

DIRECT TESTIMONY OF
JOSEPH A. MILLER JR. AND MICHAEL SKAGGS
IN SUPPORT OF GEORGIA POWER COMPANY’S APPLICATION TO ADJUST
RATES TO INCLUDE REASONABLE AND PRUDENT VOGTLE UNITS 3 AND 4 AND
COMMON COSTS
DOCKET NO. 29849

1 **I. INTRODUCTION AND QUALIFICATIONS**

2 **Q. MR. MILLER, PLEASE STATE YOUR FULL NAME, TITLE, AND BUSINESS**
3 **ADDRESS.**

4 A. My name is Joseph A. Miller Jr. I am President and Chief Executive Officer (“CEO”) of
5 Pegasus-Global Holdings, Inc.® (“Pegasus-Global”), an international management
6 consulting firm that provides services in the power, energy, and infrastructure industries.
7 My business address is 1750 Emerick Rd., Cle Elum, Washington, 98922.

8 **Q. MR. SKAGGS, PLEASE STATE YOUR FULL NAME, TITLE, AND BUSINESS**
9 **ADDRESS.**

10 A. My name is Michael Skaggs. I am an electrical industry consultant. My business address
11 is 9776 Clingmans Dome Drive, Knoxville, Tennessee, 37922.

12 **Q. MR. MILLER, PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND**
13 **AND PROFESSIONAL EXPERIENCE.**

14 A. I graduated from Purdue University with a Bachelor of Science degree in Mechanical
15 Engineering. I also completed twelve post graduate level courses in Business
16 Administration at Indiana State University. I have over 30 years of experience, including
17 four as a management consultant in utility management reviews, independent monitoring,

1 evaluations, and audits. In the last 12 years, I have sponsored 65 testimonies in regulatory
2 proceedings in multiple states, including base rate, fuel, certificate of public convenience
3 and necessity, plant abandonment, and environmental cases. I have performed extensive
4 work on a wide range of complex engagements both for and on behalf of utilities, as well
5 as public and private sector clients.

6 I began my career in 1991 as a staff engineer at Duke Energy Indiana's Cayuga Generating
7 Station. Since that time, I held various roles of increasing responsibility in the management,
8 operations, engineering, maintenance, and strategy areas, including the role of station
9 manager, first at Duke Energy Kentucky's East Bend Generating Station, followed by
10 Duke Energy Ohio's Zimmer Generating Station.

11 I was named General Manager of Analytical and Investment Engineering for Duke Energy
12 in 2010. In this role, I began providing leadership in modernizing one of the largest fossil
13 fuel generating fleets in the country. This involved supporting and directing the analysis of
14 plant abandonments and new resource replacements and setting lifecycle strategy for the
15 remaining plants in the fleet. My responsibilities also included carrying out all facets of
16 environmental compliance planning for the coal plants that would remain in operation. In
17 this role, I was also responsible for financial and engineering analysis of capital projects
18 and project controls for the Duke Energy's fleet of nuclear, fossil, and hydroelectric plants.

19 Following the merger between Duke Energy and Progress Energy in 2012, I became the
20 Vice President of Central Services. In this position, I had oversight of approximately 500
21 employees and responsibility for engineering, environmental compliance planning,
22 generation and regulatory strategy, North American Electric Reliability Corporation

1 (otherwise known as “NERC”) and regulatory compliance, technical services, and
2 maintenance services for Duke Energy’s fleet of 89 fossil and hydroelectric power plants
3 in North Carolina, South Carolina, Ohio, Indiana, Kentucky, and Florida.

4 In 2019, following my retirement from Duke, I began providing strategic and regulatory
5 consulting services primarily to utility clients undertaking transitions in the production or
6 sourcing of their electricity. I also served as a consultant to Pegasus-Global on regulatory
7 and dispute matters.

8 I was named President and CEO of Pegasus-Global in October 2022. Since joining
9 Pegasus-Global, I have continued my work on regulatory matters, with which I was
10 previously working alongside Pegasus-Global, and other matters including as part of the
11 Pegasus-Global Independent Monitoring Team for large projects being undertaken by other
12 utilities. Thus, I understand the independent construction monitoring role and reporting
13 requirements. My experience and qualifications, including the regulatory cases in which I
14 have submitted testimony, are attached as **Exhibit JAM-1**.

15 **Q. HAS PEGASUS-GLOBAL PROVIDED TESTIMONY PREVIOUSLY AS IT**
16 **RELATES TO THE PLANT VOGTLE?**

17 A. Yes. In 1987, the late Dr. Kris R. Nielsen testified on behalf of Georgia Power Company
18 (“GPC” or “Georgia Power”) in the proceeding that reviewed the prudence of the costs
19 incurred in the development of Vogtle Units 1 and 2. In 2008, Dr. Nielsen, then CEO of
20 Pegasus-Global, provided testimony in Georgia Public Service Commission (“GPSC” or
21 the “Commission”) Docket No. 27800 in Georgia Power’s Application for the Certification
22 of Units 3 and 4 at Plant Vogtle and Updated Integrated Resource Plan and performed an

1 independent evaluation of GPC's proposal to construct two new nuclear units at the Plant
2 Vogtle Site. In 2011, Dr. Nielsen filed joint testimony with Mr. Brian L. (Pete) Ivey, then
3 Vice President of Nuclear Development Support for the Southern Nuclear Operating
4 Company ("Southern Nuclear" or "SNC"), in GPSC Docket No. 29849 regarding the
5 Georgia Power Company's opposition to the risk sharing mechanism proposed by the
6 Commission Public Interest Advocacy Staff ("PIA Staff").

7 **Q. MR. SKAGGS, PLEASE SUMMARIZE YOUR EDUCATION AND**
8 **PROFESSIONAL EXPERIENCE.**

9 A. I graduated from Texas Tech University with a Bachelor of Science degree in Mechanical
10 Engineering. I received my Professional Engineer registration in Texas. I also received
11 my Senior Reactor Operator certification from Tennessee Valley Authority ("TVA").

12 I have over 35 years of experience in the utility industry. My experience has included:

- 13 • Manager of Projects for Watts Bar Nuclear Plant ("WBN") Unit 1 during the
14 design, construction, startup, and initial operation;
- 15 • Site Vice President at each of the TVA Nuclear Plants (Browns Ferry Nuclear
16 Plant ("BFN"), Sequoyah Nuclear Plant ("SQN"), and WBN);
- 17 • Senior Vice President over the WBN site, which included Unit 1 operation and
18 Unit 2 design, construction, testing, and placement in operations; and
- 19 • Chief Operations Officer ("COO") of TVA

20 I began my career in 1983 with Texas Utilities at the Comanche Peak Steam Electric
21 Station. Since that time, I have held various roles of increasing responsibility in
22 engineering, design, operations, work control, project management, project controls,

1 maintenance and modifications, plant management, and Executive Leadership and
2 Management of nuclear, coal, natural gas, and hydro generating stations, as well as supply
3 chain, environmental, land management, resource management, transmission system,
4 safety, aviation, facilities, and integrated river system management.

5 I was named the BFN Site Vice President in July 2004. In this role, I was ultimately
6 responsible for the safe operation, maintenance, and leadership of the two operating units
7 and the integration of BFN Unit 1, which was being refurbished for startup and operation.

8 In July 2005, I was named the WBN Site Vice President. Similar to my role at BFN, I
9 was ultimately responsible for the safe operation, maintenance, and leadership of the
10 operating unit. WBN was preparing to replace the four steam generators due to component
11 degradation and I was sent to the site to lead this project.

12 I was subsequently named the SQN Site Vice President in November of 2010. My role at
13 SQN was similar to the roles at BFN and WBN. The driving factor behind this assignment
14 was to address plant performance issues at SQN requiring resolution.

15 In November 2011, I was named the Senior Vice President of Nuclear Generation
16 Development and Construction at TVA. The responsibilities associated with this
17 assignment were the development, feasibility, design, construction, licensing, testing, and
18 initial operation of the Bellefonte Nuclear Plant and WBN Unit 2 and the replacement of
19 the steam generators at SQN 2. Ultimately, TVA finished WBN Unit 2 and halted work
20 on Bellefonte. With the work stoppage on Bellefonte, I was reassigned to WBN as the
21 Senior Vice President, Watts Bar Operations and Construction. In this role, I oversaw the
22 safe operation and maintenance of WBN Unit 1 and managed the completion and

1 integration of WBN Unit 2 as a generating nuclear plant. With the successful completion
2 and operation of WBN Unit 2 in October of 2016, I was named the COO of TVA until
3 my retirement in January of 2022.

4 In addition to my work at TVA, I supported the VC Summer Project as the lead over the
5 Construction Review Board (“CRB”) in 2017 and 2018 and I served on the CRB with
6 Vogtle Units 3 and 4 (“Vogtle Project”, or “Project”) from April 2018 to November 2019.
7 In both roles, I reviewed and provided feedback concerning many of the critical aspects
8 of and decisions for the Project. For example, we reviewed the adequacy of work being
9 performed for Engineering, Construction, Startup and Testing, Licensing, and
10 Operational Readiness. Additionally, the CRB for both sites evaluated Project
11 Management tools being employed and Project decision-making.

12 My experience and qualifications are attached as **Exhibit MS-2**.

13 **Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?**

14 A. Our testimony is on behalf of GPC.

15 **II. PURPOSE AND SUMMARY OF TESTIMONY**

16 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

17 A. The purpose of our testimony is to address fundamental concepts of prudence as they apply
18 to decision-making during the planning and execution of a power generation project. This
19 evaluation considered whether GPC management had an appropriate decision-making
20 structure and appropriate processes in place to ensure that management made informed
21 decisions based on information reasonably available to or known by management at the

1 time. Our evaluation also considered whether GPC management reasonably and prudently
2 implemented its decisions, with a primary focus on the time period from January 1, 2016,
3 through the completion of Unit 3. This evaluation includes:

- 4 • An assessment of the management processes used by GPC to plan, execute, and
5 manage engineering, procurement, and construction activities, including those
6 of its contractors;
- 7 • An identification of management strengths and positive actions which may have
8 impacted cost or schedule;
- 9 • An identification of any management shortcomings which may have impacted
10 cost or schedule; and
- 11 • A determination of reasonableness of overall design procurement and
12 construction management practices and the extent to which these management
13 practices avoided, mitigated, or resulted in cost and/or schedule impacts.

14 We were specifically asked by Georgia Power to testify as to the differences between
15 planning, managing, controlling, and completing a “megaproject.” This included a
16 comparison between a First-of-a-Kind (“FOAK”) project and a typical construction
17 project. We were also asked to opine on the project control tools to oversee project
18 progress, specifically the processes GPC and SNC used to measure and monitor the status
19 of the construction of the Vogtle Project, and whether those project control tools met good
20 utility practices and industry standards and were appropriate for the stage of the Project
21 when the respective project control tools were developed and implemented.

1 **Q. WHAT IS YOUR UNDERSTANDING OF THE PRUDENCE AND COSTS TO BE**
2 **ADDRESSED IN THIS DOCKET?**

3 A. Our understanding of the question of prudence in this case is informed by O.C.G.A. § 46-
4 3A-7(a), which states:

5 So long as the commission has not modified or revoked the certificate for
6 an electric plant under Code Section 46-3A-6 and to the extent the utility
7 seeks to add to its rate base upon completion of the plant construction costs
8 that do not exceed 100 percent of those approved by the commission under
9 Code Section 46-3A-5, Code Section 46-3A-6, or subsection (b) of this
10 Code section, that construction cost amount may be excluded from the rate
11 base only on the basis of fraud, concealment, failure to disclose a material
12 fact, imprudence, or criminal misconduct. Inclusion of costs in excess of
13 100 percent of those approved by the commission shall not be permitted
14 unless shown by the utility to have been reasonable and prudent.

15
16 We understand from Counsel that the prudence evaluation will assess the reasonableness
17 and prudence of Georgia Power's decisions regarding Vogtle Units 3 and 4 for the period
18 starting from December 31, 2015, through fuel load of Unit 4. The December 31, 2015,
19 date is based on the Commission's January 3, 2017, Order Adopting Stipulation between
20 PIA Staff, Georgia Power, the Georgia Association of Manufacturers, and the Georgia
21 Industrial Group regarding the Construction Monitoring Proceeding for Georgia Power
22 Company's Plant Vogtle Units 3 and 4, also known as the Supplemental Information
23 Review proceeding and stipulation ("SIR Stipulation").¹ In relevant part, the SIR
24 Stipulation established that:

- 25 • None of the costs incurred, verified, or approved through the 14th Vogtle
26 Construction Monitoring ("VCM") report should be disallowed from rate base
27 on the basis of imprudence as specified in O.C.G.A. § 46-3A-7. The VCM 14

¹ See *Order Adopting Stipulation*, Docket No. 29849 (Jan. 3, 2017). The SIR Stipulation was adopted by the Commission on December 20, 2016.

1 report covered the period June through December 2015 and stated that Georgia
2 Power's share of the incurred construction and capital costs for Vogtle 3 and 4
3 was \$3.569 billion as of December 31, 2015.² Based on the SIR Stipulation, we
4 understand that these costs are assumed reasonable and prudent and are not
5 subject to further prudence review.

- 6 • The revised schedule and capital cost forecast up to \$5.68 billion (\$5.440 billion
7 current forecast as of the time of the SIR Stipulation plus \$240 million in
8 contingency) will be presumed reasonable and prudent and the burden of proof
9 in any challenge to the reasonableness or prudence of these costs is on the party
10 challenging such costs. Therefore, any costs between \$3.5 billion and \$5.680
11 billion are assumed to be reasonable and prudent.
- 12 • Georgia Power has the burden of proof to show that costs above the \$5.680
13 billion are prudent. These are the costs that we have focused on in our prudence
14 review, including the value to the customers of Georgia Power.

15 **Q. WHAT WAS THE TIMEFRAME FOR YOUR PRUDENCE REVIEW?**

16 A. The first change in the forecasted schedule or cost after the SIR order occurred in VCM
17 17, filed in August 2017. Therefore, our review began with the go/no-go recommendation
18 and decision in VCM 17, which documents GPC's efforts following the Westinghouse
19 Company ("WEC") bankruptcy and the resulting Project changes. Our review is predicated
20 on what was reasonably known or knowable at the time of VCM 17. We also understand
21 that in the VCM 17 Order, the Commission found all costs up to \$7.3 billion to be

² See *Georgia Power Company's Fourteenth Semi-Annual Construction Monitoring Report for Plant Vogtle Units 3 and 4*, at 6, Docket No. 29849 (Feb. 29, 2016).

1 reasonable.³ For practical purposes, we reviewed all costs above \$5.680 billion for
2 prudence and reasonableness. While we have focused our evaluation on the decisions after
3 December 31, 2015, we recognize that some decisions made prior to the efforts around
4 VCM 17, and even prior to December 31, 2015, have resulted in costs incurred and
5 schedule impacts after December 31, 2015. Therefore, we reviewed these prior decisions
6 to the extent they had an impact on the issues we were investigating as part of our prudence
7 evaluation.

8 **Q. PLEASE SUMMARIZE YOUR FINDINGS.**

9 A. Based on this review of policies, procedures, processes, reports, detailed schedule and cost
10 files, and other project documentation, we found that the project controls, including scope
11 and change control management; schedule management; cost management; risk
12 management; project controls reporting; and lessons learned management, either met or
13 exceeded what would be expected on a project of this size, magnitude, scope, and
14 complexity and generally align with common industry practices.

15 In general, we find that while there were several challenges encountered throughout the
16 execution construction management and oversight, and commissioning and startup of this
17 “first of a kind” megaproject, appropriate processes and resources were in place to plan,
18 monitor, and actively manage the execution efforts on the Project. Specifically, we
19 evaluated subcontract, procurement, and supplier management for the Project, concluding
20 that, while the COVID-19 pandemic created challenges in all these areas, SNC had
21 processes in place typical for the size, magnitude, and complexity of the Project and took

³ See *Order on the Seventeenth Semi-Annual Vogtle Construction Monitoring Report* at 11, Docket No. 29849 (December 21, 2017).

1 appropriate actions to address the challenges in these areas. As part of the review of
2 construction oversight, we evaluated the quality assurance/quality control process. We
3 noted some concerns that are discussed below, but overall, we conclude that policies and
4 procedures used for Quality Assurance (“QA”)/Quality Control (“QC”) on the Project align
5 with industry standards. We note several significant improvements to improve initial
6 testing, concluding that the Project’s commissioning and startup process is typical of what
7 we have experienced on other large projects of this size, magnitude, and complexity.

8 We also identified several challenges and key decisions that the Project faced. Our
9 conclusions related to those challenges and decisions are as follows:

- 10 • One of the largest impacts unique to Vogtle 3 and 4 was the WEC bankruptcy
11 filed on March 29, 2017, which had ricochet impacts for the Project. GPC and
12 SNC made key decisions related to the WEC bankruptcy, including the decision
13 to self-perform the work, with SNC overseeing the completion of the Project on
14 behalf of the Co-owners. As part of that decision, GPC and SNC undertook the
15 substantial effort of developing a new Estimate to Complete (“ETC”), including
16 commissioning several outside experts to provide opinions concerning the likely
17 cost and schedule of various scenarios that were being considered. Also, as part of
18 the transition from the WEC to the SNC/Bechtel project structure (the “Project
19 Transition”), SNC and GPC made the decision to adopt an aggressive schedule,
20 which provided schedule contingency and an incentive for getting the
21 construction work force to work as hard as possible to meet that scheduled end
22 date. The Project’s early decision to attempt to compress the Project schedule
23 made sense because each month saved would have offset approximately \$90-\$100

1 million. We find the ETC developed at the time of the Project Transition as well
2 as the decision to adopt an aggressive schedule to be reasonable based on what
3 GPC and SNC knew at the time and based on the independent assessments it had
4 undertaken.

5 • With regard to cost challenges, we find that GPC and SNC had strong processes
6 in place to monitor cost and continually update the ETC and Estimate at
7 Completion (“EAC”). We note that the fact that the cost of the Project exceeds the
8 VCM 17 estimate does not necessarily mean there is imprudence. The issue is
9 whether decisions were made in a reasonable manner in light of conditions and
10 circumstances that were known or reasonably should have been known when the
11 decision was made. Our conclusion is that the decisions made and the actions
12 taken by GPC and SNC related to controlling costs were reasonable and prudent.

13 • With regard to scheduling challenges, we find, consistent with industry best
14 practices, the periodic re-baselining to be typical of large complex projects over
15 the course of execution and is normal with projects that fall behind schedule and
16 especially those with an aggressive target schedule.

17 • While the productivity targets and manpower requirements were challenging
18 throughout the Project and were further impacted with the FOAK nature of this
19 Project and the bankruptcy of WEC, we find that the planning assumptions used
20 by GPC and SNC were reasonable based on the information known at the time

1 and the Companies took appropriate action throughout the Project to mitigate
2 these risks and their impacts.

- 3 • We find that the decisions made and actions taken by GPC and SNC at the onset
4 of the COVID-19 pandemic, including implementation of site protocols and the
5 scenarios conducted, allowed the Project to continue in a safe manner during the
6 pandemic.

- 7 • We agree with the assessment that partial release for testing (“PRT”) would allow
8 earlier discovery and correction of any defects or nonconformances in the work to
9 help in maintaining target Commercial Operation dates (“CODs”).

- 10 • In our review of quality control issues, we find that the corrective actions taken to
11 address the Institute of Electrical and Electronic Engineers (“IEEE”) issues were
12 sufficient to strengthen the QA program and assure existing IEEE issues were
13 corrected. We agree with GPC’s decision not to see recovery of costs associated
14 with the IEEE issues, as well as the inspection report issue discovered in the fall of
15 2021. We also do not recommend a disallowance associated with the costs incurred
16 for the remediation of the spent fuel pool and fuel transfer canal over-pressurization
17 event given that the event did not result in additional delays and that the costs were
18 covered by insurance.

19 **Q. DID YOU FIND THE \$8.826 BILLION THAT GPC IS ASKING TO RECOVER TO**
20 **BE REASONABLE AND PRUDENT?**

21 A. Yes. Our review has demonstrated that, as the first new nuclear project completed in
22 decades, the Project is reasonable and prudent and will provide valuable, carbon-free

1 energy and capacity to Georgia Power and the Co-Owners’⁴ customers for the next 60-80
2 years. As Pegasus-Global’s Dr. Kris Nielsen testified in Docket No. 27800:⁵

3 The increased growth in the United States, especially in the Southeast,
4 requires that new sources of generation be constructed to meet growing
5 energy needs. In addition, there have been growing calls from the public,
6 and most recently, legislators to combat the effects of climate change by
7 reducing carbon emissions. While no specific federal legislation has been
8 passed to limit the emissions of carbon, one can assume that some form of
9 legislation will pass in the future. Together, the need for new energy sources
10 and the challenge of reducing carbon emissions have fueled a resurgence of
11 public support for nuclear generation as one of the carbon-free sources of
12 energy.
13

14 The world’s efforts to reduce carbon emissions are one of the greatest challenges of our
15 lifetime.

16 Nuclear energy is the largest source of zero-carbon energy in the United States, providing
17 half of the country’s clean energy, and the second largest source of low-carbon electricity
18 in the world behind hydropower. Further, despite producing massive amounts of carbon-
19 free power, nuclear energy produces more electricity on less land than any other clean-air
20 source.⁶ Nuclear energy is also one of the most reliable and efficient sources of clean
21 energy. Given significant recent power outages in other parts of the country, such as the
22 major outages in Texas in February 2021, where the energy infrastructure has not been able
23 to sustain the demands from extreme temperatures, GPC customers will benefit from an
24 additional source of reliable clean energy.

⁴ Oglethorpe Power Corporation, Municipal Electric Authority of Georgia (“MEAG”), and the City of Dalton through Dalton Utilities.

⁵ See Direct Testimony of Dr. Kris R. Nielsen at 3-4, Docket No. 27800-U (October 20, 2008).

⁶ See OFFICE OF NUCLEAR ENERGY, *3 Reasons Why Nuclear is Clean and Sustainable*, (March 31, 2021, updated June 2022), <https://www.energy.gov/ne/articles/3-reasons-why-nuclear-clean-and-sustainable>, (last accessed July 29, 2023).

1 We find that Vogtle Units 3 and 4, as noted above, will be a valuable source of carbon-
2 free, reliable base load generation for 60 to 80 years and will hedge against potential carbon
3 costs and fuel volatility that could impact GPC's ability to provide economic power to
4 customers over the next several decades. Given the challenges related to climate and energy
5 here and abroad, Vogtle is a project that the state of Georgia can be proud of as it provides
6 energy security and was at the forefront of recognizing the value of nuclear to the customers
7 of Georgia. We also note that the Vogtle Project has had a significant economic
8 development impact on the local community while under construction and will continue to
9 serve as an important fixture in the local economy providing tax revenues to fund additional
10 infrastructure.

11 **III. VOGTLE NUCLEAR PROJECT PRUDENCE EVALUATION** 12 **PRINCIPLES**

13 **A. PRUDENCE STANDARDS**

14 **Q. IN CONDUCTING YOUR INDEPENDENT PRUDENCE REVIEW AND**
15 **EVALUATION OF THE VOGTLE PROJECT, ARE YOU APPLYING CERTAIN**
16 **GENERALLY RECOGNIZED PRUDENCE STANDARDS?**

17 **A.** Yes. Our prudence evaluation is founded upon the following definition:

18 *Decisions are prudent if made in a reasonable manner in light of conditions and*
19 *circumstances which were known or reasonably should have been known when the*
20 *decision was made.*

21 This prudence definition is consistent with the prudence standard Pegasus-Global has
22 applied, and the definition is consistent with definitions used by regulators in multiple

jurisdictions as well as with prudence standards cited in numerous publications on the subject of prudent management decisions.⁷ In essence, management makes prudent decisions when management makes an informed decision under the circumstances at the time the decision is made.

Q. WHAT PRUDENCY STANDARD HAS THIS COMMISSION ADOPTED?

A. We understand that the GPSC has adopted prudence standards consistent with these listed above. For example, in the Rocky Mountain Pumped Storage Facility case, the Commission found:⁸

A decision must not be judged as correct or incorrect in light of perfect hindsight. Rather, a decision must be judged as to whether it was reasonable given the facts and circumstances which were known, or which reasonably should have been known at the time the decision was made. In applying this standard, it must be recognized that in any decision-making process there may exist a range of choices, any or all of which could have been adopted by reasonable management in good faith and under the same set of circumstances. If the Company has made a decision which falls within that “zone of reasonableness,” that decision must be found to have been prudent, irrespective of whether others may have selected another alternative, and irrespective of whether in hindsight another decision may now appear in hindsight to have been a more correct decision.

⁷ “Cost Recovery for Pre-Approved Projects”, Patricia D. Galloway and David Cousineau, Public Utilities Fortnightly, June 2013; “New Day for Prudence”, Kris R. Nielsen, Patricia D. Galloway and Charles W. Whitney, Public Utilities Fortnightly, December 2009; “The Prudency Management Audit – A New Challenge for the Civil Engineer”, Kris Nielsen and Patricia Galloway, Transition in the Nuclear Industry, Proceedings of the Symposium Sponsored by the Construction and Energy Divisions of the American Society of Civil Engineers in Conjunction with the ASCE Convention in Denver, Colorado, April 29 – 30, 1985. With regard to other states and FERC-accepted definitions of prudence, see, e.g., Public Utilities Commission of Ohio, Case No. 85-521-EL-COI in the matter of the Perry Nuclear Plant, *Opinion and Order*, January 12, 1988, pp.10-11 and Public Utility Commission of Texas, Docket No. 9300, *Examiner’s Report regarding the Comanche Peak Steam Electric Station*, June 12, 1991, p. 9. See also, Entergy Services, 130 FERC ¶ 61,023 (quoting New England Power Co., 31 FERC ¶ at 61,084).

⁸ GPSC Docket No. 6739-U, Order in *GPSC Staff’s Review of GPC’s Rocky Mountain Pumped Storage Facility*, January 14, 1998, p. 6.

1 We also note that in testimony before the GPSC, Dr. William Jacobs, Construction Monitor
2 (“CM”) for the GPSC, used a definition of prudence that is consistent with Pegasus-
3 Global’s definition of prudence:

4 As in previous cases, I have applied the standard of prudence
5 adopted by the Georgia Public Service Commission in Docket No.
6 6739-U, Review of Georgia Power Co.’s Rocky Mountain Pumped
7 Storage Facility.
8

9 [...]

10
11 This standard is essentially a “reasonable man standard” in that the utility’s
12 actions or decisions are compared to the reasonable actions or decisions of
13 a qualified and experienced utility manager or operator given what was
14 known, or reasonably should have been known, at the time the action was
15 taken or the decision was made without the benefit of hindsight. Thus, the
16 actions and decisions of Company personnel must be judged on what they
17 knew, or reasonably should have known, at the time the action was taken or
18 the decision was made without benefit of hindsight. The “reasonable man
19 standard” does not hold Company responsible for actions or decisions that
20 may not have been appropriate had additional information been available at
21 the time of certain actions or decision were taken.⁹

22 **Q. CAN YOU EXPLAIN WHAT YOU MEAN BY “INFORMED DECISION UNDER**
23 **THE CIRCUMSTANCES AT THE TIME THE DECISION IS MADE”?**

24 A. Yes. As noted in the definitions above, prudence cannot be judged with the benefit of
25 hindsight, primarily because a hindsight perspective involves the use of information and
26 circumstances that did not exist or were not reasonably available at the time that
27 management had to make its decision. Only those circumstances that were known or that
28 should have been known to management at the time the decision is made can be considered
29 when judging the prudence of management’s decisions and actions. Management decisions
30 are not made in static conditions and may necessarily rely upon imperfect information or

⁹ Direct Testimony and Exhibits of William R. Jacobs, Jr., PhD. at 5-6, Docket No. 43011 (May 1, 2020).

