STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF
INDIANAPOLIS POWER & LIGHT COMPANY FOR APPROVAL OF IPL’S TDSIC PLAN FOR ELIGIBLE TRANSMISSION, DISTRIBUTION, AND STORAGE SYSTEM IMPROVEMENTS PURSUANT TO IND. CODE § 8-1-39-10.)

CAUSE NO. 45264

PETITIONER’S SUBMISSION OF DIRECT TESTIMONY OF
JASON D. DE STIGTER

Indianapolis Power & Light Company ("IPL" or "Petitioner"), by counsel, hereby submits the direct testimony of Jason D. De Stigter.

Respectfully submitted,

[Signature]

Teresa Morton Nyhart (Att'y. No. 14044-49)
Lauren M. Box (Att'y. No. 32621-49)
BARNES & THORNBURG LLP
11 South Meridian Street
Indianapolis, Indiana 46204
Nyhart Phone: (317) 231-7716
Box Phone: (317) 231-7289
Fax: (317) 231-7433
Nyhart Email: tnyhart@btlaw.com
Box Email: Lauren.Box@btlaw.com

ATTORNEYS FOR PETITIONER INDIANAPOLIS POWER & LIGHT COMPANY
CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing was served this 24th day of July, 2019, by email transmission, hand delivery or United States Mail, first class, postage prepaid to:

William I. Fine
Abby R. Gray
Indiana Office of Utility Consumer Counselor
Office of Utility Consumer Counselor
115 West Washington Street, Suite 1500 South
Indianapolis, Indiana 46204
infomgt@oucc.in.gov
wfine@oucc.in.gov
agray@oucc.in.gov

Joseph P. Rompala
Todd A. Richardson
LEWIS & KAPPES, P.C.
One American Square, Suite 2500
Indianapolis, IN 46282-0003
JRompala@Lewis-Kappes.com
TRichardson@lewis-kappes.com

Courtesy copy to:
ETennant@lewis-kappes.com

Teresa Morton Nyhart (No. 14044-49)
Lauren M. Box (Atty. No. 32521-49)
Barnes & Thornburg LLP
11 South Meridian Street
Indianapolis, Indiana 46204
Nyhart Telephone: (317) 231-7716
Box Phone: (317) 231-7289
Fax: (317) 231-7433
Nyhart Email: tnyhart@btlaw.com
Box Email: Lauren.Box@btlaw.com

ATTORNEYS FOR APPLICANT
INDIANAPOLIS POWER & LIGHT COMPANY
VERIFIED DIRECT TESTIMONY

OF

JASON D. DE STIGTER

ON BEHALF OF

INDIANAPOLIS POWER & LIGHT COMPANY
VERIFIED DIRECT TESTIMONY OF JASON D. DE STIGTER
ON BEHALF OF
INDIANAPOLIS POWER & LIGHT COMPANY

1. INTRODUCTION

Q1. Please state your name and business address.

A1. My name is Jason De Stigter, and my business address is 9400 Ward Parkway, Kansas City, Missouri 64114.

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

A2. I am employed by Burns & McDonnell Engineering Company, Inc. (“Burns & McDonnell”) and lead Burns & McDonnell’s Capital Asset Planning team as part of our Utility Consulting Practice.

Burns & McDonnell has been in business since 1898, serving multiple industries, including the electric power industry. Burns & McDonnell is a family of companies made up of more than 7,000 engineers, architects, construction professionals, scientists, consultants and entrepreneurs with more than 40 offices across the country and throughout the world. Burns & McDonnell offers more than 350 services with a focus on the Aviation, Commercial, Retail & Institutional, Construction, Environmental, Government, Military & Municipal, Manufacturing & Industrial, Oil & Gas, Power, Transportation, and Water industries.

In 2018, Burns & McDonnell was rated No. 9 overall of the Top 500 Design Firms by the Engineering News Record (“ENR”). Burns & McDonnell was rated as the No. 1 engineering design firm in the United States serving the electric power industry by ENR in 2018.

Q3. Briefly describe your educational background and certifications.
A3. I have received a Bachelor of Science Degree in Engineering from Dordt College as well as a Bachelor’s in Business Administration from Dordt College. I am a registered Professional Engineer in the state of Kansas.

