.

WITNESS: Direct Testimony of Carl Vinson appearing on behalf of the Staff of the Florida Public Service Commission

DATE FILED: February 5, 2024

C4-649

Q. Please state your name and business address.

A. My name is Carl Vinson. My business address is 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850.

Q. By whom are you presently employed?

A. I am employed by the Florida Public Service Commission (Commission) as the supervisor of the Performance Analysis Section within the Office of Auditing and Performance Analysis.

Q. Please describe your current responsibilities.

A. I oversee a team of five auditors who perform management or operational audits of Commission-regulated utilities. These audits focus on issues such as effectiveness of management and company practices, compliance with internal procedures, adequacy of internal controls, and regulatory compliance.

Q. Briefly describe your educational and professional background.

A. In 1980, I received a Bachelor of Business Administration Degree in Finance from Stetson University in DeLand, Florida. In 1984, I joined the consulting firm of Ben Johnson Associates, Inc. The firm served public service commissions and offices of public counsel around the U.S. in utility rate cases and other regulatory dockets.

For two years, my assignments there included research and analysis of cost overruns in Texas Public Utilities Commission prudence determination dockets regarding the construction of South Texas Project Unit 1 and Palo Verde Nuclear Generating Station.

In 1989, I joined the Commission staff and have served 34 years performing and supervising management and operational audits of regulated electric, gas, water, and telecommunications utilities.

Q. Have you presented testimony before this Commission or any other regulatory agency?

A. Yes. In the Commission's Nuclear Cost Recovery Clause Dockets No. 20080009-EI, 20090009-EI, 20150009-EI, and 20170009-EI, I filed testimony presenting operational audit reports regarding Florida Power & Light Company (FPL) and Duke Energy Florida, LLC that evaluated project management internal controls over their nuclear plant extended uprates and the construction of proposed new nuclear units. In the Nuclear Cost Recovery Clause Dockets for the years 2010-2014 and 2016, I also directed and supervised the preparation of similar audits filed as staff testimony.

In 2020, I filed testimony regarding the Hurricane Michael storm cost management and payment processing practices of Duke Energy Florida-LLC, Gulf Power Company, and Florida Public Utility Company in Docket Numbers 20190110-EI, 20190038-EI, and 20190156-EI, respectively.

Q. Are you sponsoring any exhibits?

A. Yes. Exhibit (CV-1) is my January 2024 report entitled *Review of Nuclear Operations, Florida Power & Light Company.*

Q. Please describe the purpose of your testimony in this docket.

A. My testimony sponsors the management audit report entitled, *Review of Nuclear Operations, Florida Power & Light Company*. This report was prepared by the Performance Analysis Section under my supervision at the request of the Commission's Division of Engineering. It addresses Issue Numbers 2 through 4, providing information to be considered in determining whether FPL's actions, or lack of action, may have caused the company to incur replacement power costs.

Q. Please describe the scope of the audit.

A. The scope of the audit included FPL's internal controls and procedures governing the following:

- FPL's execution and management of operational activities at Turkey Point Units

3&4 and St. Lucie Units 1&2, including detecting and correcting observed deficiencies.

- FPL's outage management practices for both planned and forced outages, including cause determination through Root Cause Evaluations, and execution of the resulting corrective actions deemed necessary.
- FPL's formal internal monitoring and reporting of operational deficiencies at Turkey Point Units 3&4 and St. Lucie Units 1&2 to Senior and Executive Management, and operations management's response to their directives.
- FPL's monitoring and use of operational performance indicators, internal and external audit reports, consultant reports, and Quality Assurance reviews.
- The Nuclear Regulatory Commission's programmatic monitoring and inspection of FPL's nuclear performance, its compliance with 10 CFR Part 50, and management's response to NRC input.

Q. What observations and conclusions do you make in the audit report?

A. Exhibit (CV-1) presents nine observations summarizing key events and trends observed over the study period. These observations are based on analysis of thousands of pages of documents from the four FPL nuclear units' collective operational record. This analysis was augmented by six extended interviews with a panel of current or former FPL and NextEra officers responsible for its nuclear operations.

