I&M Exhibit: _____



**INDIANA MICHIGAN POWER COMPANY**

**38702 FAC-92**

# PRE-FILED VERIFIED DIRECT TESTIMONY

**OF**

**KEITH A. STEINMETZ**

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# ON BEHALF OF
# INDIANA MICHIGAN POWER COMPANY

**Q1. Please state your name and business address.**

My name is Keith A. Steinmetz and my business address is One Cook Place, Bridgman, Michigan 49106.

**Q2. By whom are you employed and in what capacity?**

I am employed by Indiana Michigan Power Company (I&M or Company) as the Manager of Nuclear Engineering at the Donald C. Cook Nuclear Plant (Cook Nuclear Plant).

**Q3. Briefly describe your educational background and professional experience.**

In 1994, I graduated from the University of Missouri-Rolla [now Missouri University of Science and Technology] with a Bachelor of Science degree in Engineering.

From August 1995 to May 1998, as an Engineer with Bettis Atomic Power Laboratory, I was involved with the training of nuclear navy personnel prior to their assignment as crew members of nuclear submarines and surface ships of the United States fleet.

From May 1998 to January 2008, while employed by I&M, I was responsible for changes to design and licensing basis requirements and was the subject matter expert for a process that evaluated changes to the plant licensing basis for determining whether proposed plant changes required approval by the Nuclear Regulatory Commission (NRC).

From January 2008 to August 2008, I was responsible for working with a nuclear fuel vendor to determine improvements in the design of nuclear fuel assemblies.

From August 2008 to June 2017, I was the Nuclear Fuels Group Supervisor and my responsibilities included core reload activities, fuel procurement, cost recovery filings, vendor manufacturing oversight, regulatory administration, fuel integrity monitoring, fuel inspection coordination, and Updated Final Safety Analysis Report modifications. In this position, I was also involved in commercial nuclear fuel contract development, contract language interpretation, and contract negotiations.

Beginning in June 2017, I became the Manager of Nuclear Engineering and my responsibilities include nuclear fuel, safety analysis, probabilistic risk assessment and reactor engineering activities in support of Cook Nuclear Plant.

**Q4. Have you previously testified before any regulatory commissions?**

Yes. I have submitted testimony before the Indiana Utility Regulatory Commission in I&M fuel cost proceedings in I&M FAC79 through FAC91. In addition, I have submitted testimony to the Michigan Public Service Commission in I&M's 2018 through 2024 PSCR Plan Cases and the 2018 through 2022 PSCR Reconciliation Cases.

**Q5. What are your responsibilities as Manager of Nuclear Engineering?**

My responsibilities include supervising activities related to the supply of nuclear fuel, including its procurement, safety analysis, performance, disposal, reload licensing, reactor engineering, and plant support.

**Q6. Are you sponsoring any attachments?**

No.

**Q7. What is the purpose of your testimony in this case?**

The purpose of my testimony is to demonstrate I&M has made every reasonable effort to acquire nuclear fuel to provide electricity to its customers at the lowest fuel cost reasonably possible.

Accordingly, I describe all major nuclear fuel contracts that affect I&M's projected May 2024 through October 2024 nuclear fuel costs and discuss the actions taken to minimize I&M's nuclear fuel costs.

Additionally, I will compare the forecast June 2023 through November 2023 nuclear fuel costs to actual costs.

**Q8. What are the responsibilities of the Nuclear Engineering Department as it relates to nuclear fuel requirements and nuclear fuel related activities?**

The responsibilities of the Nuclear Engineering Department as it relates to nuclear fuel requirements and related activities are:

- Constantly monitor and evaluate market, political, regulatory, and technical conditions that may affect the secure supply of economic and licensable nuclear fuel.
- Prepare bid specifications and evaluate bid proposals for the purchase of nuclear fuel and nuclear fuel related services, as well as the storage, shipping, and disposal of spent nuclear fuel.
- Negotiate contracts with suppliers of nuclear fuel and nuclear fuel related services.
- Establish the most economic operating parameters of each cycle with consideration of the operating requirements of the American Electric Power (AEP) System.
- Evaluate and select economic core loading plans and to administer the purchase schedule and contracts necessary to implement these plans.