1 changing circumstances. Prudence recognizes these challenges and relies on the concept of
2 foreseeability in two ways: (1) an action or lack of action of a utility manager is not
3 unreasonable or imprudent if it involves or is affected by events that were unforeseen and
4 reasonably unforeseeable at the time; and (2) the cost calculations for any imprudence we
5 found properly reflect only the reasonably foreseeable consequences of the imprudent
6 decision-making processes or performance.

7 **Q. DOES THE PRUDENCE STANDARD REQUIRE PERFECTION OR THAT A**
8 **DECISION BE OPTIMAL?**

9 A. No. Prudence is a reasonable standard, and reasonableness does not demand perfection. A
10 standard of perfection would require an entirely trouble-free project¹⁰ and would rely
11 impermissibly on hindsight or prescience, because perfection is only determinable once the
12 outcome is known (at which point the course to have avoided or minimized an adverse
13 outcome will be obvious). This information is, of course, unavailable to the project
14 manager at the time of decision-making. Relevant factors for evaluating the reasonableness
15 of decision-making are the manner and timeliness in which problems were recognized and
16 addressed.

17 **Q. IS IT POSSIBLE FOR THERE TO BE MORE THAN ONE PRUDENT RESPONSE**
18 **TO THE SAME SET OF CIRCUMSTANCES AND INFORMATION?**

19 A. Yes. However, the determinative issue is whether management considered factual
20 circumstances and conditions that management should have considered in making its
21 decision, not whether someone else might make a different decision under the same

¹⁰ See *Re Union Electric Company*, 1985 WL 1205410, *214 (Mo. P.S.C. 1985); see also P. Galloway, K. Nielsen and C.W. Whitney, *New Day for Prudence*, PUBLIC UTILITIES FORTNIGHTLY, (Dec. 2009).

1 circumstances and conditions. Management decisions are seldom black and white and
2 differences in opinion or judgment do not render a management decision imprudent. There
3 is a zone of reasonableness in which management judgment is exercised and decisions are
4 reasonable and prudent.

5 **Q. ARE ALL CHANGES TO A PROJECT'S COST, SCOPE, AND SCHEDULE THE**
6 **RESULT OF DECISIONS MADE BY MANAGEMENT?**

7 A. No. There may be factors outside the control of management that impact a project.
8 However, while it is true that factors outside the control of management can impact the
9 Project, the processes established by management to control cost, scope, schedule, and
10 related project elements and management's responses to such events can be evaluated in
11 terms of the reasonableness and prudence of these responses.

12 **Q. DOES PRUDENCE MEAN ANY RATIONAL BASIS FOR A DECISION IS**
13 **ACCEPTABLE?**

14 A. No. Prudence is not the application of a test that accepts any rational basis for a decision.
15 Rather, a prudence determination requires an evaluation of the concurrent context for a
16 given decision, the process for making the decision, and the performance or
17 implementation of that decision by management. Prudence ultimately asks whether the
18 decision is rational under all those known circumstances. This does not mean that prudence
19 is synonymous with efficiency. Prudence does not require that decisions be made and
20 executed in the most efficient manner; it simply requires that there be rational, deliberate
21 processes employed by management to make and implement the decision, considering the
22 circumstances and conditions facing management at the time.

1 **Q. DID YOU REVIEW THE PRUDENCE AND REASONABLENESS OF THE**
2 **PROJECT IN LIGHT OF THE VALUE TO CUSTOMERS?**

3 A. Yes. In our assessment, we considered the extent to which GPC's customers will benefit
4 from the completion of Vogtle Units 3 and 4. To the extent that we determined that any
5 costs should not be passed on to the GPC customer, we have identified those costs in our
6 testimony.

7 **Q. WHAT IS THE PROPER STANDARD FOR DETERMINING WHETHER COSTS**
8 **SHOULD BE DISALLOWED?**

9 A. Disallowance recommendations for imprudence must be founded on a direct causal link
10 between an imprudent decision or action and the specific cost associated with that
11 imprudent decision or action, but only to the extent such results were reasonably
12 foreseeable.

13 **B. ANALYZING THE STRUCTURE OF THE MANAGEMENT DECISION-**
14 **MAKING PROCESS**

15 **Q. IS IT NECESSARY TO EVALUATE MANAGEMENT'S DECISION-MAKING**
16 **STRUCTURE WHEN REVIEWING AND EXAMINING THE PRUDENCE OF A**
17 **UTILITY'S ACTIONS AND DECISIONS?**

18 A. Yes. When conducting a prudence review and evaluation, the reviewer must focus on the
19 management processes employed by the utility to make decisions. This evaluation should
20 determine if there is a structure in place to make decisions and a process to ensure that
21 management's decisions follow that structure. Management makes an informed decision
22 if, at the time the decision is made, management considers the factors it should reasonably
23 consider based on information that was known or should have been known at the time. An

1 informed decision includes the identification of risks that might arise and an evaluation of
2 those risks before reaching the decision.

3 Once management has made an informed decision, the prudence reviewer evaluates
4 whether that decision resulted from an exercise of reasonable business judgment. Most, if
5 not all, management decisions do not involve right or wrong answers; typically, multiple
6 decisions are equally reasonable and prudent under the circumstances then facing
7 management. If management's decisions are informed and fall within a range of reasonable
8 business judgment, they are reasonable and prudent.

9 **Q. WHAT DO YOU MEAN BY THE “STRUCTURE OF THE MANAGEMENT-**
10 **DECISION-MAKING PROCESS”?**

11 A. The management decision-making structure involves and follows four steps: (1) data
12 development, (2) information flow, (3) analysis and (4) decision. These steps are described
13 below.

14 (1) “Data development” addresses what information was available or should have been
15 available to management at the time and whether the management systems and
16 procedures were organized and implemented to produce the reasonably necessary
17 information. Data development must be judged from the position of utility
18 management based upon the varying sources of input that it had or reasonably could
19 have had at the time it was deciding. Management seldom has the time or the luxury
20 to obtain all the information that it might desire. If management waited until it had
21 all possible information, a decision would never be made, in part because

1 information is always changing. The very essence of management is making
2 decisions on less than perfect information.

3 (2) “Information flow” addresses to whom and when the available data is transmitted
4 and communicated and in what format. In evaluating information flow, the reviewer
5 determines whether management received the information in a timely and
6 understandable manner to make its decision.

7 (3) Next a reviewer should look at the “analysis” done by management. This step
8 addresses how the available information was evaluated; what alternatives, if any,
9 were identified based on such information; and what benefits and impacts were
10 projected by management based on the information.

11 (4) Finally, the “decision” step addresses what decision was made; when the decision
12 was made; how the decision was made; how the decision supported customer,
13 project, and corporate needs; and whether the decision was re-evaluated and
14 modified, as necessary, when assumptions and circumstances changed. This step
15 involves management techniques and systems to monitor performance and use that
16 new information to improve performance.

17 **IV. MEGAPROJECTS AND FOAK RISKS**

18 **Q. DOES THE VOGTLE PROJECT QUALIFY AS A “MEGAPROJECT”?**

19 A. Yes. “Megaprojects” are generally defined as exceptionally large and complex investment
20 projects that attract a prominent level of public attention or political interest because of the
21 significant costs (generally over \$1 billion) and the direct and indirect impacts on the

community, environment, and companies undertaking such projects.¹¹ Other attributes often include the execution of an engineered facility that is complex or unusual, contains FOAK elements, has an extended schedule of more than four years, involves multiple equipment and material suppliers, and involves multiple stakeholders and investors. The Vogtle Project is a megaproject under this definition.

Q. IS THE VOGTLE PROJECT ALSO A FOAK PROJECT?

A. Yes. While Vogtle is certainly not the first nuclear plant built in the United States, it is the first AP1000 nuclear plant and currently the only nuclear plant to be built in the United States in almost 30 years.¹² In addition, there are aspects of the AP1000 that are unique to this design and have never been built before. While China has also built AP1000s, there are differences between the Chinese AP1000s and the Vogtle Units, including where the owners of the China Projects deviated from the standard Nuclear Island modules for reasons such as the methods and capabilities of the Chinese companies that manufactured module components.¹³ In addition, the secondary side of the Vogtle Project is different from that of the Chinese AP1000s. Thus, SNC was required to develop its own testing procedures for the secondary side of the Project, which had not yet been tried.

Q. WHAT ARE THE CHALLENGES PRESENTED BY FOAK MEGAPROJECTS?

A. Typical construction projects incur a change phenomenon which is known in the industry as “ripple effect.” For example, the delivery delay of a needed commodity will “ripple” through a particular string of activities necessary to complete a specific element of the full

¹¹ “Managing Gigaprojects: Advice from Those Who’ve Been There, Done That”, Edited by Patricia D. Galloway, Kris R. Nielsen, Jack L. Dignum, Part 1 Megaprojects to Gigaprojects, ASCE Press, 2013, p. 1.

¹² The exception to this is Watts Bar 2 which started construction in the 1970s but was finished in 2016.

¹³ GPSC Docket No. 29849, Master List of all Staff Data Requests, Response to STF-2-5, pp. 27-28.

1 scope of work. However, FOAK megaprojects also exhibit another effect known as the
2 “ricochet effect.” Simply put, it is almost impossible to introduce a significant change into
3 an element of work on a megaproject that does not have some unexpected and unintended
4 impact on some other element(s) of work. While ripple effects are generally isolated to a
5 particular string of logically related activities within a scope of work, a ricochet effect will
6 bounce through non-logically linked activity strings in unexpected and unpredictable ways,
7 which results in unintended impact consequences for those other activities.¹⁴

8 For example, a piece of equipment is modified to meet a change in an operational
9 requirement, which in turn increases the size and weight of the piece of equipment that
10 triggers the requirement for a heavy lift crane. Use of the heavy lift crane requires a change
11 in sequence to the project (shifting other lifts) and work along the crane’s path to be cleared
12 for the lifts. Ripple effects in this case relate to the direct impacts of the change such as the
13 change in crane requirements, while ricochet effects in this case relate to the both the
14 resulting impacts to the other planned lifts that must be rescheduled and the impacts to
15 other crafts from having to clear the area where the heavy lift is now required.

16 In addition to change impact, there is an added impact when FOAK elements are part of
17 the initial scope via technology, equipment, or various components. Project controls are
18 challenged in that FOAK projects do not have a historical cost record or data from which
19 to develop a comparable basis of estimate or the history to understand how the technology,
20 the design, the equipment, or the components will actually perform to the “theoretical”

¹⁴ “Managing Gigaprojects: Advice from Those Who’ve Been There, Done That”, Edited by Patricia D. Galloway, Kris R. Nielsen, Jack L. Dignum, Chapter 8 – Six Challenges to Controlling Megaprojects, pp. 154-155, ASCE Press, 2013.

calculations that formed the basis of the FOAK design. Thus, the schedule is more sensitive to both ripple and ricochet effects, which makes both the identification, trending, and forecasting more complicated and those effects may pass through hundreds of different and even seemingly unrelated activities.

Q. WHAT WERE THE FOAK RISKS THAT WERE UNIQUE TO THE VOGTLE PROJECT?

A. Vogtle had several unique FOAK (or similarly “first-in-a-while”) aspects that presented risks to the Project, including but not limited to:

- The first nuclear plant constructed in the United States in almost 30 years.
- The limited availability of qualified craft labor and the challenge of achieving the necessary productivity goals considering the previously dormant nuclear construction industry.
- The limited availability of qualified material and equipment suppliers.
- Changes in licensing from that of the nuclear plants constructed in the 1960s-1980s.
- The AP1000 design, including unidentified scope risks and startup and testing risks.

Q. WHAT WERE THE FOAK RISKS ASSOCIATED WITH THE LENGTH OF TIME SINCE OTHER NUCLEAR PLANTS WERE CONSTRUCTED?

A. The building boom for domestic nuclear power plants ended in the 1980s. The last plant to enter service in the United States (other than Watts Bar 2) was Watts Bar 1 in 1996. The boom had started in the 1960s, which, by its end, increased the number of qualified craft

1 and non-manual availability, some with 20+ years of experience. In addition, due to the
2 number of nuclear plants under construction in this period, there were numerous equipment
3 suppliers and multiple engineering and construction organizations directly supporting the
4 nuclear industry. With the end of the nuclear boom in the 1980s, the number of skilled and
5 qualified craft available to construct the Vogtle Project was a challenge, especially given
6 the stringent Nuclear Regulatory Commission (“NRC”) requirements under which a
7 nuclear plant in the United States must be constructed.

8 **Q. WHAT WAS THE FOAK IMPACT OF THE LACK OF CRAFT WITH NUCLEAR**
9 **EXPERIENCE?**

10 A. Due to the lack of skilled craft labor in the nuclear industry, the ability to forecast
11 productivity rates for the labor force and craft was challenging. Also unknown was whether
12 early productivity rates could be maintained or improved over time given the lack of
13 information regarding actual productivity rates for new nuclear construction in the United
14 States. The Project’s projected cost and schedule were heavily dependent on assumptions
15 related to labor productivity. Thus, accurate projections of cost and schedule were
16 challenging.

17 **Q. WHAT WAS THE FOAK IMPACT RELATED TO MATERIAL AND**
18 **EQUIPMENT SUPPLIERS?**

19 A. Like the availability of skilled and nuclear-qualified craft, supply chain issues were also a
20 known risk due to the limited number of nuclear material and equipment suppliers around
21 when the Project began. The number of qualified suppliers and manufacturers of AP1000
22 components was limited, creating a potential risk to both cost and schedule stemming from
23 the lack of reasonable alternative suppliers.

1 **Q. WHAT WERE THE FOAK CHALLENGES RELATED TO LICENSING?**

2 A. Since Vogtle was the first nuclear plant in the United States in almost 30 years, there was
3 also additional FOAK risk with emerging licensing issues and design issues unique to the
4 AP1000. Plants were previously built under the NRC's 10 CFR 50 licensing process, which
5 allowed a utility to proceed with construction "at risk," which was a customary practice.
6 Under the 10 CFR 50 licensing process, field engineering had the authority and latitude to
7 resolve many issues that arose during construction. That latitude changed with the NRC's
8 introduction of 10 CFR 52, the new licensing process by the NRC, which combined the
9 construction and operating license into one process. The NRC's authorization to operate
10 the plant is conditional on the licensee demonstrating that the proposed inspections, tests,
11 and analyses performed provide assurance that the corresponding acceptance criteria have
12 been met and that the plant has been constructed and will be operated in strict compliance
13 with all the applicable nuclear regulatory requirements. This is referred to as the
14 Inspections, Tests, Analyses and Acceptance Criteria ("ITAAC"), which is a new licensing
15 process with which both utilities and craft had no prior experience.

16 The change in licensing also meant uncertainty as to how the NRC might interpret the new
17 licensing requirements that might require the work to be performed differently, undertake
18 more extensive inspections or redo already completed work. Thus, this FOAK risk unique
19 to Vogtle created the possibility of a delay to fuel load because of ITAAC closure, licensing
20 challenges, or inadequate QA documentation as this was the first new baseload nuclear
21 plant to be licensed by the NRC under new regulations.

1 **Q. WHAT WERE THE FOAK RISKS RELATED TO THE AP1000 DESIGN?**

2 A. the AP1000 standard design was still being finalized when the construction of the Project
3 began. While this was viewed in the industry as a means of expediting nuclear power plant
4 construction, it also added risk of higher rates of rework as design changes were necessary
5 throughout the Project. Being a FOAK design, unidentified scope risks could arise that
6 could not reasonably be incorporated into the SNC ETC.

7 In addition, while the initial intent was that multiple licensees could build the same standard
8 plant at the same time without separately having to achieve design approval from the NRC,
9 the abandonment of the VC Summer Plant and the Levy Plant resulted in the Vogtle Project
10 becoming the sole AP1000 project in the United States. This meant that GPC could no
11 longer take advantage of lessons learned and cost sharing as member of a utility owners'
12 group. In addition, while the AP1000 had reduced commodity quantities and a
13 corresponding smaller footprint as compared to the nuclear plants of the 1980s, the smaller
14 footprint contributed to a more congested site, made construction and installation more
15 difficult, and created scheduling challenges.

16 **Q. WERE THERE OTHER FOAK SCOPE RISKS THAT COULD NOT HAVE BEEN**
17 **REASONABLY INCORPORATED INTO THE SNC ETC?**

18 A. Yes. The lack of other existing AP1000 design plants also posed testing and startup risks.
19 While the Project was prepared to address any problems arising out of the testing of the
20 China units to avoid similar issues at Vogtle Units 3 and 4, there are significant differences
21 between the Chinese AP1000 and the Project as well as differences in the licensing between
22 the two countries. In addition, with the cancellation of the VC Summer nuclear plant, the
23 burden and cost of any licensing issues that might arise would fall entirely on GPC. As the

1 Project will be the first AP1000 to operate in the United States and the first new nuclear
2 plant in decades, the Project would be subject to an untested and extensive testing regime
3 (ITAAC), which ran the risk of delaying the COD. Again, due to the FOAK nature of the
4 issue, while general testing and startup risks were identified, they could not reasonably
5 have been precisely quantified or mitigated at the time the ETC was being completed in
6 the VCM 17 timeframe (late 2017).

7 **Q. WERE THERE OTHER SIGNIFICANT CHALLENGES ASSOCIATED WITH**
8 **THE PROJECT IN ADDITION TO THE MEGAPROJECT AND FOAK RISKS?**

9 A. Yes. We discuss the challenges later within **Section X** of our testimony.

10 **V. PRUDENCE EVALUATION PROCESS**

11 **Q. HOW DID YOU APPROACH THE PRUDENCE REVIEW OF THE DECISION-**
12 **MAKING PROCESS?**

13 A. The approach we utilized in the prudence review of Vogtle Units 3 and 4 is consistent with
14 the approach previously adopted in each of the prior prudence reviews conducted by the
15 Pegasus-Global team over the past 35 years, including Vogtle Units 1 and 2. We conducted
16 a qualitative review that focused on the SNC transition plan and the Bechtel Construction
17 Completion Agreement as a basis of moving forward with Vogtle Units 3 and 4 after the
18 Commission's VCM 17 Order, including the utilization of lessons learned from the
19 AP1000 nuclear units in China and from Vogtle Unit 3 for Unit 4. We also reviewed the
20 requirements under which the GPSC will base its review of the Company's filing.

1 **Q. DID YOU REQUEST AND REVIEW PROJECT DOCUMENTS AS PART OF**
2 **YOUR REVIEW OF GPC'S AND SNC'S MANAGEMENT?**

3 A. Yes. We requested, obtained, and reviewed project documentation to reasonably ensure
4 that the conclusions reached by management were supported by facts. We had access to
5 thousands of documents including those made available by GPC and public documents
6 such as regulatory filings and orders. Documents reviewed included contracts, plans,
7 policies, procedures, reports, presentations, minutes, NRC documents, schedules, etc. A
8 list is included as **Exhibit 3**.

9 **Q. WHY IS THE REVIEW OF PROJECT DOCUMENTATION IMPORTANT IN**
10 **EVALUATING WHETHER THE DECISIONS OF THE VOGTLE PROJECT**
11 **MANAGEMENT RELATIVE TO THE COST INCURRED WERE REASONABLE**
12 **AND PRUDENT?**

13 A. The documentation developed over the life of the Project conveys a number of individual
14 snapshots as well as more complete perspectives of project issues, concerns, problems,
15 policies, changes, responses, and practices, both positive and negative in impact. While not
16 completely definitive, the documentation can provide valuable insight into the larger
17 pattern of events, which can be indicative of underlying conditions and can demonstrate
18 what was known or should reasonably have been known at particular points in time. The
19 project documentation provides a basis to analyze and understand what happened, why it
20 happened, when it happened, when it was known, its effect, and the response to a given
21 event. Project documentation, such as that which we reviewed, is a key component in
22 developing an overall perspective and assessment of project performance – both effective
23 and ineffective.

1 **Q. CAN A PRUDENCE EVALUATION RELY ENTIRELY ON DOCUMENTATION?**

2 A. No. Documentation alone does not provide a complete or entirely accurate picture of events
3 that have transpired. For instance, not every decision is meticulously documented, and this
4 is consistent with prudent practice, since meticulous documentation of every decision
5 would often waste valuable project resources and unnecessarily negatively impact cost. On
6 the other hand, documents can also be taken out of context and be improperly isolated from
7 the “universe” of documents or broader available information that provide necessary
8 context. While documents may indicate a larger trend or recurring condition, any individual
9 can be influenced by events that are not always identified in documentation. Consequently,
10 documentation must be supplemented by personal interviews to facilitate a broader and
11 deeper appreciation of the project background and provide additional insight into historical
12 events and conditions.

13 Interviews are a necessary part of fact collection and serve to confirm facts, gather new
14 information, and fill in gaps in documentation. The combination of both document review
15 and personal interviews aids in “rounding out” the clearest possible picture of project
16 history and management performance. Interviews establish the factors which precipitate a
17 condition, result in resolution of a condition, or provide the framework for future
18 management execution.

19 **Q. DID YOU CONDUCT SUCH INTERVIEWS OF GPC AND SNC PERSONNEL?**

20 A. Yes. The Pegasus-Global team and both of us interviewed several key members of the
21 Vogtle Project Management Team. The list of personnel interviewed is provided in **Exhibit**
22 **4.**

1 **Q. DID YOU ALSO REVIEW TESTIMONY?**

2 A. Yes, we reviewed testimony in all the VCM proceedings beginning with VCM 17 as well
3 as selected testimony from the Certification filing.

4 **Q. DID YOU ALSO TOUR THE VOGTLE PROJECT SITE?**

5 A. Yes, to gain a full understanding of the scope of the Project and its complexity, we toured
6 the Vogtle Project. Construction projects are not simply “concepts” built on paper; they are
7 physical structures that must be seen to be understood. It is often more difficult to draw a
8 conclusion as to the magnitude and possible impact of a change if one has not seen the
9 conditions within which that change was accomplished.

10 **Q. DO YOU BASE YOUR FINDINGS AND CONCLUSIONS SOLELY ON WHAT**
11 **THE PROJECT MANAGEMENT TEAM TOLD YOU IN INTERVIEWS AND**
12 **DURING THE SITE TOURS?**

13 A. No. Evaluation of a large complex project is a cyclical process that starts with the project
14 documentation and records. Having identified the issues and events to be further evaluated,
15 we interviewed those Project personnel with direct knowledge of such issues, yielding
16 additional insight and knowledge, which often leads to the discovery of additional
17 documents or other sources of information that would not otherwise have been identified
18 as relevant to the issue or event. By talking to multiple Project personnel and by examining
19 the widest possible document base for each issue and event, we assured ourselves that we
20 had sufficient basis to reach informed findings and conclusions relative to each GPC
21 decision evaluated.

1 **Q. HAVE YOU ENCOUNTERED ANY DIFFICULTIES OR PROBLEMS IN**
2 **GATHERING INFORMATION THAT YOU NEEDED FROM GPC OR SNC?**

3 A. No.

4 **Q. HAS GPC BEEN TRANSPARENT WITH THE INFORMATION REGARDING**
5 **THE PROJECT WITH THE GPSC, THE CM, AND THE COMMISSION STAFF?**

6 A. Yes. GPC has continued to provide information to the GPSC, the CM, PIA Staff, and PIA
7 Staff's consultants on an on-going basis. In addition, it is our understanding that the CM
8 and PIA Staff attend the Monthly Project Review meetings and also meet monthly with
9 GPC to review the Vogtle Project Management Board ("VPMB") monthly presentations.

10 **Q. HAVE YOU REVIEWED THAT INFORMATION AS WELL?**

11 A. Yes.

12 **VI. PROJECT OVERSIGHT AND MANAGEMENT**

13 **Q. PLEASE PROVIDE AN OVERVIEW OF THE POST-WEC BANKRUPTCY**
14 **PROJECT STRUCTURE.**

15 A. The new Project structure was implemented in 2017 as part of the Project Transition
16 through the Georgia Power Project Oversight organization and is led by GPC's Nuclear
17 Development Senior Vice President.¹⁵ This organization has comprehensive
18 responsibilities covering the following areas:¹⁶

- 19 • Project performance: overseeing the metrics and reporting for overall Project
20 performance (including engineering, procurement, and construction) and

¹⁵ Plant Vogtle Units 3 and 4 Project Execution Plan ("PEP"), Version 8.1, April 2018, p. 9.

¹⁶ Plant Vogtle Units 3 and 4 PEP, Version 8.1, April 2018, pp. 10-11.

1 communication of such information to GPC and Co-Owner leadership;
2 responsible for overseeing completion of direct construction and non-
3 construction milestones that ultimately support the cost and schedule of the
4 Project.

- 5 • Schedule oversight: overseeing the integrated Project schedule, monitoring
6 whether Bechtel is achieving milestones as planned, focusing on critical path
7 activities, and progressing towards the targeted in-service dates; responsible for
8 overseeing schedule-related metrics and reporting to measure schedule
9 performance.
- 10 • Financial oversight: tracking expenditures against projections to account for
11 variances and to remedy them accordingly. GPC independently reviews and
12 assesses outputs from the Project Business Operations organization, including
13 reviewing system inputs and ensuring reconciliations to the financial general
14 ledger. GPC established a Financial Review Board (“FRB”) to review and
15 assess Project financial metrics, trends, and issues as highlighted in VPMB
16 materials.
- 17 • Risk oversight: responsible for ensuring effective processes are in place to
18 identify, assess, report, and mitigate Project risks; manages the identification
19 and mitigation of risks with the greatest potential to affect the Project and
20 ensures these risks are communicated to Project leadership and addressed to
21 mitigate potential impacts on schedule and/or cost.
- 22 • Site Operations oversight: overseeing operations with a focus on all aspects of
23 the Project that support testing, startup, and preparation to operate.

1 Under the new Project structure, SNC serves as the main Project contractor with ultimate
2 responsibility for successful completion of the Project on behalf of the Co-Owners
3 including GPC. Bechtel, as the primary construction contractor, manages the overall
4 execution and direction of day-to-day Project activities. WEC retained engineering design
5 authority but under SNC direction.

6 **Q. WHAT GOVERNING BOARDS WERE ESTABLISHED TO OVERSEE THE**
7 **PROJECT?**

8 A. As part of the new Project structure, in addition to oversight by the GPC and Southern
9 Company Boards of Directors (“BODs”), GPC implemented different governing boards to
10 provide specific oversight to various elements of the Project. These governing boards
11 included:

- 12 • The FRB was established in 2019 and charged with oversight of the Project
13 with regard to financial matters including cost estimates and risk management.
14 It is comprised of the GPC senior executives including the Chief Financial
15 Officer (“CFO”), Senior Vice President of Nuclear Development, Comptroller,
16 and legal counsel. The SNC CFO, among other Project leaders, retains a
17 standing invitation. The FRB oversees cost and schedule changes that may
18 impact the approved budget and maintains alignment for disclosures and
19 forecasting.
- 20 • The Vogtle Expansion Oversight Committee (“VEOC”) provides broad
21 oversight of GPC’s activities and obligations in connection with the Project. It
22 is led by the CEO of Southern Company and is comprised of the CEO of GPC,

1 the CFO of Southern Company, the COO of Southern Company, and the CEO
2 of Alabama Power.

