790 Buchanan Street
Amarillo, TX 79101

January 30, 2019

VIA ELECTRONIC FILING

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: Public Service Company of Colorado
Southwestern Public Service Company
Xcel Energy Operating Companies Joint Open Access Transmission Tariff
Revisions to Wholesale Real Power Losses for Southwestern Public Service Company
Docket No. ER19-____-000

Dear Secretary Bose:

Pursuant to Section 205 of the Federal Power Act ("FPA"),[1] Part 35 of the regulations of the Federal Energy Regulatory Commission ("FERC" or "Commission"),[2] and Order No. 714,[3] Public Service Company of Colorado ("PSCo"),[4] on behalf of Southwestern Public Service Company ("SPS"), hereby submits eTariff records revising Sections 15.7 and 28.5 of the Xcel Energy Operating Companies Open Access Transmission Tariff ("Xcel Energy Tariff" or "Tariff").[5] The revisions update the stated real power loss percentages ("loss factors") for service on the SPS system so they (i) are based on the most recent study of SPS system losses, and (ii) are consistent with the loss factors approved for and reflected in SPS's retail rates in Texas and New Mexico.

SPS respectfully requests that the Commission accept the proposed tariff revisions for filing effective April 1, 2019, sixty (60) days after filing, without suspension.

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1 16 U.S.C. § 824d.

2 18 C.F.R. § 35.13 (2018).

3 *Electronic Tariff Filings*, FERC Stats. & Regs. ¶ 31,276 (2008).

4 PSCo is the designated eTariff filing entity for the Xcel Energy OATT consistent with the requirements of Order No. 714. PSCo is a party to this filing solely as the eTariff filing entity.

5 Xcel Energy Operating Companies, FERC Electric Tariff, Third Revised Volume No. 1.

I. BACKGROUND

SPS is a New Mexico corporation and a wholly owned subsidiary of Xcel Energy Inc. ("Xcel Energy"). SPS is an operating utility engaged in, *inter alia*, the generation, purchase, transmission, distribution and sale of electricity to approximately 390,000 retail customers in portions of Texas and New Mexico. SPS also sells electric power and provides transmission service at wholesale to other utilities and electric cooperatives in Texas, New Mexico, Kansas, and Oklahoma.

SPS is a transmission-owning member of the Southwest Power Pool, Inc. ("SPP"), a FERC-approved Regional Transmission Organization ("RTO"). Transmission service over the SPS transmission system has been available under the SPP Open Access Transmission Tariff ("SPP Tariff") since June 2000.

Xcel Energy Services Inc. ("XES") is the centralized service company subsidiary of Xcel Energy and, as such, performs an array of administrative and general services on behalf of the Xcel Energy Operating Companies.[6] Among other things, XES submits filings with and appears in proceedings before the Commission on behalf of SPS.

II. REASONS FOR THIS FILING

A. Updated Transmission and Distribution Loss Study.

The primary reason for this filing is to ensure that the transmission and distribution real power losses charged to SPS's wholesale customers reflect the most recent analysis of the losses SPS experiences in providing such services and are consistent with the loss factors reflected in SPS's retail rates in Texas and New Mexico. As discussed further by SPS Witness Mr. Wesley L. Berger, the existing Transmission and Distribution System – Primary Voltage real power loss factors set out in the Xcel Energy Tariff applicable to SPS were accepted effective May 1, 2016, Docket No. ER16-1030-000.[7] The real power loss factors established in that docket were based on a loss study that analyzed data for the period from July 2012 through June 2013 (the "2013 Loss Study").

The updated real power loss factors contained in this filing are based upon the most recent SPS loss study, completed in 2017 for the period of January 2016 through December 2016 (the "2016 Loss Study"). The 2016 Loss Study uses the same methodology as the 2013 Loss Study, with minor enhancements discussed by SPS Witness Mr. Duane J. Ripperger, and was accepted by the retail regulatory agencies with jurisdiction over SPS in 2018: the Public Utility Commission of Texas ("PUCT") and the New Mexico Public Regulation Commission

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6 The Xcel Energy Operating Companies are: SPS, PSCo, and Northern States Power Company, a Minnesota corporation, and Northern States Power Company, a Wisconsin corporation (collectively, the "NSP Companies"). The instant filing does not affect the rates for transmission service on the PSCo or NSP Companies' systems.

7 *Public Service Company of Colorado*, Docket No. ER16-1030-000, delegated letter order (April 28, 2016).

("NMPRC").[8] SPS then began to prepare this filing to similarly update the loss factors used in calculating wholesale rates.

As discussed more fully by Mr. Ripperger, the 2016 Loss Study quantifies, through engineering analysis and calculations, the physical power and energy losses that occurred on the SPS transmission and distribution system during the study period. The 2016 Loss Study reflects the impacts of changes to the SPS system since the 2013 Loss Study, including initiation of the SPP Integrated Marketplace, installation of new 345 kV transmission facilities, and increased wind and solar generation, including generation connected to the SPS distribution system.[9] Implementing the updated loss factors in the Xcel Energy Tariff will provide for consistent allocations of costs between the three SPS rate jurisdictions: FERC wholesale, Texas retail, and New Mexico retail.

B. Summary of Current and Proposed Real Power Loss Factors.

The real power demand and energy loss factors for service on the SPS transmission system ("Transmission Loss Factors") are stated as percentage values in Sections 15.7 and 28.5 of the Xcel Energy Tariff and incorporated into Attachment M, Appendix 1 of the SPP Tariff. The real power demand and energy loss factors for service on the SPS distribution system ("Distribution Loss Factors"), applicable to those SPS wholesale customers taking service at primary distribution voltage, are also stated in Sections 15.7 and 28.5 of the Xcel Energy Tariff. As discussed by Mr. Berger, the transmission loss factors total two transmission level loss factors described in the 2016 Loss Study into a composite transmission loss factor for the Xcel Energy Tariff and the SPP Tariff.[10]

As noted, the currently effective Transmission Loss Factors and Distribution Loss Factors accepted in Docket No. ER16-1030-000 were based on the 2013 Loss Study.[11] In this filing, SPS proposes to update the Transmission Loss Factors and Distribution Loss Factors with the values derived from the 2016 SPS Loss Study and accepted by the PUCT and NMPRC. The following table shows SPS's currently effective and proposed loss demand and energy factors:

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8 *See In the Matter of Southwestern Public Service Company's Application for Revision of its Retail Electric Rates Pursuant to Advice Notice No. 272*, NMPRC Case No. 17-00255-UT, Final Order Adopting Recommended Decision (September 5, 2018); and *Application of Southwestern Public Service Company for Authority to Change Rates*, PUCT Docket No. 47527, Final Order (December 10, 2018).

9 Direct Testimony of Duane J. Ripperger, Exhibit No. SPS-0004 at PP. 15-17.

10 Direct Testimony of Wesley L. Berger ("Berger Direct Testimony), Exhibit No. SPS-0001 at P. 10.

11 *See* fn. 8. The 2013 Loss Study used the same methodology (with certain enhancements) that had been used by SPS in a 2009 Loss Study that supported SPS's updated loss factors accepted effective December 1, 2012, pursuant to a Commission-approved uncontested settlement in Docket No. ER12-1682-000. *See Public Service Company of Colorado*, 142 FERC ¶ 61,099 (2013).

Table 1 – Current and Proposed Loss Factors

	Demand Loss Factors		Energy Loss Factors	
	Current	Proposed	Current	Proposed
Transmission	3.107161%	2.738606%	2.881556%	3.203203%
Distribution – Primary Voltage	8.157751%	8.846390%	6.035731%	6.327826%

C. Impact of Proposed Tariff Revisions on Wholesale Customers.

The proposed updated Transmission and Distribution Loss Factors affect network transmission service customers in SPP Zone 11 who purchase transmission service under the SPP Tariff as well as wholesale production service customers who purchase power from SPS under wholesale requirements power sale agreements at the transmission and distribution level.[12] The Tariff revisions will affect the calculations of billing demands for both network transmission service under the SPP Tariff and wholesale production services provided by SPS. Specifically, the updated loss factors affect these wholesale power supply services because the loss factors are included in the calculation of how much energy each wholesale customer is purchasing under its power supply agreement.[13] Therefore, although this filing is not amending these power supply agreements, the updated real power loss factors will affect the calculation of charges pursuant to the power supply agreements' existing terms.

Initially, SPS estimates the updated loss factors together will result in a net decrease in the overall annual costs to wholesale customers of approximately $230,700, or approximately 0.07 percent.[14] The overall charges to network transmission service customers under the SPP Tariff in Zone 11 (the SPS zone) will be reduced due to the reduction in the transmission Demand Loss Factor. The impact of the revised real power loss factors on wholesale production customers is a small annual cost increase. Exhibit No. SPS-0003 calculates the estimated impact by SPS wholesale customer using the revised loss factors applied to 2018 billings.[15]

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[12] The affected wholesale transmission service customers in Zone 11 are: Golden Spread Electric Cooperative, Inc. (for itself and Tri-County Electric Cooperative, Inc.); Farmers' Electric Cooperative, Inc.; Lea County Electric Cooperative, Inc.; Central Valley Electric Cooperative, Inc.; Roosevelt County Electric Cooperative, Inc.; and West Texas Municipal Power Agency. All of these network transmission service customers also purchase power from SPS pursuant to Commission-approved cost-based wholesale requirements power supply sale agreements. Golden Spread purchases wholesale requirements power only for its Tri-County Electric Cooperative, Inc. member load.

[13] For example, see the Replacement Power Sales Agreement between SPS and Central Valley Electric Cooperative dated January 15, 2010, SPS Electric Rate Schedule 114, Service Schedule A, Sections 3, 4, 5, and 6.

[14] *See* Exhibit No. SPS-0003.

[15] Berger Direct Testimony, Exhibit No. SPS-0001 at P. 14. The net impact to each wholesale customer is an estimated cost reduction, with the exception of Central Valley Electric Cooperative, Inc. ("Central Valley"). Central Valley is estimated to see a small total cost increase – approximately $6800 compared to

Notably, the proposed Tariff revisions will not affect the collection of energy losses for transmission services under the SPP Tariff. Under Section II.(b) of Attachment M to the SPP OATT, energy losses are determined by the SPP regional system dispatch and included in the locational marginal prices charged to market participants, including SPS and network customers on the SPS system. The revised Energy loss factors affect only the allocation of SPS system energy costs between SPS wholesale production and retail customers.

D. Stakeholder Communications

In addition to being stated in the Xcel Energy Tariff, the SPS Transmission Demand loss factor is included in Attachment M (Loss Compensation Procedure), Appendix 1, to the SPP Tariff. SPS will work with SPP to file to modify Attachment M, Appendix 1 to the SPP Tariff to reflect the updated SPS transmission demand loss factors for purposes of calculating monthly billing determinants for the wholesale loads taking network service in the SPS rate zone (Zone 11).[16] SPS discussed the need for this revision to Attachment M, Appendix 1 with SPP, and SPP has indicated it expects to submit companion changes to the SPP Tariff shortly after SPS submits this filing, to be effective on the same effective date approved by the Commission in this proceeding.

