DOE Exhibit 2.0

STATE OF ILLINOIS

ILLINOIS COMMERCE COMMISSION

COMMONWEALTH EDISON COMPANY	)	
	)	Docket No. 10-0467
Proposed general increase in rates	)	

DIRECT TESTIMONY

OF

KIRK P. PATTERSON

ON BEHALF OF THE

UNITED STATES DEPARTMENT OF ENERGY

REPRESENTING THE FEDERAL EXECUTIVE AGENCIES

NOVEMBER 19, 2010

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STATE OF ILLINOIS

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COMMONWEALTH EDISON COMPANY	)	
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INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, OCCUPATION, AND BUSINESS ADDRESS.

A. My name is Kirk P. Patterson. I am a Principal with Patterson Consulting. My business address is 901 Mountain View Drive, Lafayette, California 94549.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I hold a Bachelor of Science degree in Electrical Engineering from San Jose State University and a Master of Science degree in Engineering Management from Santa Clara University. I have forty-three years of experience in the public utility industry. My work has been focused on transmission planning, contract negotiations, wholesale and retail contract administration, interconnection agreements, transmission cost allocation and rate design, and related regulatory issues for an investor-owned utility, municipalities, a state commission, and the federal government.

I held a variety of positions at Pacific Gas and Electric Company ("PG&E") during the period 1968 through 1994. I began my employment at PG&E as a

Transmission Planning Engineer. From 1976 through 1985, I worked in the Rates Department, where I was promoted to Senior Rate Engineer and then to Supervisor, Electric Contracts and Regulatory Costs. I participated in contract negotiations and prepared Federal Energy Regulatory ("FERC") filings associated with new contracts, and supervised work in this area. From 1984 through 1985, I worked on management development assignments.

From 1986 through 1990, I was a Senior Commercial Analyst – Government Energy Services within PG&E's Commercial Department. In this capacity, I administered power and wheeling contracts between PG&E and various wholesale and retail customers; I also participated in contract negotiations associated with interconnection agreements and wheeling services. From 1991 until my retirement from PG&E in 1994, I was a Senior Transmission Contract Specialist with the Transmission Contracts Department. In this capacity I was responsible for developing PG&E's positions in, and leading, negotiations between PG&E and various wholesale and governmental customers, including the Western Area Power Administration and the U.S. Department of Energy's northern California laboratories. I was PG&E's Contract Representative to the Pacific Intertie Task Group and was responsible for developing and writing the technical aspects of the California-Oregon Transmission Project Interconnection Rate Schedule. I also led a multi-departmental task force which examined in detail the impacts of various transmission cost allocations and rate design methods. In addition, I provided support in the area of transmission wheeling rates and contract language to the Transmission Contract Department.

From 1995 through 2000, I worked as a Senior Project Manager for Henwood Energy Services, Inc. providing regulatory and contract negotiation support to various wholesale customers and irrigation districts in California.

From 2000 to the present, I have been the Principal of Patterson Consulting, where I have provided clients with guidance in the areas of transmission-related studies, contract negotiations, North American Electric Reliability Corporation ("NERC") and Western Electricity Coordinating Council ("WECC") compliance issues, strategic planning, and rate and regulatory issues.

I have testified as an expert witness on several occasions before the FERC and the California Public Utilities Commission ("CPUC") while I was employed at PG&E or on behalf of the federal government and municipal clients. I have not previously testified before the Illinois Commerce Commission ("Commission").

A summary of my qualifications is included as an appendix to this testimony.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. I have been asked by the U.S. Department of Energy ("DOE"), on behalf of the Federal Executive Agencies ("FEA"), to evaluate the reasonableness of Commonwealth Edison Company's ("ComEd" or the "Company") proposed distribution loss factors in this case, in general, and specifically with regard to three major FEA facilities receiving distribution service from ComEd.

Q. WHAT MAJOR FEA FACILITIES TAKE SERVICE FROM COMED?

A. Two large DOE science laboratories take retail delivery service from ComEd. Fermi National Accelerator Laboratory ("Fermilab") has a peak demand of approximately 63 megawatts ("MW"), and Argonne National Laboratory ("Argonne") has a peak demand of approximately 42 MW. The U.S. Navy's Naval Training Center – Great Lakes ("Great Lakes") also takes delivery service from ComEd and has an annual peak demand around 22 MW. All three FEA sites receive service under ComEd's Rate RDS – Retail Delivery Service at rates for the High Voltage Delivery Class, which are applicable to

customers served by conductors entering the retail customer's premises at or above 69 kilovolts ("kV").

Q. WHAT INFORMATION HAVE YOU REVIEWED AS PART OF YOUR EVALUATION OF COMED'S PROPOSED DISTRIBUTION LOSS FACTORS IN THIS CASE?

A. I have reviewed the following information as part of my evaluation of ComEd's proposed distribution loss factors in this case: (1) the limited information ComEd has provided on how it developed key inputs used in its distribution loss study; (2) the calculations ComEd performed within its distribution loss study to develop the proposed distribution loss factors; (3) loss studies prepared by ComEd to develop distribution loss factors applicable for distribution service to ComEd's wholesale customers; (4) descriptions of and information related to the electrical equipment used to provide distribution service to Fermilab, Argonne, and Great Lakes, which were provided to me by ComEd staff and knowledgeable representatives that work at these three federal government facilities; and (5) discovery responses provided by ComEd to DOE and other interveners in this case.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q. MR. PATTERSON, BRIEFLY SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS.

A. ComEd's proposed 1.93 percent (see ComEd Ex. 16.19 Revised and ComEd Ex. 16.21 Revised, Sheet 75) distribution loss factor for the High Voltage Delivery Class is grossly unreasonable for the large portion of Fermilab's electrical load located at Fermilab's Kautz Road Substation that is connected directly to ComEd's 345 kV transmission system and is metered at that voltage. There are no distribution-related facilities used to deliver power to these loads that materially contribute to ComEd's distribution losses.

The distribution losses that occur to serve these loads are effectively zero. DOE witness Mr. Dwight Etheridge presents a recommendation to address the inequity that has and will continue to occur if ComEd is allowed to assess its proposed distribution loss factor to Fermilab's electrical loads at this location. He explains in his testimony that DOE is paying approximately $185,000 annually for losses that do not occur.

In addition, ComEd has failed to provide reasonable documentation to support the derivation of key inputs used in its distribution loss study, and has therefore failed to demonstrate the reasonableness of its proposed distribution loss factors. I am therefore unable to conclude that ComEd's distribution loss factors are reasonable, either in general for the rate classes, or for retail delivery service to Great Lakes, Argonne, and Fermilab's electrical loads that are not metered at 345 kV. Again, ComEd's proposed distribution loss factors are most decidedly unreasonable if applied to electrical loads at Fermilab's Kautz Road Substation.

I recommend that ComEd be ordered to prepare a revised distribution loss study with sufficient supporting documentation to allow interested parties to evaluate the reasonableness of ComEd's proposed distribution loss factors.

LOSSES ASSOCIATED WITH RETAIL DELIVERY SERVICE TO FERMILAB AT THE KAUTZ ROAD SUBSTATION

Q. PLEASE EXPLAIN GENERALLY HOW LOSSES OCCUR IN AN ELECTRICAL SYSTEM.

A. The losses that occur in an electric system can broadly be divided into two categories: (1) technical losses that are a function of electric currents and voltages in the equipment that make up the electric system, which I refer to just as "losses"; and (2) non-technical losses that result from non-metered company use (unaccounted for), and theft, which

typically represent a very small portion of total system losses. My review of ComEd's distribution loss study focused primarily on the causes of losses of the first category, i.e., "losses" in ComEd's system. These losses include electric current losses or "load-related" losses that occur in transmission and distribution lines and transformers, and excitation losses or "no-load" losses that occur in transformers, other system elements, including reactors, regulators and capacitors, and including the corona losses that occur in extra high voltage transmission lines.

The load-related losses are a function of the square of the current and the resistance of the circuit element. Many times these losses are referred to as "I^2R losses," where "I" represents current and "R" represents resistance. Transformer no-load losses, also referred to as core losses, are always present in an energized transformer. They are a function of the voltage squared and the design of the transformer. Load-related transmission and distribution line losses and load-related and no-load transformer losses represent the bulk of the technical losses that occur in an electric system. Losses associated with other system elements, e.g., switches, bus structures, etc., and corona losses are, for the most part, comparatively small.

In relatively simple terms, load-related losses occur as power flows through transmission lines. Higher voltage transmission lines are a more efficient means of transmitting electricity than lower voltage transmission lines since the current that results from transmitting a given amount of power decreases as the transmission voltage increases. For example, load-related losses that occur to transmit an equal amount of power utilizing 345 kV transmission lines would be less than load-related losses utilizing 138 kV transmission lines. This same relationship continues to hold true as power moves through lower voltage primary and secondary distribution lines on its way to customers' meters. Transformer no-load losses are primarily a function of installed transformer

capacity and transformer design; no-load losses occur in all energized transformers, at all levels of the system, including the bulk transmission system, where power is transformed from 765 kV and 345 kV, for example, to lower transmission voltages, and including transmission to distribution voltage substations, distribution substations, and line transformers. Load-related and no-load losses that occur in transformers tend to be inversely proportional to the size of the transformers, in percentage terms, typically with loss percentages being greater in smaller transformers.

Q. PLEASE EXPLAIN GENERALLY HOW LOSSES OCCUR IN THE PROVISION OF ELECTRIC SERVICE TO COMED'S CUSTOMERS, AND HOW THESE LOSSES ARE ACCOUNTED FOR.

A. Losses occur in ComEd's FERC-jurisdictional transmission system and its Commission-jurisdictional distribution system during the provision of electric service to customers. Transmission losses include, primarily, load-related line losses that occur on ComEd's FERC-jurisdictional 765 kV, 345 kV, and 138 kV transmission lines, and load and no-load losses that occur in the step down transformers used by ComEd to reduce the voltages from the transmission level to voltages used in the distribution system. The bulk of these transformers are 345 – 138 – 34 kV transformers. Wholesale suppliers that provide power supply service to wholesale customers, and retail energy suppliers ("RES") that provide power supply service to retail customers, are required to account for transmission losses pursuant to tariffs approved by FERC for PJM Interconnection L.L.C. ("PJM"), the Regional Transmission Organization ("RTO") that controls and operates ComEd's transmission system. This is primarily accomplished through the payment of locational marginal prices, which include marginal losses.

