I&M Exhibit: _____

Cause No. 45235

INDIANA MICHIGAN POWER COMPANY

PRE-FILED VERIFIED DIRECT TESTIMONY

OF

Q. SHANE LIES

INDEX

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ON BEHALF OF
INDIANA MICHIGAN POWER COMPANY

Q. What is your name and business address?

A. My name is Quinton Shane Lies. My business address is Donald C. Cook Nuclear Plant (Cook Plant or Cook), One Cook Place, Bridgman, Michigan 49106.

Q. By whom are you employed and in what capacity?

A. I am employed by Indiana Michigan Power Company (I&M or the Company), a subsidiary of American Electric Power, Inc. (AEP), as the Site Vice President at the Cook Plant.

Q. What are your responsibilities as the Site Vice President of the Cook Plant?

A. As the Site Vice President, I am responsible for providing overall management and oversight of Operations, Radiation Protection, Chemistry, Maintenance, Work Control, Outage Management, Environmental, Safety and Human Performance, Regulatory Affairs, Training, Performance Improvement, Security, Information Technology, Procedures, Emergency Preparedness, and Work Force Planning.

Q. What is your education and professional background?

A. I received a Bachelor of Science Degree in Nuclear Engineering from Kansas State University in 1994. Additionally, I received a Master's Degree in Mechanical Engineering in 1996, also from Kansas State University. I was previously a licensed engineer in the state of Michigan.

I began my career with I&M in June 1996 as a System Engineer at Cook. In 2000, I joined the Operations Department and obtained my Senior Reactor Operator's license. After serving in the Cook control rooms as a Unit Supervisor, I held the positions of System Engineering Manager, Operations Manager, Assistant Plant Manager, Engineering Director, Plant Manager, and Engineering Vice President prior to assuming my current position as Site Vice President in 2015. In this position, I report directly to the Chief Nuclear Officer of Cook.

Q. Have you previously submitted testimony in any regulatory proceedings?

A. Yes. I provided testimony before the Indiana Utility Regulatory Commission (Commission) in I&M's prior base case proceeding, Cause No. 44967. I also provided testimony before the Commission related to the Cook Plant's Life Cycle Management (LCM) Project in Cause Nos. 44182 LCM 4 and 44182 LCM 5, and I submitted testimony before the Michigan Public Service Commission in Case No. U-18370.

I. <u>PURPOSE OF TESTIMONY</u>

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

A. The purpose of my testimony is to: 1) provide an overview of I&M's nuclear generating asset, the Cook Plant, 2) support Cook's operation and maintenance (O&M) expenses during the twelve-month, forward-looking test period ending December 31, 2020 (the Test Year), 3) support the historic nuclear O&M expenses during the historical period from January 1, 2018 through December 31, 2018. I support these expenditures on a total Company basis. Company witness Duncan supports the allocation to the Indiana jurisdiction, and 4) support the projected capital expenditures at Cook from January 1, 2019 through December 31, 2020 (the Capital Forecast Period).

To provide context for I&M's investments in Cook, I address several topics in depth, including: modifications related to the March 2011 event at the Fukushima Dai-ichi Nuclear Power Station (Fukushima) in Japan; the Baffle Bolt & Up-Flow Conversion Projects; Dry Cask Storage of spent nuclear fuel; Decommissioning; and the Clean Water Act Section 316(b) Project (316(b) Project). I discuss each of these topics from an operational perspective. Company witness Williamson describes the regulatory treatment requested for the dry cask storage and 316(b) Project.

Q. Are you sponsoring any attachments to your direct testimony?

A. Yes. I am sponsoring the following attachments:

- Attachment QSL-1: Cook Plant Systems Diagram
- Attachment QSL-2: Baffle Bolt Diagram

Q. Were the attachments that you are sponsoring prepared by you or under your direction?

A. Yes.

II. THE COOK NUCLEAR PLANT OVERVIEW

Q. Please describe the Cook Plant's organization.

A. The Cook Plant is operated by I&M's Nuclear Generation Group (NGG), which consists of approximately 1200 full time I&M employees. Cook also employs approximately 100-200 contract workers on a long-term basis and 600-1000 temporary contract workers for refueling outages. The NGG is organized to ensure that all activities required to operate and maintain the Cook Plant are accomplished in a safe and efficient manner.

Q. Please describe the design of the Cook Plant.

A. The Cook Plant is a two-unit nuclear power plant located along the eastern shore of Lake Michigan in Bridgman, Michigan. Both units are pressurized water reactors with four-loop Westinghouse nuclear steam supply systems. The combined nominally-rated net electrical output for both units is 2278 megawatts (MWe). A diagram of the Cook Plant Systems is provided as Attachment QSL-1.

