STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-2, SUB 1321

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of Application of Duke Energy Progress, LLC Pursuant to G.S. 62-133.2 and NCUC Rule R8-55 Relating to Fuel and Fuel-Related Charge Adjustments for Electric Utilities	)))))	**DIRECT TESTIMONY OF** **TOM SIMRIL FOR** **DUKE ENERGY PROGRESS, LLC**

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Tom Simril, and my business address is 4800 Concord Road, York, South Carolina.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am Senior Vice President of Nuclear Operations for Duke Energy Corporation ("Duke Energy") with direct executive accountability for Duke Energy's North Carolina nuclear stations, including Duke Energy Progress, LLC's ("DEP" or the "Company") Brunswick Nuclear Plant ("Brunswick") in Brunswick County, North Carolina; the Harris Nuclear Plant ("Harris") in Wake County, North Carolina; and Duke Energy Carolinas, LLC's McGuire Nuclear Station, located in Mecklenburg County, North Carolina.

Q. WHAT ARE YOUR RESPONSIBILITIES AS SENIOR VICE PRESIDENT OF NUCLEAR OPERATIONS?

A. As Senior Vice President of Nuclear Operations, I am responsible for providing oversight for the safe and reliable operation of Duke Energy's nuclear stations in North Carolina. I am also involved in the operations of Duke Energy's other nuclear stations, including DEP's Robinson Nuclear Plant ("Robinson") located in Darlington County, South Carolina.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I have a Bachelor of Science degree in mechanical engineering from Clemson University and received a senior reactor operator license from Duke Energy's Catawba Nuclear Station. My career in the nuclear power industry spans over 37

years. I began my nuclear career as an engineer at Catawba Nuclear Station. From 1998 to 2007, I served in a variety of leadership positions at Catawba in operations and engineering. In 2007, I joined the McGuire Nuclear Station team as the operations superintendent before being transferred to serve as the operations manager at Catawba from 2010 to 2013. In 2013, I was named the plant manager at Catawba and served in this role until being promoted as the site vice president for Catawba in 2016. I held that position until January 2023 when I assumed my current role.

Q. HAVE YOU TESTIFIED BEFORE THIS COMMISSION IN ANY PRIOR PROCEEDINGS?

A. No.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to describe the performance of the Brunswick, Harris, and Robinson nuclear plants during the period of April 1, 2022 through March 31, 2023 (the "test period"). I will provide information regarding scheduled refueling outages and discuss the nuclear capacity factor being proposed by the Company in determining the fuel factor to be reflected in customer rates during the billing period of December 1, 2023 through November 30, 2024 ("billing period").

Q. PLEASE DESCRIBE SIMRIL EXHIBIT 1 INCLUDED WITH YOUR TESTIMONY.

A. Simril Exhibit 1 is a confidential exhibit outlining the planned schedule for refueling outages for DEP's nuclear units for the period of April 1, 2023 through November 30,

2024. This exhibit represents DEP's current plan, which is subject to adjustment due to changes in operational and maintenance requirements.

Q. PLEASE DESCRIBE DEP'S NUCLEAR GENERATION PORTFOLIO.

A. The Company's nuclear generation portfolio consists of approximately 3,593[1] megawatts ("MWs") of generating capacity, made up as follows:

Brunswick - 1,870 MWs

Harris - 964 MWs

Robinson - 759 MWs

Q. PLEASE PROVIDE A GENERAL DESCRIPTION OF DEP'S NUCLEAR GENERATION ASSETS.

A. DEP's nuclear fleet consists of three generating stations and a total of four units. Brunswick is a boiling water reactor facility with two units and was the first nuclear plant built in North Carolina. Unit 2 began commercial operation in 1975, followed by Unit 1 in 1977. The operating licenses for Brunswick were renewed in 2006 by the Nuclear Regulatory Commission ("NRC"), extending operations up to 2036 and 2034 for Units 1 and 2, respectively. Harris is a single unit pressurized water reactor that began commercial operation in 1987. The NRC issued a renewed license for Harris in 2008, extending operation up to 2046. Robinson is also a single unit pressurized water reactor that began commercial operation in 1971. The license renewal for Robinson Unit 2 was issued by the NRC in 2004, extending operation up to 2030.

[1] As of January 1, 2022.

On March 24, 2023, Robinson submitted a letter to the NRC stating the intent to pursue subsequent license renewal ("SLR"), and file the application in the second quarter of 2025. If the license renewal is granted by the NRC, the Company would be authorized to operate Robinson for an additional 20-year period. As announced previously, Duke Energy intends to seek SLR for all nuclear units in the fleet.