Distribution losses include, primarily, load-related losses that occur over ComEd's 34 kV, 12 kV, 4 kV and lower voltage distribution lines, including service

drops connected directly to customers' meters, and in step down transformers used throughout ComEd's distribution system. Wholesale suppliers are required to account for distribution losses through distribution loss factors that are approved by FERC. They do so by procuring additional energy above that which is measured at their wholesale customers' meters. RESs are required to account for distribution losses pursuant to tariffs approved by the Commission that require the RESs to procure and deliver to ComEd additional energy above that which is measured at their retail customers' meters.

A simplified example will put these loss factors into context. Assume the following: (1) a customer (wholesale or retail) has a load of 100 megawatt-hours ("MWh"); (2) a distribution loss factor of two percent is applicable to delivery service provided to this customer; and (3) energy prices are $50/MWh. The customer would pay $5,100 in power supply costs ((100 MWh metered energy + (100 MWh metered energy x 2 percent losses)) x $50/MWh). The cost of distribution losses is $100 (100 MWh x 2 percent losses x $50/MWh).

Q. PLEASE DESCRIBE HOW FERMILAB RECEIVES RETAIL DELIVERY SERVICE FROM COMED.

A. All but a very small portion of Fermilab's electrical loads are connected to two government-owned substations, the Master Substation and the Kautz Road Substation, both located on-site at Fermilab. ComEd has four 345 kV transmission lines located in close proximity to Fermilab. These transmission lines are part of ComEd's FERC-jurisdictional transmission facilities that are operated by PJM. ComEd's Commission-jurisdictional distribution facilities used to provide Commission-jurisdictional retail delivery service to Fermilab are those facilities that are located between ComEd's FERC-jurisdictional 345 kV transmission lines and Fermilab's government-owned facilities.

ComEd's retail delivery service to Fermilab's Kautz Road Substation entails minimal ComEd-owned Commission-jurisdictional distribution facilities. ComEd utilizes two very short taps and two switches between the nearby FERC-jurisdictional 345 kV transmission lines and the government-owned 345 kV transmission line located on Fermilab's side of the switches. A relatively short government-owned 345 kV transmission line is used to deliver power from this interconnection point to the Kautz Road Substation. In the Kautz Road Substation, there is a breaker capable of disconnecting the substation from the government-owned 345 kV transmission line. ComEd meters the power flowing into the Kautz Road Substation at 345 kV, prior to power flowing through the four 345 – 13.8 kV government-owned step down transformers located in this substation. From the Kautz Road Substation, Fermilab distributes power to electrical loads throughout the site.

Q. ARE YOU CERTAIN THAT COMED METERS THE POWER FLOWING INTO THE KAUTZ ROAD SUBSTATION ON THE PRIMARY SIDE OF THE STEP DOWN TRANSFORMERS?

A. Yes. DOE and ComEd representatives have both confirmed that the location of the meters in the Kautz Road Substation is on the primary side of the step down transformers. Early on in my investigation I was mistakenly informed by ComEd that the meters were on the secondary side of the step down transformers. ComEd subsequently confirmed DOE's understanding that the meters are in fact located on the primary side of the step down transformers.

Q. DO ANY DISTRIBUTION-RELATED FACILITIES CONTRIBUTE MATERIALLY TO DISTRIBUTION LOSSES THAT OCCUR IN THE PROVISION OF RETAIL DELIVERY SERVICE TO FERMILAB'S KAUTZ ROAD SUBSTATION?

A. No. There are no distribution-related facilities that cause material losses to occur in the provision of retail delivery service to Fermilab's Kautz Road Substation. The losses that occur in the ComEd-owned 345 kV taps (which are short) and the 345 kV switch are immaterial, and the losses that occur over the relatively short government-owned 345 kV transmission line and circuit breaker are also immaterial. Because ComEd meters power delivered to the Kautz Road Substation on the primary side of the four 345 – 13.8 kV step down transformers located in Kautz Road Substation, these transformers are not a factor in determining the distribution losses that occur in the delivery of power to this location.

ComEd agrees with my conclusion. Attached to my testimony as DOE Exhibit 2.1 is ComEd's response to DOE data request 2.06. In its response, ComEd explains that "there are no system elements that materially contribute to ComEd distribution energy losses for" "customers metered at 138 or 345 kV for which ComEd does not provide a step down transformer" (see ComEd's response to DOE 2.06c). This is exactly how ComEd provides retail delivery service to Fermilab's Kautz Road Substation. ComEd's supplemental response to DOE data request 2.16, attached to my testimony as DOE Exhibit 2.2, reinforces my conclusion by explaining that "insignificant distribution losses occur" in the ComEd-owned 345 kV lines used to provide distribution service to Kautz Road Substation.

Q. HAS COMED PUBLICLY TAKEN THE POSITION ON ADDITIONAL OCCASSIONS THAT DISTRIBUTION LOSSES OVER TRANSMISSION LINES ARE IMMATERIAL?

A. It has. ComEd has prepared multiple loss studies which have been filed with FERC to gain FERC's approval for distribution loss factors applicable to customers that take wholesale delivery service from ComEd. Attached to my testimony as DOE Exhibit 2.3 are excerpts from PJM's application in FERC Docket ER08-868-000 where PJM filed

ComEd's distribution loss studies for the City of Rock Falls ("Rock Falls") and the Village of Winnetka ("Winnetka") (four-page cover letter and two single page loss studies from Appendix B of that application). Listed on page 6 of 6 of DOE Exhibit 2.3 is ComEd's loss study for the Village of Winnetka. It appears from this study that 19,000 kilowatts ("kW") of Winnetka's peak load measured on August 7, 2007 at 1600 hours was provided through ComEd's electric service station referred to as "ESS C434." The remaining 15,300 kW of Winnetka's load at that peak hour was provided over 12 kV feeders from ComEd's substation referred to as "TDC212." ComEd provides the following notation near the bottom of this study, "ESS C434 load metered at138 kV. Losses are insignificant." ComEd's determination that losses are insignificant for loads provided to Winnetka over 138 kV lines that are metered at 138 kV is confirmed in the study slightly above that notation where ComEd shows zero losses associated with the 19,000 kW of load at the peak hour.

This study provides clear evidence that ComEd, publicly, ascribes immaterial distribution losses to loads metered at the voltages of its FERC-jurisdictional transmission system, which in the case of Winnetka is a 138 kV transmission line. ComEd's loss study for the Village of Winnetka supports my conclusion that there should be no distribution losses ascribed to ComEd's retail delivery service to Fermilab's Kautz Road Substation.

Attached to my testimony as DOE Exhibit 2.4 are excerpts from PJM's application in FERC Docket ER07-1102-000 where PJM filed ComEd's distribution loss studies for the City of Naperville ("Naperville") and the City of St. Charles ("St. Charles") (seven-page cover letter, two-page loss study for Naperville, and one-page loss study for St. Charles). On page 8 of 10 of DOE Exhibit 2.4 ComEd provides a notation near the bottom of the top table that states, "2006 138 kV radial losses per Cymdist

analysis" total 16 kW. Naperville's electrical loads at the peak hour on August 1, 2006 at 1700 hours that were served by ComEd over 138 kV lines total 296,003 kW (154, 728 + 114,324 + 26,951). Combining this information, it appears that ComEd determined that its losses over 138 kV lines that presumably are metered at 138 kV total 16 kW out of a total load over these lines of 290,003 kW for a loss percentage of 0.0055 percent, which is clearly immaterial. With the City of Naperville, ComEd has taken the position, publicly, that it does not incur material distribution losses to serve Naperville's loads that are metered at 138 kV, which is consistent with its treatment of the Village of Winnetka, a similarly situated wholesale customer.

Finally, ComEd has stated that it does not have FERC-approved distribution loss factors for the City of Batavia and the City of Rochelle because these customers are metered at 138 kV; effectively, distribution losses to serve these two wholesale customers are zero. This loss treatment is consistent with ComEd's treatment of the Village of Winnetka and the City of Naperville.

Q. ARE THESE FOUR CUSTOMERS SIMILARLY SITUATED TO FERMILAB'S KAUTZ ROAD SUBSTATION?

A. They are.

Q. IN WHAT WAY ARE THEY SIMILARLY SITUATED?

A. Their distribution service is metered at high voltages. Therefore, no material distribution losses occur to serve these customers.

Q. ARE THESE CUSTOMERS BEING TREATED CONSISTENTLY BY COMED IN TERMS OF THE LOSSSES THAT ARE ASCRIBED TO EACH CUSTOMER'S HIGH VOLTAGE DISTRIBUTION SERVICE?

A. They are not. Similarly situated customers are being treated differently. ComEd's proposed treatment of DOE suggests that significant distribution losses occur in 345 kV

transmission lines used to provide distribution service. That is not true, as reflected in ComEd's treatment of these four wholesale customers, where ComEd properly recognizes that immaterial distribution losses occur in 138 kV transmission lines use to provide distribution service.

Q. IS THERE ANY ENGINEERING JUSTIFICATION FOR ASSESSING COMED'S PROPOSED DISTRIBUTION LOSS FACTOR FOR THE HIGH VOLTAGE DELIVERY CLASS TO FERMILAB'S LOADS AT THE KAUTZ ROAD SUBSTATION?

A. There is not. The distribution losses ComEd currently assesses to DOE for electrical loads at the Kautz Road Substation are "phantom" losses, but the power supply costs DOE incurs as a result are most decidedly real. This inequitable situation can easily be and should be corrected. ComEd's proposal to assess distribution loss factors to Fermilab's electrical loads at Kautz Road Substation is grossly unreasonable, and the Commission should adopt Mr. Etheridge's recommendation so that this practice does not continue.