Unit 1 received its operating license from the Nuclear Regulatory Commission (NRC) in 1974 and began commercial operation in 1975. Unit 2 received its operating license in 1977 and began commercial operation in 1978. The NRC initially granted 40-year licenses to each unit and granted 20-year license extensions in 2005. Unit 1 is currently licensed to operate until 2034, and Unit 2 until 2037.

Q. Please describe the NRC's regulation of the Cook Plant.

A. The NRC provides specific technical requirements through regulations, regarding the components that must be incorporated into the design of the systems, to ensure the protection of public health and safety. The NRC defines compliance with these regulations during facility operation, in part, by incorporating certain Technical Specifications into the facility Operating License. These Technical Specifications include Limiting Conditions for Operation (LCO), for use during abnormal, temporary operational circumstances. In order for the Plant to continue operating during this time, the LCO must be continuously met, and the temporary operational circumstance remedied within a specified time. If an LCO is not met within the specified timeframe, the plant must be shut down until the temporary circumstance is remedied.

Q. What is the overall condition of the Cook Plant?

A. As a result of the well-planned, cost effective investment in and maintenance of the Cook Plant, it is in good condition, and necessary for I&M's provision of safe, reliable electric service to its customers.

Q. Please describe the Cook Plant's overall performance.

A. Cook's overall performance is strong, as substantiated by plant and regulatory performance. With respect to plant performance, Unit 1 has operated continuously for its last two consecutive 18-month refueling cycles. Similarly, Unit 2 continuously operated during its previous cycle and is currently on a continuous run of more than 325 days. For regulatory performance, the current ratings in the NRC's Revised Reactor Oversight Process are all green (the highest achievable level) for both Unit 1 and Unit 2. Additionally, Cook remains in the best achievable Licensee Response category, earning it the lowest level of required NRC oversight, due to its high level of performance. The Cook Plant is able to attain and maintain such high levels of performance in large part due to the expenditures supported later in my testimony.

Q. How has this performance been achieved?

A. Cook is a continuous learning organization which is steadily strengthened through the application of internal lessons learned, operating experience, benchmarking, and industry best practices to all facets of the Plant's design, maintenance, and operation. These practices have directly contributed to the cost-effective, efficient, safe, and reliable operation of the Cook Plant.

Q. Does the Cook Plant benefit I&M's customers?

A. Yes. Nuclear power is an important resource in I&M's energy portfolio. Cook provides safe, low-cost, and emission-free generation to I&M's customers. Annually, the Cook Plant generates enough electricity to supply approximately 1.5 million homes. Additionally, Cook has a long-standing commitment to nuclear education, community outreach, and non-profit agency support.

Q. Please describe the planning and management practices of the Cook Plant.

A. Cook engages in planning and resource allocation through a Nuclear Asset Management (NAM) Process and a strategic Long Range Plan (LRP), which identify critical components and the projects necessary to ensure their reliability. The NAM Process is used for making operational, resource allocation, and risk management decisions to maximize the asset while maintaining the safety of the plant and meeting regulatory requirements. NAM helps to ensure only necessary capital improvements are made.

The LRP is an element of the NAM Process and is used to identify necessary work years in advance of actual implementation. Plant needs are evaluated and refined by key plant personnel and undergo multiple internal reviews. Cook also works collaboratively with I&M and the American Electric Power Service Corporation (AEPSC)[1] to evaluate the Plant's needs.

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[1] AEPSC supplies engineering, financing, accounting, planning, advisory, and other services to the subsidiaries of the AEP system, one of which is I&M.

As part of the NAM Process and LRP, Cook identifies projects that are necessary to meet regulatory requirements and projects aimed at increasing the value of the asset. Cook applies industry best practices to identify optimum refurbishment and replacement schedules for critical plant components. Projects are prioritized and strategically scheduled in the LRP. The goal is to ensure that components continue to operate consistent with our NRC operating license so as to maintain the Cook Plant at maximum capacity.

Q. Please describe Cook's refueling outages.

A. Refueling outages occur every 18 months at each unit. Typically, every year at least one unit is refueled (in either the spring or fall), and every third year both units are refueled (one each in the spring and fall). The length of the outage limits the amount of work that can be performed on the unit. Since the Cook Plant provides reliable, low cost generation, Cook seeks to minimize the duration of refueling outages.

III. COOK PLANT OPERATION AND MAINTENANCE EXPENSES

Q. Please provide an overview of the Cook Plant's O&M expenses.

A. O&M expenses include base operating expenditures and non-outage equipment reliability expenditures. Included in the base operating expenditures are refueling outage amortizations, which can have a significant impact on O&M expenditures in any given year depending on the refueling outage cycle. The majority of Cook O&M expenses can be broken down into the following categories:

- Labor, including straight time and over time
- Planned outages
- All other

Operating and maintaining the Cook Plant involves managing technically complex systems and components. Practically all of Cook's O&M activities are subject to comprehensive regulation and continuous inspection by the NRC.