Prior to submitting this filing, on January 18, 2019, SPS also provided information to its wholesale transmission and production customers to notify them of the proposed changes to the SPS real power losses factors and the anticipated financial impact to each affected wholesale customer, and offered to hold individual meetings with each wholesale customer.[17]

E. The Tariff Revisions Should be Accepted for Filing

For the reasons stated above, SPS requests that the Commission accept the proposed changes to Sections 15.7 and 28.5 of the Xcel Energy Tariff for filing, to be subsequently incorporated into Attachment M, Appendix 1 of the SPP Tariff. The proposed revisions are further explained in the attached Testimonies and Exhibits of Mr. Wesley L. Berger and Mr. Duane J. Ripperger in support of the instant filing, including the 2016 Loss Study included as Exhibit No. SPS-0005 to Mr. Ripperger's testimony. As noted, the 2016 Loss Study uses the same basic methodology used in the 2013 Loss Study supporting SPS's currently effective real power loss factors in Sections 15.7 and 28.5, with certain refinements discussed by Mr. Ripperger.

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total transmission service and production service billings of $29.97 million – because of the high load factor at which Central Valley purchases energy from SPS. *Id.* at P. 15.

[16] Berger Direct Testimony, Exhibit SPS-0001 at P. 6. Attachment M, Appendix 1 refers to a Delivery Loss Factor ("DLF") and an Injection Loss Factor ("ILF"). The ILF equals the SPS Demand Loss factor stated in Section 15.7 and 28.5. The DLF is calculated as 1/(1-ILF)-1. So an SPS transmission demand real power loss factor (ILF) of 2.738606% would result in an SPP DLF of 2.8115717%. *Id*. at PP. 12-13.

[17] Berger Direct Testimony, Exhibit SPS-0001 at P. 15.

III. ADDITIONAL INFORMATION SUBMITTED IN SUPPORT OF FILING

A. Information Required by Section 35.13 of the Commission's Regulations, 18 C.F.R. § 35.13

1. Contents of Filing – Section 35.13(b)(1)

In addition to this transmittal letter, the filing consists of the following:

- Electronic marked and clean versions of Sections 15 and 28 of the Xcel Energy Tariff in eTariff format, including the revisions to Section 15.7 and 28.5;
- the testimony, exhibits and affidavit of Mr. Wesley L. Berger (Exhibit Nos. SPS-0001, SPS-0002, and SPS-0003); and
- the testimony, exhibit and affidavit of Mr. Duane J. Ripperger (Exhibit Nos. SPS-0004 and SPS-0005), including the 2016 Loss Study.

B. Requested Effective Date – Section 35.13(b)(2)

SPS respectfully requests that the Commission allow the proposed revised Tariff revisions to be effective April 1, 2019, sixty (60) days after filing, without suspension or condition for good cause shown. As noted, the transmission Demand Loss change will result in a small reduction in fixed charges to network transmission service customers (due to lower billing determinants after adjusting for transmission demand losses), and overall the proposed loss factors result in a net cost decrease to SPS wholesale customers of approximately $230,700 annually.[18] The revised real power loss factors reflect the most current SPS system loss study available, and will provide for consistent cost allocations between the three SPS rate jurisdictions (FERC wholesale, Texas retail and New Mexico retail).

If the Commission nonetheless believes a suspension is warranted, SPS respectfully asks that the Commission allow the proposed revised tariff provisions to become effective April 1, 2019, subject to refund, after only a nominal suspension. In *West Texas Utilities Co.*, the Commission explained that a minimal suspension period is justified in cases where no more than ten percent of the proposed increase appears to be excessive.[19] The overall rate change proposed here is negligible (-0.072 percent), and no portion of the minimal change in charges is excessive.

SPS believes the materials submitted herewith comply with the Commission's filing requirements and will permit the Commission to review the proposed revisions and determine them to be just and reasonable. SPS respectfully requests waiver of any applicable filing or notice requirements under the Commission's Rules and Regulations as may be necessary to accept the proposed revisions to the Xcel Energy Tariff on the date requested.

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[18] *See* Exhibit No. SPS-0003.

[19] *West Texas Utilities Co.*, 18 FERC ¶ 61,189, at 61,375 (1982).

1. The Names and Addresses of Persons to Whom a Copy of the Rate Change Has Been Posted – Section 35.13(b)(3)

An electronic notice of this filing will be served on the state commissions with jurisdiction over SPS. Electronic notice of this filing will also be provided to SPP and all network transmission service customers taking service under the SPP Tariff in the SPS rate zone (Zone 11), and on SPS's wholesale production service customers. A courtesy copy or notice will be served on the Commission's Director of the Division of Tariffs and Market Development (Central).

In addition, pursuant to 18 C.F.R. § 35.2(d), a copy of this filing will be available for public inspection at the offices of SPS in Amarillo, Texas. Finally, a copy of this filing will be posted at the Open Access Transmission Tariff link at the Xcel Energy Transmission website: (www.transmission.xcelenergy.com/Resources/Open-Access-Same-Time-Information-System-&-Open-Access-Transmission-Tariff).

2. Brief Description of Rate Change – Section 35.13(b)(4)

See Sections II and III above.

3. Statement of Reasons for Rate Change – Section 35.13(b)(5)

See Sections II and III above.

4. Requisite Agreement for Rate Change – Section 35.13(b)(6)

See Section II above.

5. Statement Showing Expenses or Costs Included in Cost-of-Service Statements – Section 35.13(b)(7)

None of the costs related to this filing have been alleged in any administrative or judicial proceeding to be illegal, duplicative, or unnecessary costs that are demonstrably the product of discriminatory practices.

C. Communications and Service

Please direct any communication or correspondence with respect to this filing to the following: [20]

[20] SPS respectfully requests waiver of 18 C.F.R. Section 385.203(b)(3) of the Commission's regulations to permit the designation of more than two persons upon whom service is to be made in this proceeding.

Wesley Berger
Manager, Rate Cases
Regulatory Administration
Southwestern Public Service Company
790 Buchanan St., 7th Floor
Amarillo, TX 79101
Phone: (806) 378-2891
Email: wes.berger@xcelenergy.com

James P. Johnson
Assistant General Counsel
Xcel Energy Services Inc.
414 Nicollet Mall – 401 – 8
Minneapolis, MN 55401
(612) 215-4592 (phone)
Email: james.p.johnson@xcelenergy.com

Bernard Liu
Senior Transmission Tariff Consultant
Xcel Energy Services Inc.
414 Nicollet Mall – 401 – 8
Minneapolis, MN 55401
Phone: (612) 330-5728
Email: Bernard.Liu@xcelenergy.com

Mark C. Moeller
Manager, Transmission Business Relations
Xcel Energy Services Inc.
414 Nicollet Mall – 6
Minneapolis, MN 55401
Phone: (612) 330-6773
Email: mark.c.moeller@xcelenergy.com

IV. CONCLUSION

For the reasons stated above, SPS requests that the Commission accept the proposed revisions to Sections 15.7 and 28.5 of the Xcel Energy Tariff to update SPS's Transmission Loss Factors and the Distribution System - Primary Voltage Loss Factors effective April 1, 2019.

SPS appreciates the Commission's prompt attention to this matter. Please direct any questions regarding this filing to the undersigned at (806) 378-2891 or Ms. Tracee Holte at (612) 330-6206.

Respectfully submitted,

/s/ Wesley Berger

Wesley Berger
Manager, Rate Cases
Southwestern Public Service Company

Cc: State Commissions service list
SPS Transmission and Production customers
Southwest Power Pool, Inc.
Director, Division of Tariffs and Market Development (Central)

CERTIFICATE OF SERVICE

I, Elizabeth A. Walkup, hereby certify that I have this day electronically served a notice of the foregoing document via email on the Public Utility Commission of Texas, the New Mexico Public Regulation Commission, Southwest Power Pool, Inc., all SPS wholesale transmission customers within the SPS pricing zone taking service under the SPP OATT, and all SPS wholesale production customers.

Dated at Minneapolis, Minnesota this 30th day of January 2019.

/s/ Elizabeth A. Walkup
Elizabeth A. Walkup
Business Analyst
Xcel Energy Services Inc.
414 Nicollet Mall
Minneapolis, MN 55401
Tel: 612-330-6780
Elizabeth.A.Walkup@xcelenergy.com

15 Service Availability

15.1 General Conditions: The Transmission Provider will provide Firm and Non-Firm Point-To-Point Transmission Service over, on or across its Transmission System to any Transmission Customer that has met the requirements of Section 16.

15.2 Determination of Available Transfer Capability: A description of the Transmission Provider's specific methodology for assessing available transfer capability posted on the Transmission Provider's OASIS (Section 4) is contained in Attachment C of the Tariff. In the event sufficient transfer capability may not exist to accommodate a service request, the Transmission Provider will respond by performing a System Impact Study.

15.3 Initiating Service in the Absence of an Executed Service Agreement: If the Transmission Provider and the Transmission Customer requesting Firm or Non-Firm Point-To-Point Transmission Service cannot agree on all the terms and conditions of the Point-To-Point Service Agreement, the Transmission Provider shall file with the Commission, within thirty (30) days after the date the Transmission Customer provides written notification directing the Transmission Provider to file, an unexecuted Point-To-Point Service Agreement containing terms and conditions deemed appropriate by the Transmission Provider for such requested Transmission Service. The Transmission Provider shall commence providing Transmission Service subject to the Transmission Customer agreeing to (i) compensate the Transmission Provider at whatever rate the Commission ultimately determines to be just and reasonable, and (ii) comply with the terms and conditions of the Tariff including posting appropriate security deposits in accordance with the terms of Section 17.3.

15.4 Obligation to Provide Transmission Service that Requires Expansion or Modification of the Transmission System, Redispatch or Conditional Curtailment:

(a) If the Transmission Provider determines that it cannot accommodate a Completed Application for Firm Point-To-Point Transmission Service because of insufficient capability on its Transmission System, the Transmission Provider will use due diligence to expand or modify its Transmission System to provide the requested Firm Transmission Service, consistent with its planning obligations in Attachment R, provided the Transmission Customer agrees to compensate the Transmission Provider for such costs pursuant to the terms of Section 27. The Transmission Provider will conform to Good Utility Practice and its planning obligations in Attachment R, in determining the need for new facilities and in the design and construction of such facilities. The obligation applies only to those facilities that the Transmission Provider has the right to expand or modify.

(b) If the Transmission Provider determines that it cannot accommodate a

Completed Application for Long-Term Firm Point-To-Point Transmission Service because of insufficient capability on its Transmission System, the Transmission Provider will use due diligence to provide redispatch from its own resources until (i) Network Upgrades are completed for the Transmission Customer, (ii) the Transmission Provider determines through a biennial reassessment that it can no longer reliably provide the redispatch, or (iii) the Transmission Customer terminates the service because of redispatch changes resulting from the reassessment. A Transmission Provider shall not unreasonably deny self-provided redispatch or redispatch arranged by the Transmission Customer from a third party resource.

(c) If the Transmission Provider determines that it cannot accommodate a Completed Application for Long-Term Firm Point-To-Point Transmission Service because of insufficient capability on its Transmission System, the Transmission Provider will offer the Firm Transmission Service with the condition that the Transmission Provider may curtail the service prior to the curtailment of other Firm Transmission Service for a specified number of hours per year or during System Condition(s). If the Transmission Customer accepts the service, the Transmission Provider will use due diligence to provide the service until (i) Network Upgrades are completed for the Transmission Customer, (ii) the Transmission Provider determines through a biennial reassessment that it can no longer reliably provide such service, or (iii) the Transmission Customer terminates the service because the reassessment increased the number of hours per year of conditional curtailment or changed the System Conditions.

15.5 Deferral of Service: The Transmission Provider may defer providing service until it completes construction of new transmission facilities or upgrades needed to provide Firm Point-To-Point Transmission Service whenever the Transmission Provider determines that providing the requested service would, without such new facilities or upgrades, impair or degrade reliability to any existing firm services.