Q. WERE THERE ANY CAPACITY CHANGES WITHIN DEP'S NUCLEAR PORTFOLIO DURING THE TEST PERIOD?

A. No.

Q. WHAT ARE DEP'S OBJECTIVES IN THE OPERATION OF ITS NUCLEAR GENERATION ASSETS?

A. The primary objective of DEP's nuclear generation department is to safely provide reliable and cost-effective electricity to DEP's Carolinas customers. The Company achieves this objective by focusing on a number of key areas. Operations personnel and other station employees are well-trained and execute their responsibilities to the highest standards in accordance with detailed procedures. The Company maintains station equipment and systems reliably and ensures timely implementation of work plans and projects that enhance the performance of systems, equipment, and personnel. Station refueling and maintenance outages are conducted through the execution of well-planned, well-executed, and high-quality work activities, which effectively ready the plant for operation until the next planned outage.

Q. PLEASE DISCUSS THE PERFORMANCE OF DEP'S NUCLEAR FLEET DURING THE TEST PERIOD.

A. The Company operated its nuclear stations in a reasonable and prudent manner during the test period, providing approximately 49.2% of the total power generated by DEP. The four nuclear units operated at an actual system average capacity factor of 92.12% during the test period, which included three refueling outages.

The performance results discussed in my testimony demonstrate DEP's continued commitment to achieving high performance without compromising safety and reliability.

Q. HOW DOES THE PERFORMANCE OF DEP'S NUCLEAR FLEET COMPARE TO INDUSTRY AVERAGES?

A. The Company's nuclear fleet has a history of strong operational performance that has historically exceeded industry averages. Industry averages were developed utilizing the North American Electric Reliability Council's ("NERC") Generating Unit Statistical Brochure ("NERC Brochure"), which is considered by the North Carolina Utilities Commission in Rule R8-55(k) in establishing fuel factors in proceedings such as this. The most recently published NERC Brochure indicates an industry average capacity factor of 93.92% for comparable units for the five-year period of 2017 through 2021. The Company's had a test period capacity factor of 92.12%, and 2-year average[2] capacity factor of 93.06%.

Q. GIVEN THE COMPANY'S TEST PERIOD CAPACITY FACTOR OF 92.12% AND THE 2-YEAR AVERAGE CAPACITY FACTOR OF 93.06%, WAS THE COMPANY PRUDENT IN ITS OPERATIONS?

[2] This represents the simple average for the current test period and prior test period of 12 months ended March 2021 for the DEP nuclear fleet.

A. Yes. Capacity factor is one of several metrics that should be taken into account when determining if the DEP fleet operated prudently. For the DEP nuclear fleet, safe operations is fundamental, and the fleet utilizes sound, conservative decision making that supports safe and reliable operations while maximizing generation.

Over the five-year period from 2017-2021, the DEP fleet operated above a 90% capacity factor, and the combined DEP and Duke Energy Carolinas ("DEC") nuclear fleet has exceeded a 90% annual capacity factor for the past 24 consecutive years (1999 – 2022). Additionally, during this five-year period the DEP fleet has accomplished multiple operational achievements including a record DEP fleet net generation in 2021, Brunswick producing a record net generation in 2021, Harris producing a record net generation in 2020, Robinson having its shortest ever refueling outage in 2020, and both Brunswick Unit 2 and Harris achieving their shortest refueling outages on record in 2021.

Finally, as further evidence of the Company's prudent management, DEP's nuclear fleet operated through Winter Storm Elliott in December 2022, providing baseload generation during that critical period

Q. WHAT IMPACTS A UNIT'S AVAILABILITY AND WHAT IS DEP'S PHILOSOPHY FOR SCHEDULING REFUELING AND MAINTENANCE OUTAGES?

A. In general, refueling requirements, maintenance requirements, and NRC operating requirements impact the availability of DEP's nuclear system. Prior to a planned outage, DEP develops a detailed schedule for the outage and for major tasks to be performed including sub-schedules for particular activities.

The Company's scheduling philosophy is to plan for a best possible outcome for each outage activity within the outage plan. For example, if the "best ever" time a particular outage task was performed is 10 days, then 10 days or less becomes the goal for that task in subsequent outages barring known conflicts. Those individual aspirational goals are incorporated into an overall outage schedule. The Company aggressively works to meet, and measures itself against, that aspirational schedule. Further, to minimize potential impacts to outage schedules, "discovery activities" (walk-downs, inspections, etc.) are scheduled at the earliest opportunity so that any maintenance or repairs identified through those activities can be promptly incorporated into the outage plan. Those discovery activities also have pre-planned contingency actions to ensure that, when incorporated into the schedule, the activities required for appropriate repair can be performed as efficiently as possible.