COMED'S FAILURE TO EXPLAIN THE SOURCE OR DERIVATION OF CRITICAL INPUTS TO IT'S DISTRIBUTION LOSS STUDY

Q. WHAT ARE THE CRITICAL INPUTS TO COMED'S DISTRIBUTION LOSS STUDY?

A. ComEd's distribution loss study, which is marked as ComEd Exhibit 8.3 Revised, utilizes two key sets of inputs, load information for the system and by rate class, and key inputs ComEd uses to estimate the load-related and no-load losses in various elements of ComEd's electrical system. I have no reason to doubt ComEd's derivation of its system or class loads, and I did not investigate these inputs. I focused my review of ComEd's

distribution loss study primarily on the key inputs listed in Appendix D of that study. Secondarily, I reviewed the calculations ComEd performed within its study to arrive at its final proposed distribution loss factors in this case. Attached to my testimony as DOE Exhibit 2.5 is Appendix D from ComEd's distribution loss study.

Q. PLEASE EXPLAIN THE INPUTS SHOWN IN APPENDIX D.

A. The inputs listed in Appendix D in the columns labeled "Core loss%" and "Base MVA" are used in ComEd's distribution loss study to calculate no-load transformer losses for each of the 20 system elements, or categories of equipment, listed in the first column. The inputs in the column labeled "I^2 R loss%" are used in the study to calculated load-related transformer and line losses for each system element. ComEd uses these inputs and load research data to calculate the distribution loss factors it is proposing in this case.

Q. HOW ARE THE LOSS INPUTS BY SYSTEM ELEMENT TRANSFORMED INTO DISTRIBUTION LOSS FACTORS BY RATE CLASS?

A. ComEd inputs its estimate of the percentage of a rate class' load that flows through each system element. For example, ComEd estimated that 100 percent of the High Voltage Delivery Service customers' loads flows through the first system element, High Voltage Electric Service Stations ("HV ESS"), six percent of these customers' load flows through the second system element, 138 – 69 kV Transmission Service Stations ("138-69 TSS"), and that these customers' loads do not flow through any other system elements. ComEd also developed system element utilization factors for each of the other rate classes for each system element. ComEd uses the inputs listed in Appendix D and load research data to estimate losses by system element, which it then allocates to the rate classes based on their utilization factors for each system element.

Q. WHERE DID YOU FOCUS YOUR ATTENTION WHEN REVIEWING COMED'S LOSS STUDY INPUTS LISTED IN APPENDIX D?

A. I focused primarily on the first two rows of Appendix D because these are the inputs that are critical to determining the magnitude of the distribution loss factor for the High Voltage Delivery Service Class, which directly affects the power supply costs for Fermilab, Argonne, and Great Lakes. On the first row, for the system element labeled "HV ESS", ComEd lists three inputs under the column headings "Core loss%," I^2 R loss%," and "Base MVA" as follows: 0.2, 0.8, and 3,575. The first of these figures, 0.2, is used by ComEd in its distribution loss study to calculate transformer no-load losses in HV ESSs. It is used in conjunction with the third of these figures, or 3,575, which represents, as ComEd explains in its supplemental response to DOE 2.08, "the sum of the full capacity nameplate MVA ratings (ratings with all available fans and pumps in service) of the transformers used to supply customers in this class that are on the utility side of revenue meters." The second of these figures is 0.8. It is used by ComEd in its distribution loss study to calculate transformer load-related losses that occur in HV ESSs.

In the second row of Appendix D for the system element labeled "138-69 TSS," ComEd lists three additional inputs as follows: 0.2, 0.6, and 2,122. The first and third of these figures, 0.2 and 2,122, are used by ComEd in its distribution loss study to calculate transformer no-load losses in 138 – 69 kV Transmission Service Stations ("138-69 TSS"). The second figure, 0.6, is used by ComEd to calculate transformer load-related losses that occur in 138-69 TSSs. ComEd estimates that six percent of the load for the High Voltage Delivery Service at or above 69 kV utilizes this system element.

ComEd's proposed distribution loss factor for the High Voltage Delivery Service Class is directly correlated with each of the six critical loss study inputs listed in the first two rows of Appendix D. The higher each of the figures, the higher will be ComEd's estimated distribution loss factors for the High Voltage Delivery Service Class.

Q. HAVE YOU BEEN ABLE TO DETERMINE THE REASONABLENESS OF THE INPUTS LISTED IN THE FIRST TWO ROWS OF APPENDIX D?

A. I have not. ComEd has not provided an explanation of the derivation of these inputs that would allow the Commission to examine and verify the assumptions used by ComEd to develop these inputs. ComEd has provided no basis upon which it can be concluded that ComEd's proposed distribution loss factors are reasonable.

Q. WHAT EXPLANATIONS ON THE DERIVATION OF THE INPUTS LISTED IN THE FIRST TWO ROWS OF APPENDIX D HAS COMED PROVIDED?

A. Attached to my testimony as DOE Exhibit 2.6 is ComEd's response to DOE data request 2.08. In that request, DOE requested that ComEd "provide all calculations, including reports, studies, and work papers, used to produce the figures shown in the" first two rows of Appendix D. The figures shown in these two rows represent the primary inputs, other than load research data, used to calculate the proposed distribution loss factor for the High Voltage Delivery Class, which ComEd assesses to Fermilab, Argonne, and Great Lakes. In its response to DOE 2.08, ComEd referred DOE to its response to Staff data request PL 2.05. In Attachment 1 to that response, ComEd provided an electronic copy of the spreadsheet it used to calculate its proposed distribution loss factors, as well as a hardcopy printout of the information contained in that spreadsheet. I reviewed that spreadsheet and found all of the figures listed in Appendix D on page 21 of the hardcopy printout. I've attached that page to my testimony as DOE Exhibit 2.7, and I've placed a box around those figures on page 21 that are identical to those listed in Appendix D. The figures around which I've placed the box are inputs to the spreadsheet, and by that I mean somebody had to type those numbers into the spreadsheet; their derivation occurred external to ComEd's distribution loss study. Effectively, ComEd responded to DOE's request for documentation on the figures listed in Appendix D by providing those same

figures in another form, a spreadsheet, without any additional explanation or documentation.

Late on November 12, 2010, ComEd provided a supplemental response to DOE 2.08. I've attached that supplemental response and its two attachments to my testimony as DOE Exhibit 2.8. I've reviewed that supplemental response and the attachments, and I believe that ComEd may have provided the derivation of two of the six inputs shown in the first two rows of Appendix D, but it has not provided the derivation for the remaining four inputs. I was able to find a figure close to the 3,575 MVA listed in the first row of Appendix D at the bottom of Attachment 1 to ComEd's supplemental response to DOE 2.08 (see DOE Exhibit 2.7 page 3 of 4, near the middle of the bottom of the page). There ComEd lists a figure of "3572.225" that is the sum of capacity ratings for 82 transformers listed in that attachment. I was also able to find a figure close to the 2,122 MVA listed in the second row of Appendix D at the bottom of Attachment 2 to ComEd's supplemental response to DOE 2.08. Listed there is the figure "2106."

ComEd has not provided the derivation of the 0.2 transformer no-load loss input shown in the first row of Appendix D, nor has it provided the derivation of the 0.8 transformer load-related loss input listed in that row. Likewise, ComEd had not provided the derivation of the 0.2 and 0.6 no-load and load-related loss inputs shown in the second row.

Q. WHAT IS THE EFFECT OF THIS IN TERMS OF EVALUATING THE REASONABLENESS OF COMED'S DISTRIBUTION LOSS STUDY AND ITS PROPOSED DISTRIBUTION LOSS FACTORS FOR THE HIGH VOLTAGE DELIVERY SERVICE CLASS?

A. The effect of this is that one cannot assess the reasonableness of ComEd's proposed distribution loss factors.

CONCLUSION

Q. PLEASE SUMMARIZE THE CONCLUSIONS YOU'VE DRAWN FROM YOUR INVESTIGATION INTO THE REASONABLENESS OF COMED'S PROPOSED DISTRIBUTION LOSS FACTORS IN THIS CASE.

A. Based upon my review of the facilities used by ComEd to provide retail delivery service to Fermilab's Kautz Road Substation, I believe it is unreasonable for ComEd to assess DOE a proposed 1.93 percent distribution loss factor on electrical loads at this location. DOE should not be assessed any distribution losses for these electrical loads. In addition, ComEd has not demonstrated the reasonableness of its distribution loss factors. Given ComEd's failure to explain and document critical inputs to its distribution loss study, I'm recommending that the Commission direct ComEd to produce a distribution loss study that includes sufficient documentation for an interested party to ascertain the reasonableness of any resulting distribution loss factors.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

APPENDIX

QUALIFICATIONS OF

KIRK P. PATTERSON

KIRK P. PATTERSON

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EDUCATION

M.S. Engineering Management, Santa Clara University, 1989
Edison Electric Institute, Electric Rate Fundamentals, 1977
B.S. Electrical Engineering, San Jose State University, 1965

WORK EXPERIENCE

Principal, Patterson Consulting – 2000 to the Present

Recent and ongoing engagements include:

Contract support on transmission and regulatory matters for the U.S. Department of Energy's northern California laboratories, Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, and the SLAC National Accelerator Center.

Technical support to the Merced Irrigation District in preparing EPAct 2005/NERC/WECC compliance documents, including data preparation for WECC studies, Transmission Planning and Facility Interconnection Standards for Merced Irrigation District, self certification documents, etc., including completion of 2010 WECC/NERC compliance audit.

Engaged as a Staff Transmission Expert to the Louisiana Public Service Commission, and serving as Staff's representative on the Entergy Regional State Committee Working Group and Minimizing Bulk Power Costs Study Task Force.

Additional projects include:

Strategic, contract, rate, and economic analysis of DOE's power procurement and transmission options at DOE's Portsmouth, Ohio uranium enrichment facility.

Filed expert testimony on behalf of the City and County of San Francisco in FERC Docket No. ER05-1190 on Mobile – Sierra issues in a dispute between Pacific Gas and Electric Company and San Francisco. Also provided technical support in settlement discussions involving the PG&E Wholesale Distribution Tariff Service Agreement offered to the City.