- 3 • The VPMB reviews major decisions and provides a forum for review and
4 discussion of relevant Project information, including monthly reviews of safety,
5 quality, performance, and cost. The VPMB reviews and approves each semi-
6 annual budget prior to the budget being submitted to the GPSC as part of the
7 VCM filing.¹⁷ It is comprised of senior executive representatives from various
8 GPC functional disciplines (power generation, project development, budgeting
9 and financing, external affairs, etc.) and the other Vogtle Co-Owners are invited
10 to attend the meetings.

- 11 • The Vogtle Construction Review Board (“VCRB”) provided strategic advice to
12 the Chairman, President and CEO of SNC on the execution of the Project. The
13 VCRB was chaired by Luis Reyes, who previously worked at the NRC and has
14 provided expert advice to several nuclear organizations and included other
15 representatives with vast nuclear and construction industry experience.¹⁸

16 **Q. WHAT WAS THE ROLE OF THE GPC BOARD OF DIRECTORS IN THE**
17 **PROJECT OVERSIGHT AND MANAGEMENT?**

- 18 A. The GPC BOD provided oversight of GPC’s share of Vogtle Units 3 and 4, GPC’s
19 management of oversight on the Project, oversight of SNC’s execution role, and the
20 VPMB. Each GPC BOD committee had specific oversight responsibilities as follows:¹⁹

¹⁷ VGT 3.0 Monthly Cost/Budget-to-Actual Review, March 22, p. 8.

¹⁸ As of September 2020, the VCRB transitioned into the Nuclear Safety Review Board (“NSRB”) to reflect the Project’s transition from construction into testing and startup.

¹⁹ Plant Vogtle Units 3 and 4 PEP, Version 8.1, April 2018, p. 7.

- Controls and Compliance Committee: provides oversight of Project financial controls and procedures, including oversight of the Company’s internal controls, compliance, ethics, and employee concerns.
- Finance Committee: provides oversight of the capital budget and financing costs.
- Nuclear Committee: provides oversight of construction activities.

Q. WHAT WAS THE ROLE OF SOUTHERN COMPANY’S BOARD OF DIRECTORS IN THE PROJECT OVERSIGHT AND MANAGEMENT?

A. The Southern Company BOD provided oversight of Southern Company’s management of GPC and the construction of the Project. Each Southern Company BOD committee had specific oversight responsibilities as follows:²⁰

- Audit Committee: approves financial statements for filings with the Securities and Exchange Commission (“SEC”).
- Finance Committee: reviews and recommends approval of financial plans and equity contributions to subsidiaries.
- Nuclear/Operations Committee: reviews and oversees the Company’s primary operating segments (nuclear operations, power generation, etc.).

Q WHAT INFORMATION WAS COMMUNICATED TO THE BOARDS OF DIRECTORS AND WHAT DECISIONS DID THEY MAKE?

A. The Georgia Power and Southern Company BODs received updates at each board meeting on the Project. These updates included information about cost, schedule, contingency, risk

²⁰ Plant Vogtle Units 3 and 4 PEP, Version 8.1, April 2018, pp. 6-7.

1 management, construction progress, and challenges.²¹ Following the WEC bankruptcy, the
2 Southern Company BOD gave approval to go forward with the Project but set conditions
3 related to regulatory approvals.²² The GPC Board makes recommendations to the Southern
4 Company BOD to provide the funding for the Project, including funding for contingency.²³

5 **Q. WHAT WERE YOUR FINDINGS AND CONCLUSIONS PERTAINING TO**
6 **EXECUTIVE AND CORPORATE MANAGEMENT AND OVERSIGHT OF THE**
7 **VOGTLE PROJECT?**

8 A. We concluded that GPC and Southern Company senior management, executive
9 management, and the BODs: (i) had an effective oversight process in place; (ii) focused on
10 important Vogtle Project issues; (iii) participated fully in strategic decisions; and (iv) have
11 remained active in issue resolution, being fully informed and engaged throughout the
12 Vogtle Project execution. Based on our experience and extensive analysis of senior
13 executive and board involvement, we concluded that the management oversight process
14 was thorough, complete, and consistent with what would be expected of a reasonable and
15 prudent utility.

²¹ e.g., August 15, 2018, presentation to the GPC BOD; October 16, 2018, Joint Boards of Directors for GPC and Southern Company Meeting Presentation.

²² Minutes for Special Meeting of the Southern Company BOD, August 30, 2017.

²³ e.g., August 2, 2018, minutes of GPC BOD meeting.

VII. PROJECT POLICIES, PROCEDURES AND CONTROLS

A. APPLICABLE STANDARDS FOR EVALUATION OF POLICIES, PROCEDURES, AND CONTROLS

Q. WHAT INDUSTRY STANDARDS DID YOU RELY ON TO EVALUATE THE PRUDENCY OF SNC'S PROJECT POLICIES, PROCEDURES, AND CONTROLS?

A. In addition to the vast experience we have had on similar projects, we relied primarily on industry standards published by the Project Management Institute ("PMI"), the Association for the Advancement of Cost Engineering International ("AACE"), and the Construction Management Association of America ("CMAA"), all which develop standards that suggest best practices in the execution of projects.

Q. DID YOU REVIEW THE INDUSTRY STANDARDS THAT WERE IN EFFECT AT THE TIME OF THE PERIOD OF YOUR REVIEW?

A. Yes. Many industry standards we have used in our review have been updated. We reviewed SNC's policies and procedures that were in effect at the time of the transition from the WEC Engineering, Procurement, and Construction ("EPC") structure to the SNC/Bechtel structure (the "Project Transition") and as updated through the execution of the Project.

Q. DID YOU REVIEW THE STANDARDS IN LIGHT OF GPC'S EXECUTION OF THE PROJECT?

A. Yes, we reviewed GPC's and SNC's execution over the course of the Project beginning with VCM 17 to assess whether the policies and procedures in place, as updated, were consistent with the evolution of industry standards over the same time period.

1 **B. PROJECT POLICIES AND PROCEDURES**

2 **Q. WHAT PROJECT PLANS, POLICIES, AND PROCEDURES DID YOU REVIEW?**

3 A. Our review of policies and procedures began with those in place at the time of the Project
4 Transition and continued with those in place today. **Exhibit 5** provides a list of the plans,
5 policies, and procedures we reviewed.

6 **Q. DID YOU FIND THAT THE GPC AND SNC POLICIES AND PROCEDURES**
7 **WERE CONSISTENT WITH THE UPDATES TO THE INDUSTRY STANDARDS**
8 **IN EFFECT AT THE TIME OF POLICY AND PROCEDURE UPDATES?**

9 A. Yes.

10 **Q. WERE THE PROJECT POLICIES AND PROCEDURES TYPICAL OF WHAT**
11 **YOU HAVE USED AND FOUND ON OTHER POWER PLANT PROJECTS?**

12 A. Yes, the policies and procedures are typical of what we have used and found on other large
13 projects of this size, magnitude, and complexity.

14 **C. PROJECT CONTROLS**

15 **Q. WHAT ARE “PROJECT CONTROLS”?**

16 A. “Project Controls” is a general term of art within the construction industry, which denotes
17 those systems used by management to enable it to measure progress toward a project
18 objective, evaluate the work remaining to be completed to achieve that project objective,
19 and report the status information gathered to project management in a timely manner.
20 These controls enable project management to take necessary corrective action to achieve
21 the project objective.

1 For the purposes of our prudence evaluation of the Vogtle Project, we examined the
2 following project control processes, each of which is examined in greater detail elsewhere
3 within this testimony:

- 4 • Scope and Change Control Management;
- 5 • Schedule Management;
- 6 • Cost Management;
- 7 • Risk Management;
- 8 • Project Controls Reporting; and
- 9 • Lessons Learned Management.

10 These functions represent the core of program management and, as such, are most integral
11 to the overall success of the Project.

12 **Q. WHAT ARE THE KEY ELEMENTS OF PROJECT CONTROLS?**

13 A. Project controls refers to a set of tools and processes that enable project management to:
14 (1) plan and establish cost and schedule baselines for the project; (2) monitor and measure
15 the current project conditions and progress against the baseline plan; (3) evaluate that data
16 within the context of trends or forecasts to predict costs and schedule dates at completion;
17 and (4) have the contextual information that can allow for corrective actions, if necessary.²⁴
18 Depending on the specific conditions of a given project, the project controls on a given
19 project are typically customized to meet the needs of the project's owner and typically
20 evolve over the course of the project.

²⁴ AACE International, Recommended Practice 10S-90: Cost Engineering Terminology, p. 97, May 15, 2023.

1 **Q. WHAT ARE THE PRIMARY TYPES OF PROJECT CONTROLS?**

2 A. In the construction industry, the primary controls pertain to cost/change controls and
3 schedule/progress controls, given the importance of cost and schedule to the overall
4 performance of the Project. These elements are updated through the forecasting and earned
5 value management processes in addition to being highly aligned with risk controls because
6 realized risks generally have an associated cost and/or schedule impact. Similarly, the
7 reporting of these elements of project controls conveys a project's status to project
8 management and other stakeholders. In addition, projects such as Vogtle Units 3 and 4 also
9 benefit from lessons learned from similar plants and prior unit completion (e.g., lessons
10 learned from Unit 3 that are then applied to Unit 4).

11 **Q. IS IT POSSIBLE TO RIGIDLY FOLLOW AN EXECUTION PLAN SET EARLY**
12 **IN A PROJECT FOR THE PROJECT'S ENTIRE DURATION?**

13 A. Typically, no. Construction projects are inherently executed within a dynamic
14 environment, and these projects can be influenced by a myriad of factors, events, and issues
15 arising during the project's execution. As PMI notes, "Plans may need to be revised or new
16 plans developed to account for events or conditions that emerge."²⁵ Regular reviews and
17 evaluations of the project plans and processes allow the project management team to
18 implement continuous improvements to the plans and processes in place as more detailed
19 and specific information is obtained.

²⁵ PMI, *A Guide to the Project Management Body of Knowledge ("PMBOK® Guide") – Seventh Edition*, p. 67 (2021).

1 **Q. DESCRIBE THE PROJECT CONTROLS STRUCTURE FOR THE PROJECT.**

2 A. Following the Project Transition, the Project Controls function was placed in the Business
3 Operations Group, separate from the Construction Group with cost, schedule, and risk
4 under the same leadership structure as all three are related. This separation ensured the
5 Project Controls Function was not overly influenced by the Construction Team and vice
6 versa.²⁶

7 **Q. WHAT WERE THE ADVANTAGES OF HAVING SCHEDULE, COST, AND RISK**
8 **UNDER THE SAME LEADERSHIP STRUCTURE?**

9 A. Schedule, cost, and risk are project control tools that in our experience provide a more
10 robust analysis of a project's status when they are aligned.

11 **Q. DID THE TRANSITION OF PROJECT CONTROLS FROM HOW IT HAD BEEN**
12 **PREVIOUSLY PERFORMED UNDER THE EPC CONSORTIUM TAKE TIME?**

13 A. Yes. Our review of the project record determined that it took approximately six months to
14 have a reasonable base for projections and a risk adjusted schedule, which in our experience
15 was a reasonable period to undertake this alignment and to get all the parties aligned with
16 the rigid schedule, cost, risk and reporting process.

²⁶ July 2018 Monthly Status Report, August 20, 2018, p. 25.

1 **D. PROJECT SCOPE AND CHANGE MANAGEMENT**

2 **Q. WHAT ARE THE GENERAL OBJECTIVES OF SCOPE AND CHANGE**
3 **MANAGEMENT?**

4 A. Project changes are inevitable and so some type of change control process is necessary.
5 The change control process involves a change order process that controls changes in scope,
6 schedule, and cost as measured against an established baseline. The objectives are to ensure
7 change is managed effectively; that changes are documented, reviewed, and approved (or
8 disapproved); that risks response strategies are employed to minimize impacts on cost and
9 schedule; and that changes are effectively communicated.

10 **Q. ARE THERE INDUSTRY STANDARDS TYPICALLY USED FOR MANAGING**
11 **CHANGES ON A PROJECT?**

12 A. Within the construction industry there are a number of ways in which changes can be
13 managed that include common practices such as having change requests include estimated
14 cost and schedule impacts and may include utilization of a Change Control Board (“CCB”)
15 to review, evaluate, and approve, defer, or reject proposed changes.²⁷ While these types of
16 practices and processes are key to managing change, as noted by the CMAA in its Cost
17 Management Guidelines, “Change order control is more of an art than a science.... There
18 are no exact solutions....”²⁸

²⁷ PMI, *PMBOK® Guide – Sixth Edition*, p. 115 (2017).

²⁸ CMAA, *Cost Management Procedures*, 2018 Edition, p. 78.

Q. WHAT PROCEDURES WERE USED FOR SCOPE AND CHANGE MANAGEMENT?

A. SNC utilized a change control procedure for monitoring, controlling, and approving changes in cost, schedule, or scope against approved performance measurement baselines. The procedure was modified over the course of the Project.²⁹ The change control process is under the control of the CCB, which is made up of SNC leadership involved in Vogtle Units 3 and 4.³⁰ The change control procedure outlines the process by which changes are identified and documented. It identifies the threshold for presentation to the CCB and the circumstances under which the Vogtle Co-Owners may need to be notified or approve changes.³¹

Q. HOW WAS THE SCOPE AND CHANGE PROCESS UTILIZED ON THE PROJECT?

A. Change control was overseen by the CCB utilizing Change Control Forms (“CCFs”) to document proposed changes. CCFs are used for a wide variety of reasons, including adding scope and costs, releasing funds previously approved, changing the funding source, reductions in cost, etc. Over time, CCFs were used to document monthly the cumulative impact of approvals below the CCB threshold, such as CCFs approved by the Site Project Managers. The CCFs also tracked Bechtel Trends and WEC Project Impact Notifications, including having a box designated for if a change is specific to the Bechtel Construction Completion Agreement (“CCA”).

²⁹ SNC Change Control Procedure, ND-PC-VNP-006, Version 2, p. 4; Version 3, p. 4; Version 4, p. 4.

³⁰ SNC Change Control Procedure, ND-PC-VNP-006, Version 2, p. 7; Version 3, p. 10; Version 4, p. 8.

³¹ SNC Change Control Procedure, ND-PC-VNP-006, Version 3, pp. 15, 21; Version 4, pp. 12, 15.

Each CCF that meets the requirements for CCB approval is presented at a CCB meeting and its disposition recorded. The minutes document discussion of the requested change. Occasionally, the CCF is not approved or altered in some way by the CCB. The Cost Control Process evolved over time, which we find reasonable, but was effective in monitoring and evaluating changes to the Project.

Q. IS THIS PROCESS TYPICAL OF WHAT YOU FIND IN OTHER POWER PLANT PROJECTS ON WHICH YOU HAVE WORKED?

A. Yes, the process is consistent with what we have experienced on other power projects and is typical for a large construction project the size, magnitude, and complexity of the Vogtle Project.

E. SCHEDULE CONTROLS

Q. WHAT ARE THE GENERAL OBJECTIVES OF PROJECT SCHEDULE CONTROLS?

A. The general objectives of schedule controls are to identify what activities are of a critical nature (and the relationship those activities have to one another), how the various vendors' or contractors' activities relate to the critical path, and to track progress to ensure the project meets certain key milestones, including overall completion. A schedule is not a "once and done" activity; as the PMBOK® Guide notes, "Developing an acceptable project schedule is an iterative process."³²

³² PMI, *A Guide to the Project Management Body of Knowledge ("PMBOK® Guide") – Sixth Edition*, p. 207 (2017).

1 **Q. WHAT SCHEDULE MANAGEMENT POLICIES, PROCEDURES AND**
2 **PROCESSES WERE UTILIZED ON THE PROJECT?**

3 A. Prior to the WEC bankruptcy and through VCM 16, the Consortium was responsible for
4 the development of the initial Integrated Project Schedule (“IPS”), which was attached to
5 the EPC Agreement with GPC. The IPS was developed as the means and methods by which
6 the Project was to be executed. The Consortium was accountable to GPC for the IPS and
7 was required to monitor and report its progress in completing Project work in accordance
8 with the IPS.

9 Following the WEC bankruptcy, GPC made the decision to oversee the overall Project
10 Schedule, which was incorporated into the overall IPS that was filed with the Commission
11 in VCM 17. As discussed in **Section X** below, SNC made the decision to monitor
12 construction progress utilizing an aggressive target schedule. After the transition planning
13 was complete, SNC controlled the IPS schedule development process with the Vogtle Units
14 3 and 4 Scheduling Desktop Guideline.³³ This guideline defined the division of
15 responsibilities and the schedule development, updating and maintenance processes. These
16 processes included the directions for critical path determination and the process for
17 updating the schedule weekly.

³³ Southern Nuclear, Vogtle Units 3 and 4 Scheduling Desktop Guideline Revision 6, (September 7, 2018) p. 4.

1 **Q. DOES THE FACT THAT THE IPS CONTAINED 200,000+ ACTIVITIES MAKE**
2 **IT AN UNREASONABLE SCHEDULE THAT COULD NOT BE UTILIZED TO**
3 **MANAGE THE PROJECT’S PROGRESS?**

4 A. No. The IPS was more detailed than is typically seen on a construction project as the IPS
5 developed for the Vogtle Project broke down the Project into mini projects of more detail
6 that reflected the work to be performed in “Work Packages.” It should be noted that while
7 the overall schedule network had over 200,000 activities, the number of open activities that
8 are actively managed was far less at any given data date. For example, in 2020, in-progress
9 activities were between 4,300 and 4,700 across the mini projects.

10 **Q. IS IT INDUSTRY STANDARD FOR THE LEVEL AND DETAIL OF THE**
11 **CRITICAL PATH METHOD (“CPM”) SCHEDULE TO EVOLVE?**

12 A. Yes. The IPS had the appropriate level of detail in the areas of the schedule that were
13 expected to be needed at various timeframes over the course of the Project to support the
14 engineering, procurement, and construction activities scheduled to be completed in that
15 same timeframe.

16 **Q. HOW WAS THE SCHEDULE PROGRESS REVIEWED ON THE PROJECT?**

17 A. Schedule progress was reviewed weekly in a couple of different ways. First, the critical
18 paths were analyzed at the end of each week by performing a backward pass from the
19 Substantial Completion milestone dates for each unit back to the current week’s activities.
20 The results of this analysis were circulated to the site scheduling team and construction
21 personnel for concurrence. Any negativity in either Unit’s schedule was monitored daily
22 and required mitigation from the appropriate team. In addition, planned scheduled hours

1 for the week were compared to the weekly earned hours to determine the Schedule
2 Performance Index (“SPI”) value.

3 **Q. HOW WAS SCHEDULE PERFORMANCE DETERMINED ON THE PROJECT?**

4 A. Schedule performance was measured using the industry best practices method of
5 comparing planned hours divided by earned hours to determine the SPI. These SPI
6 calculations, when evaluated over time, contributed to a trend analysis, which assisted in
7 determining schedule modifications such as the need for re-baselining.

8 **Q. DO CHANGES TO PROJECT MILESTONES OR RE-BASELINING OF THE**
9 **SCHEDULE INDICATE THAT SCHEDULE CONTROLS ARE DEFICIENT?**

10 A. No. As indicated above, schedule controls are designed to monitor the status of project
11 activities, to update project progress, and to manage changes to the schedule baseline.
12 Unexpected events occur on large complex projects and can delay the completion of
13 impacted project milestones. Schedule controls do not cause such events; they help to
14 monitor the effect such unexpected events may have and help to inform the appropriate
15 adjustments to the underlying schedule.

16 **Q. IS IT TYPICAL FOR AN IPS TO EVOLVE OVER THE COURSE OF THE**
17 **PROJECT?**

18 A. Yes. As we testified earlier, the IPS typically evolves over the course of delivering a
19 project. It is even more common and typical in megaprojects like the Vogtle Project for the
20 IPS to be improved and become more detailed as additional information becomes available,
21 such as the completion of engineering to inform specific construction installation activities.

1 **Q. IS THE IPS THE ONLY MEANS BY WHICH UTILITIES OVERSEE AND**
2 **MONITOR THE WORK BEING EXECUTED?**

3 A. No. Standard utility practice is not to solely rely on the IPS to oversee and monitor the
4 execution of the work, but to utilize other project control tools and processes that provide
5 more current and reliable information upon which to assist in taking reasonable and prudent
6 actions and decisions.

7 **Q. IS THE IPS THE ONLY METHOD ON THE VOGTLE PROJECT THAT IS BEING**
8 **USED BY GPC AND SNC TO OVERSEE AND MONITOR THE WORK BEING**
9 **EXECUTED?**

10 A. No. GPC and SNC used other project control tools and processes that were instituted on
11 the Project and by which GPC reasonably and prudently has been able to oversee the
12 Project's progress and schedule adherence.

13 **Q. WHAT OTHER METHOD WAS UTILIZED ON THE PROJECT TO MEASURE**
14 **PROGRESS, MONITOR THE CRITICAL PATH ACTIVITIES AND REPORT ON**
15 **PROGRESS PLANNED AND ACHIEVED?**

16 A. Progress was also monitored using an Earned Value Management ("EVM") system, which
17 is a common method in the industry used to measure construction progress. These
18 calculations, when evaluated over time, inform a trend analysis that assists in the cost
19 forecasting process.

1 **Q. WHAT WERE YOUR CONCLUSIONS REGARDING THE USE OF THE**
2 **SNC/BECHTEL EVM SYSTEM FOR MONITORING SCHEDULE?**

3 A. A review of the EVM methodology applied on the Project shows that the Project captured
4 earned value metrics for assessing performance that aligned with industry standards by
5 using the same or similar terminology/definitions, and establishing and maintaining
6 performance measurement baseline, change control, and periodic reviews of ETC and
7 EAC.³⁴

8 **Q. IN YOUR REVIEW OF THE VOGTLE PROJECT, DID YOU FIND ANY**
9 **EVIDENCE OF INADEQUATE SCHEDULE CONTROLS THAT CAUSED**
10 **INEFFICIENCIES?**

11 A. No. The scheduling controls used at the Vogtle Project were appropriate and in line with
12 what is expected in typical large projects of comparable size, scope, and complexity to the
13 Project. In our experience, it is appropriate to use desktop procedures, which are project
14 specific and more detailed than typical company procedures. In addition, SNC's use of a
15 Work Package based schedule is not only more detailed but also a more robust method of
16 controlling a project than a typical Level 3 schedule.

³⁴ SNC, Vogtle 3 & 4 Project Cost Management Group, Cost Management Guideline, Revision 6, (January 6, 2021).

1 **Q. WAS THE SCHEDULE EVOLUTION PROCESS THAT YOU ASSESSED ON THE**
2 **VOGTLE PROJECT SIMILAR TO THE SCHEDULE EVOLUTION YOU HAVE**
3 **SEEN ON OTHER MEGAPROJECTS OF THE SAME COMPLEXITY AS**
4 **VOGTLE?**

5 A. Yes. The schedule development evolution as we have described is the same process used
6 on other megaprojects in which we have been involved.

7 **Q. ARE THE SCHEDULE CONTROL PROCESSES TYPICAL OF WHAT YOU**
8 **HAVE FOUND ON OTHER POWER PLANT PROJECTS?**

9 A. Yes, except these processes are much more robust than that of what we have found on some
10 other large projects of a similar size, magnitude, and complexity. Scheduling by work
11 package does not occur on the majority of the plants we have reviewed.

12 **F. COST CONTROLS**

13 **Q. WHAT ARE THE GENERAL OBJECTIVES OF COST CONTROLS?**

14 A. In general, as described in industry standards such as the PMBOK and CMAA, cost
15 controls are concerned with tracking and recording the costs incurred on a project. This is
16 done by comparing the specific cost categories established and estimated for the project to
17 what is being incurred for each cost category.³⁵

³⁵ PMI, *PMBOK® Guide – Sixth Edition*, p. 259 (2017); CMAA, *Construction Management Standards of Practice*, 2015 Edition, p. 25.

1 **Q. WHAT COST CONTROLS PROCEDURES WERE USED ON THE PROJECT?**

2 A. SNC utilized a Cost Management Guideline on the Project that provided recommended
3 approaches for budgeting, cost tracking, and cost analysis and control on the Project.³⁶ The
4 Cost Management Guideline establishes the roles and responsibilities of those involved in
5 the cost management processes and the fundamental approach to cost management on the
6 Project. The Cost Management Guideline detailed the methodologies for: developing a
7 detailed code of account structure; establishing the budget; tracking and controlling costs
8 against the budget; forecasting the final cost of the Project; identifying and assessing cost
9 impacts and variances; managing project uncertainty in the cost forecasts; and reporting
10 cost data and trends.³⁷ The contents of the Cost Management Guideline align with what
11 PMI prescribes for planning cost management, which is “...the process of defining how
12 the project costs will be estimated, budgeted, managed, monitored, and controlled.”³⁸

13 The Cost Management Guideline identified the steps involved in generating cost reports
14 and established two primary levels of cost reporting: 1) management reports (essentially
15 overall Project costs); and 2) functional reports (detailed reports used to manage costs by
16 cost owners and functional group leads).³⁹ It also established minimum reporting
17 guidelines that included monthly variance explanations, EAC variance explanations, cash
18 flows, resource utilization curves, action items, and risks/opportunities. The cost control
19 process enables the cost management team to measure the project's status relative to the

³⁶ SNC, Vogtle 3 & 4 Project Cost Management Group, Cost Management Guideline, Revision 6, (January 6, 2021).

³⁷ SNC, Vogtle 3 & 4 Project Cost Management Group, Cost Management Guideline, Revision 6, (January 6, 2021), p. 5.

³⁸ PMI, *PMBOK® Guide – Sixth Edition*, p. 235 (2017).

³⁹ SNC, Vogtle 3 & 4 Project Cost Management Group, Cost Management Guideline, Revision 6, (January 6, 2021), p. 31.

1 budget and explain and report variances monthly.⁴⁰ The budget to actual process requires
2 a monthly cost budget to actual review and reforecast process in place to allocate costs and
3 analyze budget versus actual variances.⁴¹

4 **Q. WHO HAD RESPONSIBILITY FOR MONITORING THE FORECASTED AND**
5 **ACTUAL COSTS AND UPDATING THE ETC AND PROJECT BUDGET?**

6 A. The Cost Management Team under the direction of the Project Controls Vice President
7 was responsible for tracking and controlling actual costs against the budget, forecasting the
8 final cost of the Project, and updating the budget every six months in alignment with the
9 VCM periods.⁴²

10 **Q. HOW WERE COSTS REPORTED ON THE PROJECT?**

11 A. SNC held recurring monthly cost review meetings with Functional Group Managers,
12 Department Cost Owners, the Cost Management Manager, Cost Analysts, the Project Vice
13 President, and others as necessary as part of the process for reviewing and communicating
14 changes to the Vogtle Units 3 and 4 cost projections. These meetings gave Project leaders
15 an opportunity to review the budget vs. actual analysis prior to the Monthly Cost/Challenge
16 Meetings with site leadership. Project leaders also reviewed the updated forecast. There
17 were also Risk Management Working Group (“RMWG”) meetings to review “high” or
18 “very high” risk events and to ensure proper risk management functions, processes, and
19 structure around the Project. Each month, cost and schedule updates were discussed with

⁴⁰ SNC, Vogtle 3 & 4 Project Cost Management Group, Cost Management Guideline, Revision 6, (January 6, 2021), pp. 16-19.