- Provide support to a nuclear fuel quality assurance program for the purpose of assuring that the nuclear fuel is built according to its design criteria and specifications.
- Perform nuclear fuel economic analyses and provide current data and projections of future expenditures to other departments within the AEP System and I&M.
- Verify core physics parameters to ensure the operation and performance of the nuclear fuel are within safety limits and agree with predictions.
- Ensure the required logistics of the nuclear fuel cycle take place for each reload batch, consisting of new nuclear fuel assemblies that are to be placed in the reactor core during a refueling outage. This may include uranium mining and milling, conversion to uranium hexafluoride, enrichment, fuel fabrication, fuel assembly shipment, and reactor refueling operations.

**Q9. Please summarize the comparison of actual nuclear fuel costs to those forecast for the period June 2023 through November 2023.**

During the reconciliation period of June 2023 through November 2023 for Cook Nuclear Plant Unit 1, the overall weighted average cost of nuclear fuel was forecasted to be 55.20 cents per MBtu. The actual cost was 56.41 cents per MBtu. For the same time period, for Cook Nuclear Plant Unit 2, the overall weighted average cost of nuclear fuel was forecasted to be 51.57 cents per MBtu. The actual cost was 51.09 cents per MBtu.

**Q10. Please summarize the Cook Nuclear Plant operations during the reconciliation period.**

Overall, during the reconciliation period of June 2023 through November 2023 both Cook Nuclear Plant units operated very well. There was one planned refueling outage during the reconciliation period for Unit 1 that ran from October

14th through November 14th. There were no unplanned outages during the reconciliation period.

**Q11. Please describe the major contracts I&M entered into for supplying nuclear fuel to the Cook Nuclear Plant that will affect the May 2024 through October 2024 forecasted nuclear fuel costs.**

A summary of the major contracts I&M entered into for the supply and disposal of nuclear fuel for the Cook Nuclear Plant that affect the May 2024 through October 2024 forecasted costs is as follows:

1) Long-Term Contracts

a. Westinghouse Electric Company Contract dated June 1, 2012 Fuel Fabrication – Cook Nuclear Plant Units 1 & 2

This contract calls for the design and fabrication of multiple reload batches of nuclear fuel for Units 1 and 2 of the Cook Nuclear Plant. The first reload batch under this contract was delivered in 2013. The contract includes fabrication of the fuel assemblies and all transportation of special nuclear material, fuel assemblies, and components incident to the fabrication process.

b. United States of America (Department of Energy (DOE) as representative) Contract dated June 13, 1983 - Nuclear Waste Disposal

I&M has contracted with the DOE to take title to and dispose of the spent nuclear fuel or high-level waste. I&M's fuel costs include Post-April 7, 1983 Spent Nuclear Fuel (SNF) fees.

c. Louisiana Energy Services (LES/URENCO) Contract dated June 13, 2014 – Enriched Uranium

This contract covers the enrichment services for multiple reloads.

2) Mid-Term Contracts

   a. Cameco (uranium hexafluoride)

   b. ConverDyn (uranium hexafluoride)

   c. Orano (uranium hexafluoride)

3) Spot Procurement Agreements and Short-Term Contracts - These agreements and contracts are for the procurement of materials and services for the fuel cycle on a one-time spot procurement or short-term basis.

   a. UG USA, Inc (uranium hexafluoride)

   b. LES/URENCO (uranium hexafluoride)

   c. WMC Energy (uranium hexafluoride)

   d. Itochu (uranium hexafluoride) [pending contract finalization]

**Q12. Can you briefly describe the long-term contract associated with Nuclear Waste Disposal?**

Yes. The Nuclear Waste Policy Act (NWPA) of 1982 established that the Federal government had responsibility to provide for the permanent disposal of spent nuclear fuel (SNF). Thereafter, the DOE entered into standard contracts for the disposal of SNF and the standard contracts provided for a fee to be paid by generators and owners of the SNF. Nuclear utilities, including I&M, had no practical alternatives other than to sign standard contracts with the DOE to obtain and maintain operating licenses. I&M's contract with the DOE and the DOE's obligation under the contract remain in effect.

**Q13. How were I&M's projected Post-April 7, 1983 SNF costs determined?**

Post-April 7, 1983 SNF costs are calculated based on a rate per kilowatt-hour (kWh) of electricity generated and sold in accordance with the NWPA of 1982.

However, DOE provided notice that, effective May 16, 2014, the Spent Nuclear Fuel Disposal Fee will be 0.0 mill per kWh of electricity generated and sold.