15.6 Other Transmission Service Schedules: Eligible Customers receiving transmission service under other agreements on file with the Commission may continue to receive transmission service under those agreements until such time as those agreements may be modified by the Commission.

15.7 Real Power Losses: Real Power Losses are associated with all transmission service. The Transmission Provider is not obligated to provide Real Power Losses. The Transmission Customer is responsible for replacing losses associated with all transmission service as calculated by the Transmission Provider. The applicable Real Power Losses are as follows:

For Service on the NSP Transmission System: 2.4%

For Service on the PSCo System:

	Demand	Energy
Transmission System:	2.20%	1.70%
Distribution System – Primary Voltage:	3.75%	2.07%

For Service on the SPS System:

	Demand	Energy
Transmission System:	2.7386063.107161%	3.2032032.881556%
Distribution System – Primary Voltage:	8.8463908.157751%	6.3278266.035731%

The loss factors for Direct Assignment Facilities shall be determined on a case by case basis.

28 Nature of Network Integration Transmission Service

28.1 Scope of Service: Network Integration Transmission Service is a transmission service that allows Network Customers to efficiently and economically utilize their Network Resources (as well as other non-designated generation resources) to serve their Network Load located in the Transmission Provider's Control Area and any additional load that may be designated pursuant to Section 31.3 of the Tariff. The Network Customer taking Network Integration Transmission Service must obtain or provide Ancillary Services pursuant to Section 3.

28.2 Transmission Provider Responsibilities: The Transmission Provider will plan, construct, operate and maintain its Transmission System in accordance with Good Utility Practice and its planning obligations in Attachment R in order to provide the Network Customer with Network Integration Transmission Service over the Transmission Provider's Transmission System. The Transmission Provider, on behalf of its Native Load Customers, shall be required to designate resources and loads in the same manner as any Network Customer under Part III of this Tariff. This information must be consistent with the information used by the Transmission Provider to calculate available transfer capability. The Transmission Provider shall include the Network Customer's Network Load in its Transmission System planning and shall, consistent with Good Utility Practice and Attachment R, endeavor to construct and place into service sufficient transfer capability to deliver the Network Customer's Network Resources to serve its Network Load on a basis comparable to the Transmission Provider's delivery of its own generating and purchased resources to its Native Load Customers.

28.3 Network Integration Transmission Service: The Transmission Provider will provide firm transmission service over its Transmission System to the Network Customer for the delivery of capacity and energy from its designated Network Resources to service its Network Loads on a basis that is comparable to the Transmission Provider's use of the Transmission System to reliably serve its Native Load Customers.

28.4 Secondary Service: The Network Customer may use the Transmission Provider's Transmission System to deliver energy to its Network Loads from resources that have not been designated as Network Resources. Such energy shall be transmitted, on an as-available basis, at no additional charge. Secondary service shall not require the filing of an Application for Network Integration Transmission Service under the Tariff. However, all other requirements of Part III of the Tariff (except for transmission rates) shall apply to secondary service. Deliveries from resources other than Network Resources will have a higher priority than any Non-Firm Point-To-Point Transmission Service under Part II of the Tariff.

28.5 Real Power Losses: Real Power Losses are associated with all transmission service. The Transmission Provider is not obligated to provide Real Power

Losses. The Network Customer is responsible for replacing losses associated with all transmission service as calculated by the Transmission Provider. The applicable Real Power Losses are as follows:

For Service on the NSP Transmission System: 2.4%

For Service on the PSCo System:

	Demand	Energy
Transmission System:	2.20%	1.70%
Distribution System – Primary Voltage:	3.75%	2.07%

For Service on the SPS System:

	Demand	Energy
Transmission System:	2.738606~~3.107161~~%	3.203203~~2.881556~~%
Distribution System – Primary Voltage:	8.846390~~8.157751~~%	6.327826~~6.035731~~%

The loss factors for Direct Assignment Facilities shall be determined on a case by case basis.

28.6 **Restrictions on Use of Service:** The Network Customer shall not use Network Integration Transmission Service for (i) sales of capacity and energy to non-designated loads, or (ii) direct or indirect provision of transmission service by the Network Customer to third parties. All Network Customers taking Network Integration Transmission Service shall use Point-To-Point Transmission Service under Part II of the Tariff for any Third-Party Sale which requires use of the Transmission Provider's Transmission System. The Transmission Provider shall specify any appropriate charges and penalties and all related terms and conditions applicable in the event that a Network Customer uses Network Integration Transmission Service or secondary service pursuant to Section 28.4 to facilitate a wholesale sale that does not serve a Network Load.

15 Service Availability

15.1 General Conditions: The Transmission Provider will provide Firm and Non-Firm Point-To-Point Transmission Service over, on or across its Transmission System to any Transmission Customer that has met the requirements of Section 16.

15.2 Determination of Available Transfer Capability: A description of the Transmission Provider's specific methodology for assessing available transfer capability posted on the Transmission Provider's OASIS (Section 4) is contained in Attachment C of the Tariff. In the event sufficient transfer capability may not exist to accommodate a service request, the Transmission Provider will respond by performing a System Impact Study.

15.3 Initiating Service in the Absence of an Executed Service Agreement: If the Transmission Provider and the Transmission Customer requesting Firm or Non-Firm Point-To-Point Transmission Service cannot agree on all the terms and conditions of the Point-To-Point Service Agreement, the Transmission Provider shall file with the Commission, within thirty (30) days after the date the Transmission Customer provides written notification directing the Transmission Provider to file, an unexecuted Point-To-Point Service Agreement containing terms and conditions deemed appropriate by the Transmission Provider for such requested Transmission Service. The Transmission Provider shall commence providing Transmission Service subject to the Transmission Customer agreeing to (i) compensate the Transmission Provider at whatever rate the Commission ultimately determines to be just and reasonable, and (ii) comply with the terms and conditions of the Tariff including posting appropriate security deposits in accordance with the terms of Section 17.3.

15.4 Obligation to Provide Transmission Service that Requires Expansion or Modification of the Transmission System, Redispatch or Conditional Curtailment:

(a) If the Transmission Provider determines that it cannot accommodate a Completed Application for Firm Point-To-Point Transmission Service because of insufficient capability on its Transmission System, the Transmission Provider will use due diligence to expand or modify its Transmission System to provide the requested Firm Transmission Service, consistent with its planning obligations in Attachment R, provided the Transmission Customer agrees to compensate the Transmission Provider for such costs pursuant to the terms of Section 27. The Transmission Provider will conform to Good Utility Practice and its planning obligations in Attachment R, in determining the need for new facilities and in the design and construction of such facilities. The obligation applies only to those facilities that the Transmission Provider has the right to expand or modify.

(b) If the Transmission Provider determines that it cannot accommodate a

Completed Application for Long-Term Firm Point-To-Point Transmission Service because of insufficient capability on its Transmission System, the Transmission Provider will use due diligence to provide redispatch from its own resources until (i) Network Upgrades are completed for the Transmission Customer, (ii) the Transmission Provider determines through a biennial reassessment that it can no longer reliably provide the redispatch, or (iii) the Transmission Customer terminates the service because of redispatch changes resulting from the reassessment. A Transmission Provider shall not unreasonably deny self-provided redispatch or redispatch arranged by the Transmission Customer from a third party resource.

(c) If the Transmission Provider determines that it cannot accommodate a Completed Application for Long-Term Firm Point-To-Point Transmission Service because of insufficient capability on its Transmission System, the Transmission Provider will offer the Firm Transmission Service with the condition that the Transmission Provider may curtail the service prior to the curtailment of other Firm Transmission Service for a specified number of hours per year or during System Condition(s). If the Transmission Customer accepts the service, the Transmission Provider will use due diligence to provide the service until (i) Network Upgrades are completed for the Transmission Customer, (ii) the Transmission Provider determines through a biennial reassessment that it can no longer reliably provide such service, or (iii) the Transmission Customer terminates the service because the reassessment increased the number of hours per year of conditional curtailment or changed the System Conditions.

15.5 Deferral of Service: The Transmission Provider may defer providing service until it completes construction of new transmission facilities or upgrades needed to provide Firm Point-To-Point Transmission Service whenever the Transmission Provider determines that providing the requested service would, without such new facilities or upgrades, impair or degrade reliability to any existing firm services.

15.6 Other Transmission Service Schedules: Eligible Customers receiving transmission service under other agreements on file with the Commission may continue to receive transmission service under those agreements until such time as those agreements may be modified by the Commission.

15.7 Real Power Losses: Real Power Losses are associated with all transmission service. The Transmission Provider is not obligated to provide Real Power Losses. The Transmission Customer is responsible for replacing losses associated with all transmission service as calculated by the Transmission Provider. The applicable Real Power Losses are as follows:

For Service on the NSP Transmission System: 2.4%

For Service on the PSCo System:

	Demand	Energy
Transmission System:	2.20%	1.70%
Distribution System – Primary Voltage:	3.75%	2.07%

For Service on the SPS System:

	Demand	Energy
Transmission System:	2.738606%	3.203203%
Distribution System – Primary Voltage:	8.846390%	6.327826%

The loss factors for Direct Assignment Facilities shall be determined on a case by case basis.

28 Nature of Network Integration Transmission Service

28.1 Scope of Service: Network Integration Transmission Service is a transmission service that allows Network Customers to efficiently and economically utilize their Network Resources (as well as other non-designated generation resources) to serve their Network Load located in the Transmission Provider's Control Area and any additional load that may be designated pursuant to Section 31.3 of the Tariff. The Network Customer taking Network Integration Transmission Service must obtain or provide Ancillary Services pursuant to Section 3.

28.2 Transmission Provider Responsibilities: The Transmission Provider will plan, construct, operate and maintain its Transmission System in accordance with Good Utility Practice and its planning obligations in Attachment R in order to provide the Network Customer with Network Integration Transmission Service over the Transmission Provider's Transmission System. The Transmission Provider, on behalf of its Native Load Customers, shall be required to designate resources and loads in the same manner as any Network Customer under Part III of this Tariff. This information must be consistent with the information used by the Transmission Provider to calculate available transfer capability. The Transmission Provider shall include the Network Customer's Network Load in its Transmission System planning and shall, consistent with Good Utility Practice and Attachment R, endeavor to construct and place into service sufficient transfer capability to deliver the Network Customer's Network Resources to serve its Network Load on a basis comparable to the Transmission Provider's delivery of its own generating and purchased resources to its Native Load Customers.

28.3 Network Integration Transmission Service: The Transmission Provider will provide firm transmission service over its Transmission System to the Network Customer for the delivery of capacity and energy from its designated Network Resources to service its Network Loads on a basis that is comparable to the Transmission Provider's use of the Transmission System to reliably serve its Native Load Customers.

28.4 Secondary Service: The Network Customer may use the Transmission Provider's Transmission System to deliver energy to its Network Loads from resources that have not been designated as Network Resources. Such energy shall be transmitted, on an as-available basis, at no additional charge. Secondary service shall not require the filing of an Application for Network Integration Transmission Service under the Tariff. However, all other requirements of Part III of the Tariff (except for transmission rates) shall apply to secondary service. Deliveries from resources other than Network Resources will have a higher priority than any Non-Firm Point-To-Point Transmission Service under Part II of the Tariff.

28.5 Real Power Losses: Real Power Losses are associated with all transmission service. The Transmission Provider is not obligated to provide Real Power

Losses. The Network Customer is responsible for replacing losses associated with all transmission service as calculated by the Transmission Provider. The applicable Real Power Losses are as follows:

For Service on the NSP Transmission System: 2.4%

For Service on the PSCo System:

	Demand	Energy
Transmission System:	2.20%	1.70%
Distribution System – Primary Voltage:	3.75%	2.07%

For Service on the SPS System:

	Demand	Energy
Transmission System:	2.738606%	3.203203%
Distribution System – Primary Voltage:	8.846390%	6.327826%

The loss factors for Direct Assignment Facilities shall be determined on a case by case basis.