These observations rely upon statements made over the period 2017-2023 by FPL and NextEra's most experienced nuclear fleet managers in the course of applying the key internal control processes for evaluating operations at Turkey Point Units 3&4 and St. Lucie Units 1&2. These controls include FPL/NextEra's Company Nuclear Review Board, Management Review Committee, Nuclear Safety Culture Monitoring Panel, and Nuclear Assurance function.

Q. Does this complete your testimony?

A. Yes.

C4-653

(Whereupon, prefiled direct testimony of Tom Ballinger was inserted.)

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 20240001-EI - Fuel and purchased power cost recovery clause with generating performance incentive factor.

WITNESS: Direct Testimony of Tom Ballinger appearing on behalf of the Staff of the Florida Public Service Commission

DATE FILED: February 5, 2024

C5-699

Q. Please state your name and title.

A. My name is Thomas Ballinger and I am the Director of the Division of Engineering for the Florida Public Service Commission (Commission).

Q. Please describe your education and professional experience.

A. I graduated with a B.S. degree in Mechanical Engineering from the Florida State University/FAMU College of Engineering in April, 1985. Since June of that year, I have been employed with the Commission, primarily in the area of electric utility system planning and reliability. What began as an entry level engineering position has evolved into a career spanning over three decades. Throughout this time, I have been involved with significant technical and policy issues that face the electric industry such as open access to retail sales, promotion of renewable energy generation and energy conservation programs, and storm hardening efforts. During my career, I have had the opportunity to provide testimony and technical recommendations before the Commission, the Federal Energy Regulatory Commission, and have also made presentations before the Florida Legislature. The last 29 years of my career have been in managerial positions within the Commission. I was promoted to my current position in 2012 which entails directing a technical staff of 39 positions in the area of electric utility planning, water and wastewater engineering issues, and the Commission's electric and gas safety programs.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide the Commission with an independent evaluation of Florida Power & Light Company's (FPL) nuclear plant outages that occurred between 2020 and 2022 and to provide recommendations regarding the recovery of replacement fuel costs associated with such outages.

Q. What is meant by replacement fuel costs?

A. Utility personnel operate their generation units using automatic controls that continuously adjust unit outputs, start-ups, and shut-downs based on economic dispatch. In other words, utilities are constantly making changes to generators to ensure that the least cost generation is being utilized. Whenever a unit trips off line, other units in the system must pick up the slack, typically at a higher cost, until the unit returns to service. The cost of this replacement energy is known as replacement fuel costs.

Q. How do utilities recover replacement fuel costs?

A. Power plant outages occur almost daily and the actual costs incurred for fuel and purchased power are included in a utility's filings in the fuel clause. If a particular outage is at issue in the fuel clause, then the utility must model what the system costs would have been had the unit been available for service. The difference between the actual and the modeled costs is what can be refunded to customers.

Q. Do you agree with the methodology used by FPL to estimate replacement fuel costs for all of the outages in this proceeding?

A. Yes I do. FPL used a weighted average of actual fuel costs, other than nuclear, for the period of time associated with each particular outage to calculate an estimated system fuel cost. FPL then subtracted what the estimated cost of equivalent nuclear power would have been and the difference is the net replacement fuel costs. While not perfect, this method provides a reasonable estimate of what additional fuel costs were incurred as a result of the outage without having to recreate hourly loads and run economic dispatch models.

Q. What factors should be considered when deciding whether to allow cost recovery?

A. As with any regulatory review, the Commission should review the actions

leading up to the outage and determine if utility personnel acted in a prudent manner based on the information that was known, or reasonably should have been known, at the time. For example: Was the employee(s) involved adequately trained? Were written procedures followed? Was there adequate oversight of employees or outside contractors? Was the equipment involved adequately maintained and operated according to procedures and protocols?

Q. Did you review FPL witness Gebbie's direct testimony?

A. Yes I did and I agree with many of his analyses and statements regarding causal evaluations. However, I will primarily refer to witness DeBoer's testimony and other exhibits when I address particular outages.