Q4. Please briefly describe your professional experience and duties at Burns & McDonnell.

A4. I am a professional engineer with 12 years of experience providing consulting services to electric utilities. I have extensive experience in asset management, capital planning and optimization, risk assessments and analysis, asset failure analysis, and business case development for utility clients. I have been involved in numerous studies modeling risk for utility industry clients. These studies have included risk and economic analysis engagements for several multi-billion-dollar capital projects and large utility systems. In my role as a project manager I have worked on and overseen risk analysis consulting studies on a variety of electric power transmission and distribution assets, including developing complex and innovative risk analysis models. My primary responsibilities are business development and project delivery within the Utility Consulting Practice with a focus on developing risk-based business cases for large capital projects/programs.

Prior to joining Burns & McDonnell, I served as a Principal Consultant at Black & Veatch inside their Asset Management Practice performing similar studies to the effort performed for Indianapolis Power & Light Company (“IPL”).

Q5. What is the purpose of your direct testimony in this proceeding?

A5. The purpose of my testimony is to summarize the methodology used by Burns & McDonnell to develop an asset risk model (“Risk Model”) and select projects for IPL’s TDSIC Plan. Through my testimony I will describe the evaluation Burns & McDonnell
conducted on behalf of IPL, including the development of the Risk Model and its use in identifying TDSIC projects. I will define risk, consequence of failure, and likelihood of failure. I will also describe the calculations and results of the Risk Model. I also summarize the Risk Reduction Benefits Monetization analysis Burns & McDonnell performed for IPL.

Q6. Are you sponsoring any attachments in support of your testimony?
A6. Yes, I am sponsoring the IPL TDSIC Asset Risk & Investment Assessment Report prepared by Burns & McDonnell (“Risk Model Report”), which is included as Appendix 8.3 to IPL’s TDSIC Plan. I am also sponsoring the Risk Reduction Benefit Monetization Report prepared by Burns & McDonnell, which is included as Appendix 8.11 to IPL’s TDISC Plan. The IPL TDISC Plan is included with IPL Witness Bentley’s testimony as IPL Attachment BJB-2.

Q7. Were your testimony and the attachment identified above prepared or assembled by you or under your direction or supervision?
A7. Yes.

Q8. Are you also submitting workpapers?
A8. Yes. I am submitting workpapers associated with the above referenced reports.

Q9. What was the extent of your involvement in the preparation of the TDSIC Plan?
A9. I served as the Burns & McDonnell project manager on the IPL TDSIC Asset Risk & Investment Assessment. I worked directly with the IPL Team involved in the risk-based planning. I was responsible for the overall project and was involved in the development of the Risk Model and investment scenarios, as well as in preparation and review of the report.
2. RISK BASED PLANNING APPROACH

Q10. Please describe the analysis Burns & McDonnell conducted for IPL.

A10. Burns & McDonnell utilized a risk-based assessment of the electric transmission and distribution system to help IPL identify high-risk assets and identify projects to be included in its TDSIC Plan. Burns & McDonnell utilized an approach similar to that used in other TDSIC proceedings. The approach is based on the ISO 31000 framework for risk management and the ISO 55001 standard for asset management practices.

Burns & McDonnell developed a Risk Model for all critical substation and circuit assets, including 1,690 substation assets and nearly 220,000 circuit section assets (628 circuits covering 8,789 circuit miles).\(^1\) The risk-based assessment is data-driven augmented by subject matter experience from both the Burns & McDonnell and IPL team. The Risk Model prioritizes assets based on the amount of risk they pose to the IPL system and the cost to buy down asset risk. The Risk Model was developed utilizing asset level data from IPL’s core enterprise systems and a series of workshops and close collaboration with IPL’s subject matter experts over several months. The Burns & McDonnell and IPL team utilized the Risk Model results and other key criteria to identify projects for IPL’s TDSIC Plan.

The Risk Model includes risk results and investment levels for the following TDSIC Projects:

- Substation Assets Replacement
- Circuit Rebuilds
- 4 kV Conversion

---

\(^1\) IPL TDSIC Asset Risk & Investment Assessment Report, Section 3.
• XLPE Cable Replacement

• Remote End – Breaker Relay/Upgrades

Q11. Please describe the Risk Model Burns & McDonnell used to conduct its analysis.