28.6 Restrictions on Use of Service: The Network Customer shall not use Network Integration Transmission Service for (i) sales of capacity and energy to non-designated loads, or (ii) direct or indirect provision of transmission service by the Network Customer to third parties. All Network Customers taking Network Integration Transmission Service shall use Point-To-Point Transmission Service under Part II of the Tariff for any Third-Party Sale which requires use of the Transmission Provider's Transmission System. The Transmission Provider shall specify any appropriate charges and penalties and all related terms and conditions applicable in the event that a Network Customer uses Network Integration Transmission Service or secondary service pursuant to Section 28.4 to facilitate a wholesale sale that does not serve a Network Load.

Exhibit No. SPS-0001

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Southwestern Public Service Company	**)**	**Docket No. ER19-____-000**
	)	

DIRECT TESTIMONY
OF
WESLEY L. BERGER

ON BEHALF OF
SOUTHWESTERN PUBLIC SERVICE COMPANY

JANUARY 30, 2019

Exhibit No. SPS-0001

DIRECT TESTIMONY OF WESLEY L. BERGER

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EXHIBITS TO
DIRECT TESTIMONY OF WESLEY L. BERGER

Exhibit No.	**Description**
SPS–0002	Calculation of Proposed Loss Factors
SPS–0003	Estimated Annual Cost Impact to Wholesale Customers

Exhibit No. SPS-0001

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Southwestern Public Service Company	**)**	**Docket No. ER19-____-000**
	)	

Summary of the Direct Testimony of Wesley L. Berger

Mr. Berger provides testimony in support of the filing by Southwestern Public Service Company ("SPS") to revise SPS's loss factors set forth in the Xcel Energy Open Access Transmission Tariff ("Xcel Energy Tariff"), the Southwest Power Pool, Inc. Open Access Transmission Tariff ("SPP Tariff"), and certain wholesale production requirements contracts. Mr. Berger provides an overview of SPS; introduces SPS's other witness in this proceeding (Mr. Duane J. Ripperger); and explains and supports the changes to Sections 15.7 and 28.5 of the Xcel Energy Tariff proposed to be effective April 1, 2019. Mr. Berger also calculates the estimated cost impact of the revised loss factors on wholesale transmission service customers in the SPS rate zone (Zone 11) under the SPP Tariff and on customers currently receiving wholesale production service from SPS. Mr. Berger estimates that the overall impact to SPS wholesale customers of the proposed changes to the loss factors is a cost decrease of $230,728 annually.

DIRECT TESTIMONY OF

WESLEY L. BERGER

I. INTRODUCTION AND EXPERIENCE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Wesley L. Berger. My business address is 790 S. Buchanan St., Amarillo, TX 79101.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

A. I am employed by Southwestern Public Service Company ("SPS"), a New Mexico corporation and wholly owned subsidiary of Xcel Energy Inc. ("Xcel Energy"), as Manager, Rate Cases.

Q. PLEASE DESCRIBE XCEL ENERGY.

A. Xcel Energy is a public utility holding company with, among other subsidiaries, four wholly owned, vertically integrated public utility operating company subsidiaries: SPS, Northern States Power Company, a Minnesota corporation ("NSPM"), Northern States Power Company, a Wisconsin corporation ("NSPW"), and Public Service Company of Colorado ("PSCo") (together, the "Xcel Energy Operating Companies").

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of SPS.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND.

A. I graduated from New Mexico State University in 1993, receiving a Bachelor of Science degree in Mathematics and a Bachelor of Arts degree in Economics. I received a Master

of Arts degree in Economics with specialization in public utility regulation from New Mexico State University in 1995.

Q. WHAT IS YOUR PROFESSIONAL EXPERIENCE?

A. From June 1995 through April 1997, I worked as a Regulatory Compliance Coordinator for SPS providing rate design and general regulatory compliance support. After SPS and Public Service Company of Colorado merged to form New Century Energies in May 1997, I worked as a Pricing Analyst and later as a Pricing Specialist through July 2000. I provided cost of service and rate design support for the retail and wholesale jurisdictions of SPS. After the merger creating Xcel Energy in August 2000, I became a Contract Administration Manager in the Wholesale Origination department, where I attended wholesale market development meetings and regional tariff meetings, and I supported the negotiation of wholesale power purchase and sale agreements. In August 2004, I became an Originator, which meant that my duties focused more on negotiating purchase and sale agreements. In 2005, I returned to Regulatory Administration to direct a retail rate case filing in Texas. In May 2006, I assumed my current position as Manager, Rate Cases.

Q. HAVE YOU ATTENDED OR TAKEN ANY SPECIAL COURSES OR SEMINARS RELATING TO PUBLIC UTILITIES?

A. Yes. In addition to my public utility regulation courses at New Mexico State University, I have completed the advanced rate design course presented by the Edison Electric Institute. I have also attended multiple seminars, including a Regulatory & Accounting seminar presented by PricewaterhouseCoopers, a Utility Finance & Accounting seminar presented by Financial Accounting Institute, and the Public Utility Conference sponsored by New Mexico State University.

Q. WHAT ARE YOUR DUTIES IN YOUR CURRENT POSITION?

A. I oversee rate filings with the Federal Energy Regulatory Commission ("FERC" or "Commission") that impact SPS. I also provide input on SPS's cost allocation and cost of service issues for its retail jurisdictions in Texas and New Mexico. In addition, I provide regulatory policy input on various issues impacting SPS.

Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION OR ANY OTHER REGULATORY COMMISSION?

A. Yes. I have filed written testimony with the Commission. Specifically, I have filed testimony in Docket Nos. ER00-536, ER12-1682, ER16-1030, and ER19-675. I have also testified before the Public Utility Commission of Texas ("PUCT") and the New Mexico Public Regulation Commission ("NMPRC").

II. PURPOSE OF TESTIMONY

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

A. The purpose of my testimony is to support SPS's proposal to update the real power transmission and distribution line loss factors stated in Sections 15.7 and 28.5 of the Xcel Energy Tariff applicable to SPS wholesale customers. In my testimony:

- I provide an overview of SPS;
- I provide an overview of the filing and introduce SPS's other witness, Mr. Duane J. Ripperger;
- I explain how the real power demand and energy loss factors proposed by SPS were derived from the 2016 Transmission and Distribution System Loss Evaluation Study (the "2016 Loss Study") discussed and supported by Mr. Ripperger and included as Exhibit No. SPS-0005;
- I explain how the demand and energy loss factors stated in the Xcel Energy Tariff are used in calculating bills to network transmission service and wholesale production customers; and
- I discuss the estimated cost impact of the proposed changes to the current loss factors on SPS's wholesale transmission and production customers.

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes. I am sponsoring the following exhibit, which is attached to my testimony:

Exhibit No.	**Description**
SPS-0002	Calculation of Proposed Loss Factors
SPS-0003	Estimated Annual Cost Impact to Wholesale Customers

Submitted with this filing are the clean and marked tariff pages to Sections 15 and 28 of the Xcel Energy Tariff. I am sponsoring the proposed tariff revisions.

Q. WERE YOUR TESTIMONY AND EXHIBITS PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION?

A. Yes.

III. OVERVIEW OF SPS'S FILING

A. Overview of SPS

Q. PLEASE DESCRIBE SPS.

A. Headquartered in Amarillo, Texas, SPS is a vertically integrated generation, transmission, and distribution electric utility that serves approximately 390,000 retail and wholesale customers in a 52,000 square-mile area of the Panhandle and the South Plains of Texas, and eastern and southern New Mexico. SPS's service area extends approximately 400 miles from north to south and 200 miles from east to west. SPS also owns certain transmission facilities in Kansas and Oklahoma. SPS provides regulated, cost-based retail services subject to the jurisdiction of the PUCT and the NMPRC. SPS also provides cost-based requirements wholesale service to cooperative and municipal power customers, with rates determined under production formula rate templates that are part of the individual wholesale power sales agreements.

SPS is a member of the SPP regional transmission organization ("RTO") and is synchronously connected to the Eastern Interconnection grid. With limited exceptions, all transmission services on the SPS system are provided under the SPP Tariff. SPS is also connected to the Western Interconnection grid through three high-voltage direct-current back-to-back converters. Although SPS operates adjacent to the Electric Reliability Council of Texas ("ERCOT") grid, it has no direct interconnections with ERCOT transmission owners.

Q. PLEASE DESCRIBE SPS'S SERVICE AREA.

A. The Texas retail jurisdiction is SPS's single largest regulatory jurisdiction. SPS also serves retail customers in a large portion of eastern and southeastern New Mexico. SPS's

service territory in both Texas and New Mexico is primarily agricultural, with large areas of oil and natural gas production. Additionally, wholesale power sales and transmission services have historically been a significant business segment for SPS. SPS directly serves six wholesale requirements power sales (production) customers, who in turn may serve member customers, and provides wholesale Network Integration Transmission Service ("NITS") to various customers with loads on the SPS transmission system. The SPS transmission system is included in Zone 11 of the SPP Tariff. In total, wholesale production services currently account for approximately 22 percent of SPS's total production demand, and wholesale transmission services currently account for approximately 36 percent of SPS's total transmission network demand.

B. SPS's Filing and the Associated Testimony

Q. PLEASE SUMMARIZE THE CHANGES TO THE XCEL ENERGY TARIFF SPS PROPOSES IN THIS FILING.

A. SPS proposes to update its transmission and distribution real power loss factors stated in Sections 15.7 and 28.5 of the Xcel Energy Tariff. Under the Xcel Energy Tariff and the SPP Tariff, customers are responsible for replacing the real power losses associated with transmission service. SPS has conducted a loss study to determine the amount of real power losses on its system and, based on this analysis, has updated the real power loss percentages for its transmission system and its distribution-primary voltage system. Because transmission service over the SPS system is primarily provided under the SPP Tariff, SPP will separately make a filing to update the SPS loss factors in Attachment M, Appendix 1 of the SPP Tariff, to conform to the updated SPS loss factors in the Xcel

Energy Tariff, to be effective on the same effective date approved by the Commission in this proceeding.

Q. WHY IS SPS SEEKING TO UPDATE ITS TRANSMISSION AND DISTRIBUTION PRIMARY REAL POWER LOSS FACTORS?

A. The current transmission and distribution primary real power loss factors do not accurately reflect the most recent study of the transmission and distribution losses SPS experiences in providing service to its customers, including wholesale customers. SPS's current transmission and distribution loss factors stated in the Xcel Energy Tariff were accepted in Docket No. ER16-1030-000, using a loss study that included data from July 2012 through June 2013 (the "2013 Loss Study"). In 2017, SPS completed an updated loss study based on data from January 2016 through December 2016 (the "2016 Loss Study") and calculated new loss factors. The new loss factors were then filed with the PUCT and the NMPRC. The updated loss factors were accepted by the NMPRC in its final order in NMPRC Case No. 17-00255-UT, issued on September 5, 2018, and accepted by the PUCT in its final order in PUCT Docket No. 47527, issued on December 10, 2018. SPS proposes to use the 2016 Loss Study as the basis for the updated real power loss factors stated in the Xcel Energy Tariff applicable to SPS to ensure comparability and consistency among all three jurisdictions (New Mexico, Texas, and FERC).