Q. How did you develop the forecasted Test Year O&M expenses for the Cook Plant?

A. The NGG is constantly evaluating the future needs of Cook to ensure that it continues to operate safely, reliably, efficiently, and in compliance with all regulatory requirements. Cook employees continually assess the condition of plant equipment and plan not only for the modification or replacement of equipment when it reaches the end of its useful life, but also for unforeseen failures. The NGG and Cook management review the Plant's current and future needs, along with historical O&M expenses to develop forecasts, and then reassess those forecasts prior to approval. Forecasts are then refined annually in a collaborative process that involves Cook Plant management, I&M management, and AEPSC management. These reviews ensure that work is performed at a reasonable cost.

Q. What is the projected Cook O&M expense for the forward-looking 12-month Test Year ending December 31, 2020?

A. The projected Cook O&M expense for the twelve-month Test Year ending December 31, 2020 is $252.5 million. In addition, assuming a similar allocation percentage, approximately $2.5 million of Uprate amortization is included in I&M's forecast in this proceeding and will be allocated to Cook in the Test Year for a total of approximately $255 million.

• Labor, including straight time and over time	$127.5
• Planned outages	$ 60.0
• All other	$ 65.0
Total	**$252.5**

Q. What was the level of Cook O&M expense for the 12-month historical period ending December 31, 2018?

A. The Cook O&M expense for the 12-month historical period ending December 31, 2018 was $257.3 million, which includes Cook's allocated share of actual administrative and general O&M expenses during the historical period.

• Labor, including straight time and over time	$127.0
• Planned outages	$ 69.6
• All other	$ 60.7
Total	**$257.3**

Q. How does the 2018 historical level of O&M expense compare to the forward-looking 2020 Test Year level of O&M expense?

A. The 2020 Test Year level of O&M, including allocated administrative and general expenses, is approximately 1% lower than the 2018 historical levels.

Q. Is the Test Year O&M expense representative of I&M's expected activities and expenses necessary to provide ongoing safe and reliable Cook generation to its customers?

A. Yes. I&M has a long history of operating the Cook Plant, which provides reliability when forecasting O&M expenses. The Test Year O&M expenses represent a reasonable level going forward. These O&M expenses have been scrutinized at the plant, operating company, and corporate levels, and are representative of the necessary Cook Plant O&M expenses.

IV. COOK PLANT FORECASTED CAPITAL EXPENDITURES

Q. What period is I&M using for projected capital expenditures?

A. The Capital Forecast Period is the time from January 1, 2019 through December 31, 2020. This 24-month period commences after the end of the historical period and continues through the end of the Test Year.

Q. What is the amount of capital expenditures for the Cook Plant during the Capital Forecast Period?

A. Excluding AFUDC, the capital expenditures for the Cook Plant during the Capital Forecast Period are approximately $281 million, as shown on Figure QSL-1 below. As also shown in Figure QSL-1, the forecasted Cook capital expenditures can be broken down into six categories. This amount of capital spending is included in the forecast presented by Company witness Heimberger.[2]

Figure QSL-1
Cook Capital Forecast Period Expenditures
($000 – Total Company – Excluding AFUDC)

Category	2019 Capital Expenditures	2020 Capital Expenditures	2019-2020 Total Capital Expenditures
LCM Project	$57,631	$28,977	$86,608
Preventative & Corrective Maintenance	$22,021	$57,380	$79,402
Equipment Reliability	$34,966	$9,228	$44,194
Regulatory Compliance	$37,146	$7,961	$45,107
License Renewal	$4,495	$1,160	$5,655
Other	$8,760	$10,910	$19,671
Total	**$165,021**	**$115,616**	**$280,638**

[2] Figure NAH-2 of Company witness Heimberger direct testimony shows the AFUDC amounts added to capital expenditures.

Including AFUDC, approximately $478 million of Cook capital investment is forecasted to be placed in service during the Capital Forecast Period, as shown in Figure QSL-2 below.[3] This amount is accounted for as electric plant in service (EPIS).

Figure QSL-2
Cook Additions to EPIS
($000 – Total Company – Including AFUDC)

Category	2019-2020 Additions to EPIS
LCM Project	$190,839
Preventative & Corrective Maintenance	$76,534
Equipment Reliability	$112,394
Regulatory Compliance	$73,641
License Renewal	$0
Other	$24,860
Total	**$478,271**

Q. Is the level of Capital Forecast Period expenditures for the Cook Plant reasonable?

A. Yes. As the systems, structures, and components reach their end of useful life or become obsolete, they must be replaced. Additionally, capital expenditures must be made to ensure compliance with evolving regulatory requirements. The level of capital investment to be made during the Capital Forecast Period represents a reasonable level of spending, needed to ensure the safe and reliable operation of the Cook Plant.

[3] Figure NAH-1 of Company witness Heimberger's direct testimony shows how nuclear additions to EPIS are used to forecast total Company Plant in Service activity during the Capital Forecast Period.