A11. The Risk Model consists of asset data such as unique identifiers, serial and model numbers, voltage, manufacturer and/or install year, location, applicable asset attributes (i.e. class and height for wood poles), condition data, hierarchy, and other information to determine each individual asset’s likelihood of failure (“LOF”) and consequence of failure (“COF”).

The Risk Model includes power transformers, breakers, batteries, wood poles, overhead and underground distribution primary conductor, lattice towers, and transmission conductor. The circuit assets (poles, primary, towers, transmission conductor) are modeled at the span level for the overhead system and segment level for the underground system. A span is defined as a pole/tower and all the wires connected to it up to the next pole/tower. Modeling the circuit assets at this granular level allows for the identification of specific high-risk spans for replacement. For example, this approach identified replacement of 3.9 circuit miles on circuit South No. 9 which has a total of 18.0 circuit miles.

Asset LOF is based on an asset class survivor curve, age, and Asset Health Index (“AHI”), which is derived from available asset condition information, inspection information, and service history or test data. An asset’s COF is derived for six different criteria that consider the impact to IPL customers, stakeholders, or its system in the event of an asset failure. The criteria are summed to calculate a total consequence score for each asset.

The Risk Model uses this information to calculate the risk for all assets included in the model both before and after replacement. Based on the risk score, risk reduction benefit,
replacement cost, and other resource constraints, the Risk Model provides a prioritized list of assets for replacement that targets high-risk assets and provides the highest risk reduction per dollar invested into the system. The output of the Risk Model was reviewed and then used by IPL to develop the Projects included in the TDSIC Plan.

Q12. Please describe how the Risk Model used existing IPL asset management frameworks and asset scoring.

A12. The Risk Model includes risk frameworks and asset risk information already developed by IPL. The framework was initially developed by IPL staff and previously reviewed in a collaborative effort conducted per IURC Order in Cause No. 44576 dated March 16, 2016. Burns & McDonnell leveraged IPL’s existing asset health and consequence frameworks for transformers and breakers and adjusted Burns & McDonnell’s own framework for distribution circuits to create a holistic framework applicable to all asset classes.

Q13. How does the Risk Model identify projects to be included in the TDSIC Plan?

A13. The main purposes for the Risk Model are firstly, to identify high-risk assets and establish a plan to mitigate the risk, and secondly, to invest capital into the system that provides the highest risk reduction per dollar invested. The Risk Model classified assets into a risk grid and assets located in the ‘High-Risk Region’ were targeted for replacement. The ‘High-Risk Region’ includes assets with both a high LOF and COF. The Risk Model then prioritizes investment in the system based on the assessed risk reduction benefit and replacement cost for assets outside the ‘High-Risk Region’. The Risk Model also factored in other resource constraints, for instance the required scheduling coordination for the 4 kV Conversion Project. Additionally, Burns & McDonnell and IPL worked together to
identify the projects which produced the highest risk reduction benefit and included those in the Risk Model.

By utilizing a risk-based approach and the Risk Model, the IPL team was able to develop asset specific TDSIC Plan projects to meet the two main purposes of the Risk Model: mitigation of high-risk assets and investing capital to provide the highest risk reduction per dollar invested. Employing the Risk Model in this manner allows IPL to develop a plan based on the selection of projects over the plan period that prudently and efficiently reduce its overall system risk.

Q14. How is asset risk defined?


The total system risk for the asset base included in the Risk Model is the summation of the individual asset risk scores.

Q15. How was likelihood of failure estimated?

A15. For this assessment, the defined and modeled risk event is based on a deterioration related asset failure where the asset is not repairable and must be replaced. This is commonly referred to as an ‘end-of-life’ event. Since most utilities work to prevent failures, there is simply not enough actual historical failure data to perform a statistical analysis and develop deterioration curves. As such, survivor curves are widely used in the utility industry and asset management organizations to forecast the likelihood of this type of failure event.
The Risk Model uses Iowa survivor curves to forecast the end-of-life LOF for each asset. Survivor curves were assigned to each asset class using IPL’s latest depreciation study and subject matter experience on the asset class average service life. In most cases, the survivor curves selected include a higher average service life than the depreciation study. This produces a more conservative estimate for asset remaining life than the using the depreciation study values. When available, asset condition information was utilized to calculate an assets ‘effective’ age. The likelihood of failure was calculated for each asset based on the actual or ‘effective’ age and the asset class survivor curve.