⁴¹ SNC, Vogtle 3 & 4 Project Cost Management Group, Cost Management Guideline, Revision 6, (January 6, 2021), p. 22.

⁴² SNC, Vogtle 3 & 4 Project Cost Management Group, Cost Management Guideline, Revision 6, (January 6, 2021); Docket No. 29849, Response to STF-28-9, February 2022 Update.

1 GPC and SNC leaders and the Co-Owners through the various governing boards.⁴³ In
2 addition, updates on the cost and schedule are provided monthly to the Commission and
3 the CM.⁴⁴

4 **Q. DID THE MONITORING OF COSTS LEAD TO UPDATES IN THE ESTIMATES**
5 **TO COMPLETE AND ESTIMATES AT COMPLETION?**

6 A. Yes. In addition to the update to the ETC and EAC at VCM 17, the ETC and EAC were
7 updated monthly, and those updates were reflected in each VCM filed with the
8 Commission. These major updates are discussed below in the Key Challenges and
9 Decisions in **Section X**.

10 **Q. THE PROJECT WILL BE COMPLETED AT A COST WELL ABOVE THE**
11 **ORIGINAL ESTIMATE. IS THAT EVIDENCE OF IMPRUDENCE ON THE**
12 **PART OF GPC AND SNC?**

13 A. Not necessarily, as we previously referenced, assessing prudence involves determining if
14 decisions were made in a reasonable manner in light of conditions and circumstances which
15 were known or reasonably should have been known when the decision was made. From a
16 cost perspective, this often centers around an evaluation of the information and decisions
17 made in establishing the baseline cost budgets and understanding the decisions and other
18 cost drivers that influence the actual costs incurred. We review these cost drivers and the
19 surrounding decisions later within **Section X.B**.

⁴³ SNC Vogtle Process Controls Narrative, VGT 3.0 Monthly Cost/Budget to Actual Review, Version 3, March 2022.

⁴⁴ e.g., July 2018 Monthly Status Report, August 20, 2018.

1 **Q. ARE THE COST CONTROL PROCESSES TYPICAL OF WHAT YOU HAVE**
2 **FOUND ON OTHER POWER PLANT PROJECTS?**

3 A. Yes, these processes are typical of what we have found on other large projects of this size,
4 magnitude, and complexity.

5 **G. RISK CONTROLS/CONTINGENCY**

6 **Q. WHAT ARE THE GENERAL OBJECTIVES OF RISK MANAGEMENT?**

7 A. As described in industry standards, the basic objective of risk management is to identify
8 and mitigate the impact of challenges to the project, as well as to optimize the likelihood
9 of realizing positive impacts to the project.⁴⁵ Typically, identifiable risks are reviewed for
10 probability and impact, as well as being assigned a category (e.g., cost, schedule,
11 technology, etc.) and a responsible party for monitoring a specific risk.

12 **Q. WHAT PROCESSES ARE INVOLVED IN PERFORMING RISK**
13 **MANAGEMENT?**

14 A. Industry standard risk management processes include risk management planning, risk
15 identification, risk analysis, risk response planning and implementation, and monitoring
16 and reporting of risk on the project.⁴⁶

⁴⁵ CMAA, *Construction Management Standards of Practice*, 2015 Edition, p. 127.

⁴⁶ PMI, *PMBOK® Guide – Sixth Edition*, p. 395 (2017).

1 **Q. WHAT DID SNC DO TO ENSURE EFFECTIVE RISK MANAGEMENT**
2 **PROCESSES WERE IN PLACE ON THE PROJECT?**

3 A. To ensure effective risk management processes were in place on the Project, SNC planned,
4 developed, and implemented a Risk Management Program for the Project.⁴⁷ The Risk
5 Management Program defined risk management roles and responsibilities in addition to
6 detailing the risk management process itself. Risks were not only identified, but response
7 strategies were also developed to avoid, transfer, mitigate, or accept the risks. Specific
8 actions were taken to implement the selected strategies.⁴⁸

9 **Q. WHAT WERE THE PRIMARY ROLES AND RESPONSIBILITIES IDENTIFIED**
10 **FOR RISK MANAGEMENT?**

11 A. Risk management for the Project was an iterative effort performed across the executive,
12 senior, and project management groups with different responsibilities assigned to each
13 group to collectively support the implementation of risk management on the Project.
14 Implementation of the Risk Management Program was largely the responsibility of the
15 Risk Management Group that developed and maintained the risk management processes
16 and tools, monitored the status of risk management activities, and reported the current
17 status of such activities to senior management. The health of the Risk Management
18 Program was monitored by the RMWG, which was chaired by the Project Controls
19 Director and comprised of the director/manager leadership team. The RMWG also
20 participated in monthly risk management meetings, providing concurrence to high and very

⁴⁷ SNC Risk Management Program, ND-PC-VNP-010, Version 3.0, August 27, 2020.

⁴⁸ e.g., There was also a risk closure process whereby, upon reaching a probability threshold (e.g., greater than 80% probability of occurrence), the cost of the risk was transferred from project contingency to the appropriate project line-item budget through the change control process.

1 high-risk statuses. The executive leadership team participated in quarterly challenge
2 reviews of the risk register to ensure all significant project risks were identified and were
3 actively being managed.⁴⁹

4 **Q. HOW WERE RISKS COMMUNICATED ON THE PROJECT AND TO PROJECT**
5 **EXECUTIVE MANAGEMENT?**

6 A. While the risk register itself served as a primary document that communicated the risks
7 and their respective statuses to the project participants, risks were also communicated
8 through the RMWG meetings, risk workshops/reviews, and quarterly meetings with senior
9 executives. For example, SNC's monthly project review meetings highlight top risks from
10 the reporting period for review and discussion; the VPMB reviews and discusses the key
11 risks during its meetings; and key risks are presented as part of the Project updates
12 presented to the Southern Company and GPC BODs.⁵⁰ Risks are also communicated to the
13 Commission and Staff via GPC's monthly status reports through Staff's request STF-142-
14 4, which requests monthly risk updates.

15 **Q. DID BECHTEL PARTICIPATE IN THE RISK MANAGEMENT EFFORTS ON**
16 **THE PROJECT?**

17 A. Yes. Bechtel was responsible for performing risk management over its scope of work. Its
18 risk management practices were similar in function to those of SNC, such as monthly risk
19 reviews and risk register updates. In addition, SNC's risk manager conducted monthly
20 reviews of Bechtel's risk register to assess for variances and/or gaps between Bechtel and

⁴⁹ SNC Risk Management Program, ND-PC-VNP-010, Version 3.0, pp. 6-8, August 27, 2020.

⁵⁰ e.g., Project Executive Review Meeting, slides 7-9, 14, 19, April 23, 2021.

1 SNC's risk registers to ensure qualified risks were captured and being managed
2 appropriately.

3 **Q. DO THE RISK MANAGEMENT PROCESSES ESTABLISHED ON THE**
4 **PROJECT ALIGN WITH INDUSTRY STANDARDS?**

5 A. Yes. The Risk Management Program established for the Project is more granular in its
6 detail, which is expected from a Project-specific process compared to a broader industry
7 standard, but the Risk Management Program contained all the fundamental processes
8 described within industry standards. In addition, the Project Management Team monitored
9 and reviewed the implementation of the Risk Management Program during execution of
10 the Project and updated it as needed.

11 **Q. WAS THE RISK MANAGEMENT PROCESS TYPICAL OF WHAT YOU HAVE**
12 **FOUND ON OTHER POWER PLANT PROJECTS?**

13 A. Yes, the risk management process is typical of what we have experienced on other large
14 projects of this size, magnitude, and complexity.

15 **Q. HOW DOES RISK MANAGEMENT INFORM THE CURRENT VIEW OF**
16 **CONTINGENCY FOR THE PROJECT?**

17 A. Overall project contingency is managed by SNC with the contingency balance informed
18 by an assessment of the project risks. The project team utilizes the risk register, reviews
19 the work to-go, assesses risks and opportunities across each functional area, including
20 looking at both short-term and long-term risks and impacts. Based on this review of risk
21 items, cost drivers, and schedule and site performance, the project team presents a
22 contingency forecast for management approval.

1 **Q. HOW WAS CONTINGENCY DEVELOPED?**

2 A. There were multiple types of contingency on the Project: SNC Project contingency; SNC
3 management reserve; Bechtel construction contingency; Bechtel management reserve; and
4 SNC schedule reserve. We discuss each of these below.

5 As part of the Project Transition, SNC recalculated the necessary contingency for the
6 Project. SNC considered the updated Risk Register, as well as the risks associated with the
7 risk of VC Summer cancellation and the potential need for craft per diem. SNC arrived at
8 updated contingency for the Project of \$1.1 billion, which included \$400 million of
9 management reserves. Management reserves were unallocated but were reserved in part
10 for Cost Performance Index (“CPI”) performance gaps for construction execution. The
11 category also accounts for unknowns, i.e., issues that will be encountered during
12 construction that have not been foreseen.⁵¹

13 Schedule contingency was established during the VCM 17 process to represent the delta
14 between the +23 and the +29 ETC.⁵² The contingency level was adjusted as the Project
15 schedule was updated.⁵³ (See discussion below for definitions and details on the “+23” and
16 “+29” schedules.)

17 Bechtel also established a construction contingency and a management reserve. Bechtel
18 established a drawdown plan, which it monitored over the course of the Project.⁵⁴ The
19 monthly cost review included a review of SNC contingency, including the need for

⁵¹ GPSC Docket No. 29849, VCM 17 Report, pp. 15-17 of ETC; Master List of all Staff Data Requests, Response to STF-123-4, p. 2397.

⁵² ETC Variance Difference Background.

⁵³ Review of VCM Top-Bottom.

⁵⁴ e.g., Bechtel Monthly Status Report, February 2021.

drawdowns or additions. SNC also reported on the level of Bechtel construction contingency and management reserve.⁵⁵ Presentations to the VPMB, GPC BOD, and Southern Company BOD included information on the status of contingency.⁵⁶

Q. HOW WAS SNC CONTINGENCY FUNDED?

A. The VPMB monitored the level of contingency and approved additional funding as needed. If the request impacted Southern Company's financial plan, GPC requested approval by the Southern Company BOD.⁵⁷

Q. IS CONTINGENCY EXPECTED TO BE SPENT ON A PROJECT?

A. Yes, as noted by the AACE, contingency is:⁵⁸

... [a]n amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs...and is expected to be expended.

Q. WAS THE CONTINGENCY PROCESS TYPICAL OF WHAT YOU HAVE FOUND ON OTHER POWER PLANT PROJECTS?

A. Yes, the contingency process is typical of what we have experienced on other large projects of this size, magnitude, and complexity.

⁵⁵ GPSC Docket No. 29849, VCM 19 GPC Testimony of Haswell/McKinney, p. 12; Minutes of Southern Company BOD, August 30, 2017, pp. 3-4.

⁵⁶ e.g., January 28, 2020, presentation to VPMB, slides 15-16; December 9, 2019, presentation to Southern Company BOD, slides 11-12; August 18, 2021, presentation to GPC BOD, slides 7 & 9.

⁵⁷ e.g., Minutes for Special Meeting of the Southern Company BOD, August 30, 2017.

⁵⁸ AACE Recommended Practice No. 10-90, "Cost Engineering Terminology", p. 26, October 8, 2018.

1 **H. PROJECT CONTROLS REPORTING**

2 **Q. WHAT ARE THE GENERAL OBJECTIVES OF PROJECT CONTROLS**
3 **REPORTING?**

4 A. The main objective of reporting is to provide the necessary information to project
5 management in a reasonable time and in an understandable format that allows management
6 to make the necessary decisions based on the project's reported status. As noted above,
7 decision-making requires information flow as part of the process. Project reporting offers
8 a collection of performance data to monitor the project.

9 **Q. CAN YOU DESCRIBE THE BASIC PROGRESS REPORTING PROCESS USED**
10 **ON THIS PROJECT?**

11 A. Progress reporting on the Project centered on the development and distribution of key
12 metrics to monitor the status of the Project. Project metrics focused on Project execution,
13 industrial safety, quality/compliance, schedule, and regulatory/other.⁵⁹ The Project Metrics
14 Reporting procedure identified three primary types of metrics reports: monthly metrics;
15 monthly project report; and weekly metrics.⁶⁰ Beyond the metrics reports, other reports or
16 progress review meetings on the Project included SNC and Bechtel monthly project
17 reviews and reports, VPMB meetings, VCRB meetings, and GPC/Southern BOD
18 presentations.

⁵⁹ Plant Vogtle Units 3 and 4 PEP, Version 8.1, April 2018, p. 32.

⁶⁰ SNC Project Metrics Reporting, Procedure ND-PC-NVP-003, Version 4.0, March 15, 2016.

1 **Q. WERE THERE OTHER REPORTING OBLIGATIONS ASSOCIATED WITH**
2 **THE PROJECT?**

3 A. In addition to the standard project management and executive reporting, the Project had
4 regulatory reporting requirements that included reports for the GPSC and reports to meet
5 requirements of the U.S. Department of Energy (“DOE”) loan guarantee. As mentioned
6 previously, the GPSC also engaged a CM to independently monitor and report on the status
7 of the Project. The GPSC reports generally covered cost, schedule, and scope updates and
8 were issued in monthly summary reports and semi-annual construction monitoring reports.
9 The DOE reports essentially included the same material as sent to the PSC staff, including
10 the construction status, information from GPSC filings, VPMB meeting materials, filings
11 with the SEC and other financial information, and similar requirements. The CM reports
12 were also issued to the GPSC and were based on the CM attending the monthly project
13 review meetings held on the Project. These reports summarized the status of the reporting
14 period’s activities and included observations on the status from the CM’s viewpoint.

15 **Q. WAS THE PROJECT CONTROLS REPORTING ON THE PROJECT TYPICAL**
16 **OF WHAT YOU HAVE SEEN ON OTHER POWER PLANT PROJECTS?**

17 A. Yes, and the project controls reporting on this Project is also what would be expected of a
18 project of this size, magnitude, and complexity.

19 **I. LESSONS LEARNED**

20 **Q. WITHIN PROJECT MANAGEMENT, WHAT ARE LESSONS LEARNED?**

21 A. Lessons learned within project management involve the identification and capturing of the
22 actual experience encountered on a project to inform the planning and execution of future

1 efforts (which can be applied to the next phase of the same project and/or used on future
2 projects).

3 **Q. WHAT PROCESSES WERE IN PLACE FOR LESSONS LEARNED FOR THE**
4 **PROJECT?**

5 A. SNC's goal was to develop a lessons learned and best practices program to include lessons
6 learned from AP1000 projects in China as well as from its own construction experience.⁶¹
7 As part of this effort, SNC tracked the progress and performance from the Chinese AP1000
8 projects to capture and incorporate lessons learned from the FOAK technology.⁶² In
9 addition, lessons learned from Bechtel's extensive construction experience were
10 incorporated into the Project. For example, Bechtel utilized lessons learned from its past
11 experience in developing its crane plan for the Project.

12 In practice, following the Project Transition, the implementation of the lessons learned
13 program on the Project was through three primary approaches: 1) SNC's Corrective Action
14 Program ("CAP"); 2) Bechtel's QA program (primarily construction focused); and 3)
15 WEC's program (primarily design focused). Lessons learned identified by Bechtel and
16 WEC were assessed and implemented by SNC as warranted. Lessons learned were a part
17 of the reporting and communications with Project and Executive Leadership and were
18 regularly reviewed in the Monthly Project Review Meetings, VPMB meetings, Bechtel
19 monthly reports, WEC monthly reports, and other meetings and reports.

⁶¹ Plant Vogtle Units 3 and 4 PEP, Version 8.1, April 2018, p. 42.

⁶² GPSC Docket No. 29849, VCM 19 Report, p. 7, filed August 31, 2018.

1 **Q. WHAT ARE EXAMPLES OF MORE NOTABLE LESSONS LEARNED APPLIED**
2 **ON THE PROJECT?**

3 A. Lessons learned were collected and applied on the Project in multiple areas and disciplines,
4 including in the design, construction, and start up and testing aspects of the Project. For
5 example, design changes on Unit 3 were applied to Unit 4 prior to testing. From a project
6 execution standpoint, one of the most notable and concentrated efforts on the Project was
7 assessing craft performance and identifying actions to improve that performance. These
8 lessons learned productivity improvement initiatives are discussed in **Section X.D**. Other
9 examples of impactful lessons learned were the change in approach to scaffolding and
10 having Bechtel complete work closeouts earlier. These lessons learned were applied to
11 Unit 4, based on the experience observed on Unit 3. In addition, lessons learned on the Unit
12 3 test sequence were applied to Unit 4. Further, as we discuss later in our testimony, lessons
13 learned on the PRTs performed on Unit 3 allowed SNC to scope Unit 4 more strategically
14 to reduce the number of PRTs employed on Unit 4.

15 **Q. WHAT WERE YOUR OVERALL FINDINGS ON THE VOGTLE LESSONS**
16 **LEARNED PROGRAM?**

17 A. In reviewing the lessons learned program on the Project, we have found that SNC
18 appropriately captured lessons learned from the actual project experience, the Chinese
19 AP1000 projects, and other nuclear industry initiatives that were reviewed and
20 incorporated into the execution of the Project as appropriate.

21 By implementing a robust lessons learned program, SNC was able to identify and apply
22 lessons learned from its experience to reduce risks to the Project and improve performance

on the remaining work. Application of these lessons learned often resulted in enhanced craft performance and worker safety among other benefits to the Project.

Q. WAS THE LESSONS LEARNED PROCESS TYPICAL OF WHAT YOU HAVE FOUND ON OTHER POWER PLANT PROJECTS?

A. Yes, the Vogtle Project's lessons learned process is typical of what we have experienced on other large projects of this size, magnitude, and complexity.

J. INTERNAL AND EXTERNAL AUDITS

Q. WHAT IS THE PURPOSE OF AUDITS?

A. Audits are a common method for the assessment of project controls. Policies, procedures, and controls in place are audited to determine if they are meeting their intended objectives and, if they are not, to recommend possible improvement actions. As noted in the PMBOK® Guide, audits are an independent process to determine whether the project activities are complying with the organizational policies, processes, and procedures. Audits typically identify what are the best practices being implemented as well as the identification of any nonconformities and gaps. Audits assist management by proactively providing assistance to improve implementation of the processes.⁶³

Q. ARE AUDITS AN IMPORTANT PART OF THE STRUCTURE OF THE MANAGEMENT DECISION-MAKING PROCESS?

A. Yes. Conducting, using, and reviewing audits is prudent management practice and is essentially a form of ongoing, real-time prudence self-review by the utility. In addition to

⁶³ PMI, *PMBOK® Guide – Sixth Edition*, pp. 294-295 (2017).

its own internal audit group, utilities may retain outside consultants to review, audit, and make recommendations relative to project performance. Our prudence review included reviewing various internal and independent audit reports prepared over the Vogtle Units 3 and 4 Project.

Q. WHAT ARE THE VARIOUS TYPES OF AUDITS?

A. Audits can be performed to evaluate many things other than financial accuracy. Audits can evaluate governance processes; compliance with policies, plans, procedures, laws, and regulations; the efficiency and effectiveness of resource deployment; the effectiveness of the risk management process; and the means of safeguarding assets. Audits can be performed by an internal audit function that is functionally separate from the area audited or by external auditors.⁶⁴ In addition, QA audits are performed to ensure the quality of construction.⁶⁵

Q. WHAT INTERNAL AUDIT POLICIES, PROCEDURES, OR PROCESSES WERE USED ON THE PROJECT?

A. The Internal Audit (“IA”) process for SNC is under the oversight of the Audit Committee of the Southern Company BOD. According to the IA Charter: ⁶⁶

Internal Auditing is responsible for assessing the adequacy and effectiveness of governance, risk management, and internal control, providing recommendations to improve business processes, and timely reporting of its activities to the Audit Committee, Controls and Compliance Committees and other similar committees and management.

⁶⁴ Southern Company Internal Audit Playbook, May 2022, pp. 30-31.

⁶⁵ Plant Vogtle Units 3 and 4 PEP, Version 8.1, April 2018, pp. 24-25.

⁶⁶ Southern Company Internal Audit Charter, April 12, 2023.

1 The SNC Internal Audit Policy is set forth in the IA Internal Requirements and Guidelines
2 document. These guidelines make clear that when an internal audit is performed, the
3 auditors have “free, full and unrestricted access to all records, properties, functions and
4 personnel necessary to effectively discharge its responsibilities.”⁶⁷ The IA function also
5 has the Southern Company Internal Auditing Playbook, which outlines the policies,
6 procedures, and work practices for internal auditing, tying each to the International
7 Standards for the Professional Practice of Internal Auditing.⁶⁸

8 The SNC PEP included plans to perform internal and external audits of various
9 departments, suppliers, and/or contractors.⁶⁹ The Bechtel transition plan similarly
10 committed to implement a comprehensive project QA internal audit program.⁷⁰ The SNC
11 audit plan also includes a requirement for an annual independent peer audit of the QA
12 organization.⁷¹ Bechtel performed limited scope audits of its processes and procedures and
13 SNC conducted monthly audits of Bechtel’s QA program.⁷² Bechtel reported its audit
14 findings in its monthly status reports, including corrective action plans related to findings.⁷³

15 **Q. HOW WERE INTERNAL AUDITS CONDUCTED?**

16 A. Southern Company Internal Audit personnel continually monitored the Project. Each
17 summer, an audit plan for the upcoming year was developed based on the observations of

⁶⁷ IA Internal Requirements and Guidelines, December 13, 2021, p. 3.

⁶⁸ Southern Company Internal Auditing Playbook, May 25, 2022 version, p. 5; see also, e.g., Sept 2022 IA Report GPC2022-09, p. 2, which notes that Internal Audits are conducted in conformance with the International Standards for the Professional Practice of Internal Auditing; January 2017; <https://www.theiia.org/en/content/guidance/mandatory/standards/international-standards-for-the-professional-practice-of-internal-auditing/>

⁶⁹ Plant Vogtle Units 3 and 4 PEP, Version 8.1, April 2018, pp. 10-11.

⁷⁰ Bechtel Transition Plan, June 2017, p. 37.

⁷¹ e.g., Independent Industry Peer Audit Report of Nuclear Development Quality Assurance, NC-I-QA-2022, February 23, 2022.

⁷² e.g., Bechtel Monthly Status Report, June 2020, pp. 2, 17.

⁷³ e.g., Bechtel Monthly Status Report, December 2019, pp. 15-17; June 2019, pp. 15-16.

1 Internal Audit with advice from Project leadership. A typical list of internal audits
2 conducted in any given year is provided in **Exhibit 6**. Audit plans and results were
3 presented to the Southern BOD Audit Committee and to the Nuclear Oversight Committee
4 (“NOC”) regularly.⁷⁴ Findings and Observations Logs tracked audit results as well as
5 management action items.⁷⁵ Reports were issued to report close out of action plans, where
6 appropriate.⁷⁶

7 **Q. SHOULD INDIVIDUAL AUDIT FINDINGS BE USED TO DRAW CONCLUSIONS**
8 **ABOUT IMPRUDENT PROJECT MANAGEMENT?**

9 A. No. It is prudent for management to evaluate its processes during the course of a large,
10 complex project and to correct any deficiencies or make any improvements or adjustments
11 as the project continues. To attack management on its self-critical findings not only
12 discourages the self-evaluation and improvements that result from this tool, but also the
13 transparency associated with it. That said, audits are not automatically conclusive of
14 prudence either. Audits are typically conducted to ensure compliance in the use of practices
15 and processes across targeted functional areas, including, but not limited to, accounting
16 practices, financial reporting, engineering quality practices, project management
17 performance, and construction execution.⁷⁷ Audits are just one of a selection of information
18 sources a utility should consider in making decisions.

⁷⁴ e.g., January 11, 2023, presentation to Audit Committee or the Corrective Action Program Governance Audit; Southern Nuclear Operating Company Nuclear Oversight Committee, November 2018 minutes, p. 1, Southern Nuclear Operating Company Nuclear Oversight Committee, November 2019, pp. 10-13.

⁷⁵ e.g., 2021 Findings and Observation Log.

⁷⁶ e.g., August 25, 2021, correspondence from Katie Hill to Steve Owen, on Report No. GPC2020-11.

⁷⁷ PMI, *The Standard for Program Management – Third Edition*, p. 65, 2013.

1 **Q. WERE THERE EXTERNAL AUDITS AS WELL?**

2 A. Yes. For example, an independent industry peer audit of the Nuclear Development QA
3 Organization was conducted in 2017.⁷⁸

4 **Q. WAS THE INTERNAL AND EXTERNAL AUDIT PROCESS TYPICAL OF WHAT**
5 **YOU HAVE FOUND ON OTHER POWER PLANT PROJECTS?**

6 A. Yes, the Vogtle Project's audit processes are typical of what we have experienced on other
7 large projects of this size, magnitude, and complexity.

8 **K. OVERALL ASSESSMENT OF PROJECT CONTROLS**

9 **Q. WHAT IS YOUR OVERALL ASSESSMENT OF THE PROJECT CONTROLS?**

10 A. We reviewed substantial documentation in the form of policies, procedures, processes,
11 reports, detailed schedule and cost files, and other project documentation. Based on this
12 review, we found that the project controls either met or exceeded what would be expected
13 on a project of this size, magnitude, scope, and complexity and generally align with
14 common industry practices.

⁷⁸ e.g., February 2017 Audit Report ND-I-QA-2017.

VIII. CONSTRUCTION MANAGEMENT/OVERSIGHT

A. CONSTRUCTION MANAGEMENT APPROACH

Q. WHAT DOES CONSTRUCTION MANAGEMENT INVOLVE?

A. Construction management is the oversight and implementation of the execution phase of a project. According to CMAA's Construction Management Standards of Practice:⁷⁹

Construction management is the practice of professional management applied to the planning, design, and construction of capital projects from inception to completion for the purpose of achieving project objectives, including meeting all time, scope, cost, and quality goals.

Q. WHO WAS RESPONSIBLE FOR OVERSEEING CONSTRUCTION ON THE PROJECT?

A. While Bechtel was engaged at the Project Transition for managing and completing the construction of the Project, SNC was ultimately responsible for overseeing the completion of the entire Project on behalf of the Co-Owners including GPC.

Q. IN PRACTICE, HOW WAS THE CONSTRUCTION MONITORED ON THE PROJECT?

A. On the site, there were recurring daily, weekly, and monthly meetings to assess and review the status of the construction efforts on the Project. This included, among several other meeting types, a "Plan of the Day" meeting, "Work to Go" meetings, Testing Control

⁷⁹ CMAA, *Construction Management Standards of Practice*, 2021 Edition, p. 7.

Center and Operation Control Center meetings and was supplemented by topical deep dive meetings as warranted.⁸⁰

Weekly scorecards, critical path analysis, and metric reports were produced and distributed that provided current views of production, productivity, and schedule performance across the unit, building, and major commodity detail levels. Within the monthly project review meetings, many different aspects of the construction execution were reviewed, including:

- Construction metrics, such as percent complete and CPI/SPI;
- Upcoming construction activities/milestones;
- The critical path schedule;
- Work package development/completion; and,
- Construction quality.