Q. How is the level of Capital Forecast Period spending determined?

A. Similar to O&M expenses, proposed capital expenditures undergo an extensive development and refinement process. As discussed above, the LRP identifies necessary expenditures years in advance of implementation and the Cook Plant's needs are evaluated and refined through multiple levels of review involving Cook Plant personnel and I&M and AEPSC management. If and when capital investments are made is based on a combination of factors, including whether the investment is needed to fulfill regulatory or safety requirements, the urgency of the need, and economic benefit. All of these factors are evaluated by the management teams responsible for approving capital projects.

Q. Please describe the Capital Forecast Period expenditures in the LCM Project category.

A. As noted above, in 2005, the NRC granted 20-year license extensions for both Cook units. The LCM Project is a comprehensive effort to identify and undertake Cook Plant capital investments needed to ensure the units can operate through the end of their license extensions. In Cause No. 44182, the Commission approved the LCM Project and authorized I&M timely recovery of LCM costs through I&M's LCM Rider. I&M forecasts approximately $87 million of capital expenditures on the LCM Project during the Capital Forecast Period. Further, approximately $191 million of LCM capital (including AFUDC) will be placed in service during the Capital Forecast Period.

I&M has and continues to provide the Commission detailed updates on the status of the LCM sub-projects in its LCM Rider adjustment filings (Cause No.

44182 LCM 1 through LCM 8). Company witness Williamson explains the Company's proposal to move all in-service LCM capital investments (on a net basis) from the LCM Rider into base rates. The active LCM work that will not be placed in service until after 2020 will continue to be tracked through the LCM Rider as discussed by Company witness Williamson.

Q. Please describe the Capital Forecast Period capital expenditures in the Preventative & Corrective Maintenance category.

A. The expenditures in this category include necessary expenditures for maintaining and replacing Cook systems and equipment. A substantial amount of the forecasted expenditures in this category is related to Cook's routine capital blanket (NMIB) and Preventative & Corrective Maintenance budgets, which reflect capital costs for items that Plant management knows will be needed each and every year to operate.

Q. Please describe the Capital Forecast Period capital expenditures in the Equipment Reliability category.

A. Expenditures in the Equipment Reliability category include pump and valve replacements, chemistry lab equipment upgrades, installation of monitoring and detection systems, battery replacements, and switchyard upgrades, to name a few. Substantial projects within this category include:

- <u>Unit 1 Main Generator Stator Rewind</u> – During the Main Generator Rotor inspection conducted during the Unit 1 Cycle 28 refueling outage, the Main Generator Stator failed testing. Further investigation through capacitance mapping found that the stator contains wet bars that do not support long term equipment reliability. The AEP generator repair team determined that a rewind of the generator stator would be the most cost-effective repair. This project is forecasted to be placed in service during the Unit 1 refueling outage in spring 2019 at a total cost of $83.7 million (including AFUDC).

- Unit 1 and Unit 2 Reactor Controls and Instrumentation Upgrade – The purpose of these projects is to replace the existing Reactor Controls and Instrumentation (RCI) System to improve reliability and the availability of spare parts due to obsolescence and to reduce failure mode risks. The new system will be a fault-tolerant control platform that will increase system availability and support event-free operation. The new equipment will be capable of automatically handling multiple diverse faults without tripping, perturbing the controlled process, or requiring manual operator intervention. The Unit 2 RCI modification was placed into service in 2018 and the Unit 1 RCI modification is scheduled to be placed in service during the Unit 1 refueling outage in spring 2019, resulting in approximately $12.9 million (including AFUDC) being placed into service during the Capital Forecast Period.

Q. Please describe the Capital Forecast Period capital expenditures in the Regulatory Compliance category.

A. The majority of the Capital Forecast Period expenditures in the Regulatory Compliance category are related to Fukushima modifications and the Baffle Bolt and Up-Flow Conversion Projects, which I describe in my testimony below. Remaining capital expenditures in this category relate to: the replacement of reactor hold down springs, which are stainless steel springs installed in the reactor internals that prevent vibration and movement when the reactor head is installed; improvements to the Control Room Instrument Distribution (CRID) system in which fast-acting fuses will be installed to ensure that safety-related CRID branch circuits and inverters are isolated from faults generated by non-safety-related loads; fault coordination activities; and NRC inspections, programs, and security requirements.

Q. Please describe the Capital Forecast Period expenditures in the License Renewal category.

A. Capital Forecast Period expenditures for the License Renewal category relate to those activities that are necessary to support Cook's renewed operating licenses, including License Renewal Commitments made to the NRC.

Q. Please describe the Capital Forecast Period expenditures in the Other category.

A. Capital Forecast Period expenditures in the Other category relate to capital projects that are not captured in the categories discussed above. Such expenditures include: Rod Cluster Control Assembly replacements, which are assemblies that use neutron-absorbing materials to control the rate of reactor power production; fiber optics installation; simulator upgrades; self-contained breathing apparatus bottle replacements; and general plant improvements.