Q16. What is an Iowa survivor curve?

A16. Iowa Survivor Curves for depreciable physical properties were initially developed in a study at Iowa State University in the 1930s. The curves were developed using statistics and observed life tables. The types of curves differ according to the direction that the asset’s probability distribution is skewed (i.e., right, left), as well as the direction in which the asset’s aging trends (i.e., positive, negative). The curves have been re-validated over the decades since the initial study was completed. Each curve represents a probability distribution and has a series of attributes. The definition of a curve is based on one of the 31 standard curves and an asset class average service life.

Iowa Survivor Curves are widely used by investor owned utilities as part of depreciation studies to estimate the probable average service life of different assets and set depreciation rates for capitalized investment. The continuing property record (“CPR”) records both the initial purchase date and the retirement from service data according to the associated FERC account. The historical retirements distribution versus remaining asset base from the CPR are plotted to identify the ‘best-fit’ survivor curve for each FERC account.
Q17. **What is the difference between actual age and effective age?**

A17. As part of the analysis, Burns & McDonnell obtained manufacturing and/or install date information for all assets included in the Risk Model to calculate a calendar or ‘actual’ age for all assets. While the use of actual age is appropriate in determining LOF, the estimation of LOF can be enhanced by incorporating available asset health or condition information from inspections, test data, service history, or other sources. The practice of updating an asset’s calendar age to reflect condition data yields an asset’s ‘effective’ age. For instance, if an asset’s actual age is past the expected average service life for the asset class but the condition data shows the asset to be in good condition, its actual age is reduced to an effective age that is more representative of its health and expected remaining useful life. The Risk Model utilizes this approach to calculate an asset’s effective age when condition information is available.

Where available for power transformers, breakers, and wood poles, Burns & McDonnell calculated an effective age based on the asset’s condition. Burns & McDonnell utilized IPL’s asset condition information and framework for power transformers and breakers. For wood poles, the Risk Model used IPL wood pole inspection information and Burns & McDonnell’s framework. Where condition and health information are not available, the actual age was used to estimate LOF.

Q18. **Please provide an example calculation of LOF for an asset.**

A18. The LOF forecast for an asset is calculated using the percentage surviving, as noted on the y-axis of the survivor curve, and the effective age of an asset. The LOF calculation is forward looking and disregards the part of the survivor curve that is younger than the asset’s effective age. The following figure illustrates this concept for an example 138 kV
Breaker. As Figure 1 shows, the part of the curve before age 30 is not considered in calculating the forecast.

Figure 1: LOF Calculation Example – 138 kV Breaker

A survivor curve is used to calculate the discrete failure likelihood for each year for the asset. Then, these discrete likelihoods are totaled for a forward-looking timeframe to forecast the LOF for the next 10 years. Table 1 provides an example calculation for a 30-year-old asset with an LOF horizon of 10 years.

Table 1: Example LOF Calculation – 138 kV Breaker

<table>
<thead>
<tr>
<th>Age</th>
<th>Forecast Year</th>
<th>Discrete LOF</th>
<th>Cumulative LOF</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>1</td>
<td>2.27%</td>
<td>2.27%</td>
</tr>
<tr>
<td>32</td>
<td>2</td>
<td>2.35%</td>
<td>4.62%</td>
</tr>
<tr>
<td>33</td>
<td>3</td>
<td>2.44%</td>
<td>7.06%</td>
</tr>
<tr>
<td>34</td>
<td>4</td>
<td>2.53%</td>
<td>9.59%</td>
</tr>
<tr>
<td>35</td>
<td>5</td>
<td>2.62%</td>
<td>12.21%</td>
</tr>
<tr>
<td>36</td>
<td>6</td>
<td>2.70%</td>
<td>14.91%</td>
</tr>
<tr>
<td>37</td>
<td>7</td>
<td>2.78%</td>
<td>17.69%</td>
</tr>
<tr>
<td>38</td>
<td>8</td>
<td>2.86%</td>
<td>20.55%</td>
</tr>
<tr>
<td>39</td>
<td>9</td>
<td>2.94%</td>
<td>23.49%</td>
</tr>
<tr>
<td>40</td>
<td>10</td>
<td>3.00%</td>
<td>26.49%</td>
</tr>
</tbody>
</table>
Q19. How was consequence of failure COF estimated?