Provided technical and discovery support to the Joint Consumer Advocates (District of Colombia Office of the People's Counsel, the Maryland Office of the People's Counsel, the Pennsylvania Office of the Consumer Advocate, and the New Jersey Division of Ratepayer Advocate) in FERC Docket No. EL05-121-000 on rate design and cost allocation issues.

Additional projects (continued):

Provided rate, contract and contract negotiation, and cost of service technical support for the Calaveras Public Power Agency and the Tuolumne Public Power Agency in settlement discussions with the Western Area Power Administration and Pacific Gas and Electric Company in FERC Docket No. ER05-116-000.

Provided strategic planning and contract negotiation support to the U.S. Department of Energy in regard to DOE's northern California laboratories business relationships with Pacific Gas and Electric Company under Contract No. DE-AC03-03SF22557, which ultimately resulted in settlement with PG&E in FERC Docket No. ER05-116-000 that provided for, in part, a FERC jurisdictional Interconnection Agreement between the DOE's laboratories and PG&E.

Participated as a Staff Transmission Consultant to the Louisiana Public Service Commission in the development of Entergy Phase II Transmission Report (February 2004).

Previous Employment

1995-2000:	Senior Project Manager – Henwood Energy Services, Inc.
1991-1994:	Senior Transmission Contract Specialist – PG&E, Transmission Contracts Department
1986-1990:	Senior Commercial Analyst, Government Energy Services – PG&E, Commercial Department
1984-1985:	Management Development Assignments – PG&E, Rate Department
1982-1983:	Supervisor, Electric Contracts – Regulatory Costs – PG&E, Rate Department
1976-1981:	Rate and Senior Rate Engineer – PG&E, Rate Department
1968-1975:	Transmission Planning Engineer – PG&E, Transmission Planning Department
1965-1968:	Commissioned Officer U.S. Coast and Geodetic Survey in various shipboard and U.S. Weather Bureau engineering labs assignments

ICC Docket No. 10-0467

Commonwealth Edison Company's Response to
The U.S. Department of Energy ("DOE") Data Requests
DOE 2.01 – 2.33
Date Received: September 22, 2010
Date Served: October 12, 2010

REQUEST NO. DOE 2.06:

Re: ComEd Ex. 8.3 Revised, p. 7, Appendix B.

a. Please spell out the abbreviation "HV ESS TR" used in the upper left box of the diagram shown on this page.

b. Connected directly to the box listed as "HV ESS TR" at the upper left box of the diagram shown on this page is another box with a "C" in it that indicates the location of customers in ComEd's simplified system resistance model. Please provide a table listing the number of customers served in this manner and the voltage level at which ComEd delivers electricity to these customers. Please describe the high voltage electrical configurations used to provide service to each of these customers. Please include in each of these descriptions a listing of electrical equipment (e.g., tap, switches and/or transformers) that contributes to ComEd's distribution losses. Please also provide the high side and low side voltage ratings for any transformers used in each HV-ESS.

c. Connected directly to the box listed as "Generation and Transmission" at the top of the diagram shown on this page is another box with a "C" in it that indicates the location of customers in ComEd's simplified system resistance model. Please provide a table listing the number of customers served in this manner and the voltage level at which ComEd delivers electricity to these customers. Please describe the high voltage electrical configurations used to provide service to each of these customers. Please include in each of these descriptions a listing of electrical equipment (e.g., tap and/or switches) that contributes to ComEd's distribution losses.

RESPONSE:

a. The abbreviation "HV ESS TR" represents the term "High Voltage Electric Service Station Transformer".

b. The following table indicates the ComEd owned transformers in the HV ESS substations with transformer primary and secondary voltages; and the voltage level at which energy deliveries are measured. In most cases, ComEd provides one or more step down transformers that reduce 69, 138, or 345kV to a medium voltage level. For the purpose of developing energy loss factor only the transformer load and no-load losses are considered. Refer to the response to Data Request DOE 2.04 for a description of additional equipment that contributes to distribution losses for customers with an incoming line voltage of 69kV. This table excludes generating stations because there are no ComEd owned transformers at those locations. Note that the voltage at which revenue metering occurs was provided rather than the delivery voltage.

Customer Location - transformer number	Primary - Secondary kV	Meter Voltage (kV)
A429	132-13.2Y	13.2
A431	132-13.2Y	13.2
A450	132Y-35.5Y	35.5
B200	customer	13.8
B427	132-2.4Y	2.4
B465	132-13.2Y	13.2
D467	132-13.2Y	13.2
D775	132-13.2Y	13.2
D787	customer	13.2
D779	132-13.2Y	13.2
F375	132-13.2Y	13.2
G385-1	132-13.2Y	13.2
G385-2	132Y-35.5Y	35.5
G394	132-13.2Y	13.2
H471	330Y-35.5	35.5
H71	customer	138
J305	132-13.8Y	13.2
J307	132-13.2Y	13.2
J310	customer	13
J322	138Y-6.9Y	6.9
J326	132-13.2Y	13.2
J332	132-13.2Y	13.2
J339	customer	138
J370	132-13.2Y	13.2
J371	132-13.2Y	13.2
J390	132Y-35.5Y	35.5
J401	customer	4
K319	132-13.2Y	13.2
R401	66-13.2Y	13.2
W407	customer	13.2
W507	132-13.2Y	13.2
W541	customer	13.2
X646	132-13.2Y	13.2
Y652	customer	69
Z100	132-13.2Y	13.2
Z524	132-13.2Y	13.2
Z715	132-13.2Y	13.2

c. The box with a "C" connected to the "Generation and Transmission" box represents those customers metered at 138 or 345kV for which ComEd does not provide a step-down transformer. There are no system elements that materially contribute to ComEd distribution energy losses for these customers.

ICC Docket No. 10-0467

Commonwealth Edison Company's Response to
The U.S. Department of Energy ("DOE") Data Requests
DOE 2.01 – 2.33
Date Received: September 22, 2010
Date Served: November 12, 2010

REQUEST NO. DOE 2.16:

Please describe each piece of electrical equipment used by ComEd to provide distribution service to the U.S. Department of Energy's Fermi National Accelerator Laboratory that contributes to ComEd's distribution losses.

SUPPLEMENTAL RESPONSE:

Distribution losses occur in each of the four U.S. Department of Energy ("DOE") owned 345 – 138 kV step-down transformers that are located at the Fermi Master substation Insignificant distribution losses occur in the ComEd owned 345kV conductors that are used to connect ComEd transmission lines to the DOE 345kV conductors that supply the DOE owned Master and Kautz Rd. substations.

HellerEhrman LLP

April 24, 2008

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By Courier

Honorable Kimberly Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C., 20426

Re: Commonwealth Edison Company and Commonwealth Edison Company of Indiana, Inc., Docket No. ER08-___-000

Dear Secretary Bose:

Pursuant to Section 205 of the Federal Power Act ("FPA"), 16 U.S.C. § 824d (2007), and Part 35 of the Commission's Regulations, 18 C.F.R. Part 35 (2007), Commonwealth Edison Company ("ComEd") on behalf of itself and its wholly-owned subsidiary, Commonwealth Edison Company of Indiana, Inc., submits an original and five copies of this filing to revise Attachment H-13 (Network Integration Transmission Service for the ComEd Zone) of the PJM Interconnection, L.L.C. ("PJM") Open Access Transmission Tariff ("Tariff").[1] The revised tariff sheets incorporate wholesale distribution charges ("WDCs") and distribution loss factors applicable to wholesale distribution service to Illinois Municipal Electric Agency ("IMEA") on behalf of two municipalities, the Village of Winnetka ("Winnetka") and the City of Rock Falls ("Rock Falls"). Both Winnetka and Rock Falls are municipalities in Illinois. Currently, ComEd provides these municipalities with wholesale distribution service pursuant to Schedule F of a Network Integration Transmission Service Agreement ("NITSA") between PJM Interconnection, L.L.C. ("PJM") and IMEA. ComEd began providing such service to these municipalities at the time that it began providing service under the PJM OATT. The instant filing revises the charges for the service provided to these customers. ComEd requests a May 1, 2008 effective date for the proposed tariff changes and waiver of the sixty (60) day notice period to accommodate this requested effective date.

PJM has previously stated its preference to maintain the NITSAs as two-party agreements between the customer and transmission provider, and proposed, in other dockets, that ComEd's WDCs and wholesale distribution loss factors be set forth in Attachment H-13 of the PJM Tariff.[2] Consistent with this preference, ComEd is making the instant filing to revise its Attachment H-13, so

[1] The facilities of Commonwealth Edison Company of Indiana, Inc. are also included in the ComEd pricing zone. There are no other transmission owners within the ComEd pricing zone.

[2] *See, e.g.*, Docket No. ER07-1102, *et al.*

as to incorporate revised WDCs and distribution loss factors as applicable to wholesale distribution service that ComEd provides to IMEA on behalf of Winnetka and Rock Falls. It is ComEd's understanding that PJM will revise Schedule F of its existing NITSA with IMEA in order to reflect this filing. Appendix A to this filing contains the revised and redlined tariff sheets for Attachment H-13, which reflect the WDCs and distribution loss factors that ComEd proposes to assess for wholesale distribution service provided to Winnetka and Rock Falls. The WDCs for both Rock Falls and Winnetka are determined in accordance with ComEd's Fixed Charge Rate for wholesale distribution service approved by the Commission in Docket No. ER06-1194.[3]

ComEd is also, in the context of the instant filing, providing clarifying language to Attachment H-13 concerning the calculation of the transmission losses. This clarifying language in no way affects the calculation of the WDCs and distribution loss factors as applicable to Winnetka and Rock Falls.