Q. Is the projected level of the Cook Capital Forecast Period expenditures reasonable and necessary to serve I&M's customers?

A. Yes. The investments included in the Capital Forecast Period accurately represent necessary Cook Plant projects. These capital expenditures are required for maintaining Cook Plant operational excellence, which in turn provides low cost, safe, environmentally-compliant, reliable electric generation for I&M's customers.

V. FUKUSHIMA MODIFICATIONS

Q. Please provide a brief overview of the event at Fukushima.

A. On March 11, 2011, a massive earthquake and subsequent tsunami occurred off the coast of Japan, resulting in severe damage to the Fukushima Dai-ichi Nuclear

Power Station. The tsunami that impacted the station exceeded the design basis of the plant and resulted in core damage, due to loss of cooling on several units.

Q. What were the NRC's actions in response to this event?

A. In 2011, the NRC chartered the Near Term Task Force to perform an initial review of the events at Fukushima and provide a set of recommendations. The following year, the NRC issued its first regulatory requirements based on the lessons learned at Fukushima. In addition, the NRC issued orders and requests for information to each U.S. nuclear power plant to begin planning to cope with beyond-design-basis events.

Q. What action has the Cook Plant taken as a result of Fukushima?

A. As discussed within my direct testimony in Cause No. 44967, the Cook Plant has already completed many Fukushima-related modifications and evaluations, including the following:

- Construction of a robust Mitigating Strategies Equipment Storage Building (also called a FLEX Equipment Storage Facility).
- Installation of a Spent Fuel Pool Level Instrumentation System.
- Performance of an external flood hazard reevaluation.
- Implementation of interim flood protection modifications.

Cook management expects to complete Fukushima-related activities during the Capital Forecast Period. These activities include: finalizing and submitting a seismic Probabilistic Risk Assessment; completing engineering, procurement and installation of back-up power for the Distributed Ignition System; and completing installation of both fixed and deployable flood barriers. At this time, no additional Fukushima-related expenditures are anticipated beyond 2020.

Q. What is the total project cost of Fukushima-related activities through the end of the Capital Forecast Period?

A. The total cost for Fukushima-related projects that will be placed in service by the end of the Capital Forecast Period is $11.46 million (including AFUDC).

VI. BAFFLE BOLT & UP-FLOW CONVERSION PROJECTS

Q. What is a baffle bolt and what is up-flow conversion?

A. The reactor cores at Cook and other Westinghouse pressurized water reactor nuclear plants are surrounded by a series of vertical plates, called baffle plates, which are bolted to former plates. These bolts are called “baffle bolts.” Attachment QSL-2 illustrates baffle bolts and the interfacing components. To cool the baffle structure, water flowing through the reactor vessel is directed between the core barrel and the baffle plates, either downwards or upwards. A down-flow coolant path places more stress on baffle bolts, which contributes to susceptibility of degradation. Up-flow conversion is a modification of the reactor lower internals to alter the coolant flow through the baffle-former assembly. Plants with an up-flow configuration have shown little baffle bolt degradation as compared to the down-flow designs.

Q. What regulatory requirements apply to baffle bolts?

A. Cook is required by Materials Reliability Program (MRP) MRP-277-A to conduct inspections of plant internals, including baffle bolts. In addition, Westinghouse issued Nuclear Safety Advisory Letter (NSAL) NSAL-16-1 and identified Westinghouse reactors with Cook’s design as the most susceptible to having degraded baffle bolts. The NSAL provided all Westinghouse plants with recommended actions. Subsequently, MRP-2016-021 was issued prescribing interim guidance requiring that plants that are most susceptible to baffle bolt degradation (including Cook) perform baffle bolt ultrasonic test (UT) inspections at the next scheduled refueling outage. Baffle bolts that are found to be degraded in these tests, must be replaced.

Q. Please provide an overview of the Cook Plant Baffle Bolt and Up-Flow Conversion Projects.

A. As discussed in significant detail in my direct testimony in Cause No. 44967, Cook was required to conduct UT inspections on all baffle bolts on Units 1 and 2 and replace those bolts that were discovered to be structurally inadequate. Additionally, a Minimum Bolt Pattern (MBP) delineating the minimum number of new bolts needed to maintain structural integrity was required. In addition to conducting these inspections and bolt replacements, Cook has also implemented the Up-Flow Conversion Project to convert the units to up-flow configurations that will relieve future stress on the baffle bolts. Performing the up-flow conversion along with the installation of the MBP resolves the issue of baffle bolt failure and minimizes the consequences of any future bolt failures.