A19. The COF framework for each asset class includes the following categories, as depicted in Figure 2 below: (1) safety, (2) customer, (3) environmental, (4) restoration, (5) systems operations/production, and (6) regulatory/public. The total of the six categories provides the total asset risk COF score.

**Figure 2: Consequence of Failure Criteria**

All assets in the Risk Model are scored against this framework. Weighting factors are not applied across the framework, rather the scoring framework reflects the relative difference in consequence. For example, the consequence framework includes scores as low as 6.6 for a distribution section and scores as high as 660 for a large high voltage breaker. Finally, the Risk Model aligns each consequence score to one of the following consequence ratings for alignment to the risk grid: very low (1), low (2), moderate (3), high (4), very high (5).²

Q20. Please provide an example calculation of COF for an asset.

² See Section 4 of the IPL TDSIC Plan and Appendix 8.3 Risk Model Report.
The Allison #4 Bus Tie 138 kV Breaker consequence score calculation is shown in Table 2 below. The framework is configured with categories and subcategories. For scoring, the maximum subcategory score is taken as the category score and is used in the final calculation for an asset’s COF. The maximum value in each category is summed for a total consequence score of 700.

<table>
<thead>
<tr>
<th>Consequence Category</th>
<th>Consequence Subcategory</th>
<th>Score</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>Potential for Public or Employee Injury</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Potential for Fire/Explosion/etc.</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Customer</td>
<td>Customer Reliability</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Critical Customer</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Industrial Customer</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>Potential for Spill / Release / etc.</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Impact of Spill / Release / etc.</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Restoration</td>
<td>Restoration Duration</td>
<td>35</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Future Repair Costs</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Productivity/Reliability</td>
<td>Outage / Production Downtime</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Operations Workaround</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control Contingency Overloads</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Generation Loss</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Regulatory/Company Image</td>
<td>NERC</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>IURC</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Criticality Score</td>
<td>Total</td>
<td></td>
<td>700</td>
</tr>
</tbody>
</table>

3. TDSIC RISK ANALYSIS RESULTS

Q21. Please explain how the asset risk calculations were used.

A21. Burns & McDonnell used the asset risk calculations to create four investment scenarios:

1) “Do Nothing”
2) LOF 4
3) LOF 5
4) IPL Seven-Year TDSIC Risk-Based Scenario (Risk-Based Scenario)

The “Do Nothing” scenario uses the LOF calculations approach to show the increase in system risk over the seven-year period assuming no proactive replacements. The “Do Nothing” approach serves as a baseline for calculating the risk reduction benefit for the other three investment scenarios.

The LOF 4 and LOF 5 scenarios are age-based scenarios that prioritize asset replacement based on expected remaining life and do not factor in asset criticality or consequence of failure. The scenarios replace assets with an LOF 4 and above or LOF 5 score, respectively.

The creation of the Risk-Based Scenario was an iterative process. The Risk Model bundles and prioritizes assets into projects at the substation and circuit level to replace high-risk assets and maximize risk reduction benefit per dollar invested. IPL utilized the Risk Model results for the Risk-Based Scenario and factored in other constraints and the coordination of effort in order to develop an executable schedule. Additionally, the process included a refinement of asset replacement costs for the Year 1 and Year 2 investment years based on the developed engineering estimates. This produces a Risk-Based Scenario that (1) manages risk for high-risk assets, (2) maximizes the risk reduction benefit per dollar invested, and (3) is executable.