This information generally included data specific for Unit 3 and Unit 4 as well as the overall Project and was then reviewed and discussed with the meeting participants, which typically included senior and executive management from SNC, GPC, representatives from Oglethorpe, Dalton, and MEAG, Bechtel, and the GPSC's CM and PIA Staff.⁸¹

Q. HOW DID SNC RESPOND TO CONSTRUCTION-RELATED ISSUES ON THE PROJECT?

A. Through the recurring monitoring of construction progress, SNC regularly identified actions to mitigate issues and improve performance. For example, in the April 2018 monthly project review meeting, process and organizational improvements were introduced to support construction including:⁸²

- Resurrecting the Project Management Organization to increase construction accountability;

⁸⁰ TS Attachment STF-241-1-03, p. 58; TS Attachment STF-177-4-d; Monthly Project Review Meeting, September 18, 2019, p. 6; Bechtel Monthly Status Report, December 2019, pp. 6, 8, 18, Project Action Item List ("PAIL").

⁸¹ e.g., Monthly Project Review Meeting, September 23, 2020.

⁸² Vogtle Construction Monitor Report, April 11, 2018.

- Establishing a Construction Support Center to provide rapid response to issues impeding field construction; and,
- Implementing process improvements that included:
 - Reducing the delay in getting material in the hands of craft;
 - Minimizing impact of engineering changes in the field;
 - Revising the corrective action program; and,
 - Reducing the time needed to onboard new craft.

These types of process and organization improvements were implemented throughout the execution of the Project in response to the issues and needs at the time.

Q. DID SNC IMPLEMENT SITE-WIDE STAND-DOWNS?

A. Yes. On July 25, 2018, a site wide stand-down occurred to address project performance issues, establish leadership expectations, and reinforce work product ownership. Site walkdowns and inspections were performed to identify actions needed to reset project performance and restore site productivity in line with expectations.

Q. CAN YOU PROVIDE AN EXAMPLE OF THE TYPE OF PROGRESS MONITORING THAT OCCURRED ON THE PROJECT AND HOW THAT INFORMED MANAGEMENT ACTIONS?

A. Yes. In April 2020, the monthly progress review meeting reported the earned hours per discipline was behind the schedule refinement plan from February 2020.⁸³ The variance was predominantly within the electrical discipline, which prompted an improvement plan that identified the factors impacting production and identified actions to address those items.

⁸³ SNC Monthly Project Review, pp. 4-6, April 22, 2020.

1 **Q. WHAT ARE YOUR OVERALL FINDINGS ON THE CONSTRUCTION**
2 **MANAGEMENT APPROACH USED ON THE PROJECT?**

3 A. While there were several challenges encountered throughout the execution of the Project,
4 we find that appropriate processes and resources, as well as the use of a continuous
5 improvement approach, were in place to plan, monitor, and actively manage the
6 construction efforts on the Project.

7 **B. SUBCONTRACT APPROACH AND MANAGEMENT**

8 **Q. WHAT ARE THE INDUSTRY STANDARDS CONCERNING SUBCONTRACTOR**
9 **MANAGEMENT?**

10 A. Within the construction industry, the use of subcontractors is a common approach to
11 address specific skills, scopes, or other services needed to support the overall Project
12 objectives. CMAA's Construction Management Standards of Practice identifies common
13 practices towards subcontractor management from the procurement of subcontractors
14 through execution of the works to contractor closeout.⁸⁴ In general, these practices are
15 similar to the approaches used on construction management and involve the planning and
16 coordination of the work, monitoring the execution of the work, and verifying the quality
17 and status of the work.

18 **Q. WHAT PROCESSES DID SNC AND BECHTEL USE IN THE SELECTION AND**
19 **MONITORING OF SUBCONTRACTORS?**

20 A. Most of the existing subcontracts were rejected in the WEC bankruptcy. SNC entered into
21 bridge agreements to contractually cover the period between the rejected WEC

⁸⁴ CMAA, *Construction Management Standards of Practice*, 2021 Edition.

1 subcontracts and SNC's long-term agreements, thus allowing construction to continue
2 while SNC and Bechtel renegotiated subcontracts under the new Project structure.⁸⁵ The
3 Bechtel CCA outlined the scope of work to be performed by SNC-managed subcontracts
4 and scope to be performed by Bechtel-managed subcontracts.⁸⁶ As the team worked on the
5 Subcontract Alignment Process, which was completed in October 2018, SNC, GPC and
6 Bechtel continually challenged the contract values and adjusted some scope to direct hire.⁸⁷

7 The Bechtel CCA outlined a three (3) phased process to align existing subcontractors post-
8 Project Transition ("Subcontractor Alignment Process"). The Subcontractor Alignment
9 Process was conducted in three phases:⁸⁸

- 10 • Phase 1 – Review existing subcontract/scope to assess current ETC
- 11 • Phase 2 – Review re-bid/negotiation of subcontract scope to assess current ETC
- 12 • Phase 3 – Agreement with Owners on adjustment needed (if any) to target
13 construction cost and target completion date(s) (if any).

14 These contractor-managed subcontracts included mostly specialty subcontractors such as
15 the subcontract with FE Moran for fire protection\ detection\ suppression.⁸⁹ Bechtel
16 determined that subcontracting work to specialized outfits who predominately do the
17 related type of work is far more productive than Bechtel supervising direct hire craft who
18 would likely have limited experience in this type of work. Also, to minimize impact to the

⁸⁵ GPSC Docket No, 29849, VCM 18 Report, pp. 4-5, 14 (February 28, 2018).

⁸⁶ GPC and Bechtel CCA, pp. 75, 315-327 (October 23, 2017).

⁸⁷ Bechtel Corporation, Vogtle Units 3 and 4 Construction Completion Monthly Status Report June 2018, p. 7;
Bechtel Corporation, Vogtle Units 3 and 4 Construction Completion Monthly Status Report October 2018, p. 9

⁸⁸ GPC and Bechtel CCA, (October 23, 2017), pp. 75, 315-327.

⁸⁹ GPC and Bechtel CCA, (October 23, 2017), p. 322.

1 schedule, Bechtel awarded critical subcontracts to trusted and approved contractors to
2 support near term construction milestones.⁹⁰

3 In November 2018, SNC's subcontract team initiated a series of cross-functional
4 workshops to formally identify, trend, and develop mitigating action plans for subcontract
5 risks and opportunities. The subcontracts team reviewed these actions on a weekly basis
6 and conducted schedule integration workshops to ensure proper planning was in place for
7 the subcontractors in alignment with the Project needs.⁹¹

8 **Q. WHAT PROCESS WAS USED TO PROVIDE UPDATES ON SUBCONTRACTOR**
9 **PERFORMANCE?**

10 A. SNC and Bechtel included subcontractor progress in the weekly metrics, which provided
11 greater visibility into subcontractor performance. SNC and Bechtel also established “war
12 rooms” for subcontractors and Bechtel to work through coordination challenges.⁹²

13 **Q. WAS THE SUBCONTRACTS MANAGEMENT PROCESS TYPICAL OF WHAT**
14 **YOU HAVE FOUND ON OTHER POWER PLANT PROJECTS?**

15 A. Yes, the Vogtle Project's subcontracts management process is typical of what we have
16 experienced on other large projects of this size, magnitude, and complexity.

⁹⁰ Bechtel Corporation, Vogtle Units 3 and 4 Construction Completion Monthly Status Report December 2017, p. 8.

⁹¹ October 2018 VCRB Report Response, December 20, 2018, p. 5.

⁹² GPSC Docket No. 29849, VCM 20/21 Report, (August 30, 2019), p. 32.

1 **C. SUPPLIER APPROACH AND MANAGEMENT**

2 **Q. WHAT WAS SNC'S PROCUREMENT AND SUPPLIER MANAGEMENT**
3 **APPROACH?**

4 A. Prior to the Project Transition, most of the procurement risk resided with WEC as the EPC
5 contractor. However, GPC oversaw the fabrication of major equipment at international and
6 domestic vendor locations and paid close attention to challenges associated with design
7 and testing to ensure those were adequately resolved before installation.⁹³ In VCM 17,
8 GPC explained that although the Owners would assume many of the purchase orders from
9 WEC, WEC would continue to support the Project pursuant to the Services Agreement. In
10 some cases, the Owners did not assume the existing contracts but instead renegotiated
11 agreements with the same parties or reached agreements with new parties.⁹⁴

12 Nevertheless, GPC identified procurement as a risk that could impact the cost and schedule.
13 SNC committed in VCM 17 to maintain a robust oversight program for procurement and
14 to add resources to oversee vendors who did not perform to expectation or where additional
15 oversight resources were otherwise deemed appropriate.⁹⁵ There was also a recognition
16 that the VC Summer abandonment could affect procurement costs.⁹⁶

⁹³ See e.g., GPSC Docket No. 29849, VCM 14 Report (February 2016), p. 19.

⁹⁴ GPSC Docket No. 29849, VCM 17 Report, August 31, 2017, Public Version, pp. 34-35, 41-42.

⁹⁵ GPSC Docket No. 29849, VCM 17 Report, August 31, 2017, Public Version, p. 96.

⁹⁶ GPSC Docket No. 29849, VCM 17 Report, August 31, 2017, Public Version, pp. 99-100.

1 **Q. HOW DID SNC MONITOR SUPPLIERS?**

2 A. SNC conducted frequent internal audits related to procurement with no deficiencies or
3 findings, except in the August 2020 audit.⁹⁷ The audit called for additional training of
4 supply chain personnel. Subsequent audits in 2021, 2022, and 2023 evaluated the
5 effectiveness of SNC's Subcontracts Management program implementation including
6 training records and had no further findings.⁹⁸

7 **Q. WHAT SPECIFIC PROCUREMENT/SUPPLY CHAIN CHALLENGES DID THE**
8 **PROJECT EXPERIENCE AND HOW WERE THESE CHALLENGES**
9 **HANDLED?**

10 A. The completely unknown and unforeseeable COVID-19 global pandemic that affected the
11 Project since early 2020 also created supply chain challenges. The pandemic exposed the
12 Project to many of the same supply chain issues and delivery delays as other industries.
13 GPC and SNC's response to COVID-19 challenges is discussed in **Section X.E.**

14 **Q. WAS THE PROCUREMENT PROCESS TYPICAL OF WHAT YOU HAVE**
15 **FOUND ON OTHER POWER PLANT PROJECTS?**

16 A. Yes, the Vogtle Project's procurement process is typical of what we have experienced on
17 other large projects of this size, magnitude, and complexity.

⁹⁷ SNC Nuclear Development Quality Assurance ("NDQA") Audit Report of Compliance Monitoring and Subcontracts (CMP/SC), ND-SC-CMP-SC-2018, (May 16, 2018); SNC Quality Assurance (NDQA) Audit Report for Supplier Compliance and Subcontract Management, ND-SC-SCMSC-2019, (April 11, 2019); SNC Quality Assurance (NDQA) Audit Report for Subcontract Management, (April 16, 2020); SNC Quality Assurance (NDQA) Audit Report for Subcontract Management – ND-SC-SCMGMT-2020, (August 17, 2020).

⁹⁸ SNC Quality Assurance (NDQA) Audit Report for Subcontract Management, ND-S-SC-2021, (April 21, 2021); SNC Quality Assurance (NDQA) Audit Report for Subcontract Management, ND-S-SC-2022, (March 10, 2022); SNC Quality Assurance (NDQA) Audit Report for Subcontract Management, ND-S-SC-2023, (February 7, 2023).

1 **D. QUALITY ASSURANCE PROCESS**

2 **Q. WHAT ARE THE GENERAL OBJECTIVES OF QUALITY CONTROL (“QC”)**
3 **AND QUALITY ASSURANCE (“QA”)?**

4 A. A Quality Management Plan (“QMP”), helps ensure that the project as built meets the
5 owner’s expectations and intended purpose and complies with all applicable rules and
6 regulations. The QMP will contain all aspects of the project's quality oversight, including
7 QC and QA. As defined by the CMAA in its Standard of Practice:⁹⁹

8 **Quality Control**

9 The continuous review, certification, inspection, and testing of project
10 components, including persons, systems, materials, documents, techniques,
11 and workmanship to determine whether or not such components conform to
12 the plans, specifications, applicable standards, and project requirements.

13 **Quality Assurance**

14 The application of planned and systematic examinations or verifications,
15 which demonstrate that quality control procedures are being effectively
16 implemented.

17
18 Essentially, QC is the verification of the installed and completed work to ensure it
19 meets all requirements, and QA verifies that the QC policies and procedures are
20 being followed on the Project.

21 **Q. WHAT INDUSTRY STANDARD PROCESSES ARE INVOLVED IN**
22 **PERFORMING QA/QC MANAGEMENT?**

23 A. Project quality management includes the processes and activities to ensure the project
24 fulfills the purpose for which it was undertaken and involves putting into place objectives,

⁹⁹ CMAA, Construction Management Standards of Practice, pp. 51-52, (2015).

1 policies, and roles and responsibilities to that end.¹⁰⁰ The PMBOK® Guide lays out the
2 three key quality management processes as: 1) Plan Quality Management – identifying the
3 requirements/standards for the project and defining deliverables to demonstrate
4 compliance; 2) Management Quality – translating the quality management plan into
5 executable activities; and 3) Control Quality – monitoring the results of performing quality
6 management activities.¹⁰¹

7 **Q. ARE THERE SPECIFIC QA/QC REQUIREMENTS FROM THE NRC?**

8 A. Yes. The NRC requires all applicants for an operating license or a combined license to
9 establish a Quality Assurance Program, which comprises all systemic actions necessary to
10 ensure that the plant will perform satisfactorily during operations. The Quality Assurance
11 Program includes and governs all Quality Control activities.¹⁰² The QA/QC program must
12 meet all quality requirements prescribed by the NRC. Specifically, the program must
13 meet:¹⁰³

- 14 • 10 CRF 50.55, Conditions of construction permits, early site permits, combined
- 15 licenses, and manufacturing licenses, and 10 CRF 50, Appendix B, Quality
- 16 Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants;
- 17 • 10 CRF 52, Licenses, Certifications, and approvals for Nuclear Power Plants; and,
- 18 • American Society of Mechanical Engineers (“ASME”) NQA-1-1194, Quality
- 19 Assurance Requirements for Nuclear Facility Applications.

¹⁰⁰ The 5th edition of the PMBOK® Guide indicated that, “Project Quality Management includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. PMI, *PMBOK® Guide – Fifth Edition*, p. 227 (2013). The 6th edition of the PMBOK® Guide updated this description by stating, “Project Quality Management includes the processes for incorporating the organization’s quality policy regarding planning, managing, and controlling project and product quality requirements in order to meet stakeholders’ objectives. Project Quality Management also supports continuous process improvement activities as undertake on behalf of the performing organization.” PMI, *PMBOK® Guide – Sixth Edition*, p. 271 (2017).

¹⁰¹ PMI, *PMBOK® Guide – Fifth Edition*, p. 227 (2013); *PMBOK® Guide – Sixth Edition*, p. 271 (2017).

¹⁰² 10 CFR 50 Appendix B – Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants

¹⁰³ Project Execution Plan, Version 8.1, pp. 24, 25 (April 2018).

1 **Q. WHAT WERE THE QA/QC PROCESSES UTILIZED ON THE PROJECT BY SNC**
2 **AND WERE THEY APPROPRIATE FOR THE PROJECT?**

3 A. Yes. The Nuclear Development QA maintains the Nuclear Development Quality
4 Assurance Manual (“NDQAM”), which describes the overarching nuclear quality program
5 with which SNC, Bechtel, its subcontractors, and project vendors are required to comply.
6 The NDQAM is a regulatory document approved by the NRC as part of the preliminary
7 safety analysis report, which must be submitted as part of the application for a construction
8 permit.¹⁰⁴ The NDQAM establishes roles and responsibilities for the QA/QC process.
9 Nuclear Development QA ensures and implements its program by:¹⁰⁵

- 10 • Ensuring compliance with regulatory requirements and procedures through audits
11 and surveillances;
- 12 • Monitoring processes to ensure conformance to commitments and licensing
13 document requirements; and,
- 14 • Ensuring vendors provide quality services, parts, and materials to SNC that meet
15 the requirements of 10 CFR 50, Appendix B.

16 **Q. HOW WAS QA/QC REPORTED ON THE PROJECT?**

17 A. The Bechtel Monthly Status Reports contained a section for Quality Status, which reviews
18 QA/QC activities conducted over the previous month. The reports detail any surveillances
19 conducted on the quality assurance program, report on any significant conditions or

¹⁰⁴ 10 CFR 50.34(a)(7) specifies that, “A description of the quality assurance program to be applied to the design, fabrication, construction, and testing of the structures, systems, and components of the facility. Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” sets forth the requirements for quality assurance programs for nuclear power plants and fuel reprocessing plants. The description of the quality assurance program for a nuclear power plant or a fuel reprocessing plant shall include a discussion of how the applicable requirements of appendix B will be satisfied.” The Project may make changes to the quality assurance program provided it does not reduce the commitments required by the NRC. Changes must be submitted to the NRC within 90 days. (10 CFR 50.55(f)(3)) Changes that do reduce the commitments must be submitted to the NRC with a forwarding letter that identifies the change, reason for the change, and basis for concluding that the change still complies with 10 CFR 50 Appendix B. (10 CFR 50.54(a)(3)).

¹⁰⁵ Plant Vogtle Units 3&4 PEP, Version 8.1, pp. 24, 25 (April 2018). The NDQAM was updated frequently with the most recent version being Version 23 NCQAM, Version 23.0, (December 20, 2022).

deficiencies identified in construction and report metrics on quality performance. The reports also contain graphics that report construction quality performance by tracking the acceptance rate of inspected works and classifying them as satisfactory, monitoring or action required.

Q. DO THE QA/QC PROCESSES ESTABLISHED ON THE PROJECT ALIGN WITH INDUSTRY STANDARDS?

A. Yes. The policies and procedures used for QA/QC on the Project align with industry standards, but are also subject to NRC requirements, which are much more stringent than what the general construction industry would be required to use, making these policies and procedures much more detailed and defined than what would be recommended by comparable industry standards. The NDQAM incorporates industry standard QA/QC processes, which were defined and adopted for use on the Project.

Q. WAS THE QA/QC PROCESS TYPICAL OF WHAT YOU HAVE FOUND ON OTHER POWER PLANT PROJECTS?

A. Yes, the Vogtle Project's QA/QC program is typical of what we have experienced on other large projects of this size, magnitude, and complexity.

E. SYSTEM COMPLETIONS

Q. CAN YOU ELABORATE ON THE DIFFERENCES BETWEEN BULK COMMODITIES INSTALLATION AND COMPLETE SYSTEMS?

A. Yes. Bulk commodities installation is the process of installing large quantities of commodities in certain areas of the plant, such as pulling multiple cables through an electrical raceway at a single time. Normally this is referred to as working by "areas" in a

1 construction project, such as a specific building. Before a project begins to start its Initial
2 Test Program (“ITP”) activities, it begins to focus on completing “systems” which can
3 encompass multiple areas and buildings. It is generally considered more efficient to stay in
4 bulk commodities installation for as long as possible before focusing on completing
5 individual systems.

6 **Q. IS THIS CONSISTENT WITH INDUSTRY BEST PRACTICES AND IS THIS**
7 **COMMON IN THE INDUSTRY?**

8 A. Yes. In our experience, we find it is normal for construction projects to begin work in bulk
9 commodities installation before transitioning to a systems completion-based focus. The
10 Construction Industry Institute (“CII”) highlights the importance of this transition as listed
11 as Critical Success Factor Number 15 - Transition to Systems-Based Management:¹⁰⁶

12 Plan to transition from construction progress tracking on an area basis to a
13 systems-completion basis so that construction forces may be most
14 effectively redirected as needed. Involve [Construction/Start-up (“CSU”)]
15 staff in construction planning at approximately 60-80% system construction
16 completion (for each single major system) in order to help mitigate
17 construction punch list items (with particular early focus on utility systems).

18
19 CII states that CSU should be getting involved when construction reaches 60-80%
20 completion. We agree with this approach.

¹⁰⁶ CII, Identification and Implementation of Critical Success Factors in the Commissioning and Startup of Capital Projects, p. 57, (August 2016).

1 **Q. ARE YOU FAMILIAR WITH SNC'S DECISION TO FOCUS ON**
2 **CONSTRUCTION OF COMPLETE SYSTEMS INSTEAD OF BULK**
3 **COMMODITIES INSTALLATION?**

4 A. Yes. The Project planned to stay in bulk commodities installation for as long as possible
5 while supporting the turnover of required systems to meet the startup schedule. The Project
6 did not abandon bulk commodities installations when it began to turnover partial systems;
7 rather, it continued to work in bulk in areas that were available while it instituted system
8 completion crews that focused on finishing construction for near term system turnovers.
9 There was not a hard cutoff where bulk work stopped.

10 When the first partial system turnover was accelerated to August 2018, the total Project
11 was reported as 69.6% complete, with overall construction at 55.3% complete (combined
12 Units 3 and 4, through the end of July 2018).¹⁰⁷ This is slightly earlier than typical, but this
13 early turnover was done as a 'pilot' to capture lessons learned for incorporation into future
14 system turnover efforts.¹⁰⁸ The Project ITP activities appear to have started around the
15 earlier bound of the recommended percentages of 60-80%, but overall, we find their
16 approach to early testing to be reasonable given it provided an early identification of issues
17 that otherwise would have been encountered later in the startup process, likely with greater
18 impact.

19 We find the Project's decision to remain in bulk construction for as long as possible while
20 trying to support the startup schedule with complete systems to be reasonable and prudent.

¹⁰⁷ GPSC Docket No. 29849, VCM 19 Report, p. 17, filed August 31, 2018.

¹⁰⁸ Monthly Project Review Meeting, June 12, 2018; Monthly Project Review Meeting, August 17, 2018, p. 14.

IX. INITIAL TEST PROGRAM

Q. HOW IS THE INITIAL TEST PROGRAM USED IN THE NUCLEAR INDUSTRY?

A. The NRC requires all applicants for a combined license to maintain an ITP program that verifies that all structures, systems, and components (“SSCs”) will perform satisfactorily when the plant is in service.¹⁰⁹ The NRC provides guidance on specific tests that are recommended or required to be performed, including tests on the reactor coolant system; reactor control systems; reactor protection systems; fuel storage and handling systems; power conversion system; and preliminary and secondary containments.¹¹⁰

The ITP consists of three phases of testing that align with industry standards: (1) component testing, which aligns with pre-commissioning activities; (2) preoperational testing, which aligns with commissioning activities and includes milestone tests prior to fuel load such as integrated flush and Hot Functional Testing (“HFT”); and (3) startup, which is consistent across industries and starts with initial fuel load and goes through power ascension testing.

Q. HOW WAS ITP ORGANIZED ON THE PROJECT?

A. The initial organization arrangement for ITP was for the Bechtel Construction Completion Group to coordinate completion of physical construction. Then the system or area would be turned over to the SNC ITP Group, which would be responsible for managing the commissioning of the plant systems, testing during

¹⁰⁹ 10 CFR Part 50 Appendix B (XI) Test Control.

¹¹⁰ NRC Regulatory Guide 1.68, Initial Test Programs for Water-Cooled Nuclear Power Plants, (June 2013).

1 startup activities, and finally transitioning the systems to plant operations, which
2 would operate the plant.

3 **Q. WHAT WERE THE ITP PROCESSES UTILIZED ON THE PROJECT?**

4 A. Before the Project Transition to SNC, SNC utilized the Conduct of Operations for the ITP
5 Group.¹¹¹ The majority of the Conduct of Operations procedures were later superseded and
6 rolled into a single conduct of operations. This Vogtle 3 and 4 Conduct of Operations
7 Procedure laid out the organization and functions of the SNC Project Staff from a high
8 level. This identified the Senior Manager of Testing and Turnover as being responsible for
9 the ITP Group.¹¹² The Project also utilized the ITP Administration and Organization
10 Manual. The ITP Administration Manual defines the procedures used to control the testing
11 activities, including:¹¹³

- 12 • Controls for test procedure contents;
- 13 • Controls for the format of individual test procedures;
- 14 • Controls to provide for participation of the Responsible Design Organization;
- 15 • Controls to provide for ITP personnel qualifications; and
- 16 • Controls for handling of approved documents.

17 The Project also used the Bechtel System Completion and Turnover Procedure, and the
18 SNC Project Completion and Transition to Operations Procedure to manage the system
19 and area turnovers from construction to ITP to operations.¹¹⁴

¹¹¹ SNC Conduct of Operations for Initial Test Program Group Procedure, NC-CO-013, Version 7.0, May 30, 2017.

¹¹² SNC Vogtle 3&4 Conduct of Operations Procedure, ND-CO-026, p. 10.

¹¹³ SNC ITP Administration and Organization Procedure, B-GEN-ITPA-001, Version 7.2, April 29, 2020.

¹¹⁴ Bechtel System Completion and Turnover, 26139-000-4MP-T81C-N1601, Revision 10, November 11, 2020;
SNC Project Completion and Transition to Operations Procedure, ND-AD-VNP-029, Version 5.1, April 30, 2019.

1 **Q. IS EARLY PLANNING AND PROJECT INTEGRATION ESSENTIAL FOR ITP**
2 **SUCCESS?**

3 A. Yes. Industry best practices advise that it is essential for the goals and objectives of ITP to
4 be started early in the project phases. The Project engaged the ITP Group significantly
5 early, starting during the Project Transition period in 2017 when it assumed all the testing
6 governance from WEC. The ITP Group then spent the first half of 2018 with construction
7 and engineering to integrate testing activities into the IPS. After the April 2019 schedule
8 re-baseline, ITP developed a resource loaded schedule for the IPS.

9 **Q. WHAT ACTIONS DID THE PROJECT TAKE TO IMPROVE THE ITP**
10 **ORGANIZATION?**

11 A. The Project took several significant actions to improve the ITP Group knowledge and
12 processes. SNC brought in ITP personnel with experience from the Watts Bar Nuclear
13 Plant, which was commissioned in 2016. SNC sent ITP personnel to China to observe the
14 preoperational testing and startup activities there, and to capture lessons learned for
15 implementation on the Project. In 2019, the Project established the Testing Control Center
16 to resolve issues during component and preoperational testing and to maintain the “Lock-
17 Out-Tag-Out” program. The Project also formed a joint SNC and Bechtel Testing and
18 Completion Group to allow for more efficient turnover of systems from Bechtel to SNC.

19 **Q. WAS THE COMMISSIONING AND STARTUP PROCESS TYPICAL OF WHAT**
20 **YOU HAVE FOUND ON OTHER POWER PLANT PROJECTS?**

21 A. Yes, the Vogtle Project’s commissioning and startup process is typical of what we have
22 experienced on other large projects of this size, magnitude, and complexity.

X. KEY CHALLENGES AND DECISIONS

Q. WHAT CHALLENGES AROSE DURING THE PROJECT AND WHAT KEY DECISIONS DID GPC/SNC MAKE TO ADDRESS THE CHALLENGES?

A. We found that the major challenges on the Vogtle Project included:

- Transitioning from the WEC EPC to the self-perform model with SNC and Bechtel
- Continuing challenges to the forecasted costs
- Continuing challenges to maintain the schedule
- Craft productivity and retention
- COVID-19 pandemic
- System turnover & PRTs
- QC challenges

We discuss these challenges and key decisions GPC/SNC made in the corresponding sections below.