Q. What is the status of the Baffle Bolt and Up-Flow Conversion Projects for Unit 1 and Unit 2?

A. The Baffle Bolt and Up-Flow Conversion Projects required two refueling outages per unit to complete the required activities and modifications. Unit 2 has been entirely completed and Unit 1's implementation will finish in the Unit 1 Cycle 29 refueling outage in spring 2019.

Q. Do the Cook Plant Baffle Bolt and Up-Flow Conversion Projects have an impact on scheduled refueling outages?

A. Yes. Because performing UT inspections and replacing baffle bolts is time consuming, Cook determined the best approach was to replace bolts during two refueling outages on each unit, instead of one. However, even with the inspections and baffle bolt replacements divided among multiple refueling outages, each individual refueling outage had to be extended longer than the duration of a typical refueling outage.

Q. What is the total cost of the Baffle Bolt and Up-Flow Conversion Projects through the end of the Capital Forecast Period?

A. The total cost of the Baffle Bolt and Up-Flow Projects through the end of the Capital Forecast Period is $45.4 million (including AFUDC). This includes all costs associated with completing these projects on both Cook Units.

VII. DRY CASK STORAGE

Q. Please describe the breach of contract by the United States Department of Energy (DOE) as it pertains to the disposal of spent nuclear fuel?

A. I&M is the "Purchaser" under a Standard Contract with the DOE for the acceptance of spent nuclear fuel (SNF) and high-level radioactive waste (HLW) under the Nuclear Waste Policy Act. *See* 10 CFR 961.11. Under the Standard Contract, DOE was supposed to begin accepting SNF and HLW from Cook "not later than January 31, 1998." However, the DOE has neither accepted this material from any facility nor issued an acceptance schedule as required. This has resulted in a partial breach of contract. Because the DOE has failed to fulfill its contractual obligation to accept Cook's SNF and HLW, Cook has been required to construct Dry Cask Storage to store this material on site.

Q. What is the purpose of the Cook Plant Dry Cask Storage Project?

A. The purpose of the Dry Cask Storage Project is to provide spent nuclear fuel dry storage capacity at the Cook Plant at an Independent Spent Fuel Storage Installation (ISFSI) pad. If additional fuel storage space were not made available, the Spent Fuel Pool (SFP) capacity would be exceeded and the ability to offload spent fuel from the reactor to the SFP would be lost. If the spent fuel cannot be removed from the reactor due to a loss of space in the SFP, new fuel cannot be loaded into the reactor. This would require a shutdown of both units.

Q. Please describe the Dry Cask Storage process and major components.

A. SNF assemblies are loaded into stainless steel canisters while submerged in the SFP. Upon loading, a transfer cask is used to insert the canister into a dry, concrete overpack cask. Once the dry cask is loaded with the canister, the entire unit is moved along a haul path via a specialized heavy haul transport vehicle. The dry cask is then taken to the ISFSI, where the SNF remains in the dry casks until final disposition occurs.

Q. Has any spent nuclear fuel been loaded into the Dry Casks?

A. Yes. As described in my testimony in Cause No. 44967, Cook has conducted three loading campaigns, occurring in 2012, 2015, and 2018. As a result, 44 casks have been loaded with 1,408 fuel assemblies. The next loading campaign is scheduled to occur in 2021.

Q. Does I&M have a settlement agreement with the DOE as a mechanism for submitting and recovering costs associated with Dry Cask Storage?

A. Yes. I&M has had a Settlement Agreement (Agreement) with the DOE since October 2011. Claims are submitted on an annual basis according to terms laid out within the Agreement. The Agreement recovers costs incurred through December 31, 2019. As of December 31, 2018 I&M has submitted nine claims and has recovered $146.2 million from the DOE. This equates to a recovery rate of approximately 96%. Company witness Williamson discusses I&M's request for deferral accounting authority related to this Settlement Agreement claims process.

VIII. DECOMMISSIONING

Q. Please explain the decommissioning process.

A. Decommissioning is the process by which a nuclear power plant is retired from service and its operating license is terminated by the NRC. This process involves the safe dismantlement of the plant and related facilities, disposal of the radioactive portions of the plant, storage of spent nuclear fuel as needed, and restoration of the plant site. The owner of the facility remains accountable to the NRC until decommissioning has been completed and the license has been terminated. The NRC has established regulations and associated guidance to ensure that decommission is performed in a safe and environmentally sound manner.

Q. Is Cook required to have a trust fund for decommissioning?

A. Yes. The NRC requires companies that operate nuclear power plants to provide assurance that funds will be available to decommission the facility. This assurance is generally provided through a decommissioning trust fund. Every two years, a nuclear power plant must submit a report to the NRC on the status of its decommissioning funding for each reactor that it owns. Company witness Hill provides further information on the status of Cook's decommissioning trust fund.