Q. WHY DOES SPS NEED TO FILE DISTRIBUTION LOSS FACTORS WITH THE COMMISSION?

A. SPS has transmission and wholesale production service customers who have delivery points at primary distribution voltage. These real power demand and energy loss factors

need to be updated so that they are consistent with the primary distribution loss factors applied to SPS's retail customers.

Q. HOW DO THE PROPOSED LOSS FACTORS COMPARE TO THE CURRENT LINE LOSS FACTORS?

A. The proposed transmission loss factor for demand is slightly lower than the current transmission demand loss factor, while the proposed transmission loss factor for energy is slightly higher than the current transmission energy loss factor. SPS's proposed primary distribution loss factors are higher than the current distribution loss factors. A comparison of the current and proposed loss factors is shown in Table 1:

Table 1

	Demand Loss Factors		Energy Loss Factors	
	Current	Proposed	Current	Proposed
Transmission	3.107161%	2.738606%	2.881556%	3.203203%
Distribution - Primary Voltage	8.157751%	8.846390%	6.035731%	6.327826%

Q. WHAT IS THE PROPOSED EFFECTIVE DATE FOR THE REVISED LOSS FACTORS?

A. SPS is requesting an effective date of April 1, 2019 for the revisions to Sections 15.7 and 28.5 of the Xcel Energy Tariff to reflect new demand and energy loss factors.

Q. PLEASE INTRODUCE THE OTHER WITNESS PROVIDING TESTIMONY IN SUPPORT OF SPS'S PROPOSED LOSS FACTORS.

A. SPS's filing is also supported by the Direct Testimony of Mr. Duane J. Ripperger, Manager, Regional Transmission Initiatives for XES, Exhibit Nos. SPS-0004 and SPS-0005 (the "Ripperger Testimony").

Q. WHAT DOES MR. RIPPERGER ADDRESS IN HIS TESTIMONY?

A. Mr. Ripperger discusses how a system loss study is performed, and the methodology used by SPS for the 2016 Loss Study. Mr. Ripperger also discusses certain refinements to the 2016 Loss Study as compared to the 2013 Loss Study.

Q. HAVE YOU QUANTIFIED THE IMPACT OF THE CHANGE PROPOSED IN THE REVISED TEMPLATE ON SPS'S WHOLESALE DISTRIBUTION SERVICE CUSTOMERS?

A. Yes. In Exhibit No. SPS-0003, I present the annual customer impact of the new loss factors. In Section V of my testimony, I discuss my calculations of the annual customer impact presented in Exhibit No. SPS-0003.

IV. CALCULATION OF PROPOSED LOSS FACTORS

Q. WHAT IS THE BASIS FOR THE REAL POWER LOSS FACTORS SPS PROPOSES IN THIS PROCEEDING?

A. SPS is using the 2016 Loss Study, its most recent system loss study, as presented by Mr. Ripperger. As I mentioned, the loss factors resulting from this study have been accepted by the PUCT and the NMPRC.

Q. WHAT MODIFICATIONS DID YOU MAKE TO THE 2016 LOSS STUDY RESULTS TO DERIVE THE PROPOSED WHOLESALE LOSS FACTORS?

A. The primary distribution loss factors proposed by SPS come directly from Appendices O and P to the 2016 Loss Study (attached as Exhibit No. SPS-0005 to Mr. Ripperger's testimony).

I also used the loss factors from the 2016 Loss Study as the basis for SPS's proposed transmission loss factors, but modified the loss factors to tailor them to

wholesale service. Specifically, I began with the Energy and Demand loss factors shown in Appendices O and P to the 2016 Loss Study, and made one modification: I combined the two transmission level loss factors described in the 2016 Loss Study into the composite transmission loss factor for the Xcel Energy Tariff and the SPP Tariff.

Q. PLEASE DESCRIBE YOUR MODIFICATION IN ORDER TO CREATE A COMPOSITE CALCULATION.

A. Both the Xcel Energy Tariff and the SPP Tariff employ a single loss factor for all transmission voltage facilities. The 2016 Loss Study, however, contains two transmission loss factors. Specifically, the 2016 Loss Study calculates a loss factor for transmission facilities with a voltage of 115 kV or higher and a separate loss factor for transmission facilities at a voltage level of 69 kV. Therefore, it was necessary for me to calculate a composite transmission loss factor applicable to all transmission voltages to be set out in the Xcel Energy Tariff and SPP Tariff. The current SPS transmission loss factors accepted in Docket No. ER16-1030-000 were also calculated as composite factors.

The modification I made to the Appendix O and P loss factor calculations was to sum the losses for the two transmission service levels (levels 2 and 3) into a single total transmission losses number. The total is shown on line 21 in the kW Loss by Level column (column E) on page 1 and on line 21 in the kWh Loss by Level column (column E) on page 2 of Exhibit No. SPS-0002. The remaining mathematical calculations on line 21 on both pages are identical to the original loss factor calculations done by Mr. Ripperger and accepted by the PUCT and NMPRC.

Q. IS IT NECESSARY TO MAKE A MODIFICATION TO THE 2016 LOSS STUDY TO REMOVE GENERATOR STEP-UP TRANSFORMER LOSSES?

A. No. As discussed in the 2016 Loss Study, SPS metered its generators at the high side of the generator step-up transformers during the time period of the 2016 Loss Study.

Q. WHAT ARE SPS' PROPOSED LOSS FACTORS AFTER THESE CALCULATIONS?

A. SPS proposes a transmission demand loss factor of 2.738606%, as shown on page 1, line 21 (column C) of Exhibit No. SPS-0002, and a transmission energy loss factor of 3.203203%, as shown on page 2, line 21 (column C) of Exhibit No. SPS-0002. SPS proposes a distribution demand loss factor of 8.846390%, as shown on page 1, line 25 (column C) of Exhibit No. SPS-0002, and a distribution energy loss factor of 6.327826%, as shown on page 2, line 25 (column C) of Exhibit No. SPS-0002. Table 1, on page 8 above, compares the currently effective wholesale transmission and distribution loss factors with the proposed factors.

V. APPLICATION OF REAL POWER LOSS FACTORS TO CALCULATE RATES APPLICABLE TO WHOLESALE SERVICES

Q. WHAT CUSTOMERS ARE AFFECTED BY SPS'S PROPOSED CHANGE TO ITS LOSS FACTORS?

A. The network transmission service customers that purchase transmission service under the SPP Tariff for loads on the SPS system (SPP Zone 11), and production service customers who purchase power from SPS under wholesale requirements power sale agreements, are both affected by SPS's proposal to update its real power loss values. The demand loss change will affect the calculation of billing demands for both network and production customers, and the energy loss change will affect charges to production customers.

Q. HOW DOES SPS APPLY THE LOSS FACTORS TO DETERMINE THE CHARGES APPLICABLE TO NETWORK TRANSMISSION CUSTOMERS?

A. The loss factors developed by Mr. Ripperger in the 2016 Loss Study are what are termed injection loss factors. However, these loss factors are typically applied to metered usage values of network transmission customers in calculating monthly network demands. Therefore, it is necessary to use what are termed delivery loss factors. Mr. Ripperger explains how the delivery loss factors in the 2016 Loss Study are calculated.

As shown on page 1, line 21 (column B) of Exhibit No. SPS-0002, the transmission demand delivery loss factor to be applied to metered usage is 1.028157. The metered usage is multiplied by the delivery loss factor to determine the monthly network demand. For example, if a customer has a metered demand of 600,000 kW, the monthly network demand for billing purposes is 600,000 *1.028157 = 616,894 kW. Similar delivery loss factors are shown in Exhibit No. SPS-0002 for the transmission energy, distribution demand, and distribution energy loss factors.

Alternatively, a delivery loss factor can be expressed as a percentage as is done in Attachment M, Appendix 1 to the SPP Tariff. This is calculated by the following equation: delivery loss factor = [(1/(1 – injection loss factor)) - 1] * 100. Using the transmission demand injection loss factor in Exhibit No. SPS-0002 on page 1, line 21 (column C) of 2.738606%, we can calculate the delivery loss factor SPP will show in Attachment M as [(1/(1-.02738606)) - 1] * 100 = 2.815717%. The metered usage is added to the product of the metered usage and the delivery loss factor expressed as a percentage to determine monthly network demand. For example, if a customer has a

metered demand of 600,000 kW, the monthly network demand for billing purposes is 600,000 + (600,000 * 2.815717%) = 616,894 kW.

Note that although the arithmetic calculations are performed differently, both methodologies result in the same billing demand.

Q. HOW DOES SPS APPLY THE LOSS FACTORS TO DETERMINE THE CHANGES APPLICABLE TO WHOLESALE PRODUCTION REQUIREMENTS SERVICE CUSTOMERS?

A. SPS applies the delivery loss factors calculated using the first method described above to the wholesale customers' metered monthly usage. For example, if a wholesale customer has a monthly demand of 100,000 kW and monthly energy usage of 50,000,000 kWh, SPS would calculate the monthly billing determinants using the delivery loss factors shown in line 21, Column B of pages 1 and 2 of SPS Exhibit 2. Specifically, billing demand equals 100,000 * 1.028157 = 102,816 kW and billing energy equals 50,000,000 * 1.033092 = 51,654,600 kWh.

Q. WILL THE PROPOSED LOSS FACTOR CHANGES AFFECT ENERGY LOSSES BILLED TO NETWORK CUSTOMERS UNDER THE SPP TARIFF?

A. No. Under Attachment M to the SPP OATT, energy losses are determined by the SPP regional system dispatch and included in the locational marginal prices charged in the SPP Integrated Marketplace to market participants, including network transmission customers on the SPS system. The SPS Tariff loss factors do not affect these calculations.

Q. IS IT NECESSARY TO UPDATE ANY SPS WHOLESALE PRODUCTION SERVICE AGREEMENTS TO REFLECT THE REVISED LOSS FACTORS?

A. No. The SPS production service agreements refer to the loss values as stated in the applicable Tariff. As such, while the revised loss values will affect the calculation of bills for SPS's production customers, Commission acceptance of the revised real power loss factors will not require revisions to the underlying agreements.

VI. COST IMPACT OF THE PROPOSED LOSS FACTORS

Q. HAVE YOU ESTIMATED THE COST IMPACT TO WHOLESALE CUSTOMERS OF THE PROPOSED TARIFF CHANGES?

A. Yes. I estimated the cost impact to individual network transmission service customers and wholesale requirements customers on the SPS system by recalculating SPS bills to wholesale customers for calendar year 2018 using the proposed loss factors in place of the currently effective loss factors.

Q. WHAT IS THE ESTIMATED COST IMPACT OF THE PROPOSED TARIFF CHANGES TO SPS'S NETWORK TRANSMISSION SERVICE AND WHOLESALE REQUIREMENTS CUSTOMERS?

A. The overall cost impact to these customers of the changes to the current loss factors is estimated to be a decrease of $230,728 annually or approximately -0.072%. Exhibit No. SPS-0003 shows the estimated transmission bill impact, production bill impact and net impact for each wholesale customer. As noted, this estimate reflects billing data for the twelve months from January 2018 through December 2018 and compares the amounts billed using the current loss factors to the amounts that would have been billed had the proposed loss factors been in effect.

Exhibit No. SPS-0003 shows that charges to network transmission service customers would be reduced as a result of the lower demand loss factor by approximately $419,000 per year, while charges to wholesale production customers would increase by approximately $188,000 per year. With one exception, all of SPS's wholesale customers are expected to see a slight net reduction. Central Valley Electric Cooperative is estimated to see a slight increase ($6,833) because Central Valley Electric Cooperative has a relatively high load factor and the energy loss factor is increasing.