Appendix B to this filing contains a summary of the cost support for the WDCs and distribution loss factors for Winnetka and Rock Falls. ComEd is providing, in electronic format, the calculations for both the WDC and distribution loss factors. The WDCs were developed by applying the FCR of 24% to the net distribution plant that is directly assigned to the individual customer taking wholesale distribution service from ComEd. The distribution loss factors represent the energy lost due to power flows through ComEd's distribution substation transformers and distribution feeders, which are used to deliver power from the PJM operated transmission system to the delivery points for Winnetka and Rock Falls. ComEd calculated the loss factors for the two municipalities in the following manner. First, ComEd determined the peak power loss for each feeder using power flow software that models the conductor properties and the load of existing customers on the peak day of August 6, 2007. Then, substation transformer losses were determined. The energy loss relative to the peak loss for all non-peak hours for the most recent 12-month period was determined using an hourly to peak load loss ratio, which is defined as the square of the hourly substation load divided by the square of the peak load at the substation. This ratio is used because energy losses are proportional to the square to the load. Annual losses due to load are calculated as the peak load multiplied by the average of all hourly to peak load loss ratios, multiplied by the percent of losses at peak. ComEd determined the annual no-load losses and added them to the sum of annual load losses to derive the total losses. The annual energy loss factor is the total annual losses divided by the annual energy delivered.

ComEd requests that the proposed revisions to Attachment H-13 be accepted with an effective date of May 1, 2008 and requests waiver of the sixty (60) day notice period to accommodate this requested effective date.[4] Good cause exits to grant waiver of the prior notice requirement, because ComEd has reviewed the calculations with Rock Falls and Winnetka, and as a result of these reviews, it is ComEd's understanding that both customers have agreed to the calculations underlying these charges.

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[3] See Letter Order, Docket No. ER06-1194 (Aug. 15, 2006) (accepting ComEd's FCR filing).

[4] 18 C.F.R. § 35.11.

I. Persons On Whom This Filing Is Being Served

Pursuant to Section 35.2(d) of the Commission's regulations, a copy of this filing is being served on representatives of PJM, the Illinois Commerce Commission, the Indiana Utility Regulatory Commission, and the customers at issue, IMEA, Winnetka, and Rock Falls. ComEd has requested PJM to serve a copy of this filing as well on all PJM members and on all state utility commissions in the PJM region by posting this efiling electronically, and requests waiver of paper service. Waiver of paper service is consistent with the Commission's decision to establish electronic service as the default method of service on service lists maintained by the Commission Secretary for Commission proceedings.[5] While Order No. 653 did not amend the posting requirements, application of its rules to initial tariff filings would be consistent with the Commission's "efforts to reduce the use of paper in compliance with the Government Paperwork Elimination Act."[6] Applying amended Section 385.2010(f) to this filing, ComEd has requested PJM to post this filing today to the FERC filings section of PJM's internet site, *available at* http://www.pjm.com/documents/ferc.html, and send an email to all PJM members and all state utility regulatory commissions in the PJM region[7] alerting them that this filing has been made by ComEd today and is available by following such link.

II. Miscellaneous

No agreement is required by contract for the filing of this rate filing. There are no costs included in this filing that have been alleged or adjudged in any administrative or judicial proceeding to be illegal, duplicative, or unnecessary costs, nor has any expense or cost been demonstrated to be the product of discriminatory or employment practices, within the meaning of Section 35.13(d)(3).

III. Persons To Whom Correspondence Should Be Addressed

Persons to whom correspondence and communications regarding this filing should be addressed are as follows:

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[5] *See Electronic Notification of Commission Issuances*, Order No. 653, 110 FERC ¶ 61,110 (2005).

[6] *Id.* at P 2 (citing 44 U.S.C. § 3504).

[7] PJM maintains, updates, and regularly uses e-mail lists for all Members and affected commissions.

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Sincerely,

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Attorneys for Commonwealth Edison Company

Appendix A	Revised and redlined Attachment H-13
Appendix B	Cost support for Winnetka and Rock Falls.

City of Rock Falls - 2006/07 ComEd distribution system losses

Circuit	8/7/2007 Peak kW	Loss kW	% load loss	
L13348	16,670	131	0.786%	
L13349	10,000	69	0.690%	
Total 34 kV circuits	26,670	200	0.750%	a

Circuit peak loss calculated by Cymdist using 2007 peak load and configuration

Average ComEd transformer losses at FA nameplate

	132-35.5 kV
NL loss %	0.093%
FL loss %	0.465%

Substation	TR	NP MVA	8/7/2006 Peak MW	Loss kW	% load loss	
TSS133	76	40	26.1	79.2		
TSS133	77	40	28.5	94.4		
Total 138-34 kV trsf		80	54.6	173.6	0.318%	b
				% NL loss	0.136%	c

Total peak 34 kV feeder and substation % loss	1.068%	d = a + b
Peak load (kW)	20,346	e
Peak loss (kW)	217	f = d * e
Total Energy 10/1/2006 -9/30/2007 (kWh)	80,549,127	g
Load factor	0.452	h
Average to peak loss factor	0.223	j
Load losses (kWh)	424,310	k = f * j * 8760
No-load losses (kWh)	242,859	l = c * e * 8760
Total losses (kWh)	667,169	m = k + l
Loss factor	**0.83%**	n = m / g

Energy Loss Factor

Loss Data from CYMDIST power flow simulation (peak)

12 kV Feeder	Load (kW)	Loss (kW)	% Loss
L21230	8,500	51	
L21231	6,800	32	
L21233	0	0	
	(a)	(b)	(c) = b/a
Feeder total	15,300	83	0.54%

Substation transformer load losses

Substation	Load (kW)	Loss (kW)	% Loss	loss at NP
TDC212-TR71	22,200	174		0.707%
TDC212-TR72	34,300	226		0.767%
TDC212-TR73	30,000	173		0.767%
TDC212-TR74	34,200	224		0.767%
	(d)	(e)	(f) = e/d	
TDC212 total	120,700	797	0.66%	

Total 12 kV peak loss 1.20% (g) = c + f

Winnteka peak loss 8/7/2007 hour 16

12 kV load	15,300	184	
138 kV load (C434)	19,000	0	
Total Winnetka	34,300	184	0.54% (h)

Substation no load loss allocation

Substation	Transf kVA	NL loss %	NL kW total
TDC212	140,000		
			(k)
Total	140,000	0.047%	66
			(l)=k*o/(d*p)
% of Winnetka 12kV average load			0.06%

TDC212 peak occurred on 8/7/07
Winnetka peak occurred on 8/28/07

ESS C434 load metered at 138 kV. Losses are insignificant.

	(o)
Winnetka peak load	35,154
	(p)
Average load	13,420
	(q)
Average load loss	32
	(r) =q/p
Average load loss % of load	**0.23%**
	(s) =l+r
Winnetka energy loss factor	**0.30%**

ATTORNEYS AT LAW
WRIGHT & TALISMAN, P.C.

ORIGINAL

Carrie L. Bumgarner
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June 29, 2007

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: PJM Interconnection, L.L.C., Docket No. ER07-1162-000

Dear Ms. Bose:

Pursuant to section 205 of the Federal Power Act ("FPA"), 16 U.S.C. §824d, PJM Interconnection, L.L.C. ("PJM") encloses for filing agreements for Network Integration Transmission Service ("NITSA") under the PJM Open Access Transmission Tariff ("PJM Tariff"), and submits notices of cancellation for two NITSAs that have been superseded. The new executed agreements are with the City of Batavia, the City of Naperville and the Illinois Municipal Electric Agency ("IMEA") on behalf of the City of St. Charles (collectively, the "Customers"). PJM is filing these NITSAs because, as explained more fully below, they contain non-standard terms and conditions. PJM requests that the enclosed NITSAs be accepted, effective June 1, 2007.

I. Description of Filing

A. Background

Each of the Cities of Batavia, Naperville and St. Charles previously took bundled transmission and wholesale distribution service from Commonwealth Edison Company ("ComEd") to import power for municipal customers. Additionally, each City notified ComEd of its intent to enter into a NITSA with PJM to receive transmission service from PJM, while continuing to receive wholesale distribution service from ComEd. While, under this arrangement, transmission related charges will be recovered pursuant to the PJM Tariff, there is no corresponding rate that will enable ComEd's prospective recovery of the relevant distribution costs associated with the Customers' use of ComEd's distribution facilities. Accordingly, these costs need to be recovered via an alternative rate mechanism. The Other Supporting Facilities Charge provision under section 7.5 of

provisions of the Customers' NITSAs are non-standard terms and conditions that are not specifically provided for in the form of NITSA in Attachment F of the PJM Tariff.

B. City of Batavia

The City of Batavia NITSA, designated as Original Service Agreement No. 1681, and filed herein, supersedes an earlier NITSA designated as Original Service Agreement No. 1041. Therefore, PJM submits a notice of cancellation in the form indicated by the Commission's regulations in 18 C.F.R. §§ 35.15, 131.53 for Original Service Agreement No. 1041. In accordance with Order No. 614,[1] PJM also includes a sheet designated as First Revised Service Agreement No. 1041 indicating the cancellation of Original Service Agreement No. 1041.

The City of Batavia is constructing a 138 kV facility to serve its own load. Until that construction is complete the City of Batavia and ComEd have agreed that the City of Batavia will continue to utilize ComEd's 34.5 kV distribution facility. During this time, ComEd will impose on the City of Batavia a wholesale distribution charge as more fully described in section 7.5 of the Specifications to the City of Batavia NITSA. That provision, which was negotiated and agreed to by the City of Batavia and ComEd, specifies that the City of Batavia will pay to ComEd a wholesale distribution charge of $101,000 per month in the event that the City of Batavia does not cut its load over to its own transmission facilities before June 1, 2007. The wholesale distribution charges will be assessed to the City of Batavia through September 30, 2007, or until the City of Batavia has achieved complete cutover to its 138 kV system, whichever occurs first. This charge will be billed by PJM, paid by the City of Batavia and credited to ComEd in accordance with procedures to be developed by ComEd, PJM and Batavia. In the event complete cutover is achieved prior to the end of any month, payment for that month will be prorated accordingly.