The prior fee of one mill per kWh remained in effect through May 15, 2014. Therefore, for the forecasted months (May 2024 through October 2024) included in this filing, the projected Post-April 7, 1983 SNF costs are zero.

**Q14. Please describe any additional obligations entered into by I&M that affect the projected May 2024 through October 2024 nuclear fuel costs.**

I&M entered into the following leases that will affect the May 2024 through October 2024 nuclear fuel costs:

| Unit | Batch | Provider | Effective date |
|---|---|---|---|
| 2 | 27 | Mizuho Bank / DCC Fuel XIV | 11/12/19 – 05/12/24 |
| 1 | 32 | Mizuho Bank / DCC Fuel XV | 10/15/20 – 04/15/25 |
| 2 | 28 | Bank of America Leasing BSC, LLC / DCC Fuel XVI | 05/18/21 – 11/18/25 |
| 1 | 33 | Bank of America Leasing BSC, LLC / DCC Fuel XVII | 05/23/22 – 11/23/26 |
| 2 | 29 | Mizuho Bank / DCC Fuel XVIII | 11/07/22 – 05/07/27 |
| 1 | 34 | Mizuho Bank / DCC Fuel XIX | 11/13/23 - 05/14/28 |

Costs associated with these leases include the monthly rent component, finance charges, and administration fees. The monthly rent component for the nuclear fuel is determined by multiplying the number of BTUs consumed by the nuclear fuel during such month and the dollar amount per BTU (BTU charge) as established in an Individual Leasing Record. During months for which no BTUs are consumed, the only expenses incurred are finance charges and administration fees.

**Q15. Why did I&M enter into these obligations?**

The Nuclear Fuel Leases that I&M entered into provide a lower cost financing option versus using internal incremental cost of capital to purchase the fuel.

**Q16. Will the Nuclear Fuel Leases affect the projected May 2024 through October 2024 nuclear fuel costs?**

Yes, the projected May 2024 through October 2024 nuclear fuel costs include basic rent, financing charges, and other administrative fees associated with the Nuclear Fuel Leases. This is the result of the continued service of Unit 1 Batches 32, 33 and 34 as well as Unit 2 Batches 27, 28 and 29. CNP is expecting to complete a new lease for Unit 2 Batch 30 in April 2024 which will also affect the projected nuclear fuel cost.

**Q17. How will the "Inflation Reduction Act" impact projected nuclear fuel costs?**

There will be no impacts to the nuclear fuel cost from the Inflation Reduction Act. Please see the testimony for Company witness Owens for potential impacts to I&M.

**Q18. What actions did I&M take to minimize the projected nuclear fuel costs?**

The actions taken by I&M to minimize the cost of nuclear fuel occurred primarily as part of the long-term planning and competitive bidding processes for nuclear fuel supply to the Cook Nuclear Plant. The Cook Nuclear Plant units are refueled on an 18-month cycle and a reload batch can remain in the reactor for many years; therefore, nuclear fuel cost savings achieved through long-term planning and competitive bidding are realized over a period of years as the fuel is consumed for the production of electricity.

Another way the cost of nuclear fuel is minimized is through the judicious use of the secondary nuclear fuel market. Historical inventories in the nuclear fuel market have made it possible for I&M to purchase fuel on the secondary market. The logistics of providing the enriched uranium to the fuel fabricator are accomplished by an accounting transfer of material at the fuel fabricator's facility, which reduces risk for I&M.

Yet another example of nuclear fuel cost minimization is the examination and revision of the fuel loadings that our fuel fabricator proposes to the Company, when such revision is technically and economically justified. Technical evaluations of nuclear fuel cycle designs have also been effective in improving the negotiating position of I&M during the fuel fabrication contract administration. A detailed analysis of a proposed design can show the impact of technical trade-offs made in new products offered by the bidders. I&M technical staff is involved in the vendor's reload design process so that the design process can occur just prior to a refueling outage. This compressed design schedule allows I&M to develop loading patterns that meet the changing energy or regulatory requirements with a minimal impact on fuel cycle economics.