A. PROJECT TRANSITION

Q. WHAT WERE THE MAJOR CHALLENGES RELATED TO THE PROJECT TRANSITION?

A. One of the largest impacts unique to Vogtle 3 and 4 was the WEC bankruptcy filed on March 29, 2017. WEC had obtained NRC approval for the AP1000 standard design that was being constructed in China and, as we noted previously, was also to be constructed by two other utilities in the United States. Given that WEC was the entity responsible for the AP1000, including the EPC package that included the design, procurement and construction of the AP1000, the WEC bankruptcy that occurred in the middle of Project construction had significant ricochet impacts for the Project. GPC had obtained an EPC Contract for which significant risks were allocated to WEC under its fixed price contract

1 and under which WEC would be the organization responsible for engineering,
2 procurement, and construction. However, once WEC filed for bankruptcy, GPC was faced
3 with an environment that not only changed the way in which the Project would be
4 completed, but resulted in additional unforeseen ripple and ricochet events that impacted
5 both Project cost and schedule as we will discuss later in our testimony. In Pegasus-
6 Global's testimony for the Application for Certification of Vogtle 3 and 4 sponsored by
7 Dr. Kris Nielsen, Dr. Nielsen testified that the construction labor availability and
8 productivity was the responsibility of the EPC contractor, relieving GPC of the
9 responsibility for labor difficulties like those experienced in constructing Vogtle Units 1
10 and 2.¹¹⁵ The unforeseeable WEC bankruptcy transferred that labor responsibility risk to
11 GPC.

12 The WEC bankruptcy further exacerbated the FOAK risk impacts that resulted in both
13 ripple and ricochet effects throughout the course of the Project. As we noted above, the
14 WEC bankruptcy created a significant challenge, which precipitated the need to transition
15 the Project from an EPC-managed Project to a new governance structure. In evaluating the
16 options available, GPC was aware that it was the realization of these FOAK risks that
17 ultimately led to the bankruptcy of WEC.

18 Further, the WEC bankruptcy created the need for SNC to develop a more thorough
19 understanding of where the Project stood regarding cost, schedule, procurement, etc.
20 leading up to the Project Transition. At the time of the WEC bankruptcy event, the details
21 of the basis of the cost estimate and the assumptions under which the schedule had been

¹¹⁵ GPSC Docket No. 27800-U, Direct Testimony of Dr. Kris Nielsen, October 20, 2008, pp. 5-6.

prepared were not available to the Owners under the fixed price contracting model. As acknowledged in VCM 17, GPC's insight into WEC's costs and schedule were limited to the deliverables that WEC provided to the Owners.¹¹⁶

Q. WHAT KEY DECISIONS DID GPC/SNC MAKE WITH REGARD TO THE ISSUES RELATED TO THE PROJECT TRANSITION?

A. GPC and SNC were faced with difficult decisions considering the WEC bankruptcy. Those key decisions included:

- Self-performing the work versus retaining an alternate EPC Contractor
- Developing an ETC for completing the Project
- Executing the Project via an Aggressive Schedule

i. SELF-PERFORMING VERSUS RETAINING AN EPC CONTRACTOR

Q. WHAT STEPS WERE TAKEN TO TRANSITION FROM THE EPC-LED STRUCTURE TO THE SELF-PERFORMANCE STRUCTURE?

A. GPC/SNC recognized that attempting to complete the Project under another EPC contracting model was unrealistic as (1) there were too many unknown risks that an EPC contractor would need to build into the costs of a fixed-price contract for a project already under construction and (2) the timing to undertake an EPC contractor search effort would most certainly result in significant delay to COD. Replacing WEC with another EPC contractor would have required a significant amount of time to allow bidding contractors to get scope, estimate, schedule, and bid the work to complete. It is even highly possible

¹¹⁶ GPSC Docket No. 29849, VCM 17 report, dated August 31, 2027, Public Version, p. 28.

1 that no other contractor would have submitted an EPC bid due to the Project being a FOAK
2 project, with WEC in bankruptcy and the engineering being incomplete.

3 Moreover, pausing the Project to gain a sufficiently clearer understanding of the current
4 situations caused by the WEC bankruptcy and thoroughly analyzing all available options
5 was not a viable option. GPC and SNC had to take quick action to provide bridge solutions
6 to keep the Project moving forward notwithstanding the WEC bankruptcy. For example,
7 as work was ongoing, there were subcontractors, vendors and suppliers who had not been
8 paid. GPC reached an Interim Agreement with WEC and made the decision to pay the
9 outstanding debts of WEC related to the Vogtle Project through calling on the Toshiba
10 Parent Guarantee ensuring that key subcontractors, vendors, and suppliers continued to
11 work at the site.

12 As we discussed earlier, once SNC developed its transition planning and developed the
13 ETC assessment of the cost and schedule (as discussed below), including a review of the
14 remaining quantities to install, SNC decided to engage Bechtel to be responsible for
15 construction of the Project, and Bechtel developed its own transition planning for the
16 Project. .¹¹⁷

17 Bechtel's transition plan, developed in June 2017, described the scope of work Bechtel
18 proposed to perform in support of project completion. The Bechtel transition plan described
19 the activities for the transfer of the construction responsibilities for the Project from WEC
20 to Bechtel.¹¹⁸ The transition from WEC to the SNC/Bechtel structure resulted in several

¹¹⁷ GPSC Docket No. 29849, VCM 17 Report, August 31, 2017, pp. 46-50.

¹¹⁸ Bechtel Transition Plan, June 2017, p. 7.

1 new contracts to manage the Project. One was the Services Agreement with WEC, which
2 allowed WEC to continue with the engineering under the direction of SNC, and another
3 was the CCA with Bechtel, which established Bechtel's responsibilities for construction
4 and the Level 3 Construction Schedule.

5 **Q. DID YOU FIND THAT THE NEW MANAGEMENT STRUCTURE WAS**
6 **REASONABLE?**

7 A. Yes. As a result of various analyses discussed below, GPC concluded it was in the best
8 interest of customers to complete the Project with a new management structure.¹¹⁹ The
9 structure was for GPC, along with SNC, to act as Project Manager, with Bechtel serving
10 as the prime construction contractor.

11 **ii. DEVELOPMENT OF THE NEW ETC**

12 **Q. HOW DID GPC AND SNC DEVELOP THE NEW ETC?**

13 A. Developing a new ETC required determining the quantities remaining, applying unit rates
14 to those quantities, and then calculating the labor hours of direct work remaining on the
15 Project. When the decision was made to self-perform, GPC looked to two contractors,
16 Bechtel and Fluor, who both had nuclear experience internationally and domestically, and
17 in our experience, were the best in the industry. The initial unit rates used were those
18 developed by Fluor, specific to the size, type, and location for each commodity to be
19 installed on the Project. SNC then retained independent consultants to assess the unit rates
20 used for piping and electrical commodity installations because of the potential impact
21 installing those quantities may have on the critical path of the installation of these

¹¹⁹ GPSC Docket No. 29849, VCM 17 Report, August 31, 2017, pp. 90-91.

1 commodities. That independent assessment resulted in an overall difference in work hours
2 of less than 3.5%, which supported the reasonableness of the Fluor unit rates in its basis of
3 estimate. Based on the concept of transferring Unit 3 labor to Unit 4, SNC included a 12.5%
4 performance factor improvement, which we find reasonable and consistent with other
5 multi-unit plants with which we have been involved.¹²⁰

6 **Q. WHAT IS A PERFORMANCE FACTOR AND WHY IS IT USED IN THE**
7 **MANHOUR EVALUATION?**

8 A. As mentioned above, SNC used an average performance factor to estimate the remaining
9 manhours to complete the work where Quantity x Unit Rate x Performance Factor = Total
10 Manhours to Go. The average performance factor is a blended, weighted factor for the total
11 scope of direct manhours based on quantity of hours by building and by building
12 performance factor. The performance factors were the result of the estimate product from
13 Fluor's Basis of Estimate. The average performance factor was used to include a target
14 productivity in the estimate.¹²¹

15 **iii. EXECUTING THE PROJECT VIA AN AGGRESSIVE SCHEDULE**

16 **Q. PLEASE DESCRIBE HOW THE VOGTLE PROJECT SCHEDULE WAS**
17 **DEVELOPED IN LIGHT OF THE WEC BANKRUPTCY.**

18 A. Similar to the analysis undertaken for the labor unit rates, GPC and SNC undertook
19 assessments along with a Bechtel independent review of the project schedule to establish
20 target dates leading to commercial operation dates of May 2021 and May 2022 for Units 3

¹²⁰ GPSC Docket No. 29849, VCM 17 Report, August 31, 2017, pp. 486, 488.

¹²¹ GPSC Docket No. 29849, VCM 17 Report, August 31, 2017, p. 488.

1 and 4 respectively (the “+23 schedule”). GPC undertook several studies to determine the
2 best path forward, including an effort by SNC to determine the cost to complete the Project
3 with SNC, themselves, managing the project completion efforts. As part of this effort, SNC
4 had to prepare a new project schedule to assist in determining those costs. Bechtel’s
5 assessment included walkdowns and an independent review of congestion, schedule logic,
6 craft productivity and other items including key risks that the Project may encounter. The
7 critical path was determined to be through the Auxiliary Building due to the work required
8 to complete the electrical work. The remaining manhours to complete the Project as of June
9 1, 2017, were approximately 21 million as estimated using Fluor rates, which were detailed
10 by size, type, and location of each commodity. The piping and electrical rates were
11 evaluated independently by a third party (Work Management, Inc.), due to the importance
12 of piping and electrical work in determining the Project’s outcome. The outcome of that
13 comparison was less than 3.5% difference, which was considered insignificant, although
14 the difference in cost was added to contingency. The schedule evaluation was presented to
15 the senior management team, recommending a +23-month schedule with a 12-month gap
16 between units for managing the pipefitter and electrical trade manpower requirements.
17 SNC considered these assessments along with the WEC Services Agreement, the new
18 organizational structure and the review of subcontracts that would remain in place on the
19 Project to develop staffing curves for construction management and project oversight to
20 develop an ETC for the Project.¹²²

¹²² GPSC Docket No. 29849, VCM 17 Report, August 31, 2017, pp. 53, 771.

1 **Q. DID GPC INDEPENDENTLY VALIDATE THE NEW ETC AND ADOPT THE +23**
2 **SCHEDULE FOR COMPLETING THE PROJECT?**

3 A. Yes. To gain an understanding of where the Project stood as well as to obtain independent
4 assessments as to cost and schedule, GPC, on behalf of all Owners, undertook various tasks
5 including commissioning several outside experts to provide opinions concerning the likely
6 cost and schedule of various scenarios that were being considered.¹²³

- 7 • Kenrich Group LLC (“Kenrich”) provided an analysis of the cost and schedule to
8 complete Units 3 and 4 using independent assumptions based on their familiarity
9 with the project as an expert for litigation for the Project involving Westinghouse.
10 Kenrich’s projections included improved, similar-to-historical, and worsened
11 productivity scenarios.¹²⁴ Kenrich’s range (excluding owners’ costs) was \$7.4
12 billion to \$10.1 billion total Project cost.¹²⁵
- 13 • Bechtel provided an independent assessment and estimate of the cost-to-complete
14 and the schedule. Bechtel’s review included “an analysis of the logic of civil and
15 structural activities, peak craft density, and congestion. In its review, Bechtel
16 applied rates that were informed by Bechtel’s historical experience in nuclear
17 plant construction. Historical data from previous Bechtel nuclear power projects
18 was used as a basis for the schedule assessment.”¹²⁶
- 19 • Pegasus-Global assisted in the development of cancellation costs for two
20 scenarios: the cancellation of Unit 4; and the cancellation of Units 3 and 4. The
21 cancellation estimate included site demobilization, potential liability to

¹²³ GPSC Docket No. 29849; VCM 17 Report, August 31, 2027; Public Version, p. 45.

¹²⁴ GPSC Docket No. 29849; VCM 17 Report, August 31, 2027; Public Version, p. 51.

¹²⁵ GPSC Docket No. 29849; VCM 17 Report, August 31, 2027; Public Version, pp. 45, 51-52.

¹²⁶ GPSC Docket No. 29849; VCM 17 Report, August 31, 2027; Public Version, pp. 45, 57.

subcontractors and vendors, employee severance, and GPC and SNC overhead to manage the cancellation efforts. The range developed for cancellation of both units was \$730 to \$760 million (total Project).¹²⁷

- Black & Veatch Corporation (“B&V”) provided estimates of the costs associated with demobilization of the Project and securing the site for the cancellation under either cancellation scenario, as well as an estimate of the likely costs of deferral going forward.¹²⁸
- PricewaterhouseCoopers (“PwC”) developed a quantitative risk analysis for the three options that were presented for consideration: complete both units based on SNC’s ETC, cancel both units, and complete Unit 3 and cancel Unit 4.¹²⁹

In addition to its own internal assessments, SNC sought independent external challenge assessments from the executive leadership team at Watts Bar Unit 2, including the Senior Vice President of WBN Operations and Construction, the Director of Engineering and Construction, the WBN2 Scheduling Manager, and the WBN2 Startup Manager, LES/URECO for fuel enrichment facility, and the Southern Company executive teams.

Q. DID GPC IDENTIFY CRITICAL ASSUMPTIONS THAT COULD STILL IMPACT THE NEW ETC AND SCHEDULE?

A. Yes. The VCM 17 filing noted critical assumptions that could have a major impact on the costs that were outside the control of GPC and other Owners:¹³⁰

¹²⁷ GPSC Docket No. 29849; VCM 17 Report, August 31, 2027; Public Version, p. 53.

¹²⁸ GPSC Docket No. 29849; VCM 17 Report, August 31, 2027; Public Version, pp. 45, 54.

¹²⁹ GPSC Docket No. 29849; VCM 17 Report, August 31, 2027; Public Version, pp. 45, 55-56.

¹³⁰ GPSC Docket No. 29849; VCM 17 Report, August 31, 2027; Public Version, p. 9.

1. Will Toshiba Corporation (“Toshiba”) be financially stable enough to meet the payment obligations of the Parent Guaranty?
2. Will WEC meet its obligations under the new services agreement?
3. Can the labor force and craft maintain the productivity improvements seen recently as the number of craft is increased as required to meet the new schedule?
4. Will the Project continue to meet the FOAK challenges, including such questions as will the NRC be able to process and close the ITAACs in a timely fashion to support the schedule?
5. Will the Project’s tax credits be extended and expanded as assumed?
6. Will the DOE Loan Guarantee be extended as assumed?

Q. DID YOU REVIEW THE ETC AND SCHEDULE AT THE TIME OF VCM 17 AND DID YOU FIND IT TO BE REASONABLE?

A. Yes. We found the ETC to be reasonable based on what GPC and SNC knew at the time and based on the independent assessments it had undertaken. The Commission also found the revised schedule and cost forecast to be “reasonable” and set the approved revised capital cost forecast at \$7.3 billion (after netting of the Toshiba Parent Guaranty). The Commission declined to set a cost cap on the Project, but did make clear that:¹³¹

The Commission further finds that any costs spent up to the revised cost forecast will be deemed reasonable, but will be subject to the findings and presumptions as defined in the Stipulation approved on January 3, 2017. This includes the Company retaining the burden of proof on prudence on all capital costs above \$5.680 billion.

Q. HOW DID SNC MAKE THE DECISION TO USE AN “AGGRESSIVE SCHEDULE” FOR THE VOGTLE PROJECT?

A. SNC’s schedule evaluation showed that a +23-month schedule had a 50% probability of meeting the end date and their +29-month schedule had an 80% probability of meeting the end date. These evaluations were the result of performing Monte Carlo simulations of a summarized version of the Project schedule. As set forth in VCM 17, SNC made the

¹³¹ GPSC Docket No. 29849, *Order on VCM 17*, Issued December 21, 2017, pp.11, 13.

1 decision to carry costs in their ETC for a +29-month schedule and use a +23-month
2 schedule as a target schedule for the construction forces. Bechtel performed an assessment
3 that relied on SNC background documents for current project status (that were not
4 independently verified or assessed by Bechtel) and historical data from previous Bechtel
5 Nuclear projects. Bechtel's independent analysis of the cost and schedule to complete the
6 Project resulted in a +19-month schedule with a 50% probability as the target to challenge
7 the construction forces even more. The +19-month schedule gave credibility to SNC's +23
8 assessment.

9 The Project eventually settled on a +21-month schedule as a target schedule. The Bechtel
10 CCA established the Baseline Schedule based on an "early target" schedule, meaning the
11 Project was executed on the basis on completion of both units earlier than the date set by
12 GPC and with the GPSC.¹³² The aggressive schedule provided schedule contingency and
13 an incentive for getting the construction work force to work as hard as possible to meet that
14 scheduled end date. At the peak of the Project, each month of construction added
15 approximately \$90-\$100 million per month in time-driven costs to the cost of the Project.
16 The Project's early decision to attempt to compress the Project schedule made sense
17 because each month saved would have offset approximately \$90-\$100 million.¹³³

¹³² The Bechtel CCA, in Section 9.1 discusses the baseline schedule stating: 9.1 Baseline Schedule. Notwithstanding the Unit 3 and Unit 4 Target Completion Dates, the Parties agree to utilize an "early target" as the Baseline schedule, which as of the Effective Date is premised upon Mechanical Completion for each of Unit 3 and Unit 4 being achieved two (2) months earlier than the respective Target Completion Date for each of Unit 3 and Unit 4 ("Early Completion Targets") (each such two month period is referred to herein as "Schedule Contingency"). For purposes of this Agreement, Schedule Contingency is considered to be for the exclusive use and benefit of Contractor." GPC and Bechtel CCA, p. 105 (October 23, 2017).

¹³³ Project Management Board Meeting, p. 19, July 28, 2020.

1 **Q. WHAT DID YOU FIND REGARDING THE REASONABLENESS OF THE USE**
2 **OF AN AGGRESSIVE SCHEDULE?**

3 A. SNC's decision to use an aggressive schedule was a reasonable decision that in our
4 experience is a common approach used on megaprojects.¹³⁴ Our experience finds that it is
5 quite normal to use an aggressive target schedule as a means of incentivizing work and
6 often allows a project to finish earlier than the later end date. Bechtel, one of the most
7 experienced major contractors in the world, suggested a +19-month schedule, based on the
8 information that was available to them at the time. It was reasonable for SNC to rely on
9 Bechtel's vast experience in this decision process, but to temper that reliance with its own
10 analysis and experience.

11 **Q. DID YOU FIND THAT THE DECISIONS MADE BY GPC AND SNC**
12 **MANAGEMENT WITH REGARD TO THE PROJECT TRANSITION WERE**
13 **REASONABLE AND PRUDENT?**

14 A. Yes. We find reasonable, consistent with the Commission's order on VCM 17,¹³⁵ the
15 decision to move forward with construction, the revised schedule with COD dates for
16 Unit 3 of November 2021 and for Unit 4 of November 2022 (an additional 29 months for
17 each unit from the then currently approved schedule), and GPC's \$8.77 billion share of the
18 total capital cost (as of July 1, 2017).¹³⁶ We also find reasonable the decision to use an
19 aggressive schedule to provide schedule contingency and incentivize work. We find the

¹³⁴ Ibbs, C. W., Lee, S. A., & Li, M. I. (1998). Fast-tracking's impact on project change. *Project Management Journal*, 29(4), 35–41.

¹³⁵ GPSC Docket No. 29849, Order on VCM 17, Issued December 21, 2017, p. 13.

¹³⁶ GPSC Docket No. 29849, VCM 17 Report, p. 7, Public Version.

1 time to fully transition to an execution phase to be reasonable based on what was known at
2 the time of the WEC bankruptcy.

3 We also find the transition plans developed and implemented by SNC and Bechtel to be
4 comprehensive and served as a reasonable plan from which to prepare the Project for
5 execution post-WEC bankruptcy. We further find that the time to transition the Project to
6 the new organizational structure and divided responsibilities between WEC and Bechtel
7 through the CCA, as well as SNC's overall role to manage the Project, was challenged by
8 late documentation and information that trickled in from WEC and the bankruptcy court
9 and the continued discovery of unanticipated uncompleted work in the field as we will
10 discuss later in this testimony. Based on the unforeseen time to gather and review all the
11 necessary information, we find the time to fully transition to an execution phase to be
12 reasonable based on what was known at the time of the WEC bankruptcy.

13 **B. CHALLENGES TO MAINTAINING ESTIMATE AT COMPLETION**

14 **Q. WHAT KEY DECISIONS DID GPC/SNC MAKE WITH REGARD TO THE**
15 **UPDATED EACS?**

16 A. Over the course of the Project, based on the situation at the time and based on what
17 information was known, GPC decided that major reforecasts of its EAC were necessary as
18 included in updated ETCs within VCM 19, VCM 25 and VCM 26.

1 **i. VCM 19**

2 **Q. WHY DID GPC REFORECAST THE EAC IN VCM 19?**

3 A. The Project Transition began immediately following the WEC bankruptcy but continued
4 well into 2018. As discussed by SNC witnesses Kuczynski and Abramovitz in their VCM
5 19 direct testimony, SNC determined that certain categories of cost estimates contained in
6 the VCM 17 ETC were insufficient in that they did not fully anticipate or address certain
7 costs, circumstances and events that were incurred by the Project.¹³⁷ SNC determined that
8 it would be necessary to implement changes to lower Project risks, maintain its schedule,
9 and address cost estimates that were included in the VCM 17 ETC. Accordingly, SNC
10 performed a full cost reforecast for the Project. The reforecast updated assumptions,
11 reflecting contractor duties for Bechtel, increased field supervision, engineering support,
12 and craft incentives. The reforecast also reflected the costs of the 60-plus subcontracts that
13 had not yet been negotiated at the time of the VCM 17 ETC.¹³⁸ The reforecast resulted in
14 over \$1 billion increase from the EAC in VCM 17. This increase was reported in VCM 19.
15 GPC announced that it would not seek to recover \$694 million of the increase, stating,
16 “[GPC] has made the judgment that it is in the best long-term interests of customers,
17 investors, and other stakeholders that it not disrupt Project momentum by seeking approval
18 of the base capital cost increase so soon after receiving Commission approval to continue
19 the Project.” GPC stated that it may seek recovery of the \$366 million contingency
20 estimate.¹³⁹

¹³⁷ GPSC Docket No. 29849, SNC Direct Testimony of Stephen Kuczynski and Aaron Abramovitz, VCM 19, filed October 12, 2018, p. 7.

¹³⁸ GPSC Docket No. 29849, SNC Direct Testimony of Stephen Kuczynski and Aaron Abramovitz, VCM 19, filed October 12, 2018, pp. 7-8.

¹³⁹ GPSC Docket No. 29849, VCM 19 Report, p. 5, filed August 31, 2018.

1 **ii. VCM 25**

2 **Q. WHY DID GPC REFORECAST THE EAC IN VCM 25?**

3 A. The next significant change in the forecasted cost was reflected in VCM 25, which reflected
4 the impact of COVID-19 on the Project as well as the increased cost associated with the
5 schedule extension of seven months for Unit 3 and two months for Unit 4. In his direct
6 testimony in VCM 25, SNC witness Stephen Kuczynski noted the challenges in achieving
7 target earned hours and CPI assumed in the base cost forecast. He also noted that the large
8 focus on the Unit 3 construction remediation work was resulting in higher spend than was
9 anticipated following HFT. He further acknowledged that these pressures were continuing
10 and could impact costs further.¹⁴⁰

11 **Q. WHAT EFFORTS WERE MADE TO ADDRESS THESE CHALLENGES?**

12 A. We address SNC's response to productivity challenges below but add that with respect to
13 the VCM 25 reforecast, SNC witness Stephen Kuczynski described the response to the
14 productivity challenges, noting the "heightened focus" towards first-time quality, with a
15 "sign as you go" strategy, an increased focus on work package closure, and continuing
16 onboarding of craft and other resources.¹⁴¹

17 **iii. VCM 26**

18 **Q. WHY DID GPC REFORECAST THE EAC IN VCM 26?**

19 A. The reforecast reported in VCM 26 reflects the increasing cost pressures due to continuing
20 productivity challenges and the need for remediation work which led to schedule

¹⁴⁰ GPSC Docket No. 29849, Direct Testimony of Stephen Kuczynski, VCM 25, filed October 21, 2021, pp. 18-19.

¹⁴¹ GPSC Docket No. 29849, Direct Testimony of Stephen Kuczynski, VCM 25, filed October 21, 2021, pp. 17-18.

1 extensions.¹⁴² As noted in the VCM 25 discussion, focus continued on work package
2 closure. In addition, there was a focus on preventing a repeat of Unit 3 quality issues on
3 Unit 4.¹⁴³

4 **Q. DID GPC CONTINUALLY EVALUATE WHETHER GOING FORWARD WITH**
5 **THE PROJECT WAS IN THE BEST INTEREST OF CUSTOMERS?**

6 A. Yes. In each VCM through VCM 23, GPC provided an updated comparison of the
7 economics of the Project.¹⁴⁴ In each economic analysis presented, GPC concluded that
8 completing the Project was the best option for customers.¹⁴⁵

9 **Q. DID YOU FIND THAT THE DECISIONS MADE BY GPC AND SNC**
10 **MANAGEMENT WITH REGARD TO THE REFORECASTS WERE**
11 **REASONABLE AND PRUDENT?**

12 A. Yes. GPC and SNC had strong processes in place to monitor costs and continually update
13 the ETC and EAC. Issues impacting costs were recognized and efforts put in place to
14 address the issues. As we noted earlier, a project exceeding original cost projections is not
15 necessarily evidence of imprudence or unreasonable decision-making. We found the
16 actions taken by GPC and SNC to be both reasonable and prudent with regard to the cost
17 challenges the Project faced.

¹⁴² GPSC Docket No. 29849, VCM 26 Report, February 17, 2022, p. 8.

¹⁴³ GPSC Docket No. 29849, Direct Testimony of Stephen Kuczynski and John Williams, VCM 26, filed April 13, 2022, pp. 13-14.

¹⁴⁴ The Stipulation approved in VCM 23 removed the requirement to continue to provide the economic analysis beginning the VCM 24. GPSC Docket No. 299849, *Order Adopting Stipulation*, February 16, 2021.

¹⁴⁵ e.g., GPSC Docket No. 29849, VCM 18 Report, February 2018, p. 34; VCM 23 Report, August 2020, pp. 46-47.

1 **C. CONSTRUCTION SCHEDULE CHALLENGES**

2 **Q. WHAT WERE THE MAJOR CHALLENGES RELATED TO MAINTAINING**
3 **PROGRESS ON THE SCHEDULE?**

4 A. GPC and SNC closely monitored the Project's schedule and cost. At a point in time when
5 the schedule progress is behind due to reasons such as lack of progress due to insufficient
6 manpower numbers, poorer than expected productivity, or an increase in quantities, it is
7 vital to the project to re-baseline and make the schedule be a realistic target to measure
8 progress against. Over the course of the Project, SNC recognized the need to conduct a re-
9 baseline of the schedule to address schedule pressures. The schedule pressures included the
10 impacts of the COVID-19 pandemic, continuing challenges with productivity, and the
11 identification of issues necessitating remedial work.