C. City of Naperville

The City of Naperville was party to a grandfathered, pre-Order No. 888 bundled Electric Service Contract with ComEd under which the City of Naperville was a full-requirements customer of ComEd. That agreement terminated on May 31, 2007, and on June 1, 2007 the City of Naperville began receiving service from a new supplier utilizing the PJM transmission system. The City of Naperville is interconnected to the PJM transmission system by means of certain ComEd distribution facilities. The City of Naperville NITSA, in section 7.5 of the Specifications, includes the rate mechanism (i.e., Other Supporting Facilities Charge) to recover those costs that previously had been recovered through the bundled Electric Service Contract. ComEd provided PJM with the cost support for this charge, which is attached to this transmittal letter as Attachment D. According to ComEd, the charge is calculated by applying the wholesale distribution rate

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[1] Designation of Electric Rate Schedule Sheets, Order No. 614, 1996-2000 FERC Stats. & Regs., Regs. Preambles ¶ 31,096 (2000).

on file for ComEd in the PJM Tariff[2] to the facilities directly assigned to the City of Naperville service. See Attachment D. That rate incorporates a Fixed Charge Rate of 24%, which is a weighted average carrying charge for the distribution facilities expected to be used in providing wholesale distribution service. Id. The local distribution facilities assigned to the City of Naperville service result in annual/monthly wholesale distribution charges of $702,489/$58,540.79. Id.

D. IMEA/City of St. Charles

The IMEA/City of St. Charles NITSA, designated as Original Service Agreement No. 1683, and filed herein, supersedes an earlier NITSA designated as Original Service Agreement No. 1042. Therefore, PJM submits a notice of cancellation in the form indicated by the Commission's regulations in 18 C.F.R. §§ 35.15, 131.53 for Original Service Agreement No. 1042. In accordance with Order No. 614, PJM also includes a sheet designated as First Revised Service Agreement No. 1042 indicating the cancellation of Original Service Agreement No. 1042.

The City of St. Charles was party to a grandfathered, pre-Order No. 888 bundled Electric Service Contract with ComEd under which the City of St. Charles was a full-requirements customer of ComEd part of the year, and a partial requirements customer the rest of the year. When ComEd was integrated into the PJM region, PJM became the transmission provider for ComEd's service territory. PJM subsequently submitted for filing Original Service Agreement No. 1042 with the City of St. Charles as the Transmission Customer. To accommodate continuation of the Electric Service Contract, specifically its nonconforming provisions allowing the City of St. Charles to elect to be a partial or full requirements customer, PJM included in Original Service Agreement No. 1042 a Network Service Agreement Addendum by and between ComEd and the City of St. Charles. The Electric Service Contract, and consequently Original Service Agreement No. 1042 and its Network Service Agreement Addendum, terminated on May 31, 2007.

As the new full-requirements supplier to the City of St. Charles, IMEA began providing service to the City of St. Charles, utilizing the PJM transmission system, on June 1, 2007. The City of St. Charles is interconnected to the PJM transmission system by means of certain ComEd distribution facilities. The IMEA/City of St. Charles NITSA, in section 7.5 of the Specifications, includes the rate mechanism (i.e., Other Supporting Facilities Charge) to recover those costs that previously had been recovered through the bundled Electric Service Contract. ComEd provided PJM with the cost support for this charge, which is attached to this transmittal letter as Attachment F. According to ComEd, the charge is calculated by applying the wholesale distribution rate on file for ComEd in the PJM Tariff to the facilities directly assigned to the City of St. Charles service. Id. That rate incorporates a Fixed Charge Rate of 24%, which is a weighted average carrying charge for the distribution facilities expected to be used in providing

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[2] See Commonwealth Edison Co., Letter Order, Docket No. ER06-1194-000 (August 15, 2006).

wholesale distribution service. Id. The local distribution facilities assigned to the City of St. Charles service result in annual/monthly wholesale distribution charges of $2,177,743/$181,479. Id.

The non-standard terms and conditions in these NITSAs are just and reasonable because it permits the City of Batavia, the City of Naperville and the IMEA/City of St. Charles to obtain necessary transmission service for the term of the agreement by utilizing the ComEd distribution facilities. Therefore, the Commission should accept these NITSAs for filing.

II. Effective Dates and Waiver

PJM requests that the enclosed NITSAs be accepted effective June 1, 2007. The parties to each NITSA have agreed to this effective date.

PJM requests waiver of the Commission's prior notice requirement (18 C.F.R. § 35.3) to permit such effective date. Waiver is appropriate for the Service Agreement as it is being filed within 30 days of the effective date and the customer agreed to the effective date. See Prior Notice Filing Requirements Under Part II of the Federal Power Act, 64 FERC ¶ 61,139, at 61,983-84 (1993); Central Hudson Gas & Electric Co., 60 FERC ¶ 61,106, at 61,339, reh'g denied, 61 FERC ¶ 61,089 (1992).

III. Documents Enclosed

PJM encloses the original and six copies of the following:

1. Transmittal Letter;
2. Attachment A: City of Batavia NITSA, Original Service Agreement No. 1681;
3. Attachment B: Notice of Cancellation of Original Service Agreement No. 1041;
4. Attachment C: City of Naperville NITSA, Original Service Agreement No. 1682;
5. Attachment D: ComEd Cost Support for City of Naperville NITSA, Calculation of Wholesale Distribution Charges and Distribution Loss Factor dated March 16, 2007;
6. Attachment E: IMEA/City of St. Charles NITSA, Original Service Agreement No. 1683;
7. Attachment F: ComEd Cost Support for City of St. Charles/IMEA NITSA, Calculation of Wholesale Distribution Charges and Distribution Loss Factor dated March 16, 2007; and
8. Attachment G: Notice of Cancellation of Original Service Agreement No. 1042.

IV. Service

A copy of this filing has been served upon each of the parties to the NITSAs and the state commissions in the PJM Region.

V. Communications

Correspondence and communications with respect to this filing should be sent to, and PJM requests the Secretary to include on the official service list, the following:

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Respectfully submitted,

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Counsel for
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Naperville Energy Loss Factor

City of Naperville - 2006 ComEd Distribution System Losses

8/1/2006 17:00

ESS/FDR	Location	kW	Type	Peak loss kW	NL loss kW
W600	Rt 59-Metra	154,728	138 kV	0	0
W600	Rt 59-Metra	114,324	138 kV	0	0
W8118	Swim Club; RT59 S OF CHAMPION DR	0	12 kV feeder	0	0
W0308	Danada Woods subdiv; 0.5 mi N/ Warrenville, W/S	94	12 kV feeder	3	0
W604	Meadows Sub; SS 75TH ST 1E GREE TRN	26,951	138 kV	0	0
W602	Springbrook - L1809	8,547	12 kV ESS	17	12
W601	Rt 59 & 95th - L0907	22,896	12 kV ESS	122	12
W601	Rt 59 & 95th - L1804	12,500	12 kV ESS	38	12
W602	Springbrook - L1804	17,539	12 kV ESS	72	12
W3914	Lincoln Park Apts; SS WRRNVILLE E WASH	0	12 kV feeder	0	0
W603	Royce Rd. - L1803	13,928	12 kV ESS	47	12
W603	Royce Rd. - L1809	17,541	12 kV ESS	91	12
	2006 138 kV radial losses per Cymdist analysis			16	
				a	b
	Total peak load losses (kW)			405	73

Naperville peak 30 min coincident load (kW)	389,049	c
Total Energy 1/1/2006 - 12/31/2006 (kWh)	1,492,880,557	d
Load factor	0.438	e = d / (8760 * c)
Average to peak loss ratio	0.205	d
Load losses kWh	725,471	e = a * d * 8760
No-load losses kWh	641,232	f = b * 8760
Total losses kWh	1,366,703	g = e + f
Loss factor	**0.09%**	h = g / d

Substation	Transformer	MVA	%Z @ 15 MVA	No load kW	kW loss @15 MVA	X/R
W601	75XA	15	8.95	12.1	52.5	25.6
W601	75XB	15	8.99	12.3	52.3	25.8
W602	72XA	15	9.02	12.1	52.3	25.9
W602	72XB	15	9.01	12.3	52.8	25.6
W603	65XA	15	8.91	12.4	54.0	24.7
W603	65XB	15	9.06	12.0	66.9	20.3

Average transformer loss factors - %NP (Naperville 15 MVA OA, 132-12.47 kV)

no load	0.081%
load	0.368%

Typical feeder losses

Feeder	Peak kW	Peak loss kW	% peak loss
W0308	8062	417	0.052
W3914	4875	59	0.012
W8118	7572	389	0.049
Naperville gr	20529	845	0.041
J3672	7137	163	0.023
J3673	7342	58	0.008
J3674	7222	172	0.024
J3675	5680	113	0.020
J3676	6745	167	0.025
J3677	7609	350	0.046
J3678	7218	299	0.041
J3679	6748	514	0.076
J3680	5928	114	0.019
J3681	6909	150	0.022
J3682	6873	222	0.032
J3683	5170	70	0.014
J3684	6247	244	0.039
J3685	7018	164	0.023
J3686	3260	48	0.015
J3687	6845	138	0.020
J3688	5855	551	0.094
J3689	1058	13	0.012
J3690	7166	185	0.026
J3691	7078	340	0.048
J3693	6869	224	0.033
Hillcrest group	131999	4299	0.033
Combined	152528	5144	0.034

City of St. Charles - 2006 ComEd distribution system losses

Circuit	8/1/2006 Peak kW	Loss kW	% load loss	
L13150	19,380	538	2.775%	
L13154	21,700	369	1.700%	
L13155	28,000	379	1.354%	
L13156	27,600	673	2.438%	
L13159	17,400	143	0.822%	
L56931	29,675	1,781	6.002%	
L57736	31,900	1,205	3.777%	
L7962	17,700	694	3.921%	
Total 34 kV circuits	193,365	5,782	2.990%	a

Circuit peak loss calculated by Cymdist using 2006 peak load and configuration

Average ComEd transformer losses at FA nameplate

	132-35.5 kV
NL loss %	0.086%
FL loss %	0.465%

Substation	TR	NP MVA	8/1/2006 Peak MW	Loss kW	% load loss	
TDC569	77	60	29.1	65.6		
TDC577	77	60	34.6	92.8		
TDC577	78	60	29.7	68.4		
TSS131	76	40	37.5	163.5		
TSS131	77	40	35.8	149.0		
TSS131	78	40	34	134.4		
TSS131	79	40	34.3	136.8		
TSS79	76	40	28.7	95.8		
TSS79	77	40	31.4	114.6		
TSS79	78	60	40.7	128.4		
Total 138-34 kV trsf		480	335.8	1149.1	0.342%	b
				% NL loss	0.123%	c