As noted, the Company uses the schedule for measuring outage planning and execution and driving continuous improvement efforts. However, in order to provide reasonable, rather than best ever, total outage time for planning purposes, particularly with the dispatch and system operating center functions, DEP also develops an allocation of outage time, which incorporates unforeseen, reasonable schedule delays that may be needed for unplanned equipment repairs found during inspections. The development of each outage allocation is dependent on maintenance and repair activities included in the outage, as well as major projects to be implemented during the outage. Both schedule and allocation are set aggressively to drive continuous improvement in outage planning and execution.

Q. HOW DOES DEP HANDLE OUTAGE EXTENSIONS AND FORCED OUTAGES?

A. When an outage extension becomes necessary, DEP believes that work completed in the extension results in more reliable operations and fewer forced outages, thereby reducing fuel costs in the long run. Therefore, if an unanticipated issue that has the potential to become an on-line reliability issue is discovered while a unit is off-line for a scheduled outage and repair cannot be completed within the planned work window, the outage is usually extended to perform necessary maintenance or repairs prior to returning the unit to service. In the event that a unit is forced off-line, every effort is made to safely perform the repair and return the unit to service as quickly as possible.

Q. DOES DEP PERFORM POST-OUTAGE CRITIQUES AND CAUSE ANALYSES FOR INTERNAL IMPROVEMENT EFFORTS?

A. Yes. The nuclear industry recognizes that constant focus on operational excellence results in improved nuclear safety and reliability. As such, DEP applies self-critical analysis to each outage to identify every potential cause of an outage delay or event resulting in a forced or extended outage. These critiques and cause analyses do not document the broader context of the outage or event, and thus rarely reflect strengths and successes.

Q. IS SUCH ANALYSES INTENDED TO ASSESS OR MAKE A DETERMINATION REGARDING THE PRUDENCE OR REASONABLENESS OF A PARTICULAR ACTION OR DECISION?

A. No. Given this focus on identifying opportunities for improvement, these critiques and cause analyses are not intended to document the broader context of the outage nor

do they make any attempt to assess whether the actions taken were reasonable in light of what was known at the time of the events in question. Instead, the reports utilize hindsight (*e.g.*, subsequent developments or information not known at the time) to identify every potential cause of the incident in question. However, such a review is quite different from evaluating whether the actions or decisions in question were reasonable given the circumstances that existed at that time.

Q. WHAT REFUELING OUTAGES WERE COMPLETED AT DEP'S NUCLEAR FACILITIES DURING THE TEST PERIOD?

A. There were three refueling outages[3] completed during the test period: Harris and Robinson in the fall of 2022, followed by Brunswick Unit 2 during the spring of 2023.

The Harris fall 2022 refueling outage began on October 8, 2022. In addition to refueling, maintenance activities, safety and reliability enhancements, and testing and inspections were completed. Reliability enhancements completed during the outage included the inspection of sections of the circulating water system's pre-stressed concrete cylinder pipe, and installation of a carbon fiber reinforced polymer wrap to extend the longevity and address reliability concerns that could threaten unit operations, and replacement of 'B' service water piping and valves. Electrical system reliability enhancements included emergency response facility information system monitor replacement, replacement of 480V breakers to ensure continued reliability of plant equipment, and installation of the main generator ground detection system. The outage was successfully completed with no recordable injuries or environmental events and the unit was returned to service on October 30, 2022 — an outage duration

[3] The Brunswick Unit 1 spring 2022 refueling outage (B1R24) began on 3/4/2022 and ended on 4/4/2022; 4 days into this test period. The outage was reviewed in the 2022 fuel proceeding.

of 22.2 days compared to a scheduled allocation of 25 days. Shortly after the unit was synchronized to grid, the unit increased power to approximately 16 percent when post-maintenance testing of a breaker from the unit auxiliary transformer to the auxiliary bus was performed. During this testing, a wiring fault resulted in the loss of the auxiliary bus causing two reactor coolant pumps to lose power causing an automatic reactor trip on October 30, 2022. Following the reactor trip, the impacted wiring connection was identified, corrected, and the unit was returned to service 3.4 days later on November 2, 2022.