The provision of adequate and reliable electricity is essential to our society's health and welfare. Witness Gebbie's statement that "[t]he U.S. nuclear power plant industry is said to 'aim for perfection but settle for excellence'" is something the Commission should expect from all Florida utilities, not just ones with nuclear power. In order to achieve excellence in any profession, you must have open communication, competency, and accountability. Like a three-legged stool, if one of these components is missing, then the goal of excellence will never be achieved. The after-the-fact review processes discussed by witness Gebbie on pages 5 through 7 of his testimony are critical and should continue even if the results identify management shortcomings. That is the ultimate purpose of any review process, to identify areas for improvement and to ensure the issue or behavior does not happen again.

Q. Did you review the Commission Staff's operational audit report entitled Review of Nuclear Operations, Florida Power & Light Company, dated January, 2024?

A. Yes I did.

Q. Did this report identify any outages that are the subject of this proceeding?

A. The staff who prepared the audit identified eight forced outage events involving various problematic issues. One of the eight, the 2017 outage at St. Lucie Unit 2, is outside of the review timeframe for this proceeding. It is my understanding that another outage, the August 19, 2020 outage at Turkey Point Unit 3, has already had the replacement fuel costs returned to customers so it is not at issue in this proceeding. The remaining six outages are discussed in witness DeBoer's direct testimony.

Q. Did you review witness DeBoer's direct testimony and exhibits?

A. Yes I did. The issues carried forward for this docket are basically a review of FPL's nuclear outages for calendar years 2020, 2021, and 2022. Witness DeBoer identified and discussed two outages for 2020, seven outages for 2021, and one outage for 2022.

Q. What outages did you review in preparation for this proceeding?

A. I reviewed all the outages discussed by Witness DeBoer as well as one additional outage in 2021 and seven additional outages in 2022 for a total of 18 outages. I have attached to my testimony Exhibit (TEB-1) which is a summary table of the outages I reviewed in preparation for this proceeding.

Q. What are your recommendations to the Commission?

A.Of the ten outages discussed by witness DeBoer, I am recommending that FPL refund the replacement power costs for three of the outages; the July 2020 outage at Turkey Point 4 ($1,453,970), the December 2021 outage at St. Lucie 1 ($1,434,048), and the January 2022 outage at St. Lucie Unit 2 ($8,693,593). These outages are discussed in detail below. I am not recommending any adjustments pertaining to the remaining seven outages discussed by witness DeBoer or the additional eight outages

that staff reviewed.

July 2020 Turkey Point Unit 4 Outage

Q. What is your understanding as to the cause(s) of this outage?

A. Based on the Root Cause Evaluation (RCE) provided by FPL, this outage appears to have been caused by the age of the exciter stator winding combined with the intrusion of water. According to the RCE, neither of these factors in isolation would have caused the outage.

The timeline provided with the RCE states that on September 9, 2019, FPL conducted an assessment of its nuclear unit exciter windings following notification of a failure at another nuclear plant, the H.B. Robinson plant located in Hartsfield, South Carolina. The assessment recommended rewinding the exciter rotating and stationary windings based upon the age of the components. On December 4, 2019, FPL initiated the process to rewind both rotating and stationary exciter windings at Turkey Point Units 3 & 4 for the next refueling outage. Therefore, prior to the outage that occurred on July 5, 2020, FPL was aware of, and appears to have taken actions to address, the age of the exciter windings.

The water intrusion has been a long time problem. According to the timeline provided by FPL, this has been identified for several FPL units with outdoor generating facilities since 1998. In 2008, FPL adopted revisions to its installation procedure, 0-GMM-090.1, to include FPL supervisory verification of the installation of specific sizes and types of weatherization materials for the exciter enclosure installation procedures. The RCE states that:

> [T]he PTN subject matter expert for the Generator/Exciter equipment developed a weather sealing detail for the Exciter housing that replaced the standard ¼" thick inner rubber gasket with a ½" thick foam gasket

> to ensure proper compression between the housing and the Turbine Deck curb. This site specific seal was developed due to previous water intrusion events that demonstrated the standard ¼" thick inner rubber gasket did not provide a sufficient seal between the Exciter housing and Turbine Deck curb. The inner foam gasket was incorporated into procedure 0-GMM-090.1 "*Exciter Removal, Inspection, and Installation"* but was not included in OEM procedures.