**Q19. Please describe how I&M purchases nuclear fuel.**

I&M carefully plans the lead time required to perform each phase of fuel processing which supports contract development and purchase decisions. The target date from which decisions are made is the date the fabricated fuel is needed at the plant. Once the target date is established, it is then necessary to identify when the fabricator must have the enriched uranium. Likewise, contracted delivery dates are established for providing uranium to the enrichment provider. A thorough knowledge of uranium market situations is necessary to determine when conditions justify a mid-term or long-term supply contract rather than spot market purchases. Inventory fluctuates depending on the timing of the reload batch to be delivered as well as depending on the availability of material from providers. Natural uranium inventory may be required when market conditions warrant in order to provide security of supply at the lowest cost to customers in order to operate the units. Any inventory is promptly used in near-term reloads. Also, small amounts of enriched uranium inventory exist as a result of final detailed fuel cycle and fuel assembly design.

I&M continually monitors the performance of any vendor who is under contract to assure fulfillment of contractual obligations. By contracting with reliable and

proven performers, and by continuously monitoring their performance, the Company can operate the units with confidence.

**Q20. Has the recent decline in uranium availability and pricing volatility changed how I&M procures uranium?**

Yes. The recent volatility in market pricing and supply availability has changed how and when I&M is able to procure uranium for future reloads. With primary producers unable to provide uranium material for future years delivery, I&M began to procure material in 2023 to ensure security of supply to maintain the reactors at full power at the lowest cost possible for the next several years. The uranium material that has been procured within the last 6 months will be held until needed in the reactor. All uranium material that was purchased was competitively bid and financially prudent to purchase. I&M will continue to monitor the uranium market and procure material that will be needed to ensure security of supply while working to provide the lowest cost fuel possible.

**Q21. Are there other actions taken to minimize I&M's nuclear fuel cycle costs?**

Yes. Because the Cook Nuclear Plant is the most economical fuel cost steam plant on the AEP System, both of the Cook Nuclear Plant units are typically base-loaded. Accordingly, I&M's policy is to operate them at a steady state maximum power level unless other operational restrictions apply. Because changes in power level create additional stress on the nuclear fuel assemblies, I&M strives to have these load changes performed as a planned maneuver and at proceduralized and conservative rates of change.

Along these same lines, I&M has developed an extensive capability in neutronic analysis. This allows I&M to develop an optimized fuel management plan for the Cook Nuclear Plant that considers the following:

- The specific number of fuel assemblies to be loaded each cycle.
- What their corresponding uranium enrichment should be.

- Which fuel assemblies should be removed from the core during the refueling.
- How these new fuel assemblies and those remaining in the core should be rearranged during the refueling. As a result, I&M can meet its energy requirements while at the same time minimizing fuel cycle costs. This is a significant task, and to accomplish it, I&M has developed models of the reactor core utilizing sophisticated computer programs. These models are used to evaluate different reload arrangements proposed by fuel vendors to attain, within certain technical constraints, the goal of meeting I&M's energy requirements and minimizing fuel costs. Through this approach, I&M has been able to develop improved fuel management plans that lower fuel costs.

**Q22. Is there another area that results in minimizing I&M's nuclear fuel costs?**

Yes. The actions of the Company's technical staff to decrease the stress on the fuel during operation of the reactor are complemented by assuring that the fuel assemblies are built in accordance with design requirements.

I&M operates under an NRC-approved Quality Assurance Program that requires the procurement of nuclear fuel from vendors with approved Quality Assurance Programs which meet federal regulations. Periodic audits and process surveillances are required for all suppliers to assure that the supplier produces a finished product that fulfills all applicable design and specification criteria.

These audits examine aspects of the manufacturing process, including raw materials, details of the design and design control, machined parts, sub-assemblies, components, and the finished fuel assemblies, to assure that corresponding specifications, drawings, and design criteria are met. These Quality Assurance Programs are intended to control the design and manufacturing process to assure a product of the highest quality.

The fuel fabrication contracts give I&M auditors significant authority to reject material at any stage and disqualify a supplier for nonperformance, resulting in a

credible threat of contract termination if audit concerns are not addressed in a timely manner. The Quality Assurance Program minimizes fuel cycle cost by eliminating design errors and manufacturing mistakes and ensuring that the final product can fulfill its intended function.

**Q23. Has I&M made every reasonable effort to acquire nuclear fuel to provide electricity to its customers at the lowest nuclear fuel cost reasonably possible?**

Yes.

**Q24. Does this conclude your pre-filed verified direct testimony?**

Yes.

## VERIFICATION

I, Keith A. Steinmetz, Manager of Nuclear Engineering, affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information, and belief.

Date: 25 January 2024

Keith A. Steinmetz