The Robinson fall 2022 refueling outage began on November 19, 2022. In addition to refueling, maintenance activities, safety and reliability enhancements, and testing and inspections were completed. Testing and inspection activities completed included the reactor vessel internals inspections, containment vessel liner panel inspections, 'B' component cooling water heat exchanger inspection and Eddy current testing, and emergency diesel generator fuel oil storage tank internal inspection. Safety and reliability enhancements completed during the outage included installation of upgraded rod control circuit boards; replacement of core exit thermocouples; heater drain pump and condensate pump replacements and motor refurbishments; installation of NERC protective relays for the main generator and main and unit auxiliary transformers mitigating operational and regulatory risks; main generator exciter replacement, main generator and exciter ground detection system replacement; and installation of remote monitoring equipment for various electrical components. During the inspection of the reactor vessel internals indications were discovered in the core barrel. These indications were identified, assessed, and mitigated prior to the unit

returning to service, which resulted in an outage extension of 11.6 days. Robinson was returned to service on December 30, 2022 — a total outage duration of 41.6 days compared to an allocation of 30 days. Shortly after synchronizing to the grid, Robinson experienced a main generator lockout due to a configuration issue with a protection relay which resulted in a turbine trip. The relay configuration was addressed, and the unit was returned to service 1.9 days later on January 1, 2023.

The Brunswick Unit 2 spring 2023 refueling outage began on February 7, 2023. In addition to refueling, maintenance activities, safety and reliability enhancements, and testing and inspections were completed. Testing and inspection activities completed during the outage included '2A' reactor feed pump steam path inspection, conventional service water header inspection, and Eddy current testing for the condenser water box. Maintenance activities completed during the outage included ultrasonic fuel cleaning, identification and discharge of a defective fuel bundle, replacement of safety relief valve main body assemblies, and seal replacements for the '2A' and '2B' reactor recirculation pumps. Additionally, 32 single point vulnerabilities were eliminated via design modifications that will help ensure continued safe and reliable operations of Brunswick Unit 2 in the future. The outage was successfully completed with no recordable injuries or environmental events and the unit was returned to service on March 8, 2023 — a duration of 28.3 days compared to a scheduled allocation of 29 days.

Q. OTHER THAN REFUELING, WHAT OUTAGES OCCURRED AT DEP'S NUCLEAR FACILITIES DURING THE TEST PERIOD?

A. In addition to the short duration outages immediately following the Harris and Robinson refueling outages discussed above, there were two additional outages unrelated to refueling at the Harris Nuclear Plant, and one additional outage unrelated to refueling at the Robinson Nuclear Plant.

On April 29, 2022, Harris entered a forced outage due to a loss of condenser vacuum that resulted in a manual reactor trip. During monthly equipment swaps for the condenser vacuum pumps, the suction isolation valve for one of the pumps failed shut, resulting in a rapid decrease in the main condenser vacuum. The rate of decrease was too great for local isolation attempts to be successful, resulting in a manual reactor trip. Replacement and inspection of components included a control relay for the suction isolation valve and repair of a discharge check valve stuck in the open position. The unit was safely returned to service on April 30, 2022 – an outage duration of 1.4 days.

On August 28, 2022, the Harris Nuclear Plant operators manually tripped the reactor following the loss of the 'B' condensate pump and 'B' condensate boost pump. Investigations revealed damage to the 'B' condensate pump motor due to a lightning strike, and the motor was replaced. The unit was safely returned to service on August 29, 2022 – an outage duration of 1.5 days.

On September 24, 2022, the Robinson Nuclear Plant was disconnected from the grid to address a seal leak on the 'C' reactor coolant pump. The seal for the 'C' reactor coolant pump was replaced, and the unit began its return to service when the seal leak-off flow for the 'B' reactor coolant pump was below the threshold for continued operation, requiring the 'B' reactor coolant pump seal to be replaced. After

the 'B' reactor coolant pump seal was replaced, the unit was safely returned to service on October 10, 2022 – an outage duration of 16.3 days.

Q. WHAT CAPACITY FACTOR DOES DEP PROPOSE TO USE IN DETERMINING THE FUEL FACTOR FOR THE BILLING PERIOD?

A. The Company proposes to use a 92.27% capacity factor, which is a reasonable value for use in this proceeding based upon the operational history of DEP's nuclear units and the number of planned outage days scheduled during the billing period. This proposed percentage is reflected in the testimony and exhibits of Company witness Harrington.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes, it does.