Q. How were the current decommissioning costs estimated for the Cook Plant?

A. A detailed study of the cost to decommission the Cook Plant was performed by a decommissioning expert consulting company. The study assumed that the most current available technology would be used to dismantle the Plant and safely dispose of the irradiated portions of the Plant waste. The results of that study are discussed in the direct testimony of Company witness Knight.

IX. CLEAN WATER ACT SECTION 316(B) PROJECT

Q. Please describe the Clean Water Act 316(b) Rule.

A. In October 2014, the U.S. Environmental Protection Agency (EPA) issued a final Rule implementing Section 316(b) of the Clean Water Act (316(b) Rule or Rule). The 316(b) Rule requires individual facilities, including Cook, to evaluate the mortality-related impacts of their cooling water intake system on large and small aquatic organisms. Specifically, Cook was required to assess the impact of the station intake system on aquatic organisms in Lake Michigan, including impingement of fish on Cook's traveling screens and entrainment of juvenile fish, fish eggs, and other organisms that are small enough to pass through the screen mesh.

In Michigan, the 316(b) Rule is regulated by the Michigan Department of Environmental Quality (MDEQ), and all studies related to the Rule must be approved by the MDEQ as part of a National Pollution Discharge Elimination System (NPDES) permit for the facility.

Q. What was Cook Plant's response to the EPA's 316(b) Rule?

A. Initially, prior to undertaking in-depth studies, Cook was concerned that the 316(b) Rule could require Cook to install a costly closed-cycle cooling system (i.e., cooling tower) retrofit. Such a system potentially could have been very costly and could have had a detrimental impact on plant performance and Cook's economic viability. However, through detailed studies and testing, Cook has been able to support an application to the MDEQ that calls for no additional retrofits or actions by Cook to comply with the 316(b) Rule.

Cook performed a comprehensive assessment of all 316(b) Rule compliance options. For instance, leveraging studies that Cook had already performed prior to the issuance of 316(b) Rule, Cook evaluated the possibility of installing a deep water intake tunnel (DWIT) in Lake Michigan. These efforts began in 2008 with limited lake temperature surveys and continued in 2009 with continuous temperature monitoring and geotechnical studies to provide information on a potential tunnel from onshore to approximately one mile offshore. In early 2010, as the 316(b) Rule was pending, Cook was able to modify the DWIT initiative to determine if a DWIT was a viable option to address the Rule.

Many other activities have been conducted since then to evaluate all options for Cook's compliance with the Rule, including offshore coring investigations, installation and continuous monitoring from the Cook Plant Real Time buoy, and performance of a series of biological studies to characterize benthic macro invertebrates, benthic algea, quagga-zebra mussel densities, larval fish, and adult fish. Other studies included the following:

- Impingement and Entrainment Study
- Entrainment Characterization
- Background Larval Fish Mortality Assessments
- Through-Plant Survival Assessment
- Screen Mesh Performance Assessment

Q. Did Cook receive a recommendation as a result of these studies and activities?

A. Yes. In order to properly evaluate the vast amount of data received during the course of the 316(b) Project, Cook hired an outside vendor to assess the data. The vendor's final report indicated that "the existing operations of CNP [Cook Nuclear Plant] result in sufficiently low levels of entrained organisms, resulting in minimal effects on the aquatic biology of the lake." The report continued: "The current intake locations is offshore and generally disconnected from the nearshore environment by prevailing longshore currents and the profiles of underwater sand dune structures . . . . [Therefore,] the comprehensive analysis included in this reports shows that the social cost of compliance with 316(b) at CNP exceeds the social benefit by at least an order of magnitude."

Q. Has Cook submitted a 316(b) proposal to the MDEQ?

A. Yes. Based on the results of the studies and recommendation, in spring 2018 Cook submitted a proposal to the MDEQ that Cook take no action on the ground that compliance with the 316(b) Rule had already been achieved.

Q. Has the MDEQ reviewed I&M's proposal?

A. The MDEQ is allowed an 18-month window in which to review I&M's submittal. As such, a response from the MDEQ is not expected until late 2019.

Q. What is the total project cost?

A. As of December 31, 2018 approximately $10.7 million has been spent on the 316(b) Project. The Company requests amortization and recovery of these costs in this proceeding as further discussed by Company witness Williamson.

Q. Were the costs of the 316(b) Project justified?

A. Yes. As described above, Cook's 316(b) Project was a major undertaking involving many complex studies and activities over almost 10 years. Incurring these expenses was necessary for Cook to comply with the 316(b) Rule and resulted in a well informed and thoroughly reviewed recommendation to the MDEQ. If the MDEQ accepts Cook's proposal – which we believe is likely – I&M will have achieved cost-effective compliance with the Rule and will have substantially decreased I&M's cost to serve customers in comparison to other compliance options such as cooling towers.