(Page 9 of RCE, Bates stamp FCR-22-003431)

This omission is later referred to as a "latent error" in the RCE. Since 2008, the Original Equipment Manufacturer (OEM) vendor Siemens apparently performed the required exciter testing and maintenance many times prior to, and including, the latest testing on March 21, 2019. At that time, several seals were found hard and torn and degraded seals were replaced. Siemens concluded the equipment was acceptable for return to service. However, the RCE states:

> Of particular concern was the housing floor gaskets which were found dislodged in sections around the perimeter of the PMG compartment. These floor gaskets did not meet the site-specific design which uses an inner ½" thick foam seal. Instead, the standard ¼" thick rubber inner gasket was applied. Additionally, the site-specific vertical foam weather seal designed under MSP02-055 and required in site procedure 0-GMM-090.1 was not installed.

(Pages 9 & 10 of RCE, Bates stamp FCR-22-003431 through 003432)

Q. What do these facts provided by FPL suggest to you?

A. These facts are troubling for two reasons. First, I find it troubling that a utility would identify a problem, design a fix, but then not implement the solution for many

years. Such behavior is far from pursuing excellent performance. Second, FPL has provided no documentation showing that FPL signed off on the last Exciter housing installation and has provided no explanation as to how outdated weatherization sizes and materials were provided to the vendor. In my opinion, FPL management failed to follow up with its own employees to ensure that the design fixes were incorporated and FPL management failed to provide proper oversight of its OEM vendor to ensure that these procedures were followed. For these reasons, I would recommend to the Commission that the replacement power costs of $1,453,970 plus interest be refunded to FPL's customers.

December 2021 St. Lucie Unit 1 Outage

Q. What is your understanding as to the cause(s) of this outage?

A. FPL utilizes groups of employees known as Fix It Now (FIN) teams which are deployed throughout FPL's nuclear fleet to perform routine maintenance and repairs. Based on the testimony of Witness DeBoer, a technician who is part of a FIN team was replacing a pressure differential indicating switch (PDIS). During this process, the technician inadvertently contacted a live wire to the surrounding enclosure causing a blown fuse which resulted in a loss of steam generator feed flow. The unit was then manually tripped off-line. Witness Gebbie describes this outage as being caused by a properly trained FPL supervisor not enforcing the use of human error reduction tools with his technicians. My understanding of the term human error reduction tools would refer to the use of items such as rubber mats or gloves and insulating straps on hand tools. Such practices are common in many maintenance procedures and are in place to eliminate both personnel and equipment safety risks. So apparently, both witnesses focus on the technician's failure to isolate the area electrically when working with live wires.

However, according to the RCE provided by FPL, the root cause was the FIN Supervisor choosing to deviate from the FIN work management process and failing to validate authorization to perform the work. A contributing cause was that the planner developed the work instructions based on a historical work order and did not adequately identify the interaction between this circuit and the other control valves. During a pre-job briefing, the FIN supervisor informed the technicians that the leads in the enclosure were energized. However, a second contributing factor was the technician's complacency in not utilizing insulating materials, contrary to internal procedures, due to past success landing leads.

Q. What do these facts provided by FPL suggest to you?

A. These facts demonstrate that even with all the proper tools being available, the lack of management following known processes and procedures was the primary cause of the outage. While it appears FPL did hold the FIN Supervisor accountable for his actions, this does not negate the fact that management did not act in a prudent fashion based on the information known at the time. Based on the examples I gave earlier in my testimony, it appears that the employees were adequately trained, but did not follow written procedures for authorization, did not provide adequate oversight of the employees, and did not conduct the procedure according to approved written maintenance procedures. Therefore, I recommend to the Commission that the replacement power costs of $1,434,048 plus interest be refunded to FPL's customers.

<u>January 2022 St. Lucie Unit 2 Outage</u>

Q. What is your understanding as to the cause(s) of this outage?

A. It is my understanding that the ultimate cause of the outage was a broken piece of a tool that was lodged on the latching mechanism for the Control Element Drive Mechanism. The tool, referred to as a SCOUT, is used during refueling activities so

apparently the piece broke off and became lodged during the unit's last refueling outage. During the last refueling, the vendors apparently experienced some difficulty with the SCOUT and ultimately had to use a backup tool to finish the task. According to Witnesses DeBoer and Gebbie, the individuals inspected the defective tool but did not recognize that the part was missing or damaged because the part cannot be examined without Westinghouse disassembling the tool. According to Witness DeBoer, FPL has incorporated a new complex tool inspection process and procedures to address the SCOUT failure.

