VERIFIED DIRECT TESTIMONY OF STEVEN WARREN

Q1. Please state your name, business address and title.

A1. My name is Steven Warren, P.E. My business address is 55 E. Monroe Street, Chicago, IL 60603. I am a Senior Manager with Sargent & Lundy ("S&L").

Q2. On whose behalf are you submitting this direct testimony?

A2. I am submitting this testimony on behalf of Northern Indiana Public Service Company LLC ("NIPSCO").

Q3. Please describe your educational and employment background.

A3. I received a Bachelor of Science degree in engineering from Purdue University in 1985. I have been employed by S&L since earning my engineering degree. I hold a professional engineering license in Indiana, Nevada, and Texas.

Q4. What are your responsibilities as Senior Manager?

A4. I am responsible for managing projects within S&L, which includes planning, design, control, monitoring and improvement of the project both technically and financially. I am responsible for leading the project staff from project inception through project completion, including the preparation of the project scope of work, procurement and installation specifications, equipment evaluation and recommendation, design details, and design deliverables. I am also responsible for coordinating the project engineering across all disciplines, providing a comprehensive review of the systems/equipment being studied, and providing recommendations. These projects can range from large complex power generation facilities to smaller power generation studies. While I have worked on numerous projects, most of the projects are combustion turbine based simple cycle or combined cycle. This has provided me with extensive experience in the engineering design of these facilities. Based on this experience, I provide consultation on many of S&L's combustion turbine based projects, I have provided training for both S&L personnel as well as client personnel, and I have authored/coauthored industry papers and publications associated with combustion turbine based power generation design.

Q5. Have you previously testified before the Indiana Utility Regulatory Commission ("Commission") or any other regulatory commission?

A5. No.

Q6. What is the purpose of your direct testimony in this proceeding?

A6. The purpose of my direct testimony is to support NIPSCO's request for a certificate of public convenience and necessity to construct a natural gas combustion turbine ("CT") peaker plant (the "CT Project") on available property at NIPSCO's R.M. Schahfer Generating Station ("Schahfer") site. Specifically, I sponsor the Simple Cycle Gas Turbine Engineering Study, Report No. SL-016874, prepared by S&L (the "Engineering Study"), which sets forth the American Association of Cost Engineers ("AACE") Class 3 cost estimate for NIPSCO's proposed simple cycle gas turbine project, a copy of which is attached hereto as Confidential Attachment 4-A. This cost estimate was used by NIPSCO to develop its best estimate of the costs of construction of the proposed CT Project. I present information regarding the engineering work completed by S&L in support of NIPSCO's request for approval of a new peaker power plant to be located at the Schahfer site. The CT Project is currently expected to be comprised of one larger industrial frame combustion turbine with three smaller aeroderivative, or similarly sized industrial frame combustion turbines, for a total output of approximately 400 MWs.

Q7. Are you sponsoring any attachments to your direct testimony in this

Cause?

A7. Yes. I am sponsoring Confidential Attachment 4-A, which was prepared by me or under my direction and supervision.

S&L's Role in the CT Project

Q8. Please explain the work S&L has performed in support of the CT Project and NIPSCO's application.

A8. S&L's initial work scope was to perform an engineering study for installation of a peaking (a/k/a simple cycle) facility at NIPSCO's Schahfer site. The Engineering Study provided a conceptual engineering design evaluation for the installation of the peaker power plant. The conceptual engineering design included technology selection, overall site layout, equipment general arrangements, estimated performance, estimated emissions, estimated project implementation schedule, estimated installation commodities and cost estimates to determine if new power generation is viable. The Engineering Study provided an independent evaluation of the conceptual CT project and provided the estimated market cost.

As further described in Confidential Attachment 4-A, there were several locations considered for the installation of the new peaker facility. The locations were within the Schahfer site boundary and were screened to determine the best overall location. The location selected was in an area with no known demolition of antiquated equipment/foundations, ease of access for construction, and overall best choice for facility interconnects. Additionally, the conceptual design is reusing the substation bay currently being used by Schahfer Unit 17 to aid in the power interconnection into the 345 kV transmission system.

The work performed as part of the study provided information to assist in determining whether the peaking project would proceed. As such, S&L was requested to provide further support for the peaker power plant project. S&L then developed an Engineer, Procure, Construct ("EPC") technical specification for the installation of the peaker power plant at the Schahfer site. This EPC specification was used by NIPSCO in a Request for Proposals ("RFP") issued in Fall 2022 to power generation EPC contractors (the "EPC RFP"). NIPSCO solicited bids from experienced contractors to install the facility. NIPSCO received bids from potential EPC contractors and S&L supported NIPSCO in the technical evaluation of one of those bids.