Q. HAS SPS CALCULATED THE COST IMPACT TO POINT-TO-POINT TRANSMISSION SERVICE CUSTOMERS?

A. No. Point-to-point service is provided only by SPP under the SPP Tariff. SPS does not have the information necessary to calculate the impact of the slight reduction of the transmission demand loss factor on SPP point-to-point transmission service customers. Further, similar to network transmission customers, point-to-point customers' energy charges will not be impacted by this change to the SPS transmission energy loss factor because energy losses are determined by the SPP regional system dispatch and included in the locational marginal prices charged in the SPP Integrated Marketplace.

Q. DID SPS SHARE THE PROPOSED LOSS FACTOR CHANGES AND THE ESTIMATED COST IMPACT WITH ITS WHOLESALE CUSTOMERS PRIOR TO SUBMITTING THIS FILING?

A. Yes. SPS provided the proposed loss factors and the estimated cost impact analysis to each of its wholesale customers on January 18, 2019, and offered to hold pre-filing conference calls with each of the customers to explain the calculations and why SPS was

making this filing. SPS answered a few questions, but none of the customers requested a pre-filing meeting.

VII. CONCLUSION

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS.

A. I recommend that the Commission approve SPS's proposed revisions to Sections 15.7 and 28.5 of the Xcel Energy Tariff to incorporate the new SPS loss factors discussed in my testimony, effective on April 1, 2019. The Tariff changes are just and reasonable because they incorporate information from SPS's most recent system loss study, and that same loss study has recently been approved by the NMPRC and PUCT for retail ratemaking purposes.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Southwestern Public Service Company	)	**Docket No. ER19-____-000**
	)	

AFFIDAVIT

Wesley L. Berger, being duly sworn, deposes and states: that the Direct Testimony of Wesley L. Berger was prepared by me or under my direct supervision, and that the statements contained therein are true and correct to the best of my knowledge and belief.

DONNA M. ANDERSON
Notary Public, State of Texas
Notary ID #853163-5
My Commission Expires 06-17-2020

Wesley L. Berger

Subscribed and sworn before me this 29 day of January 2019.

Donna M Anderson
[Name]
Notary Public
My commission expires: [date] 6/17/2020

SOUTHWESTERN PUBLIC SERVICE COMPANY
DEMAND LOSS FACTOR CALCULATION
12 MONTHS ENDING DECEMBER 2016

Loss Factor Calculation

Total Generation Inputs = 6,003,000 Kw
System Peak Hr. 6,003,000 Kw

Line No.		(A) Loss Factor to Gross up to Gen	(B) Loss factor to gross up 1 level 1/(1-loss %)	(C) % loss by level	(D) KW Flow into each level		(E) KW Loss by Level		(F) KW Demand by loss level	(G) Loss Check Loss fac X sales
12	Sales at the Generator @ Generation	**1.000000**	1.000000	0.000000%	6,003,000		0		0	0
15	Sales @ 115, 230 & 345 KV Level 2	**1.023667**	1.023667	2.311973%	6,003,000		138,788		2,244,415	2,297,533
18	Sales @ 69 KV Level 3	**1.030961**	1.007126	0.707520%	3,619,798		25,611		1,090,485	1,124,247
21	**Transmission Losses Levels 2 and 3 combined**	**1.028157**	**1.028157**	**2.738606%**	**6,003,000**		**164,399**		**3,334,899**	
25	Sales @ Primary (33kv - 2.4kv) Level 4	**1.131015**	1.097049	8.846390%	2,503,702		221,487		436,754	493,975
28	Secondary Sales @ the Transf. Level 5	**1.161769**	1.027192	2.647180%	1,845,461		48,853		640,746	744,399
31	Sales served by secondary lines Level 6	**1.166539**	1.004106	0.408905%	1,155,862		4,726		1,114,734	1,300,380
34	Total		1.078990	7.320754%	5,966,598	=	439,465	+	5,527,133	5,960,535
36	Composite Factor Levels 5 and 6	**1.164833**	1.029901	2.903288%	1,845,461		53,579		1,755,480	

SOUTHWESTERN PUBLIC SERVICE COMPANY
ENERGY LOSS FACTOR CALCULATION
12 MONTHS ENDING DECEMBER 2016

Loss Factor Calculation

Total Generation Inputs = 31,758,276,076 kWh

Line No.		(A) Loss Factor to Gross up to Gen	(B) Loss factor to gross up 1 level 1/(1-loss %)	(C) % loss by level	(D) KWH Flow into each level		(E) KWH Loss by Level		(F) KWH Sales by loss level	(G) Loss Check Loss fac X sales
12	Sales at the Generator @ Generation	**1.000000**	1.000000	0.000000%	31,758,276,076		0		8,295,082	8,295,082
15	Sales @ 115, 230 & 345 KV Level 2	**1.029633**	1.029633	2.877997%	31,749,980,994		913,763,470		13,821,244,766	14,230,809,712
18	Sales @ 69 KV Level 3	**1.035919**	1.006105	0.606835%	17,014,972,758		103,252,764		4,942,501,116	5,120,030,814
21	**Transmission Losses Levels 2 and 3 combined**	**1.033092**	**1.033092**	**3.203203%**	**31,749,980,994**		**1,017,016,234**		**18,763,745,882**	
25	Sales @ Primary (33kv - 2.4kv) Level 4	**1.105898**	1.067553	6.327826%	11,969,218,878		757,391,388		3,704,794,414	4,097,124,733
28	Secondary Sales @ the Transf. Level 5	**1.125047**	1.017315	1.702074%	7,507,033,076		127,775,281		3,205,486,688	3,606,323,182
31	Sales served by secondary lines Level 6	**1.128389**	1.002971	0.296182%	4,173,771,108		12,361,948		4,161,409,160	4,695,688,321
34	Total		1.064152	6.028491%	31,758,276,076	=	1,914,544,850	+	29,843,731,226	31,758,271,843
36								Check using rounded factors		-4,233
39	Composite Factors 5 & 6 to Gen.	**1.126935**	1.019023	1.866746%	7,507,033,076		140,137,228		7,366,895,848	

Loss factor calculation for gross up to a target level equals the product of loss factors for each level up through the target level.

Cost Impact Estimate Summary (Using Calendar Year 2018 data)

Line No.		Central Valley	Farmers	Lea County	Roosevelt	WTMPA	Golden Spread (Tri-County)	Golden Spread*	Total
1	**Production Demand**								
2	Current	$ 7,411,636	$ 3,870,853	$ 13,216,957	$ 1,516,124	$ 49,016,199	$ 5,483,249	$ -	$ 80,515,020
3	Proposed	7,370,042	3,852,157	13,150,440	1,507,465	48,859,356	5,462,471	-	80,201,932
4	Change	$ (41,594)	$ (18,697)	$ (66,517)	$ (8,660)	$ (156,843)	$ (20,778)	$ -	$ (313,088)
5									
6	**Production - Energy & Fuel**								
7	Current	$ 15,289,781	$ 4,635,246	$ 21,730,993	$ 2,245,149	$ 74,689,469	$ 9,880,499	$ -	$ 128,471,138
8	Proposed	15,365,731	4,664,705	21,837,680	2,259,011	74,932,072	9,913,327	-	128,972,525
9	Change	$ 75,950	$ 29,459	$ 106,687	$ 13,862	$ 242,603	$ 32,827	$ -	$ 501,387
10									
11	**Total Production**	$ 34,356	$ 10,762	$ 40,169	$ 5,202	$ 85,760	$ 12,049	$ -	$ 188,299
12									
13	**Transmission**								
14	Current	$ 7,263,150	$ 3,772,194	$ 12,045,284	$ 1,541,995	$ 32,393,247	$ 3,652,788	$ 52,124,076	$ 112,792,734
15	Proposed	7,235,627	3,757,899	11,999,638	1,536,152	32,276,237	3,638,946	51,929,209	112,373,708
16	Change	$ (27,524)	$ (14,295)	$ (45,645)	$ (5,843)	$ (117,010)	$ (13,842)	$ (194,868)	$ (419,027)
17									
18	**Total Transmission**	$ (27,524)	$ (14,295)	$ (45,645)	$ (5,843)	$ (117,010)	$ (13,842)	$ (194,868)	$ (419,027)
19									
20	**Total Change**	$ 6,833	$ (3,533)	$ (5,476)	$ (641)	$ (31,250)	$ (1,793)	$ (194,868)	$ (230,728)
								Total % Change	-0.072%

* Column represents Golden Spread loads where no wholesale power requirements are supplied by SPS. These loads incur only network transmission service and local distribution facilities charges.

Exhibit No. SPS-0004

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Southwestern Public Service Company	**)**	**Docket No. ER19-____-000**
	)	

DIRECT TESTIMONY
OF
DUANE J. RIPPERGER

ON BEHALF OF
SOUTHWESTERN PUBLIC SERVICE COMPANY

JANUARY 30, 2019

Exhibit No. SPS-0004

DIRECT TESTIMONY OF DUANE J. RIPPERGER

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EXHIBITS TO
DIRECT TESTIMONY OF DUANE J. RIPPERGER

Exhibit No.	**Description**
SPS–0005	SPS's 2016 Transmission and Distribution System Loss Evaluation Study

Exhibit No. SPS-0004

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Southwestern Public Service Company	**)**	**Docket No. ER19-____-000**
	)	

Summary of the Direct Testimony of Duane J. Ripperger

Mr. Ripperger discusses SPS's 2016 Transmission and Distribution System Loss Evaluation Study (the "2016 Loss Study") conducted for the period from January 1, 2016 through December 31, 2016 ("Study Period") and completed in July 2017. The 2016 Loss Study is the basis for the updated wholesale loss factors proposed by SPS in this proceeding.

DIRECT TESTIMONY OF

DUANE J. RIPPERGER

I. INTRODUCTION AND EXPERIENCE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Duane J. Ripperger. My business address is 790 S. Buchanan Street, Amarillo, Texas 79101.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?

A. I am filing testimony on behalf of Southwestern Public Service Company, a New Mexico corporation ("SPS") and wholly-owned electric utility subsidiary of Xcel Energy Inc. ("Xcel Energy").

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?

A. I am employed by Xcel Energy Services Inc. ("XES") as Manager, Regional Transmission Initiatives.

Q. PLEASE BRIEFLY DESCRIBE YOUR DUTIES AS MANAGER, REGIONAL TRANSMISSION INITIATIVES.

A. I am responsible for supporting the implementation of strategic transmission priorities. These priorities include the planning for large electric transmission projects, support of transmission-related regulatory activities, and the implementation of evolving technologies on the transmission grid.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND.

A. I earned a bachelor's degree in Electrical Engineering from Iowa State University and a master's degree in Engineering Management from the University of Colorado.

Q. PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE.

A. I have 34 years of experience in the electric utility industry obtained through various engineering and management assignments. I have been employed by SPS or XES since June 1984. I have held positions in distribution engineering, electrical operations, transmission and distribution planning, asset management, and most currently in transmission project planning and public policy.

Q. DO YOU HOLD A PROFESSIONAL LICENSE?

A. Yes. I am currently licensed as a Professional Engineer in the states of New Mexico, Texas, and Colorado.

Q. ARE YOU A MEMBER OF ANY PROFESSIONAL ORGANIZATIONS?

A. Yes. I am a senior member of the Institute of Electrical and Electronics Engineers.

Q. HAVE YOU TESTIFIED BEFORE ANY REGULATORY AUTHORITIES?

A. Yes. I filed testimony with the Public Utility Commission of Texas ("PUCT") on behalf of SPS regarding: transmission capital additions in Docket No. 46877, SPS's 2017 proceeding to adjust its Transmission Cost Recovery Factor; and the 2016 System Loss Study and the 2017 Radial line study in Docket No. 47527, SPS's 2017 Texas base rate case. I have also filed testimony with the New Mexico Public Regulatory Commission ("NMPRC") on behalf of SPS regarding the 2016 System Loss Study and the 2017 Radial line study in Case No. 17-00255-UT, SPS's 2017 New Mexico base rate case. Additionally, I filed affidavit testimony with the Federal Energy Regulatory Commission ("FERC") regarding a filing by the Southwest Power Pool, Inc. ("SPP") in FERC Docket No. ER18-2358-000.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE SCOPE OF YOUR DIRECT TESTIMONY?