12 **Q. WHAT KEY DECISIONS DID GPC/SNC MAKE WITH REGARD TO THE**
13 **SCHEDULE CHALLENGES?**

14 A. As discussed earlier in our testimony, when circumstances and conditions change that
15 impact the schedule to which no further recovery efforts can be made, the schedule must
16 be re-baselined to provide a realistic base from which to monitor progress. Based on the
17 circumstances and information known at the time, SNC made the decision to formally re-
18 baseline the schedule four times. We discuss each of the re-baselines below, including the
19 drivers for each.

1 **i. APRIL 2019 RE-BASELINE**

2 **Q. WHY DID SNC RE-BASELINE THE SCHEDULE IN APRIL 2019?**

3 A. In May 2019, the Plant Vogtle Units 3 and 4 Schedule and Cost Update showed that the
4 Project underwent a comprehensive and collaborative re-baseline effort as part of an
5 ongoing review of cost and schedule. This re-baseline effort was intended to incorporate
6 the latest information into the cost forecast and the site work plan.

7 **Q. DID TARGET IN-SERVICE DATES CHANGE?**

8 A. No. While the site work plan forecasted a slip in its target in-service date, these dates
9 remained within the margin of regulatory approved dates. Therefore, the April 2019 re-
10 baseline did not change the approved commercial operation dates of November 2021 for
11 Unit 3 and November 2022 for Unit 4.

12 **ii. FEBRUARY 2021 RE-BASELINE**

13 **Q. WHY DID SNC RE-BASELINE THE SCHEDULE IN FEBRUARY 2021?**

14 A. In 2020, SNC determined that the pressures on the November 2021 COD for Unit 3 and
15 November 2022 COD for Unit 4 required a review of the schedule. GPC testified in VCM
16 24 that, by the end of 2020, productivity impacts of the COVID-19 pandemic had
17 consumed an estimated three to four months of the schedule margin previously embedded
18 in the site work plans for both units. This was much of the remaining margin in the Unit 3
19 schedule. The COVID-19 pandemic certainly exacerbated previously existing challenges
20 associated with lower production, work package closure, component testing, and schedule
21 sequencing issues. In addition, in preparation for starting HFT, SNC identified several

1 issues that required remediation work. These are also discussed below. These issues would
2 delay HFT, which would ultimately delay the completion date.¹⁴⁶

3 **Q. HOW WAS THE FEBRUARY SCHEDULE UPDATE ACCOMPLISHED?**

4 A. As a result of the schedule pressures, a schedule update was made in February 2021. The
5 Vogtle Project Team worked with Bechtel and subcontractors to remove barriers to
6 production and to support their efforts to increase production, as well as continuing efforts
7 to remove constraints to testing and pre-operational activities. GPC committed in the re-
8 baselining effort to continue to ensure quality and design standards were met prior to
9 critical testing activities (i.e., HFT), Fuel Load, and ultimately operations.

10 **Q. WHAT WERE THE RESULTS OF THE FEBRUARY 2021 SCHEDULE RE-**
11 **BASELINE?**

12 A. The re-baselining effort resulted in adding seven months to the Unit 3 COD (moving from
13 November 2021 to June 2022) and two months to the Unit 4 COD (moving from November
14 2022 to January 2023).

15 **iii. AUGUST 2021 RE-BASELINE**

16 **Q. WHY DID SNC RE-BASELINE THE SCHEDULE IN AUGUST 2021?**

17 A. Unit 3 schedule challenges were tied to “three major activities or milestones:
18 (1) completion of construction remediation work; (2) completion of system turnovers,
19 testing, [ITAACs], and other activities prior to Fuel Load; and (3) transitioning from Fuel

¹⁴⁶ GPSC Docket No. 29849, VCM 24 Direct Testimony of David McKinney and Jeremiah Haswell, filed April 20, 2021, pp. 6-7. GPSC Docket No. 29849, VCM 24 Direct Testimony of Stephen Kuczynski and Aaron Abramovitz, filed April 20, 2021, p. 7.

1 Load to plant operation.” To address these challenges at Unit 3, the Project team worked
2 with Bechtel and subcontractors to address obstacles to productivity, increased walk downs
3 of construction areas to identify open work scopes, removed constraints to testing/pre-
4 operational activities, and increased field non-manual support to close out remaining work
5 packages to support the transition of the Project to Fuel Load. Also, progress on Unit 4 had
6 slowed during this period, due to some craft and support resources being diverted from
7 Unit 4 temporarily to support construction efforts on Unit 3. Project leadership, noting this
8 diversion, continued to try to add craft labor and field non-manual support resources,
9 particularly pipefitters and electricians, in order to increase production.¹⁴⁷

10 **Q. WHAT WERE THE RESULTS OF THE AUGUST 2021 SCHEDULE RE-**
11 **BASELINE?**

12 A. As a result of the schedule pressures, a schedule update was made in August 2021
13 forecasting targeted in-service dates for Unit 3 in third quarter 2022 and for Unit 4 in
14 second quarter 2023.

15 **iv. FEBRUARY 2022 RE-BASELINE**

16 **Q. WHY DID SNC RE-BASELINE THE SCHEDULE IN FEBRUARY 2022?**

17 A. During this period, Unit 3 continued to face significant challenges with construction
18 productivity, remediation work, pace of system turnovers, spent fuel pool repairs,
19 timeframe/duration for hot functional and other testing, and documentation completion
20 (e.g. inspection reports). Unit 4 continued to have challenges with productivity.¹⁴⁸

¹⁴⁷ GPSC Docket No. 29849, VCM 25 Direct Testimony of Stephen E. Kuczynski, pp. 6-7, filed October 21, 2021.

¹⁴⁸ GPSC Docket No. 29849, VCM 26 Report, February 17, 2022, pp. 4-5.

1 **Q. WHAT WERE GPC AND SNC DOING WITH REGARD TO THESE**
2 **CHALLENGES?**

3 A. GPC witnesses noted the slowed production in Unit 4 was due to the diversion of resources
4 to Unit 3 but also stated that: ¹⁴⁹

5 progress continues for the necessary work to support the continuation of
6 [open vessel testing], while construction production has supported the
7 successful completion of several testing evolutions With construction
8 production constraints primarily in the electrical disciplines, the workforce
9 has been augmented by utilizing specialty contractors for specific work
10 evolutions, such as safety-related terminations. Additionally, the
11 incorporation of lessons learned from Unit 3 continues to improve first-time
12 quality with changes to work sequencing expected to reduce the amount of
13 congestion from Subcontractors as electrical resources increase.

14 **Q. WHAT WERE THE RESULTS OF THE FEBRUARY 2022 SCHEDULE RE-**
15 **BASELINE?**

16 A. In the VCM 26 Report, the target in-service dates were again adjusted forecasting Unit 3
17 during the fourth quarter of 2022 or the first quarter of 2023 and Unit 4 during the third
18 quarter or the fourth quarter of 2023.

19 **v. FEBRUARY 2023 RE-BASELINE**

20 **Q. WHY DID SNC RE-BASELINE THE SCHEDULE IN FEBRUARY 2023?**

21 A. The adjustment to Unit 3 targeted in-service date was due to required remediation work to
22 certain equipment and components that was identified during start-up testing. Due to the
23 lessons learned in Unit 3 start-up testing efforts, Unit 4 targeted in-service date was

¹⁴⁹ GPSC Docket No. 29849, VCM 26 Direct Testimony of David L. McKinney and Jeremiah C. Haswell, April 13, 2022, p. 8.

adjusted to increase margins to account for current pace of start-up testing efforts.¹⁵⁰ GPC
witness testified that:¹⁵¹

Unit 4's projected in-service date primarily depends on potential impacts arising from Unit 4 testing activities overlapping with Unit 3 start-up and commissioning; maintaining overall construction productivity and production levels, particularly in subcontractor scopes of work; and maintaining appropriate levels of craft laborers.

Q. WHAT WERE THE RESULTS OF THE FEBRUARY 2023 SCHEDULE RE-BASELINE?

A. In the VCM 28 Report, the target in-service dates were again adjusted forecasting Unit 3 during the second quarter of 2023 and Unit 4 during the fourth quarter of 2023 or first quarter 2024.

Q. DID YOU FIND THAT THE DECISIONS MADE BY GPC AND SNC MANAGEMENT WITH REGARD TO RE-BASELINING THE SCHEDULE WERE REASONABLE AND PRUDENT?

A. Yes. Consistent with industry best practices, SNC periodically re-baselined the project target schedule to account for events that occurred at the time. We find the re-baselining to be typical of large complex projects over the course of execution and is normal with projects that fall behind schedule and especially those with an aggressive target schedule.

¹⁵⁰ GPSC Docket No. 29849, VCM 28 Report, February 16, 2023, p. 5.

¹⁵¹ GPSC Docket No. 29849, VCM 28 Direct Testimony of John B. Williams and Jeremiah C. Haswell, filed May 5, 2023, pp. 6-7.

1 **D. CRAFT PRODUCTIVITY AND RETENTION**

2 **Q. WHAT WERE THE MAJOR CHALLENGES RELATED TO CRAFT**
3 **PRODUCTIVITY AND RETENTION?**

4 A. Throughout the execution of the Project, and reflective of a non-existent domestic nuclear
5 construction industry, challenges were encountered relative to having the adequate amount
6 of qualified and skilled craft to support the Project needs and maintaining the required
7 productivity on the site to maintain the schedule.

8 **Q. WHAT KEY DECISIONS DID GPC/SNC MAKE WITH REGARD TO THE**
9 **ISSUES RELATED TO CRAFT PRODUCTIVITY AND RETENTION?**

10 A. As craft availability/retention and productivity were both among the top risks to the Project
11 (including both being identified as one of Bechtel's top 10 risks nearly every month),
12 Project Management continuously assessed actual performance and identified actions to
13 minimize these risks. GPC/SNC made decisions to improve productivity and craft retention
14 by conducting various productivity studies throughout the Project and implementing
15 various initiatives as discussed below to both improve productivity and retain craft.

16 **Q. HOW DID GPC/SNC ASSESS PRODUCTIVITY AND DETERMINE WHAT**
17 **ACTIONS TO TAKE?**

18 A. For craft availability and retention, the Project maintained current projections of the craft
19 staffing needs by discipline to have informed views on when and where additional craft
20 were needed. Labor studies were also conducted to monitor competing projects in the
21 region and their labor demands. To address these needs, the Project maintained regular
22 communication with the labor unions and sought other avenues to boost craft availability,

1 such as applying to use travelling craft from Puerto Rico and Canada (this latter effort was
2 ultimately successful for Puerto Rico but unsuccessful for Canada as the application was
3 denied). To retrain the craft on site and reduce turnover, the Project implemented retention
4 bonuses, wage increases, per diem increases, sign-on and referral bonuses, and related
5 efforts. These types of incentives/bonuses were universal in some cases (such as a retention
6 incentives applicable to all craft), while in other cases they were more targeted (such as
7 wage increases for electricians, pipefitters, and tower crane operators when those resources
8 demands were of a higher risk to the Project).¹⁵² Project Management also moved craft on
9 the site as needed to address project needs, such as shifting resources from Unit 4 to Unit 3
10 or implementing a “helping hands” initiative where other types of craft could be engaged
11 to perform supporting work when the direct craft type was limited or unavailable.

12 For craft productivity, metrics were tracked across craft disciplines and by unit to provide
13 Project Management with a view of where productivity was improving (or worsening) that
14 then provided a measure of the success of productivity improvement initiatives already
15 implemented (or identifying areas that warranted further attention and/or actions to
16 improve performance). SNC also conducted detailed productivity assessments that
17 included a study of productive vs. non-productive time and identified actions to improve
18 performance.¹⁵³

¹⁵² SNC Project Review Meeting, November 13, 2018, slides 8-9.

¹⁵³ SNC Monthly Project Review, p. 12, February 14, 2018; SNC Monthly Project Review, p. 9, August 17, 2018.

1 **Q. WHAT TYPES OF ACTIONS WERE UNDERTAKEN TO IMPROVE**
2 **PRODUCTIVITY?**

3 A. Throughout the course of the Project, many different initiatives were undertaken to
4 improve productivity on the Project. Some actions were targeted to specific areas or
5 disciplines, others were broadly applicable across the Project. One of the more significant
6 productivity improvement efforts took place in the form of a formal productivity
7 improvement plan introduced in August 2018. This plan identified six key areas for
8 targeted improvements and specific actions for each of the building managers to undertake
9 to improve productivity. The key areas targeted for improvement included:¹⁵⁴

- 10 • **Time at the work face:** Placing supervision at the work face during critical times
11 (i.e., first 90 minutes of the shift and before/after lunch).
- 12 • **“Ready-Ready” program:** Process to ensure that work packages issued contain
13 implementable designs, are free from paperwork issues, and all required material
14 and labor needs are identified and available.
- 15 • **“Right-Sizing” crews:** Additional emphasis on using daily quantity tracking sheets
16 and related tools to ensure the appropriate number of personnel are assigned to a
17 given task based on the budget and complexity of the task.
- 18 • **Reducing travel/wait time/non-productive time:** Several related actions to
19 remove barriers to performing the work and improving work planning (e.g.,
20 utilizing advance requests for weld rod to minimize wait times at the rod room).
- 21 • **Internal milestones:** Utilize aggressive internal milestones that meet or beat the
22 project schedule dates and communicate these schedules to supervision to ensure
23 required completion dates for activities are well understood.
- 24 • **Optimize night shift utilization:** Focus night shift work on support for critical/near
25 critical path activities and scopes that can be assigned independently to the night
26 shift.

27 Monitoring the progress of the work and identifying areas for improvement was an ongoing
28 and recurring effort throughout the execution of the Project.

¹⁵⁴ Vogtle Units 3 and 4 Construction Completion Project, Productivity Improvement Plan, August 7, 2018.

1 As previously mentioned, a craft incentive program was introduced November 15, 2018,
2 to improve absenteeism and craft retention.¹⁵⁵ A rate increase and per diem were introduced
3 to attract additional pipefitters and electricians, as well as a visa process to attract available
4 and qualified Canadian workers. These are only the recovery improvements instituted
5 through early 2018; the Project had a continuous improvement mindset that included craft
6 training, craft leadership changes, specific work for each shift to avoid rework and take
7 advantage of the learning curve, right sizing crews for specific work efforts, and using
8 certain crews for work that the crew excels in executing.

9 **Q. DID THE DECISIONS MADE AND STEPS TAKEN BY GPC AND SNC IMPROVE**
10 **THE CRAFT PRODUCTIVITY AND RETENTION?**

11 A. Yes. Following implementation of specific initiatives such as those discussed above,
12 improved performance and retention was observed. This improvement, however, did not
13 eliminate the risks associated with craft productivity and craft retention. Nevertheless, we
14 found GPC and SNC appropriately monitored and communicated the current status of these
15 challenges to allow informed decisions to be made to support the Project.

16 **Q. DID YOU FIND THAT THE DECISIONS MADE BY GPC AND SNC**
17 **MANAGEMENT WITH REGARD TO CRAFT PRODUCTIVITY AND**
18 **RETENTION WERE REASONABLE AND PRUDENT?**

19 A. Yes. While the productivity targets and manpower requirements were challenging
20 throughout the Project and were further impacted with the FOAK nature of this Project and
21 with the bankruptcy of WEC, we find that the planning assumptions used by GPC and SNC

¹⁵⁵ CCF 2018-218, dated October 30, 2018, approved November 15, 2018.

1 were reasonable based on the information known at the time and that the Companies took
2 appropriate action throughout the Project to mitigate these risks and their impacts.

3 We find it is important to emphasize that this Project was the first nuclear power plant built
4 in nearly 30 years in this country, resulting in the historical data being dated and most of
5 the craft resources having little or no experience working under nuclear QA/QC conditions.
6 The containment vessel in the AP1000 unit was significantly smaller than the older design,
7 which caused increased craft congestion and contributed to lower-than-expected
8 productivity. Very few projects require the large numbers of highly skilled workers as a
9 nuclear power plant and typically the only way to draw those numbers of workers is to pay
10 higher hourly rates and a per diem to draw travelers from other parts of the country. Many
11 of the quality requirements are very demanding on electricians and having a workforce
12 unfamiliar with the demands exacerbated the productivity issues and, in some instances,
13 led to a significant amount of rework.

14 Our experience indicates that it is normal on a power plant project for pipefitter and
15 electrician work to become the critical work of the plant. The manhours of work to
16 complete associated with these crafts is so substantial from the peak work period through
17 the completion of the plant that it is essential to have the right numbers of workers with the
18 correct skill set. SNC increased both per diem and rates of these craft disciplines to both
19 attract and retain the appropriate levels of skilled workers. SNC understood its own
20 monthly time-driven costs and offered these incentives to reduce the duration SNC monthly
21 management costs were incurred.

E. COVID-19 PANDEMIC

Q. WHAT CHALLENGES DID THE COVID-19 PANDEMIC PRESENT TO THE PROJECT?

A. SNC witnesses described the on-going challenges caused by the COVID-19 pandemic in their VCM testimonies. In the VCM 23 testimony, SNC witnesses Kuczynski and Abramovitz described higher than normal absenteeism and the disruptive effects of having to stop or change work based on persons requiring isolation. They also noted the supply chain disruptions associated with the pandemic. In the VCM 24 testimony, these same witnesses reiterated these challenges, adding the fact that subcontractors were facing the same obstacles as well as degradation in performance.¹⁵⁶

Q. WHAT KEY DECISION DID GPC/SNC MAKE WITH REGARD TO THE COVID 19 PANDEMIC?

A. When COVID-19 was declared a pandemic in March 2020, GPC and SNC took two immediate actions to quickly take appropriate actions to be able to consider whether the Project could continue or not, including: (1) implementation of a number of site protocols to reduce the likelihood of exposure to the virus (e.g. expanding medical clinic capabilities onsite, suspending bus services, modifying break schedules, etc.); and, (2) preparation and evaluation of different scenarios based on different levels of site activity due to the pandemic.¹⁵⁷

¹⁵⁶ GPSC Docket No. 29849, VCM 24 Direct Testimony of Stephen Kuczynski and Aaron Abramovitz, filed October 21, 2020, p. 4.

¹⁵⁷ SNC Monthly Project Review Meeting, April 22, 2020, slides 9-12.

1 **Q. DID YOU FIND THAT THE DECISIONS MADE BY GPC AND SNC**
2 **MANAGEMENT WITH REGARD TO THE COVID-19 PANDEMIC WERE**
3 **REASONABLE AND PRUDENT?**

4 A. Yes, we find that the decisions made by GPC and SNC based on the implementation of site
5 protocols and the scenarios conducted allowed the Project to continue in a safe manner
6 during the pandemic.

7 **F. SYSTEM TURNOVER & PARTIAL RELEASE FOR TESTING**

8 **Q. ARE YOU AWARE OF THE DECISION TO USE THE PARTIAL RELEASE FOR**
9 **TESTING PROCESS?**

10 A. Yes. We are aware that the Project utilized a PRT process.

11 **Q. CAN YOU EXPLAIN WHAT THE PRT PROCESS IS?**

12 A. Under the PRT process, complete systems are broken down into smaller partial systems
13 and turned over to ITP. These partial turnovers can be further broken down into mechanical
14 and electrical partial turnovers. Some of these partial turnovers can contain exceptions,
15 which are scopes of work within the turnover boundary that is not yet complete, and it may
16 include a punch list of work items that still must be completed.

17 **Q. DO YOU FIND THE DECISION TO USE PRT ON THE PROJECT TO BE**
18 **PRUDENT?**

19 A. Yes. During execution of the Project, it was determined that construction was not
20 proceeding fast enough to complete a full system for turnover on the dates that ITP planned
21 to begin its testing. The Project made the decision that its priority should be to test the
22 equipment and partial systems as soon as possible to discover any defects or

1 nonconformances in the Work. The earlier discovery of issues would allow the Project to
2 correct them earlier, which would help in maintaining their target COD dates. The Project
3 determined that the value of early discovery of defects would be a net benefit. We agree
4 with this assessment.

5 **G. QUALITY CONTROL**

6 **Q. WHAT WERE THE MAJOR CHALLENGES RELATED TO QUALITY**
7 **ASSURANCE ON THE PROJECT?**

8 A. There were three main challenges related to quality assurance, IEEE 384 cable separation
9 remediation, Inspection Reports backlog, and Spent Fuel Pool and Fuel Transfer Canal
10 remediation. We discuss each challenge below.

11 **i. IEEE REMEDIATION**

12 **Q. CAN YOU PROVIDE A BRIEF SUMMARY OF THE IEEE 384 REMEDIATION?**

13 A. Yes. On May 5, 2020, the NRC notified SNC that it had found deficiencies in the
14 construction of the IDS battery racks, specifically misaligned spring bolts, also referred to
15 as channel nuts. After additional correspondence and clarification by the NRC, a Root
16 Cause Determination (“RCD”) was initiated, and SNC determined that Condition Reports
17 (“CR”) were not properly being generated and entered into the Corrective Action program
18 (“CAP”) upon discovery of non-conforming work. SNC and Bechtel leadership took steps
19 to ensure CRs were being written when required by the CAP.¹⁵⁸

¹⁵⁸ RCD for CR Number: 50064326 / CAR Number: 80003772; pp. 3,9,28; December 4, 2020.

1 On December 22, 2020, a CR was generated to identify a trend of electrical cable
2 installations not meeting IEEE 384 cable separation and spacing requirements, based on
3 57 individual CRs that had been written since November 2020. IEEE 384 sets the criteria
4 for physical separation and isolation of electrical circuits between Safety Related cables
5 and Non-Safety Related cables. On January 25, 2021, additional issues relating to electrical
6 commodity installations were captured in a CR and an RCD was initiated. The initial IEEE-
7 384 separation issues investigation identified approximately 600 issues within 64 rooms.¹⁵⁹

8 From June 21 to July 2, 2021, the NRC conducted a special investigation at Vogtle and on
9 August 26, 2021, the NRC issued three findings and violations to SNC:¹⁶⁰

- 10 • Preliminary White Finding: Failure to Promptly Identify and Correct IEEE 384
11 Cable Separation and Seismic/Structural Nonconformances;
- 12 • Preliminary Greater than Green: Failure to Accomplish Separation for Class 1E
13 System Field Installations in Accordance with Applicable Instructions, Procedures,
14 and Drawings; and
- 15 • Green: Failure to Install Electrical Raceways and Connections in Accordance with
16 Applicable Instructions, Procedures, and Drawings.

17 After reviewing a response from SNC submitted on October 5, 2021, the NRC made final
18 significance determinations of the three findings on November 17, 2021, confirming the
19 white finding for the failure to promptly identify and correct IEEE 384 cable separation
20 and seismic/structural nonconformances, and upgrading the Greater than Green Finding to

¹⁵⁹ RCD for CR Number: 50075757 / CAR Number: 80004436; p. 4; April 15, 2021.

¹⁶⁰ NRC, Vogtle Electric Generating Plant, Units 3 and 4 – NRC Special Inspection Reports 05200025/2021010, 05200026/2021010 and – Preliminary White and Greater than Green Findings for Unit 3 – p. 1, Enclosure 1, p. 2-3, August 26, 2021; The NRC uses a color-coding system to more easily convey information to the general public regarding safety significance of its findings. The NRC uses Green, White, Yellow, and Red to prioritize its findings according to safety significance. The color green represents very low safety or security significance, the color white represents low to moderate safety or security significance, the color yellow represents substantial safety or security significance, and the color red represents high safety or security significance.
<https://www.nrc.gov/reactors/operating/oversight/rop-description.html>

1 a White Finding for the failure to accomplish separation for Class 1E System Field
2 Installations.¹⁶¹

3 The Project spent a significant amount of time and resources from spring of 2021 to
4 summer of 2022 to identify and correct these deficiencies. On April 19, 2022, the NRC
5 issued a Supplemental Inspection Report and Follow-up Letter that found that "... the
6 completed or planned corrective actions were sufficient to address and preclude repetition
7 of the performance issues that led to the White Findings..." and subsequently closed all
8 findings.¹⁶²

9 **Q. DID YOU EVALUATE SNC'S RESPONSE TO THE NONCONFORMANCE OF**
10 **ELECTRICAL WORKS THAT RESULTED IN THE IEEE REMEDIATION?**

11 A. Yes. We examined the information surrounding the IEEE Remediation, which included the
12 discovery of the nonconforming works, communications with the NRC, actions taken to
13 correct the nonconforming works and prevent recurrence, implementation of training for
14 electrical craft on IEEE standards, and updates to the policies and procedures to ensure
15 future compliance with IEEE standards.

16 **Q. WHAT CORRECTIVE ACTION DECISIONS DID SNC MAKE TO AVOID**
17 **REOCCURRENCE?**

18 SNC implemented several corrective action decisions to address the IEEE Remediation
19 efforts including:

¹⁶¹ NRC, Vogtle Electric Generating Plant, Unit 3 – Final Significance Determination of a Preliminary White Finding, A Preliminary Greater than Green Finding, Notice of Violation, and Assessment Follow-up Letter; NRC Special Inspection Report 05200025/2021011; p. 1-2; November 17, 2021.

¹⁶² NRC, Vogtle Electric Generating Plant, Unit 3- Supplemental Inspection Report 05200025/2022010 and Assessment Follow-Up Letter; p. 1; April 19, 2022.

- Revisions to SNC’s electrical installation specifications procedure;¹⁶³
- Revisions to Bechtel’s procedures to ensure that field inspectors document deficiencies in a CR;¹⁶⁴
- Revisions to SNC’s work package planning and development procedure;¹⁶⁵
- Implementation of changes to the Engineering Service Request (“ESR”) database;¹⁶⁶
- Development and implementation of a process for the QC Inspectors to review Safety Related Work Packages;¹⁶⁷
- Lessons learned with IEEE remediation were captured on Unit 3 and applied on Unit 4;
- Continuous SNC field oversight to ensure issues are identified and corrected during installation;
- Conducted a site-wide standdown on March 18, 2021;¹⁶⁸ and
- Implementation of a new electrical training module.

Q. WERE THE CORRECTIVE ACTIONS TAKEN TO ADDRESS THE DEFICIENCIES REASONABLE AND PRUDENT?

A. Yes. We found that the corrective actions taken to address the IEEE issues were sufficient to strengthen the QA program and ensure existing IEEE issues were corrected and no new issues occurred in the field. We found the management decision to implement these corrective actions to be reasonable and prudent.

Q. HAS GPC RECOGNIZED THE COSTS TO INSTITUTE THE CORRECTIVE ACTIONS AS COSTS THAT IT WILL NOT PASS ON TO ITS CUSTOMERS?

A. Yes. GPC has conveyed to us its intentions to not seek recovery of costs from the IEEE remediation. We strongly agree with GPC’s decision not to seek recover of these costs from its customers.

¹⁶³ RCD for CR Number: 50075757 / Corrective Action Record (CAR) Number: 80004436, March 19, 2021, p. 18.

¹⁶⁴ RCD for CR Number: 50075757/CAR Number: 80004436, March 19, 2021, p. 16.

¹⁶⁵ RCD Report for CR Number: 50064326/CAR Number: 80003772, December 11, 2020, pp. 4-5.

¹⁶⁶ RCD for CR Number: 50075757/CAR Number: 80004436, March 19, 2021, p. 17.

¹⁶⁷ RCD for CR Number: 50064326/CAR Number: 80003772, December 11, 2020, pp. 4-5.