As NIPSCO Witness Baacke explains, NIPSCO ultimately determined to reject all of the bids and proceed with a self-build option. At that point, S&L was requested to provide additional services associated with NIPSCO self-performing the installation of the peaker power plant. These services include the development of a CT specification, the development of a generator step-up transformer specification, and additional support relative to procurement of this equipment. S&L is currently supporting NIPSCO in procuring this equipment, along with additional engineering and cost estimation services. Details of S&L's work related to the Engineering Study can be found in Confidential Attachment 4-A.

Q9. Please describe the technical evaluation work performed by S&L relating to the EPC RFP.

A9. NIPSCO requested S&L to provide the technical specification for the EPC RFP. This technical EPC specification included site specific data, as well as specific technical design requirements for the CTs and balance of plant (BOP) design. While the EPC specification included specific requirements, these were included to capture prudent industry standard requirements for such a facility which the EPC contractors would typically meet. Other design aspects were left to the EPC bidders to base their proposals on their standard technical specifications and procedures to achieve cost effective offerings. The technical specifications prepared by S&L were included within the EPC RFP. As further discussed by NIPSCO Witness Baacke, the EPC RFP was issued publicly, and bids were received from three bidders. At NIPSCO's request, S&L assisted NIPSCO with a technical review of one of the bids. Commercial items such as pricing, terms, and conditions were not part of S&L's technical evaluation.

Q10. Please discuss S&L's qualifications to perform this work.

A10. S&L's CT experience is based on decades of project experience, spanning from the technology's inception through today's most advanced machines. Since 2000, based on my understanding, S&L has been authorized to provide design and Owner's Engineer services for more than 150 CT units installed in either combined cycle or simple cycle configurations, totaling more than 35,000 MW of capacity for numerous clients in the U.S. and abroad. More than fifty of these projects were detailed design assignments representing over 100 generating units. Additionally, S&L has conducted combustion turbine studies and/or provided conceptual designs for over 80 clients on more than 140 assignments. The projects have encompassed a range of fuels, such as natural gas, liquefied natural gas, diesel oil, naphtha, propane, and integrated coal gasification combined cycle syngas. S&L

maintains a full-fledged staff of full-time estimating professionals engaged in performing cost estimates, exclusively for the power generation industry.

<u>Evaluation of Alternatives and Description of the Project Configuration</u>

Q11. Please describe in further detail how S&L assisted NIPSCO's assessment and development of the proposed CT Project at the Schahfer site leading up to the EPC RFP.

A11. As stated above, S&L developed the conceptual engineering design and detailed cost estimate for the peaking facility. S&L's work included the development of the facility design criteria establishing the engineering design basis. The design basis identified the key elements for the new facility. Some of the key elements that were established are as follows:

- Gas Turbine Simple Cycle Installation
- Nominal Output
- Number of gas turbines being considered
- Fuel Gas Interconnect
- Transmission Interconnect
- Water Interconnect

Additionally, the engineering design basis provided other information used to establish the overall conceptual design of the facility to support the development of the cost estimates. As part of the conceptual design effort, the power generation technology needed to be selected. There were several configurations considered with each configuration potentially having advantages over the other configurations. The industrial frame and aeroderivative gas turbines were considered in meeting the facility's operating needs.

The gas turbines considered for the new peaker facility included both industrial frame and aeroderivative machines. The industrial frame gas turbines are designated as such due to their design being for land-based power generation. They are built with "industrial" heavier grade components because they do not need to be lighter in weight which is a key requirement of gas turbine design in the airline industry. In general, industrial frame gas turbines are heavier, more durable, and less complicated in design compared to aeroderivative gas turbines used in the airline industry.

Gas turbines for the airline industry are designed to provide propulsion or thrust for jet airplanes. These engines are designed with lighter weight materials to meet the design requirements for the airline industry. The basic difference in a gas turbine for the airline industry and an aeroderivative gas turbine for power generation is the airplane gas turbine includes a nozzle to provide propulsion or thrust and an aeroderivative gas turbine for power generation has a power turbine(s) in lieu of the nozzle. Additionally, aeroderivative machines are smaller for use in the airline industry. Therefore, the power production from these machines is limited. Finally, since aeroderivative machines are designed for the airline industry and require numerous starts and stops, they provide an advantage over industrial frame machines in regard to starts and the impact of starts on maintenance cycles, as well as the time to start a unit.

To assist in the evaluation of the potential configurations that meet the facility design requirements, S&L further developed the conceptual design for each configuration. Each configuration's conceptual design included development of an overall site plan with conceptual general equipment arrangements. This assessment confirmed the complete facility will be capable of being located and installed at the Schahfer site. Additionally, each configuration's conceptual design included estimated output and heat rate (efficiency) identifying the anticipated performance of the new facility at various site ambient conditions. The conceptual design also included emissions estimates, estimated design quantities, procurement, installation, commissioning and testing, implementation schedule, and each configuration's cost estimate. These are key activities in determining the feasibility of each configuration as well as establishing the configuration best suited to meet NIPSCO's future power generation needs.