A. I will discuss the results of SPS's 2016 Transmission and Distribution System Loss Evaluation Study (the "2016 Loss Study") conducted for the period from January 1, 2016 through December 31, 2016 ("Study Period") and completed in July 2017. The 2016 Loss Study is the basis for the updated wholesale loss factors proposed by SPS in this proceeding. Exhibit No. SPS-0005 is a copy of the 2016 Loss Study, which consists of a narrative explanation of the study results and numerous detailed work papers.

Q. WAS YOUR DIRECT TESTIMONY PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION?

A. Yes.

III. SPS'S 2016 LOSS STUDY

Q. WHAT IS A LOSS STUDY?

A. A loss study is an engineering evaluation of the transmission and distribution ("T&D") losses incurred on an electrical system for a specified period of time. The goal of such a study is to determine where the losses have occurred, that is, on what T&D elements (transmission lines and transformers, distribution lines and transformers, and Generator Step Up transformers) the losses occur and to then properly allocate the losses to each individual type of element of the system. The losses determined in an engineering evaluation should reasonably match losses derived from accounting records comparing energy deliveries and energy supplies into the T&D system. After the losses have been determined, loss factors representing the T&D losses on specific voltage levels of the system are developed for rate making purposes.

Q. WHY DID SPS PREPARE THE 2016 LOSS STUDY?

A. The previous SPS loss study had been completed utilizing data from July 1, 2012 through June 30, 2013 ("2013 Loss Study"), and loss factors based on this study were incorporated in the Xcel Energy Open Access Transmission Tariff ("Xcel Energy Tariff") in Docket No. ER16-1030-000 effective May 1, 2016. The SPS system has experienced several significant changes since 2013, including implementation of the SPP Integrated Marketplace, installation of new 345 kV transmission facilities by SPS, and increased wind and solar generation. SPS concluded it would be appropriate to perform a new Loss Study. Additionally, SPS committed to perform a new loss study that would cover a study period ending no later than December 31, 2016 in both NMPRC Case No. 14-00348-UT and in the Non-Unanimous Stipulation in PUCT Docket No. 42004.

Q. HOW DOES THE 2016 LOSS STUDY COMPARE TO THE 2013 LOSS STUDY?

A. During the Study Period, energy supplies (*i.e.*, "Resources") and energy deliveries ("Sales")[1] were lower in absolute terms than in the 2013 Loss Study. As a percentage of SPS's total Resources, however, actual losses in the 2016 Loss Study were slightly higher than in the 2013 Loss Study. The losses calculated in the 2016 Loss Study are 1,948,829 megawatt hours ("MWh"), which is only 1.79% more than the actual losses of 1,914,545 MWh, i.e., calculated losses equal 101.79% of actual losses.

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[1] The sum of energy SPS sold to customers and delivered to interconnections with other utilities at the points the energy left the SPS transmission and distribution system, collectively "Sales." "Sales" thus include deliveries of power produced by suppliers other than SPS to transmission-only customers.

The following Table DJR-1 compares data and results from the 2013 and 2016 Loss Studies.

Table DJR-1
Comparison of 2013 and 2016 Loss Study Data[2]

Subject	2013 Loss Study	2016 Loss Study
Total Resources	32,964,320 MWh	31,758,276 MWh
Total Sales	31,142,401 MWh	29,843,731 MWh
Actual Losses	1,821,919 MWh	1,914,545 MWh
Overall Loss Percentage	5.53%	6.03%
Calculated Losses	1,836,997 MWh	1,948,829 MWh
Calculated Losses as % of Actual Losses	100.83%	101.79%
Undeterminable Losses	-15,079 MWh	-34,284 MWh
Peak Load	6,079 MW	6,003 MW

Q. DID YOU PARTICIPATE IN THE PREPARATION OF THE 2016 LOSS STUDY?

A. Yes. I participated in the preparation of the 2016 Loss Study and oversaw its completion. Several SPS and XES staff provided the necessary data updates required for the 2016 Loss Study.

[2] Data presented are rounded, which may result in calculations not totaling properly. Loss study spreadsheets frequently display rounded data, but use the unrounded data in the calculations.

Q. HAS SPS SUBMITTED THE 2016 LOSS STUDY TO ITS STATE REGULATORY AGENCIES?

A. Yes. As discussed in the Direct Testimony of Mr. Wesley L. Berger, SPS submitted the 2016 Loss Study to the PUCT and the NMPRC, and these commissions accepted the loss factors derived from the 2016 Loss Study in orders issued in 2018. SPS proposes to revise the wholesale real power loss percentages set out in the Xcel Energy Tariff to be consistent with the 2016 Loss Study and the loss factors used to calculate retail rates to provide consistency across SPS's three jurisdictions (FERC, Texas and New Mexico).

Q. WHAT ARE ELECTRICAL "LINE LOSSES"?

A. As electrical current flows from a generation source to customers' loads, it passes through wires and transformers that have an inherent electrical resistance to the flow of electricity. This electrical resistance causes some of the energy flowing in the system to be converted to heat and is, thereby, "lost." Total losses are the difference between the electrical energy put onto the T&D system and the electrical energy that was either sold to customers or delivered to exit points on the utility's T&D system. For example, if a utility generates 1,000 MWh and experiences overall losses of 6%, it will deliver only 940 of the 1,000 MWh generated. The 60 MWh difference between the amounts generated and delivered to customers are the T&D losses. Such losses are an inherent characteristic of a properly functioning electrical system and are unavoidable.

Q. IN YOUR EXAMPLE, WOULD EACH TYPE OF CUSTOMER CAUSE THE UTILITY TO LOSE 6% OF THE ENERGY GENERATED?

A. No, not generally, and not on SPS's system. In order for electricity to reach a typical residential customer, it must flow from the generator through generation unit main

transformers, then through bulk transmission lines and related autotransformers, then through transformers at a distribution substation, then through primary distribution lines, then through a pole top transformer, then through a secondary distribution line from the pole top transformer to a pole behind the residence, and finally through a service line from the pole to the meter on the side of the house. At each step, losses are incurred to serve the residential customer.

By contrast, to reach a wholesale or industrial customer taking service at 230 kilovolts ("kV"), the electricity has to flow through only the generation unit main transformer, some bulk transmission lines, and a 345/230 kV autotransformer. None of the losses incurred at distribution substations, primary distribution lines, distribution transformers, secondary lines, and service lines are experienced in serving an industrial customer taking service at transmission voltage. Thus, in general, customers taking service at higher voltages cause fewer losses to be incurred than do customers taking service at lower voltages.

On the SPS system, customers take service at multiple voltages ranging from 230 kV to 120 volts. For example, on the SPS system, a wholesale customer may take service at transmission voltages from 230, 115, or 69 kV. Wholesale customers may also take service at various distribution voltages from 34 to 2.4 kV. A wholesale customer taking service at a transmission voltage should only be required to pay for the losses incurred as the power moves from the generators through the transmission system (or through the distribution system for wholesale loads served at distribution voltage).

Q. DO UTILITIES IN GENERAL, AND SPS IN PARTICULAR, HAVE METERS INSTALLED AT EACH STEP IN THE ELECTRICAL FLOW DESCRIBED ABOVE SO THAT LOSSES AT EACH STEP CAN BE MEASURED?

A. No. In general and on SPS's system, meters exist at generators, at locations where SPS's transmission lines interconnect with transmission lines of other utilities, and at points of delivery to customers. Thus, SPS can use meters to measure the total electrical energy placed on its T&D system, whether from generators located within or outside its system, and the total energy Sales. The difference between total Resources and total Sales is the actual loss incurred.

Given that meters do not exist at each step at which losses are incurred, a loss evaluation study is performed to quantify, through engineering analysis and calculations, the power and energy losses that occurred at the different loss levels on the T&D system during the study period. The calculated loss values for each loss level are used with the undeterminable losses (discussed later) to assign the proper portion of actual losses to Loss Level 2 through Loss Level 6 discussed below.

Q. WHAT CIRCUIT ELEMENTS OF SPS'S ELECTRICAL SYSTEM WERE ANALYZED IN THE 2016 LOSS STUDY?

A. The circuit elements analyzed were: (1) the transmission lines, (2) the transmission autotransformers, (3) the distribution substation transformers, (4) the distribution primary feeder circuits, (5) the distribution line transformers, and (6) the distribution secondary lines and service lines.

Q. YOU STATED THAT THE 2016 LOSS STUDY CALCULATES LOSSES AT SEVERAL LEVELS. PLEASE IDENTIFY THE LOSS LEVELS AND THE CIRCUIT ELEMENTS CONTAINED IN EACH LOSS LEVEL.

A. Loss Level 1 is the generator and generator step-up transformer and no losses are calculated at this level because the Backbone Transmission is considered the delivery point of the electricity from the generator. Loss Levels 2 through 6 and the circuit elements in each loss level are identified below.

Loss Level 2 – Backbone Transmission

- Bulk transmission lines (345 kV, 230 kV, and 115 kV); and
- Autotransformers (345/230 kV and 230/115 kV).

Loss Level 3 – Sub-Transmission

- 69 kV transmission lines; and
- Autotransformers (115/69 kV).

Loss Level 4 – Distribution Primary

- Transformers located at distribution substations; and
- Primary Distribution Lines ("feeders") (34.5 kV – 2.4 kV).

Loss Level 5 – Distribution Secondary Transformers

- Transformers located on primary distribution lines.

Loss Level 6 – Distribution Secondary and Service Lines

- Secondary distribution lines running from Level 5 transformers to other poles or service points and service lines running to the customers' premises.

The losses at Levels 5 and 6 are combined to create a "Distribution Secondary" classification.

Q. YOU NOTED THAT THE 2016 LOSS STUDY COVERED A 12-MONTH PERIOD. IS IT APPROPRIATE TO PERFORM A LOSS EVALUATION STUDY OVER A PERIOD SHORTER THAN 12 MONTHS?

A. In general, no. The loss evaluation study must correlate energy generated and purchased for customers with Sales to those customers. SPS bills some customers every normal business day of each month. Customers are usually billed once per month; however, the billing period start and end dates do not always respect the calendar month boundary. The billing period may cover part of a previous calendar month or may only cover part of the current month, with no overlap into a previous month. When all Sales are totaled and compared to that billing month's generation and power purchases, there will be a difference, which may be a positive or a negative number. This difference does not necessarily reflect the actual losses incurred on the T&D system during this billing month. This precludes doing a loss evaluation study for a short period of time.

Q. HOW DOES A LONGER TIME PERIOD AID IN PREPARING A LOSS STUDY?

A. By using a longer time period, such as one year, the effects of the different customer billing cycles are minimized. I would note that the previous 2009 and 2013 loss studies used to update the SPS loss factors included in the Xcel Energy Tariff in 2012 (Docket No. ER12-1682-000) and 2016 (Docket No. ER16-1030-000) also used historic one year study periods.