¹⁶⁸ RCD for CR Number: 50075757/CAR Number: 80004436, March 19, 2021, p. 17.

ii. INSPECTION REPORTS

Q. CAN YOU BRIEFLY EXPLAIN THE ISSUES REGARDING INSPECTION REPORTS?

A. Yes. After HFT was completed for Unit 3 in July 2021, the Project was focused on closing out ITAACs to receive its Unit 3 103(g) letter. Along with the IEEE Remediation issues the Project was facing, the Project noticed in the fall of 2021 that work package closure curves were flat and not declining as expected. Bechtel notified SNC that the Project needed to focus on Inspection Records (“IRs”) necessary for completion of the ITAACs. The Project started to assess open IRs in fall of 2021 and determined in early 2022 that there were an estimated 24,441 IRs that needed to be closed for the 103(g) letter. The Project began specifically tracking and reporting on IR closure in the IR Burndown Curve provided in the Monthly Status Reports and Presentation Slides.¹⁶⁹ All Unit 3 ITAACs required for fuel load were closed on August 18, 2022.

Q. WHAT CORRECTIVE ACTIONS DID SNC IMPLEMENT AS A RESULT OF THIS ISSUE?

A. SNC had already implemented numerous corrective actions to address related issues that had been occurring during execution and felt that any corrective actions that would be recommended had already been implemented and additional actions were not necessary at that time. Corrective actions that had been implemented included:

- Improvement measures taken to address IEEE Remediation as discussed above;

¹⁶⁹ Monthly Project Review Meeting Presentation, p. 4, January 2022.

- The Bechtel QC program increased its number of QC inspectors and SNC added additional support and leadership to the Bechtel QC program to help drive quality;¹⁷⁰
- Increased effectiveness of the ITAAC War Room;¹⁷¹
- Bechtel organized daily accountability meetings to monitor IR closure rates;¹⁷²
- Reinforcing the “Sign As You Go” Standard for all work packages;¹⁷³ and
- Changing Rules of Credit for Bechtel construction to require IRs and work package closure before 100% credit can be earned.

The Project transferred lessons learned from Unit 3 to ensure that the same issues did not reoccur on Unit 4.

Q. HAS GPC RECOGNIZED THE COSTS TO INSTITUTE THE CORRECTIVE ACTIONS AS COSTS THAT IT WILL NOT PASS ON TO ITS CUSTOMERS?

A. Yes. GPC has conveyed to us its intentions to not seek recovery of costs from the IR closure efforts. We strongly agree with GPC’s decision not to seek recover of these costs from its customers.

iii. SPENT FUEL POOL AND FUEL TRANSFER CANAL

Q. ARE YOU AWARE OF REMEDIATION WORK PERFORMED ON THE SPENT FUEL POOL AND FUEL TRANSFER CANAL?

A. Yes. The Spent Fuel Pool (“SFP”) is a pool filled with boronated water that is used to store nuclear fuel rods underwater and the Fuel Transfer Canal (“FTC”) is where a shuttle system is used to transfer the fuel rods for loading into the reactor. The walls and floor of the pool consist of stainless steel liners, which are welded together to form a leak tight boundary.¹⁷⁴

¹⁷⁰ Monthly Project Review Meeting Presentation, p. 11, January 2022.

¹⁷¹ Monthly Project Review Meeting Presentation, p. 10, January 2022.

¹⁷² Monthly Project Review Meeting Presentation, p. 5, December 2021.

¹⁷³ Monthly Project Review Meeting Presentation, p. 11, February 2022.

¹⁷⁴ Westinghouse CA20 Leakage Apparent Cause Analysis Input – ESRs 50083161 and 50083422, p. 2, May 14, 2021.

1 The SFP was initially filled in August 2019 and ITP drained it in October of 2019. After
2 draining, a small amount of water leakage was discovered. The Radioactive Waste Drain
3 System (“WRS”), which contains the leak detection and monitoring equipment, was not
4 operational at that time, so the source of the leakage was not determined. The SPF was
5 filled a second time by ITP in April 2020 and drained again in May 2020, but no leak
6 evaluation was performed.

7 On February 27, 2021, the SFP was filled for a third time. On March 16, 2021, two gallons
8 per minute of leakage was discovered in several drains in the SFP and FTC.¹⁷⁵ After several
9 failed attempts to isolate the source of the leakage in the WRS, ITP attempted to identify
10 the source of the leakage by applying pressurized air to the WRS while the SFP was filled
11 in an attempt to create air bubbles that would float to the top of the SFP. The test was
12 initially run with 30 pounds per square inch (“PSI”) and, when no bubbles appeared, the
13 ITP Test Engineer increased the pressure to 60 PSI.¹⁷⁶ After the pressure was increased,
14 the ITP Test Engineer heard metallic pinging sounds, and the PSI was reduced to 45. The
15 leak chases have a design pressure of 20 PSI and the leak chase piping has a design pressure
16 of 30 PSI. After the testing connections were removed the leak rate increased to 6.2 gallons
17 per minute.

18 This over pressurization event had caused significant stress to the welds, which caused new
19 leakage paths and exacerbated existing leakage paths, which caused the overall leakage

¹⁷⁵ Westinghouse CA20 Leakage Apparent Cause Analysis Input – ESRs 50083161 and 50083422, p. 4, May 14, 2021.

¹⁷⁶ Westinghouse CA20 Leakage Apparent Cause Analysis Input – ESRs 50083161 and 50083422, p. 4, May 14, 2021.

rate to increase. To address the leak, SNC removed all the floor panels, redesigned the floor panels to include fewer welded seams, and re-installed new floor plates.

Q. DO YOU RECOMMEND A DISALLOWANCE OF COSTS INCURRED FOR THE REMEDIATION OF THE SFP AND FTC?

A. No. During the SFP and FTC remediation efforts the Project was already being delayed by the IEEE remediation efforts, so no delay costs can be specifically attributed to this remediation. The Project also recovered significant remediation funds through its builder's risk policy, so we understand that customers will not be paying costs associated with this remediation.

XI. OVERALL ASSESSMENT OF THE OVERSIGHT AND MONITORING OF THE VOGTLE PROJECT

Q. WHAT IS YOUR OVERALL ASSESSMENT OF THE OVERSIGHT AND MONITORING OF THE VOGTLE PROJECT?

A. We conclude that SNC and GPC exercised appropriate oversight and monitoring of the Project and that the Project is reasonable and prudent. Our review has demonstrated that, as the first new nuclear project completed in decades, the Vogtle Project will provide valuable, carbon-free energy and capacity to Georgia Power and the Co-Owners' customers for the next 60-80 years.

Q. DO YOU FIND THAT THE COMPANY'S REQUEST OF \$8.826 BILLION TO BE REASONABLE RESULTING IN VALUE TO THE CUSTOMER?

A. Yes, based on our assessment as discussed in our testimony.

1 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

2 **A. Yes.**

Exhibit JAM-1 – Joe’s CV



Joseph Miller

President & Chief Executive Officer



Pegasus-Global
Holdings, Inc.

Contact

Phone

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Email

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Address

964 Wessington Manor Lane, Fort Mill, SC 29715

Website

www.pegasus-global.com

Education

University of North Carolina at Chapel Hill

Strategic Leadership Program, 2009

Indiana State University

Business Administration Coursework
(12 of 16 MBA courses completed), 1997

Purdue University

Bachelor Degree in Mechanical
Engineering, 1991

Areas of Expertise

- Energy Transition
- Engineering
- Environmental Compliance Planning
- Expert Witnessing
- Financial Analysis
- Generation and Regulatory Strategy
- Mergers & Acquisitions
- Operations Management

Career Summary

- **2022 - present**
President & Chief Executive Officer, Pegasus-Global Holdings, Inc.
- **2019 - 2022**
Executive Consultant, Pegasus-Global Holdings, Inc.
- **2014 - 2019**
Vice President/Central Services & Compliance, Charlotte, NC,
Duke Energy Corporation
- **2012 - 2014**
General Manager/Strategic Engineering, Charlotte, NC,
Duke Energy Corporation
- **2010 - 2012**
General Manager/Generation Support, Charlotte, NC,
Duke Energy Corporation
- **2006 - 2010**
Station Manager/Power Operations, Zimmer Station, OH,
Duke Energy Corporation
- **2002 - 2006**
Station Manager/ Power Operations, East Bend Station, KY,
Duke Energy Corporation
- **2000 - 2002**
Group Manager/Power Operations, Cincinnati, OH,
Duke Energy Corporation
- **1997 - 2000**
Support Team Group Leader/Power Operations, Cayuga Station, IN,
Duke Energy Corporation
- **1991 - 1997**
Staff Engineer/Power Operations, Cayuga Station, IN,
Duke Energy Corporation

Profile

Mr. Miller is an accomplished energy executive valued for leadership in operations, engineering, generation fleet modernization, and both generation and regulatory strategy. His experience includes sponsoring testimony before utility commissions in 56 regulatory proceedings, including base rate, fuel, CPCN, plant abandonment and environmental cases in multiple states. He has held several leadership positions at power plant and corporate levels, including managing both regulated and merchant power plants. Mr. Miller has proven to be a strong, effective communicator and problem solver who thrives in environments that require the capacity to prioritize concurrent projects both calmly and efficiently. Mr. Miller is a sought-after keynote speaker, panelist, and industry conference presenter.

Prior to joining Pegasus-Global, Mr. Miller provided leadership and regulatory support in modernizing one of the largest generation fleets in the United States. Mr. Miller led the analysis and program development for fleet compliance with complex environmental regulations, including MATS, CSAPR, 316(b), ELG and CCR. He generated the idea and strategy to convert three coal plants to also burn natural gas, significantly reducing fuel cost and carbon emissions. He has had significant involvement in acquisition and divestiture due diligence, evaluation and negotiations.

Experience

Pegasus-Global Holdings, Inc.

President & Chief Executive Officer, 2022-Present

Executive Consultant, 2019-2022

Leading a firm that is globally recognized for providing expert technical, strategic and dispute services to the energy and infrastructure sectors.

Duke Energy Corporation

Vice President/Central Services & Compliance, Charlotte, NC, 2014-2019

- Provided oversight of 550 employees, engineering, environmental compliance planning, generation and regulatory strategy, NERC and regulatory compliance, technical services and maintenance services for the company's fleet of 89 fossil and hydro power plants in North Carolina, South Carolina, Ohio, Indiana, Kentucky and Florida.
- Chaired enterprise engineering council.

General Manager/Strategic Engineering, Charlotte, NC, 2012-2014

- Negotiated agreement with Indiana Office of Utility Consumer Counselor on \$400 million environmental filing.
- Led multi-department initiative resulting in early retirement of fossil plants.
- Identified unique compliance method that allowed Crystal River units 1 & 2 (900MW) to comply with BART and MATS rules, reducing grid reliability concerns and avoiding \$200 million in transmission projects.
- Implemented plant retrofits to improve fuel flexibility to achieve \$168 million in savings and maintain reliability.
- Led the evaluation and negotiation of generation asset purchase.
- Represented company in numerous regulatory proceedings.

Experience

General Manager/Generation Support, Charlotte, NC, 2010-2012

- Headed up financial and engineering analysis of capital projects and project controls responsibility for the company's fleet of nuclear, fossil and hydroelectric plants.
- Facilitated and carried out all facets of environmental compliance planning and strategy.
- Served as Merger Integration Team Leader of Fossil Hydro Generation Operations Services Team (2011).

Station Manager/Power Operations, Zimmer Station, OH, 2006-2010

- Personally surpassed 13 years and 2.75 million worked-hours leading employees without a lost-time injury.
- Introduced improvements to gypsum processing and scrubber waste operations, saving \$5 million per year.
- Facilitated and executed needed modifications to allow station to burn lower cost coal from the Illinois Basin.
- Served on the management committee during labor negotiations with IBEW 1347 (2006).

Station Manager/Power Operations, East Bend Station, KY, 2002-2006

- Led efficiency-improvement effort allowing station to achieve its second-best heat rate in 25-year history.
- Improved SO₂ scrubbing and fuel cost to become the cheapest plant in the Cincinnati region.
- Led corporate Human Resources and Benefits teams through a continuous improvement process resulting in annual cost savings of \$10 million.

Group Manager/Power Operations, Cincinnati, OH, 2000-2002

Support Team Group Leader/Power Operations, Cayuga Station, IN, 1997-2000

Staff Engineer/Power Operations, Cayuga Station, IN, 1991-1997

Appendix

Nature of Proceeding	Petition Date	Company	Regulatory Body	Docket #
Ongoing Review of Edwardsport IGCC Project	1/27/2010	Duke Energy Indiana	IURC	43114
Fuel and Fuel-Related Cost Adjustment	10/18/2011	Duke Energy Carolinas	PSC of SC	2012-3-E
Fuel and Fuel-Related Cost Adjustment	3/7/2012	Duke Energy Carolinas	NCUC	E-7 Sub 1002
Environmental Cost Recovery	4/26/2012	Duke Energy Indiana	IURC	ECR - 19
CPCN for Pollution Control Equipment	6/28/2012	Duke Energy Indiana	IURC	44217
Fuel and Fuel-Related Cost Adjustment	10/23/2012	Duke Energy Progress	PSC of SC	2013-1-E
Environmental Cost Recovery	10/26/2012	Duke Energy Indiana	IURC	ECR - 20
Fuel and Fuel-Related Cost Adjustment	12/28/2012	Duke Energy Carolinas	PSC of SC	2013-3-E
Base Rate Adjustment	1/4/2013	Duke Energy Carolinas	NCUC	E-7 Sub 1026
Base Rate Adjustment	2/15/2013	Duke Energy Carolinas	PSC of SC	2013-59-E
Fuel and Fuel-Related Cost Adjustment	3/6/2013	Duke Energy Carolinas	NCUC	E-7 Sub 1033
Environmental Cost Recovery	4/29/2013	Duke Energy Indiana	IURC	ECR - 21
Fuel and Fuel-Related Cost Adjustment	6/12/2013	Duke Energy Progress	NCUC	E-7 Sub 1031
Fuel and Fuel-Related Cost Adjustment	10/8/2013	Duke Energy Progress	PSC of SC	2014-1-E
Fuel and Fuel-Related Cost Adjustment	10/8/2013	Duke Energy Carolinas	PSC of SC	2014-3-E
Environmental Cost Recovery	10/28/2013	Duke Energy Indiana	IURC	ECR - 22
CPCN for Pollution Control Equipment	11/7/2013	Duke Energy Indiana	IURC	44418
Fuel and Fuel-Related Cost Adjustment	2/24/2014	Duke Energy Carolinas	NCUC	E-7 Sub 1051
Environmental Cost Recovery	4/28/2014	Duke Energy Indiana	IURC	ECR - 23
Fuel and Fuel-Related Cost Adjustment	5/28/2014	Duke Energy Progress	NCUC	E-7 Sub 1045

Appendix

Nature of Proceeding	Petition Date	Company	Regulatory Body	Docket #
Fuel and Fuel-Related Cost Adjustment	10/7/2014	Duke Energy Progress	PSC of SC	2015-1-E
Fuel and Fuel-Related Cost Adjustment	10/7/2014	Duke Energy Carolinas	PSC of SC	2015-3-E
Environmental Cost Recovery	10/28/2014	Duke Energy Indiana	IURC	ECR - 24
Fuel and Fuel-Related Cost Adjustment	2/10/2015	Duke Energy Carolinas	NCUC	E-7 Sub 1072
Environmental Cost Recovery	4/28/2015	Duke Energy Indiana	IURC	ECR - 25
Fuel and Fuel-Related Cost Adjustment	4/29/2015	Duke Energy Progress	NCUC	E-7 Sub 1069
Fuel and Fuel-Related Cost Adjustment	10/1/2015	Duke Energy Progress	PSC of SC	2016-1-E
Fuel and Fuel-Related Cost Adjustment	10/1/2015	Duke Energy Carolinas	PSC of SC	2016-3-E
Environmental Cost Recovery	10/28/2015	Duke Energy Indiana	IURC	ECR - 26
Fuel and Fuel-Related Cost Adjustment	2/3/2016	Duke Energy Carolinas	NCUC	E-7 Sub 1104
Environmental Cost Recovery	4/28/2016	Duke Energy Indiana	IURC	ECR - 27
Fuel and Fuel-Related Cost Adjustment	5/17/2016	Duke Energy Progress	NCUC	E-7 Sub 1107
Base Rate Adjustment	6/2/2016	Duke Energy Progress	PSC of SC	2016-227-E
CPCN for Dry Bottom Ash Conversion	7/28/2016	Duke Energy Kentucky	KY PSC	2016-00268
Fuel and Fuel-Related Cost Adjustment	10/12/2016	Duke Energy Progress	PSC of SC	2017-1-E
Fuel and Fuel-Related Cost Adjustment	10/12/2016	Duke Energy Carolinas	PSC of SC	2017-3-E
Environmental Cost Recovery	10/28/2016	Duke Energy Indiana	IURC	ECR - 28
Fuel and Fuel-Related Cost Adjustment	1/5/2017	Duke Energy Carolinas	NCUC	E-7 Sub 1129
Base Rate Adjustment	4/18/2017	Duke Energy Progress	NCUC	E-2 Sub 1142
Environmental Cost Recovery	4/28/2017	Duke Energy Indiana	IURC	ECR - 29

Appendix

Nature of Proceeding	Petition Date	Company	Regulatory Body	Docket #
Fuel and Fuel-Related Cost Adjustment	5/3/2017	Duke Energy Progress	NCUC	E-7 Sub 1146
CPCN for Alternate Fuel Source	5/31/2017	Duke Energy Kentucky	KY PSC	2017-00186
Base Rate Adjustment	6/7/2017	Duke Energy Carolinas	NCUC	E-7 Sub 1146
Base Rate Adjustment	9/15/2017	Duke Energy Kentucky	KY PSC	2017-00321
Fuel and Fuel-Related Cost Adjustment	10/4/2017	Duke Energy Progress	PSC of SC	2018-1-E
Fuel and Fuel-Related Cost Adjustment	10/4/2017	Duke Energy Carolinas	PSC of SC	2018-3-E
Environmental Cost Recovery	10/25/2017	Duke Energy Indiana	IURC	ECR - 30
Fuel and Fuel-Related Cost Adjustment	1/4/2018	Duke Energy Carolinas	NCUC	E-7 Sub 1163
Fuel and Fuel-Related Cost Adjustment	3/16/2018	Duke Energy Progress	NCUC	E-7 Sub 1173
Environmental Cost Recovery	4/23/2018	Duke Energy Indiana	IURC	ECR - 31
CPCN for New Landfill	6/15/2018	Duke Energy Kentucky	KY PSC	2018-00156
Base Rate Adjustment	10/9/2018	Duke Energy Progress	PSC of SC	2018-318-E
Base Rate Adjustment	10/9/2018	Duke Energy Carolinas	PSC of SC	2018-319-E
Environmental Cost Recovery	10/22/2018	Duke Energy Indiana	IURC	ECR - 32
Environmental Cost Recovery	4/22/2019	Duke Energy Indiana	IURC	ECR - 33
Plant Decertification and Abandonment	4/2/2021	Public Service Co. of New Mexico	NM PRC	21-00083-UT
Base Rate Adjustment	12/5/2022	Public Service Co. of New Mexico	NM PRC	22-00270-UT

Exhibit MS-2 – Mike’s CV

Michael D. Skaggs
9776 Clingmans Dome, Knoxville, Tennessee 37922
(865)228-0426 mds9869@gmail.com



Mike Skaggs, who has over 35 years of experience in the utility industry, is now supporting other needs, including participating on Duke Energy's Nuclear Safety Review Board, support of Georgia Power for Vogtle 3&4, Ontario Power Groups new nuclear plant and the Customer Advisory Council for BrightNight LLC as well as other local philanthropic interests.

Most of Skaggs' utility experience was gained at TVA, a corporate agency of the United States that provides electricity for business customers and local power companies serving nearly 10 million people in parts of seven southeastern states.

Skaggs' experience at TVA included serving as Executive Vice President and Chief Operating Officer. In this role, he was responsible for generation, power supply, transmission, stewardship, and aviation functions and oversaw the management of the integrated river system, generation construction activities, major projects, and TVA facilities.

In late 2015, Skaggs assumed the position of Senior Vice President of Operations and Construction at Watts Bar Nuclear Plant. He took on that role as construction and design was completing and power ascension testing of Unit 2 was starting. He also provided the final oversight of the integration, testing, and startup of the unit - the nation's first new nuclear generation of the 21st century.

In addition to assuming responsibility in 2011 for the construction completion of Watts Bar Unit 2, Skaggs' leadership experience at TVA included managing the recovery of Browns Ferry Unit 1 to return that site to full, three-unit operation and overseeing two successful steam generator replacement projects. He held top management posts at each of the TVA's three operating nuclear plants and served as Vice President of TVA's Nuclear Operations Support group, with responsibility for corporate functional area management, emergency preparedness, and nuclear security. He also led a number of initiatives across the nuclear fleet that resulted in improved operational performance, organizational alignment, and cultural health.

Skaggs first came to TVA as a contractor at Watts Bar Nuclear Plant and joined the company in 1994 to manage performance analysis for initial plant operations. He then oversaw capital projects for TVA's transmission system, telecommunications, and substations before returning to the nuclear group.

Skaggs began his career as a nuclear quality assurance engineer at TexasUtilities in 1983. He worked at Comanche Peak Steam Electric Station in several capacities, including mechanical engineering, ASME coordination, and system engineering supervision.

A registered professional engineer, he holds a bachelor's degree in mechanical engineering from Texas Tech University, in Lubbock, Texas, and earned a senior reactor certification at Watts Bar Nuclear Plant.

Skaggs and his wife, Lisa, have a daughter and a son and live in Knoxville, Tennessee.

Michael D. Skaggs

Summary of TVA Job History

Calendar Year 2022	Skaggs Services consulting – Duke Energy and BrightNight
06/2021 – 01/2022	Executive Vice President and Advisor to the Chief Executive Officer
10/2018 – 06/2021	Executive Vice President and Chief Operating Officer
10/2016 – 09/2018	Executive Vice President, Operations
10/2015 – 10/2016	Senior Vice President, Watts Bar Operations and Construction
09/2012 – 10/2015	Senior Vice President, Nuclear Construction
10/2011 – 09/2012	Senior Vice President, Nuclear Generation Development and Construction
11/2010 – 10/2011	Vice President, Sequoyah Nuclear Plant
12/2009 – 11/2010	Vice President, Nuclear Operations Support
07/2005 – 12/2009	Vice President, Watts Bar Nuclear Plant
07/2004 – 07/2005	Vice President, Browns Ferry Nuclear Plant
04/2003 – 07/2004	Plant Manager, Browns Ferry Nuclear Plant
07/2001 – 04/2003	Assistant Plant Manager, Browns Ferry Nuclear Plant
07/2000 – 07/2001	Maintenance and Modifications Manager, Browns Ferry Nuclear Plant
02/1999 – 07/2000	Manager, Chief Nuclear Officer's Staff, TVA Nuclear
07/1997 – 02/1999	Manager of Projects, Transmission
02/1995 – 07/1997	Site Performance Analysis Manager, Watts Bar Nuclear Plant
02/1994 – 02/1995	Project Manager, Watts Bar Nuclear Plant

Exhibit 3 – List of Documents Reviewed

- Bechtel Construction Completion Agreement and Amendments thereto;
- Bechtel Transition Plan;
- Project Management Organization (“PMO”) and Development;
- SNC Policies and Procedures;
- Change Control Forms (“CCFs”);
- Cost Management Guidelines
- SNC Monthly Progress Presentations;
- Bechtel Monthly Status Reports;
- Westinghouse Monthly Status Reports;
- Monthly Cost Monitoring Reports;
- Monthly Cost Reports;
- Project Cost Contingency Analysis;
- Weekly Metrics;
- Inspection Reports;
- Quality Assurance Aggregate Trend Reports;
- Project Execution Plans (“PEPs”);
- Construction Execution Plan;
- Risk Management Program;
- Risk registers;
- Project Schedules;
- Organizational charts;
- Meeting minutes/notes;
- Cost estimates and reforecasts;
- Budgets and cost reports;
- Contractor/Vendor proposals;
- Purchase Orders;
- Southern Company and GPC Board of Directors (“BOD”) information;
 - Meeting Minutes; and
 - Presentations to the Board of Directors and Board Committees.
- Construction Review Board (“CRB”) Meeting Minutes and Presentations;
- Vogtle Project Management Board (“VPMB”) Meeting Minute and Presentations;
- Vogtle Construction Review Board (“VCRB”) Meeting Minutes and Presentations;
- Change Control Board (“CCB”) Minutes
- Internal audit reports
- External audit reports
- The Institute for Nuclear Power Operators (“INPO”) Principles for Excellence;
- NRC Correspondence;
- NRC Inspection Reports;
- Root Cause Determinations;
- Lessons Learned;
- Industry Standards;
- Industry data, presentations, and reports;

- GPC filed pleadings with the GPSC;
- Testimony filed and Orders issued in the GPSC Dockets 29849 and 27800;
- Data Requests and corresponding responses submitted by the Staff, CM, and various Intervenors.

Exhibit 4 – Personnel Interviewed

- GPC Executive Vice President, CFO, and Treasurer
- GPC Nuclear Development, Regulatory Support
- Executive Vice President, Vogtle 3 & 4
- Work Management Director
- Budgeting and Reporting Manager
- Project Oversight Director
- Internal Audit Director
- Construction Project Director
- SNC Chairman, President, and CEO
- Site Vice President, Unit 3
- GPC Senior Vice President, Nuclear Development
- ITP Director
- GPC Regulatory & External Affairs Project Manager
- Vice President, Project Controls
- Principle Project Scheduler (Lead)
- Cost Management Manager
- Vice President, Business Operations
- Business Operations Director
- GPC Commercial Director, Nuclear Development

Exhibit 5 – List of Policies and Procedures Reviewed

- SNC Change Control Procedure, ND-PC-VNP-006, Versions 2.0-4.0
- SNC Vogtle Units 3 and 4 Scheduling Desktop Guideline, Revision 6-12
- SNC Vogtle 3 & 4 Project Cost Management Guideline, Revision 6
- SNC Vogtle Process Controls Narrative, VGT 3.0 Monthly Cost/Budget to Actual Review, Version 3
- SNC Risk Management Program, ND-PC-VNP-010, Version 3.0
- Plant Vogtle Units 3 and 4, Project Execution Plan, Version 8.1
- SNC Project Metrics Reporting, ND-PC-NVP-003, Version 4.0
- Southern Company Internal Audit Playbook
- SNC Conduct of Operations for Initial Test Program Group Procedure, NC-CO-013, Version 7.0
- SNC Vogtle 3&4 Conduct of Operations Procedure, ND-CO-026
- SNC Project Completion and Transition to Operations Procedure, ND-AD-VNP-029, Version 5.1
- SNC ITP Administration and Organization Procedure, B-GEN-ITPA-001, Version 7.2

Exhibit 6 – Internal Audits for 2019

Q1

- Contract Administration/Contractor Flowdown Compliance Review
- Physical Site Security Review
- Information management Review
- Vendor Quality Oversight Review

Q2

- Budget/Cost Management Review
- Project Interaction Review (VPEP Sub-Plans)
- PRISM Application Review
- Project Metrics Review

Q3

- Owner Controlled Insurance Program Assessment
- Schedule Assessment
- Operational Readiness – Unit 3
- Vendor Management – Accenture SLA Review
- Accrual Assessment
- DOE Loan Guarantee Review

Q4

- Regulatory Compliance Review
- Information Management Review
- Environmental, Health, and Safety Audit

Projects On-Going Throughout the Year

- Vendor Contract Management Reviews

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