Q. Is this explanation consistent with the RCE provided by FPL?

A. Not entirely. While the physical cause of the outage is consistent, i.e. the broken SCOUT pin, the events leading up to the discovery and the subsequent actions are a bit different. For example, the RCE found that the SCOUT tool is not a standard tool used throughout the industry and that the workers did not use the existing Complex Tool Inspection Checklist that is used throughout FPL's nuclear fleet. Therefore, it is not surprising that although a brief inspection of the failed tool was performed after it was removed from service, the individuals were not adequately knowledgeable about the tool to identify the issue. The SCOUT actually had two pins missing and the second pin has yet to be found. In addition, FPL has in place the requirement to develop a Foreign Material Exclusion (FME) Plan during control element coupling activities. The RCE also found that no such FME plan for the SCOUT tool had been developed. Apparently, complex tooling requirements have existed in the FME procedures since 2016. However, complex tool risk discussion has been lacking in prior FME plans and the key individuals who were responsible for this level of planning are no longer with the Company.

Q. Do you have any other unanswered questions regarding this outage?

A. Yes. If the pins of the SCOUT tool are unable to be inspected without disassembly of the tool, how did they fall out in the first place? Also, if the new complex tool inspection process adopted by FPL would not be able to identify the broken or missing pins in the SCOUT, why has the inspection process been adopted? Such an action is contrary to Witness Gebbie's assertion that causal evaluations should result in specific corrective actions that should prevent the event(s) from happening again.

Q. What do these facts provided by FPL suggest to you?

A. These facts demonstrate that FPL management did not follow proper written procedures to discuss complex tool risk as part of the FME plan. In addition, it appears that the vendors performing the tasks were not adequately trained or familiar with the SCOUT tool to identify the broken and missing pins. It also appears the proposed corrective actions instituted by FPL will not prevent a similar event from happening in the future. For these reasons, I recommend to the Commission that the replacement power costs of $8,693,593 plus interest be refunded to FPL's customers.

Q. Does this conclude your testimony?

A. Yes, it does.

MS. BROWNLESS: Staff would further like to move into the record the CEL, identified as Exhibit 1, and Exhibits 2 through 22 listed on the CEL.

CHAIRMAN LA ROSA: So moved.

(Whereupon, Exhibit Nos. 1-22 were received into evidence.)

MS. BROWNLESS: Staff would request that the record be closed at this time.

CHAIRMAN LA ROSA: The record, then, is hereby closed.

Any other questions or any of the parties have any additional matters that need to be addressed before us?

MR. TRIERWEILER: No.

CHAIRMAN LA ROSA: Awesome. Well, with that -- with that being said, see that this hearing is adjourned.

Thank you.

MS. BROWNLESS: Thank you.

(Proceedings concluded.)

CERTIFICATE OF REPORTER

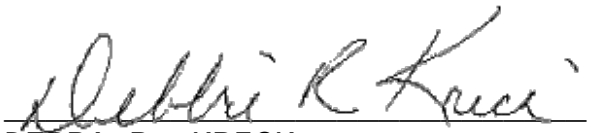
STATE OF FLORIDA)
COUNTY OF LEON)

I, DEBRA KRICK, Court Reporter, do hereby certify that the foregoing proceeding was heard at the time and place herein stated.

IT IS FURTHER CERTIFIED that I stenographically reported the said proceedings; that the same has been transcribed under my direct supervision; and that this transcript constitutes a true transcription of my notes of said proceedings.

I FURTHER CERTIFY that I am not a relative, employee, attorney or counsel of any of the parties, nor am I a relative or employee of any of the parties' attorney or counsel connected with the action, nor am I financially interested in the action.

DATED this 8th day of April, 2024.



DEBRA R. KRICK
NOTARY PUBLIC
COMMISSION #HH31926
EXPIRES AUGUST 13, 2024