Q12. Did S&L evaluate multiple technologies for the project?

A12. Yes. S&L evaluated three plant configurations as specified by NIPSCO. The three configurations included all large industrial frame machines, all small aeroderivative machines, and a combination of large industrial frame and smaller aeroderivative machines. Smaller industrial frame machines are available and could be used in place of the smaller aeroderivative machines. The representative specific units used for the three configurations were (1) 2-General Electric (GE) 7FA.04 Industrial Frame Machines (approximately 360 MWs, Net); (2) 6-GE LM6000 Aeroderivative Machines (approximately 325 MWs, Net); and (3) a combination utilizing 1-GE 7FA.04 and 3-GE LM6000 Machines (340 MWs, Net). While General Electric equipment was used for the study evaluation, other original equipment manufacturers (OEMs) offer similar equipment which would meet the requirements established for the facility. At NIPSCO's request, S&L also prepared a decision matrix with 23 factors to aid NIPSCO in the selection of the most appropriate alternative.

The Engineering Study evaluates all three configurations and presents AACE Class 4 cost estimates for each, which are summarized at page 1-3 of the Engineering Study. Those AACE Class 4 estimates are at a probable accuracy range of -30%/+50%. Then, based on NIPSCO's ultimate determination to pursue the third plant configuration, S&L developed an AACE Class 3 estimate for the combination industrial frame/aeroderivative configuration using a GE 7FA.05 for the industrial frame unit and LM6000 pf+ units for the aeroderivative units. This is summarized at pages 1-4 and 1-5 of the Engineering Study. A GE 7FA.05 was used for the AACE Class 3 estimate due to increased power generation needed (as explained by Witness Augustine), since the GE 7FA.05 produces more power compared to the GE 7FA.04 model. The Class 3 estimate is at a probable accuracy range of -20%/+30%.

Based on the S&L's analysis performed on the various configurations, NIPSCO ultimately chose the third configuration, which is the industrial frame and aeroderivative units (assumed to be one GE 7FA.05 and three GE

LM6000 machines) as best suiting NIPSCO's generation needs.

Q13. Please describe the work performed by S&L to develop a design basis for the project.

A13. One of the key elements in performing an engineering study and establishing a cost estimate for a project is establishing the design basis. The design basis or criteria provides the crucial information to define the design elements including materials, equipment sizing and redundancy, civil/structural design, mechanical design, electrical/I&C design, environmental design basis for HVAC, etc. In general, NIPSCO's guideline for the design basis is to achieve a reliable, robust facility having a minimum 30-year life with the ability to save costs through a design that allows for efficient operation and maintenance without excessive initial capital cost. This design basis was established with the complete Design Criteria/Basis described in Section 4 and found in Appendix 1 of the Engineering Study.

<u>Cost Estimate for the CT Project</u>

Q14. Please describe the work performed by S&L to develop the cost estimate for the CT Project.

A14. As I indicated previously and as described more fully in the Engineering Study, the engineering services work included the preparation of a total installed cost ("TIC") estimate aligning with the AACE Class 4 (-30%/+50%) for all three configurations. As part of this work effort, S&L prepared and issued cost information requests from GE to obtain current cost information for the combustion turbines and corresponding auxiliaries. Additionally, S&L developed conceptual site plans and assessed site conditions to support the determination of the estimated commodities for the installation of the simple cycle unit at Schahfer. S&L also used recent information from other projects to support the development of the estimated commodity and cost information. Based on further refinement of the conceptual design, S&L then developed the AACE Class 3 (-20%/+30%) estimate for NIPSCO's selected configuration. This work is described in Sections 10.2 and 12.2 of the Engineering Study. In summary, S&L considered: Equipment and Material Costs, Labor Wage Rates, Construction Direct and Indirect Costs (General Expense Costs), and Contingency associated with the information within the cost estimate.

Q15. Please further discuss the AACE Class 3 cost estimate.

A15. The self-build scope of work includes the design, engineering, procurement, construction, construction management, commissioning, operator training, demonstration, and testing of the project. The cost estimate was based upon S&L's experience with developing similar simple cycle facilities where NIPSCO will procure the combustion turbines and associated auxiliary equipment using detailed specifications developed by S&L and will maintain performance responsibilities. The structure used for the cost estimate is based upon utilizing subcontractors for appropriate work.