X. SUMMARY

Q. Please summarize your testimony.

A. The Cook Plant Test Year O&M expenses and Forecasted Capital Period investments are prudent and necessary for the continued safe and reliable operation of the Cook Plant. To support this conclusion, I provided an overview of the Cook Plant and its operations, a description of the Test Year O&M expenses and Forecasted Capital Period investments, along with the thorough, systematic processes used to manage them. The Cook Plant Test Year O&M expenses and Forecasted Capital Period investments are necessary to ensure the continued safe, low cost, reliable, environmentally-compliant, emission-free delivery of electricity to I&M's customers.

Q. Does this conclude your pre-filed verified direct testimony?

A. Yes.

VERIFICATION

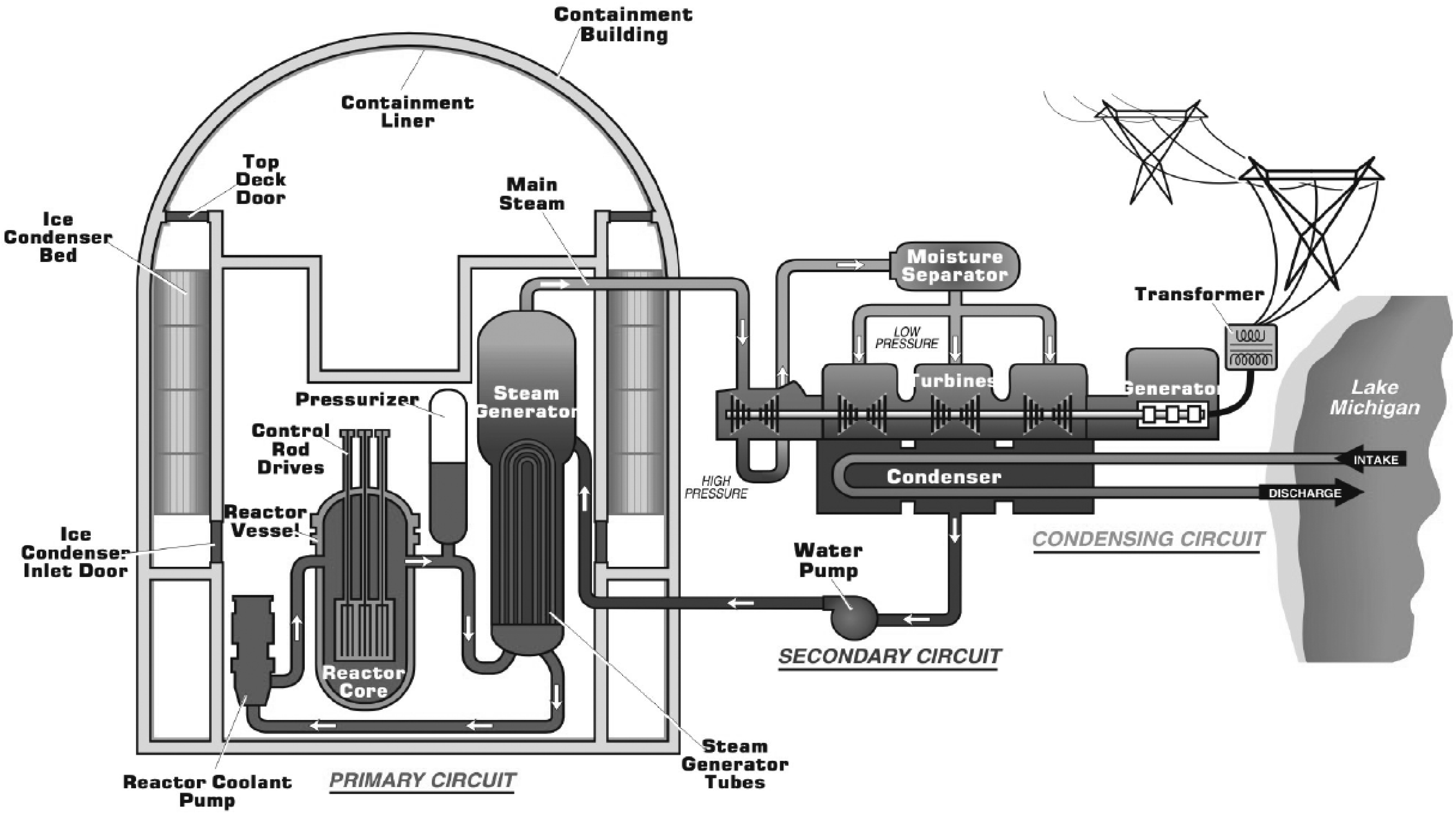
I, Quinton Shane Lies, Site Vice President at the Donald C. Cook Nuclear Plant of Indiana Michigan Power Company (I&M or the Company), affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information, and belief.

Date: 5/6/19

Quinton S. Lies

Quinton Shane Lies

Cook Nuclear Plant Pressurized Water Reactor



AEP AMERICAN ELECTRIC POWER

Baffle Bolt Diagram