Q22. **What was the purpose of conducting the risk analysis in this manner?**

A22. The Risk Model uses risk-based planning principles and approaches to identify assets for replacement and to optimize capital budgets as recognized within the industry as good management practice. Relying solely on historical spending levels or the age of the system assets to prioritize investment could expose the utility to higher rates of asset failure
resulting in negative consequences for customers and other stakeholders. The risk-based approach enables utilities to both optimize the level of overall capital expenditure as well as target the investment with confidence into areas of the system where risk is reduced the most, thereby maximizing the overall benefits to the system.

Q23. **What were the results of the risk analysis?**

A23. The results of the scenario risk analysis are summarized in Figure 3.

**Figure 3: Scenario Risk and Investment Summary Results**

The red line represents the “Do Nothing” risk results, while the green line represents the 2026 risk score of each scenario investment plan. The blue bars show the total 7-year investment for each scenario. The orange box shows the risk reduction per million dollars invested, a measure of the investment scenarios capital efficiency. The Risk-Based Scenario developed by the Burns & McDonnell and IPL team provides a reduction in
system risk of approximately 36.6 percent over the seven-year period of the TDSIC Plan compared to the “Do Nothing” scenario. The Risk-Based Scenario requires lower overall capital investment than the two age-based scenarios while also providing the high-risk reduction benefit per dollar of investment.

Figure 4 below shows the annual details of the Risk-Based Scenario. The costs for the Risk-Based Scenario are based on detailed engineering cost estimates for 2020 and 2021 and for years 2022 through 2026, unit replacement costs are utilized. These costs are informed by the detailed engineering estimates. The LOF 4 and LOF 5 scenarios utilized unit replacement costs for all seven years.

**Figure 4: IPL TDSIC Risk-Based Scenario Capital Investment vs. Risk Profile**

Q24. What conclusions can be made from the results of the risk analysis?
Based on risk analysis and results described above:

1) The Risk-Based Scenario is an optimized and executable investment plan that prioritizes investment for eligible transmission and distribution improvements to manage high-risk assets and maximize risk reduction benefit per dollar invested.

2) By implementing the Risk-Based Scenario, total transmission and distribution system asset risk is significantly reduced, providing incremental benefits to IPL’s system, customers in terms of improved system reliability, and other utility stakeholders.

4. RISK REDUCTION MONETIZATION ANALYSIS & RESULTS

Q25. Please summarize the Risk Reduction Monetization analysis and results.

A25. As detailed in the Burns & McDonnell Risk Reduction Benefit Monetization Report included in the IPL TDSIC Plan as Appendix 8.11 and also addressed by IPL Witness Bentley, Burns & McDonnell supported IPL’s analysis of the risk reduction monetization associated with the Plan. The analysis was performed on the following projects: Substation Assets Replacement, Circuit Rebuilds, 4kv Conversion, XLPE Cable Replacement, and Remote End – Breaker Relay/Upgrades. The monetization was performed on failure repair costs and customer reliability from Figure 2 above.

For the monetization analysis, Burns & McDonnell leveraged the Risk Model and calculated a 20-year likelihood of failure profile using the survivor curves and effective ages from the asset health calculations for all substation and circuit assets. For monetized consequence, Burns & McDonnell utilized the Department of Energy’s Interruption Cost Estimate (“ICE”) Calculator to monetize outage for various asset failure scenarios. For failure repair costs, Burns & McDonnell assumed a 40 percent cost added to proactive
replacement. The monetized risk profile equals the 20-year likelihood of failure forecast multiplied by the monetized consequence of failure for customer reliability and failure repair costs. The monetized risk reduction benefits were calculated by taking the difference between the “Do Nothing” and Investment monetized risk forecasts.

Figure 5 provides a summary of the 20-year escalated nominal investment level and monetized risk benefit by category. For the five projects listed above, the monetized benefits provide total (or gross) escalated nominal benefits of $1,404 million, as compared to the TDSIC investment of $746 million, for a net benefit of $658 million.

**Figure 5: Monetized Risk Reduction Nominal Cash Flow Benefit Summary**
5. CONCLUSION

Q26. Does this conclude your prepared verified direct testimony?

A26. Yes.
VERIFICATION

I, Jason De Stigter, Capital Asset Planning Business Lead, affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information and belief.

Dated: 22 July 2019

[Signature]
Jason De Stigter