Total peak 34 kV feeder and substation % loss	3.332%	d = a + b
Peak load (kW)	133,191	e
Peak loss (kW)	4,438	f = d * e
Total Energy 1/1/2006 -12/31/2006 (kWh)	559,293,092	g
Load factor	0.479	h
Average to peak loss factor	0.243	j
Load losses (kWh)	9,430,004	k = f * j * 8760
No-load losses (kWh)	1,434,293	l = c * e * 8760
Total losses (kWh)	10,864,297	m = k + l
Loss factor	**1.94%**	n = m / g

Illinois Youth Center supplied from St. Charles Peck Rd. substation

ComEd Ex. 8.3 Revised

Appendix D

2009 Loss Factors - Element Loss Parameters

Element losses at nameplate load for transformers or at system peak for lines

Element (#)	Element Description	Core loss%	I^2 R loss%	Base MVA	Loss Code (See Note 1)
1	HV ESS	0.2	0.8	3,575	2
2	138-69 TSS	0.2	0.6	2,122	1
3	138-34 TSS	0.2	0.7	6,123	1
4	34KV LINES	0	3	3,637	1
5	34-12KV DC	0.2	0.8	3,915	1
6	34-4KV DC	0.3	0.8	1,167	1
7	34KV ESS	0.3	0.8	2,619	2
8	138/69-12 TDC	0.2	1	22,733	1
9	12KV LINES	0	1.8	2,257	1
10	12KV FDR	0	4	11,755	1
11	12-4KV DC	0.3	0.8	1,085	1
12	12KV ESS	0.3	0.8	16,344	2
13	ACNW FDR	0	0.8	359	1
14	ACNW TRANF	0.3	1	2,143	1
15	ACNW SEC	0	0.5	359	1
16	4KV FDR	0	5	1,093	1
17	LINE TRANF	0.4	1.4	33,024	2
18	480V DRYTR	0.7	1.4	528	2
19	SECONDARY	0	2	9,061	1
20	Transmission	0.2	1.9	27,950	1

Note 1: Loss Code – I^2 R loss proportional to:

1. square of the sum of the load
2. sum of the squares of the load

ICC Docket No. 10-0467

Commonwealth Edison Company's Response to
The U.S. Department of Energy ("DOE") Data Requests
DOE 2.01 – 2.33
Date Received: September 22, 2010
Date Served: October 12, 2010

REQUEST NO. DOE 2.08:

Re: ComEd Ex. 8.3 Revised, p. 9, Appendix D.

a. Please provide all calculations, including reports, studies, and work papers, used to produce the figures shown in the first row, labeled "HV ESS", of this table in electronic format with formulas intact.

b. Please provide all calculations, including reports, studies, and work papers, used to produce the figures shown in the second row, labeled "138-69 TSS", of this table in electronic format with formulas intact.

RESPONSE:

a. The calculations used to produce the figures in the first row, labeled "HV ESS" of Appendix D are contained in the attachment to ComEd's Response to Staff Data Request PL 2.05 labeled as PL 2.05_Attach 1.

b. The calculations used to produce the figures in the second row, labeled "138-69 TSS" of Appendix D are contained in the attachment to ComEd's Response to Staff Data Request PL 2.05 labeled as PL 2.05_Attach 1.

Commonwealth Edison Company

Class profiles grossed up to include Free Service and ComEd company Use

Element losses at nameplate load for transformers or at system peak for lines

System Element	NP MVA	Core loss%	I2R loss%	basemva	Loss Code	Code type	I2R loss proportional to:
HV ESS	3575	0.2	0.8	3575	2		1 square of the sum of the load
138-69 TSS	2122	0.2	0.6	2122	1		2 sum of the squares of the load
138-34 TSS	6123	0.2	0.7	6123	1		
34KV LINES	0	0	3	3637	1		
34-12KV DC	3915	0.2	0.8	3915	1		
34-4KV DC	1167	0.3	0.8	1167	1		
34KV ESS	2619	0.3	0.8	2619	2		
138/69-12 TDC	22733	0.2	1	22733	1		
12KV LINES	0	0	1.8	2257	1		
12KV FDR	0	0	4	11755	1		
12-4KV DC	1085	0.3	0.8	1085	1		
12KV ESS	16344	0.3	0.8	16344	2		
ACNW FDR	0	0	0.8	359	1		
ACNW TRANF	2143	0.3	1	2143	1		
ACNW SEC	0	0	0.5	359	1		
4KV FDR	0	0	5	1093	1		
LINE TRANF	33024	0.4	1.4	33024	2		
480V DRYTR	528	0.7	1.4	528	2		
SEC / SERVICE	0	0	2	9061	1		
BULK PWR	27950	0.2	1.9	27950	1		

Percent of Class Load Through System Elements

	System Element	SF	MF	SF_SH	MF_SH	WH	0-100 kW	100-400 kW	400-1,000 kW	> 1-10 MW	> 10 MW	HV >= 69 kV	Railroad	D-D Lighting	Gen Lighting	Muni
A	HV ESS	0	0	0	0	0	0	0	0	0	0	100	0	0	0	13
B	138-69 TSS	4	4	4	4	4	4	4	4	4	4	6	5	4	4	0
C	138-34 TSS	17	16	17	16	17	17	20	20	25	25	0	3	17	17	34
D	34KV LINES	17	16	17	16	17	17	20	20	25	25	0	3	17	17	34
E	34-12KV DC	13	13	12	13	13	13	10	6	0	0	0	3	13	13	0
F	34-4KV DC	4	3	5	3	4	4	5	1	0	0	0	0	4	4	0
G	34KV ESS	0	0	0	0	0	0	5	13	25	25	0	0	0	0	5
H	138/69-12 TDC	83	84	83	84	83	83	80	80	75	75	0	97	83	83	0
I	12KV LINES	5	5	5	5	5	7	8	11	35	35	0	85	10	10	0
J	12KV FDR	78	77	78	77	73	71	67	64	40	40	0	12	71	71	0
K	12-4KV DC	5	5	5	5	5	5	3	0	0	0	0	0	5	5	0
L	12KV ESS	0	0	0	0	0	0	10	25	75	75	0	0	0	0	0
M	ACNW FDR	0	2	0	2	5	5	5	5	0	0	0	0	2	2	0

ICC Docket No. 10-0467

Commonwealth Edison Company's Response to
The U.S. Department of Energy ("DOE") Data Requests
DOE 2.01 – 2.33
Date Received: September 22, 2010
Date Served: November 12, 2010

REQUEST NO. DOE 2.08:

Re: ComEd Ex. 8.3 Revised, p. 9, Appendix D.

a. Please provide all calculations, including reports, studies, and work papers, used to produce the figures shown in the first row, labeled "HV ESS", of this table in electronic format with formulas intact.

b. Please provide all calculations, including reports, studies, and work papers, used to produce the figures shown in the second row, labeled "138-69 TSS", of this table in electronic format with formulas intact.

SUPPLEMENTAL RESPONSE:

a. The value for Core Loss%, I^2R Loss% for the equipment category "HV ESS" was obtained from the average value of core losses and load losses from those transformer manufacturer test reports that were readily available. The Base MVA value is the sum of the full capacity nameplate MVA ratings (ratings with all available fans and pumps in service) of the transformers used to supply customers in this class that are on the utility side of revenue meters. Core Loss% is equal to the reported MW of losses at zero load divided by the nameplate MVA rating of the transformer. The I^2R Loss% is equal to the additional losses when load is applied to the transformer divided by the nameplate rating of the transformer. For those transformers that had load losses reported at a level other than the full capacity nameplate MVA rating, the reported losses were multiplied by the square of the ratio of the full MVA rating divided by the MVA loading at which the losses were measured. The calculations for the transformers in this category are contained in the attachment DOE 2.08 SUPP_Attach 1.

b. The value for Core Loss%, I^2R Loss% for the equipment category "138-69 TSS" was obtained from the average value of core losses and load losses from those transformer manufacturer test reports that were readily available. The Base MVA value is the sum of the full capacity nameplate MVA ratings (ratings with all available fans and pumps in service) of all transformers in this category. Core Loss% is equal to the reported MW of losses at zero load divided by the nameplate MVA rating of the transformer. The I^2R Loss% is equal to the additional losses when load is applied to the transformer divided by the nameplate rating of the transformer. For those transformers that had load losses reported at a level other than the full capacity nameplate MVA rating, the reported losses were multiplied by the square of the ratio of the full MVA rating divided by the MVA loading at which the losses were measured. The calculations for the transformers in this category are contained in the attachment DOE 2.08 SUPP_Attach 2.