The cost estimate was based on current CT OEM pricing, as well as pricing obtained during previous projects and comparing with other recent S&L proposals and projects. Material takeoffs were based on the preliminary design with reference to similar sized plants that S&L has designed, constructed, and/or estimated on a self-build basis. The cost estimate is stated in 2022 dollars.

Q16. Is the cost estimate, to the extent commercially practicable, the result of competitively bid engineering, construction, or procurement contracts?

A16. Yes. Although NIPSCO's RFP was for an EPC contract, the cost estimate is not derived directly from the bids received. Due to the current status of the design, the project is not yet ready for competitive bidding, which will be done later, which is described by NIPSCO Witness Baacke. The actual costs of the project will be based upon competitive bidding. For purposes of the cost estimate, however, equipment and material costs were estimated on the basis of S&L in house data, vendor catalogs, industry publications, and other related projects, with the exception of the major electrical equipment, gas turbines, and associated auxiliaries, including post-combustion nitrogen-oxide control equipment. For these larger items, vendor quotes were solicited and received. As such, the cost estimate was based upon competitive prices received specific to this project or upon information from other projects that were competitively bid.

Q17. Please provide the basis for the cost estimate.

A17. The complete basis for the cost estimate is included in Section 4 and Appendix 1 of the Engineering Study. To obtain the Class 4 and Class 3 estimates, AACE seeks to establish a minimum design definition of 1% and 10%, respectively. To achieve these requirements, S&L obtained design and cost information directly from the CT OEMs which makes up much of a simple cycle installation. In addition, S&L provided conceptual design corresponding to the Schahfer site and used previous design information to establish the remaining design and cost for the facility. The installation cost information was developed using construction hours and labor costs. The base hours and costs were adjusted for local labor productivity, as well as cost data for union craft. The craft cost information is taken from prevailing wages for Gary, Indiana. This information is from the publication RS Means Labor rates for the Construction Industry, 2022 edition. The labor productivity is adjusted using a regional labor productivity multiplier of 1.1 to the estimated installation hours per Compass International Global Construction Yearbook. This multiplier is applied based on comparison to labor in the Texas/Gulf Coast region. In addition, it was determined craft labor would work 5x10s to attract and keep labor.

Most of the direct construction costs are determined as identified above. There are other direct costs that are determined indirectly by taking a percentage of the direct costs (defined by S&L as "Variable Accounts"). The percentages were based on S&L's experience with similar type and size projects. The Variable Accounts, including the percentages, are set out in Section 12.2.3 of the Engineering Study.

The Variable Account Costs included in the cost estimate are set out in Section 12.2.3 of the Engineering Study and were determined as follows:

- Engineering, procurement, and project services - included as a lump sum
- A/E Construction Management – included at 1.25% of Total Direct and Construction Indirect Costs
- A/E Start-up and Commissioning Support – included at 0.75% of Total Direct and Construction Indirect Costs
- Start-up Spare Parts – included at 0.3% of Total Direct Process Equipment Cost
- Owner's Cost – not included

Q18. Are there costs that are not included in your cost estimate?

A18. The costs that are excluded from the cost estimate, including Owner's Costs and Escalation, are set forth in Section 12.2 of the Engineering Study.

Q19. Is contingency included?

A19. Yes. Contingency is included at 20% of all cost categories except process equipment. Process equipment includes a contingency at 10%. These rates related to pricing and quantity variation in the specific scope estimated. The contingency does not cover new scope outside of what has been estimated, only the variation in the defined scope. This is consistent with industry practice. As explained by NIPSCO Witness Baacke, for purposes of the best estimate of the costs of construction, the contingency S&L has included in its cost estimate has been removed and replaced by contingency determined by NIPSCO.

Q20. Was a project schedule developed?

A20. Yes. S&L developed a project schedule outlining the design, procurement, construction, and commissioning phases of the CT Project, as set forth in Section 8 of the Engineering Study.

Q21. Was an O&M cost estimate developed?

A21. Yes. S&L developed an O&M cost estimate for the CT Project in 2022 dollars, as set forth in Section 9 and Appendix 15 of the Engineering Study.

Q22. Please explain how S&L's estimate for the cost of the CT Project are incorporated into the best estimate of the costs of construction project presented by NIPSCO Witness Baacke.

A22. The AACE Class 3 (-20%/+30%) cost estimate for the new CT supports and aligns with the cost breakdown of the total project cost presented by NIPSCO Witness Baacke. As noted above, the details of S&L's cost estimate are set forth in the Engineering Study (Confidential Attachment 4-A).

Q23. Does this conclude your prefiled direct testimony?

A23. Yes.

VERIFICATION

I, Steven Warren, Senior Manager with Sargent & Lundy, affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information, and belief.

/s/ Steven Warren
Steven Warren

Date: September 12, 2023

Confidential Attachment 4-A (Redacted)