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DOE 2.08 SUPP_Attach 1
ESS

Location	T Diag	MFG	S.N.	kV	NP MVA	NL kW loss	% NL NP	FL kW loss	% FL NP	%Z@ NP	X/R
A429-71	00-137	DS		132-13.2Y	40	15.5	0.039%	278.9	0.697%	24.5	35.1
A429-72	01-128	WES		132-13.2Y	40	n/a					
A429-73	01-137	WES		132-13.2Y	40	23.4	0.059%	330.8	0.827%	26.1	31.6
A429-74	01-128	WES		132-13.2Y	40	n/a					
A431-1-71	93-128	MTEK		132-13.2Y	50	n/a					
A431-1-72	92-135	MTEK		132-13.2Y	50	12.8	0.026%	391.7	0.783%	21.0	26.7
A431-2-71	73-51	FPE		132-13.2Y	20	22	0.110%	124.7	0.624%	13.2	21.2
A431-2-72	73-51	FPE		132-13.2Y	20	22	0.110%	124.7	0.624%	13.2	21.2
A450-76	67-03	WAG		132Y-35.5Y	33	n/a					
A450-77	63-82	W		132-35.5	33	n/a					
B200		customer		138-13.8Y							
B427-71	63-83	W		132-2.4Y	9.375	n/a					
B427-72	68-35	FERR		132-2.4Y	9.375	n/a					
B427-73	75-65	W		132-2.4Y	9.375	14.2	0.151%	73.3	0.782%	9.8	12.5
B465-71	95-129	WES		132-13.2Y	33.3	14.9	0.045%	177.5	0.533%	17.8	33.4
B465-72	74-12	AC		132-13.2Y	33.3	22.9	0.069%	207.5	0.623%	17.2	27.5
C434		customer		132-13.2Y	33.3						
D467-71	74-50	AC		132-13.2Y	33.3	23.4	0.070%	206.6	0.621%	17.5	28.2
D467-72	74-50	AC		132-13.2Y	33.3	23.7	0.071%	201.7	0.606%	17.3	28.6
D522-61	54-17	AC		66-12.6Y	25	30.4	0.122%	133.7	0.535%	10.6	19.7
D522-62	80-28	RTE-ASEA	F33	66-12.6Y	26.7	17.6	0.066%	118.3	0.443%	14.2	31.9
D775-71	83-127	FERR		132-13.2Y	50	31.8	0.064%	316.7	0.633%	17.3	27.4
D775-73	83-127	FERR		132-13.2Y	50	32.4	0.065%	304.2	0.608%	17.3	28.5
D787-71											
D787-72											
D787-73											
D779-71	83-128	KUH		132-13.2Y	50	n/a					
D779-72	80-128	RTE-ASEA		132-13.2Y	50	n/a					
D779-73	80-128	RTE-ASEA		132-13.2Y	50	n/a					
F303-72	76-26	KUH		132-13.2Y	25	25.9	0.104%	133.6	0.534%	13.4	25.0
F303-73	89-129	ABB	A0908T	132-13.2Y	25	13.6	0.054%	147.2	0.589%	13.6	23.1
F375-71	97-141	WES		132-13.2Y	40	16.8	0.042%	176.9	0.442%	18.0	40.7
F375-72	97-141	WES		132-13.2Y	40	17.1	0.043%	175.8	0.440%	17.9	40.6
F387		customer			25						
G311		customer									
G385-1-1	57-53	W		132-13.2Y	20	36.5	0.183%	130.7	0.653%	11.2	17.1
G385-1-2	69-09	FPE	F33	132-13.2Y	26.7	n/a					
G385-2-76	95-128	SMIT		132Y-35.5Y	60	39.4	0.066%	174.7	0.291%	11.4	39.1
G385-2-77	95-128	SMIT		132Y-35.5Y	60	38.8	0.065%	174.1	0.290%	11.4	39.3
G385-2-78				132Y-35.5Y	60						
G394-71	88-130	ABB		132-13.2Y	33.3	n/a					
G394-72	88-130	ABB		132-13.2Y	33.3	n/a					
H471-81	70 29	W		330Y-35.5	300	230.3	0.077%	967.3	0.322%	18.7	58.0
H471-83	89-134	ABB		330Y-35.5	300	121.9	0.041%	964.6	0.322%	18.4	57.2
H71		customer	pri meter								
J305-71	75-8	FERR		132-13.8Y	50	40	0.080%	285.3	0.571%	16.7	29.2
J305-72	75-8	FERR		132-13.8Y	50	38	0.076%	288.8	0.578%	16.7	28.8
J307-72	69-24	WAG	F33	132-13.2Y	26.7	n/a					
J307-73	96-131	WES	A2684T	132-13.2Y	66.7	36.9	0.055%	339.8	0.509%	10.4	20.3
J310-1		customer									
J310-2		customer									
J310-3		customer									
J310-4		customer									
J310-5		customer									
J310-6		customer									
J310-7		customer									
J310-8		customer									

ICC Dkt. No. 10-0467
DOE 2.08 SUPP_Attach 1
ESS

Location	T Diag	MFG	S.N.	kV	NP MVA	NL kW loss	% NL NP	FL kW loss	% FL NP	%Z@ NP	X/R
J322-1	90-126	GE		138Y-6.9Y	30	30	0.100%	166.7	0.556%	10.0	18.0
J322-2	90-126	GE		138Y-6.9Y	30	30	0.100%	166.7	0.556%	10.0	18.0
J326-71	80-127	KUH		132-13.2Y	33.3	n/a					
J326-72	80-127	KUH		132-13.2Y	33.3	n/a					
J332-1-71	68-47	FERR		132-13.2Y	50	n/a					
J332-1-72	68-47	FERR		132-13.2Y	50	n/a					
J332-1-73	02-135	WES		132-13.2Y	50						
J332-1-74	02-135	WES		132-13.2Y	50						
J332-2-71	69-13	FPE		132-13.2Y	16.7	n/a					
J332-2-72	69-13	FPE		132-13.2Y	16.7	n/a					
J339		customer	pri meter								
J370-71	96-129	WES	A2574T	132-13.2Y	20	12.1	0.061%	66.0	0.330%	13.5	41.0
J370-72	96-129	WES	A2575T	132-13.2Y	20	12.1	0.061%	64.8	0.324%	13.6	42.0
J371-71	89-129	MTEK	A0909T	132-13.2Y	25	13.5	0.054%	146.1	0.584%	13.7	23.4
J371-72	89-129	MTEK	A0910T	132-13.2Y	25	13.4	0.054%	146.7	0.587%	13.6	23.2
J375		customer	138kV metered								
J390-76	06-	WES		132Y-35.5Y	40						
J390-77	68-11	W	7001146	132Y-35.5Y	60	71.5	0.119%	262.8	0.438%	12.2	27.9
J390-78	68-11	W	7001147	132Y-35.5Y	60	69.5	0.116%	272.8	0.455%	12.6	27.6
J390-79	06-	WES		132Y-35.5Y	40						
J401		customer									
K319-1-71	61-103	PEN		132-13.2Y	10						
K319-1-72	61-103	PEN		132-13.2Y	10						
K319-2-71	88-135	ABB	A0800T	132-13.2Y	50	19	0.038%	293.9	0.588%	17.9	30.5
K319-2-72	88-135	ABB	A0801T	132-13.2Y	50	19.5	0.039%	292.5	0.585%	17.9	30.6
K319-2-73	88-135	ABB	A0802T	132-13.2Y	50	20.8	0.042%	293.1	0.586%	17.8	30.3
K320-1				132-.48	2.5						
R401-61	70-40	W		66-13.2Y		n/a					
R401-62	70-40	W		66-13.2Y		n/a					
W407-82		customer									
W407-83		customer									
W407-83A		customer									
W407-84		customer									
W407-85		customer									
W407-86		customer									
W407-87		customer									
W407-88		customer									
W502		customer		138-34	45						
W503		customer		138-34	90						
W507-71	66-94	FPE		132-13.2Y	25	n/a					
W507-72	66-94	FPE		132-13.2Y	25	n/a					
X646-71	66-44	WAG		132-13.2Y	30						
Y652		customer	pri meter								
Z100-71	73-50	W	39071	132-13.2Y	50	32.1	0.064%	289.2	0.578%	18.1	31.3
Z100-72	73-50	W	39072	132-13.2Y	50	36.5	0.073%	281.7	0.563%	18.1	32.0
Z494-72	69-20	FPE	20654-2	132-6.9Y	75	73	0.097%	365.8	0.488%	14.3	29.2
Z494-74	69-20	FPE		132-6.9Y	75	73	0.097%	365.8	0.488%	14.3	29.2
Z524-71	84-126	RTE-ASEA	A6636	132-13.2Y	40	22	0.055%	264.7	0.662%	18.2	27.4
Z524-72	81-28	ME	F40	132-13.2Y	32	24.6	0.077%	107.7	0.337%	13.3	39.6
Z524-73	81-28	ME	F40	132-13.2Y	32	24.2	0.076%	108.4	0.339%	13.3	39.2
Z524-74	84-126	RTE-ASEA	F50	132-13.2Y	40	22	0.055%	264.7	0.662%	18.2	27.4
Z715-2	67-59	WAG		132-13.2Y	16.7						
Z715-3	60-86	W	F33	132-13.8Y	20						
				Total	3572.225						
				Average			0.076%		0.559%		30.9

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Location	T Diag	MFG	S.N.	kV	NP MVA	NL kW loss	% NL NP	FL kW loss	% FL NP	%Z@ NP	X/R
TSS90-77	01-132	SMIT	220672	132Y-69Y	200	90	0.045%	666	0.333%	15.3	
TSS90-76	02-133	SMIT	220726	132Y-69Y	200	88.8	0.044%	666	0.333%	15.3	
TSS192-71	51-8	AC	1-0104-229	132Y-69Y	200	252.3	0.126%	975	0.488%	15.6	32.0
TSS160-76	56-252	MOL	917930	138/69Y	50	n/a					
TSS45-78	60-92; 51-8; 51-8	PEN;AC		132Y-69Y	200	189	0.095%	1116	0.558%	15.8	28.3
TSS45-77	60-92A; 51-8; 53-71	PEN;AC		132Y-69Y	200	183.9	0.092%	1098	0.549%	15.7	28.6
TSS163-77	65-89	GE	D573312	138/69Y	50	n/a					
TSS194-76	67-133	W	7001274	138/69Y	55	40.8	0.074%	126	0.229%	6.2	27.2
TSS194-79	67-133	W	7001273	138/69Y	55	41	0.075%	123	0.223%	6.1	27.1
TSS192-72	79-128	GE		132Y-69Y	200	132.3	0.066%	1022	0.511%	14.8	28.9
TSS150-76	79-130	GE	L 252598B	138/69Y	32	20.6	0.064%	62	0.193%	5.5	28.3
TSS150-77	79-130	GE	L 252598A	138/69Y	32	21.1	0.066%	65	0.204%	5.6	27.4
TSS150-78	79-130	GE	L 252598C	138/69Y	32	20.6	0.064%	64	0.201%	5.6	27.8
TSS45-76	92-136	ELIN		132Y-69Y	200	81.3	0.041%	864	0.432%	15.8	36.6
TSS192-74	97-126	SMIT		132Y-69Y	200	94.8	0.047%	669	0.334%	15.4	45.9
TSS45-79	97-126 00-135 00-135	SMIT		132Y-69Y	200	94.8	0.047%	669	0.334%	15.4	45.9
				Total	2106						
				Average			0.079%		0.388%		28.6