Q. DID THE 2016 LOSS STUDY CONSIDER LOSSES OF CUSTOMERS OPERATING THEIR OWN TRANSMISSION AND/OR DISTRIBUTION SYSTEMS?

A. No. SPS evaluated losses up to the customers' meters but not beyond, because SPS does not incur the losses that occur beyond the customers' meters.

Q. PLEASE DESCRIBE THE METHODOLOGY USED TO DETERMINE THE TRANSMISSION SYSTEM LOSSES.

A. For peak demand losses, the 2016 summer peak was modeled with powerflow studies and the losses per circuit element were tabulated and grouped by voltage category. Any loss contribution due to no-load losses was also calculated. For energy losses, the Study Period was divided into four time segments consisting of whole months, and average loads were computed for each time segment. Powerflow studies determined the losses for each circuit element for the average load during each of the four segments. The average loss per circuit element was determined and multiplied by the hours in the load segment to determine the energy losses. The months included in each load segment are identified in Appendix A of Exhibit No. SPS-0005.

Q. WHAT ARE "NO-LOAD LOSSES"?

A. Whenever a transformer is energized, a relatively small loss occurs even during hours when no load current is passing through the transformer. These losses are referred to as "no-load losses." Since transformers are typically energized every hour of the year, no-load losses must be calculated for each transformer in order to accurately estimate losses incurred at each transformer location.

Q. WHERE ARE TRANSMISSION LEVEL LOSSES DISCUSSED IN THE 2016 LOSS STUDY?

A. The circuit elements (i.e., lines and transformers) of the transmission system are identified in Section 1.1 of Exhibit No. SPS-0005, and the process for calculating transmission level losses for each type of circuit element is discussed in Sections 4 through 5.

Appendix M of Exhibit No. SPS-0005 presents a summary of losses for each type of circuit element at both transmission and distribution levels.

Energy losses by level are stated in Appendix O of Exhibit No. SPS-0005 in the column labeled "kWh Loss by Level" and Levels 2 and 3 are the transmission voltage levels.

Losses for individual transmission circuit elements are tabulated in Appendices E, F, and G of Exhibit No. SPS-0005.

The summary results of the powerflow studies are in Appendix N of Exhibit No. SPS-0005.

Q. PLEASE DESCRIBE THE METHODOLOGY USED TO DETERMINE THE DISTRIBUTION SYSTEM LOSSES.

A. Peak demand and energy losses were calculated for the elements in the distribution system and accumulated based on a typical representation of SPS's distribution system. Losses were calculated for the distribution substation transformer, the primary feeders, the secondary system (including distribution transformers), and the service lines to the customers. The annual energy loss was determined by calculating annual energy loss per

distribution element and summing up the total energy loss. Similarly, demand losses were determined on each component of the distribution system and aggregated.

Q. WHERE ARE DISTRIBUTION LEVEL LOSSES DISCUSSED IN THE 2016 LOSS STUDY?

A. The circuit elements (i.e., lines and transformers) of the distribution system are identified in Section 1.1 of Exhibit No. SPS-0005, and the process for calculating losses for each type of circuit element is discussed in Sections 6 through 10.

Appendix M of Exhibit No. SPS-0005 presents a summary of losses for each type of circuit element at both transmission and distribution levels.

Energy losses by level are stated in Appendix O of Exhibit No. SPS-0005 in the column labeled "kWh Loss by Level" and Levels 4, 5, and 6 are the distribution voltage levels.

Losses for individual distribution circuit elements are tabulated in Appendices I, J, K, and L of Exhibit No. SPS-0005.

Q. WHAT ARE THE RESULTS OF THE 2016 LOSS STUDY?

A. Total actual losses for the Study Period were 1,914,545 MWh, and the losses determined through the 2016 Loss Study's engineering analysis were 1,948,829 MWh. The undetermined losses are the difference, -34,284 MWh, which is -1.79% of the actual losses. See Appendix M of Exhibit No. SPS-0005, Line No. 44 for total actual losses, Line No. 42 for total determined losses, and Line No. 43 for undeterminable losses.

Q. CAN YOU DETERMINE THE REASON FOR THE -34,284 MWH DIFFERENCE BETWEEN THE LOSSES CALCULATED IN THE 2016 LOSS STUDY AND THE ACTUAL LOSSES INCURRED?

A. No. Undeterminable losses are equal to the Total Actual Losses minus the Total Determined Losses (calculated losses). The -34,284 MWh of undeterminable losses cannot be assigned to any particular cause. A loss evaluation study is an engineering analysis of line losses attributable to average electrical loadings of particular components of the T&D system. There is always a difference between the actual and calculated losses, which can be positive or negative, between the results of a computer analysis using average loads and the actual line losses experienced. The small 1.79 percent difference between the actual losses and calculated losses indicates the 2016 Loss Study reasonably represents the losses on the SPS T&D systems.

Q. ARE UNDETERMINABLE LOSSES TAKEN INTO ACCOUNT IN DETERMINING LOSS FACTORS?

A. Yes. The loss factors must be based on actual losses to ensure correct fuel factors. Thus, the undeterminable losses, whether positive or negative, are assigned to the circuit elements for which losses have been calculated in the study based on the ratio of each circuit element's calculated loss to the total of all calculated losses. The results of this assignment process appear in Appendix M of Exhibit No. SPS-0005 in the "Adjusted Energy MWH" and "Factored KWH" columns. The totals for those columns tie to the Total Losses on Line No. 66 of Appendix A of Exhibit No. SPS-0005.

Q. DID ANY OF THE DATA OR METHODS USED TO CALCULATE LOSSES IN THE APPENDICES OF THE 2016 LOSS STUDY CHANGE FROM THE DATA USED IN THE 2013 LOSS STUDY?

A. Yes, there are always changes in data from one study to the next. Changing the Study Period changes much of the data, e.g. generation amounts, power purchases, peak load, powerflow case results, Sales data, miles of T&D lines, customer meter counts, etc. The updated data are reflected in the appendices of the 2016 Loss Study.

The SPS T&D systems modelled in the 2016 Loss Study have experienced four major changes since the 2013 Loss Study.

- First, there was significantly more wind and solar generation connected to SPS's transmission system in 2016 than in 2013. The effect of this additional generation injecting power into the transmission system at different locations than in the past has a significant effect on losses.

- Second, a significant amount of wind and solar generation has been connected to the SPS distribution system since the 2013 Loss Study. This wind and solar generation delivers energy directly to the distribution system in contrast to the historical norm of nearly all the energy flowing through the transmission system into the SPS distribution system.

- Third, three new 345 kV lines that significantly strengthen the SPS connection to the rest of the SPP grid were placed in service in 2014. The installation of these transmission lines has allowed SPS and other wholesale load serving entities ("LSEs") on the SPS system to purchase significant amounts of low-cost energy from the SPP Integrated Marketplace and import that power into the SPS system. These imports could significantly change the flows on the SPS transmission system and therefore affect losses.

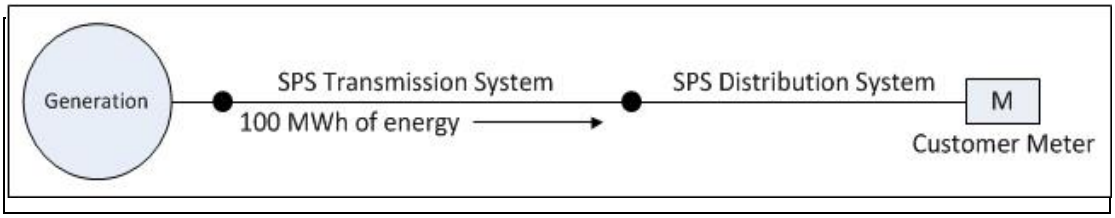
- Fourth, there have been changing patterns of power delivery on SPS's system. Recently, SPS has been transmitting more wholesale customer-procured power than in the past.

Q. DID ANY OF THE METHODOLOGIES USED TO CALCULATE LOSSES IN THE APPENDICES OF THE 2016 LOSS STUDY CHANGE FROM THE METHODOLOGIES USED IN THE 2013 LOSS STUDY?

A. Yes. While the majority of the fundamental methodologies did not change, the increase in generation connected to the SPS distribution system from 2013 to the present Study Period has required a change in study methodology to accurately account for losses.

In previous studies, nearly all the generation was connected to the transmission system and the generated energy flowed through the transmission system to the distribution system. This energy flow scenario is shown graphically in Figure DJR-1:

Figure DJR-1
Historical SPS Energy Flow

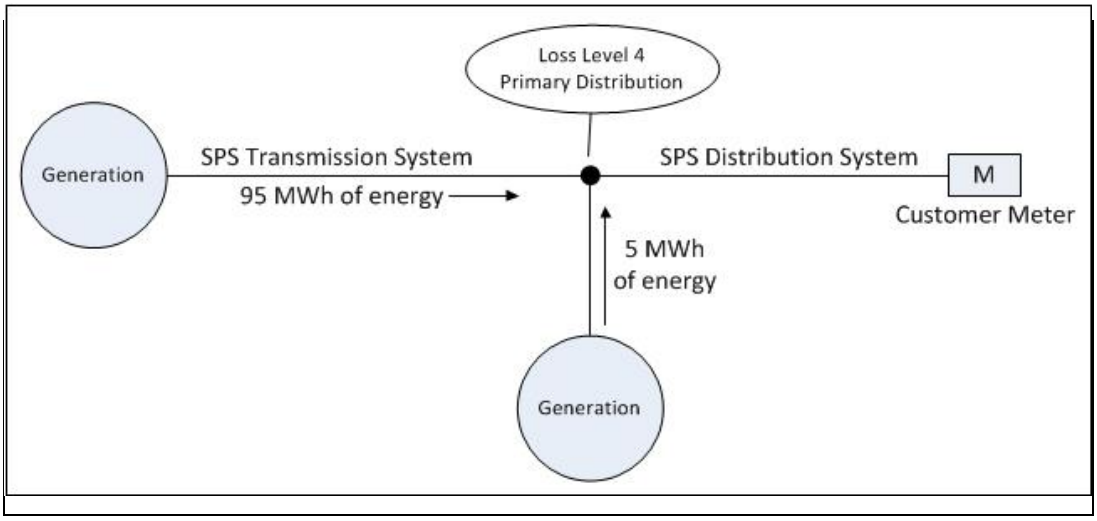


In Figure DJR-1, 100 MWh of energy flows through the transmission system to the distribution system, resulting in transmission losses in proportion to the 100 MWh flow of energy.

In the 2016 Loss Study, a significant amount of generation had been connected to the SPS distribution system, delivering energy directly to the distribution system. In this simplistic example, the energy delivered directly to the distribution system does not cause losses in the transmission system, resulting in lower transmission losses than in the scenario shown in Figure DJR-1. This new energy flow scenario is shown graphically in Figure DJR-2 (next page):

Figure DJR-2

2016 Loss Study Energy Flows



In Figure DJR-2, only 95 MWh of energy flows through the transmission system to the distribution system, while 5 MWh of energy is generated and delivered directly to the distribution system. This scenario results in transmission losses from only 95 MWh of energy flow instead of 100 MWh as in the first scenario.

In the 2016 Loss Study, the significant increase in generation connected directly to the distribution system necessitated a change in the study methodology to account for this change in the energy flows. The Loss Study now includes data in Appendix B of Exhibit No. SPS-0005 that summarizes the energy and demand delivered directly to the distribution system. Updates were made to the spreadsheets in the Excel workbook to reflect this change in flows so that the resulting loss calculations are accurate. The methodology used in the 2016 Loss Study shows the generation connected to the distribution system flowing into the distribution system at the low voltage side of the distribution substation transformer.

Q. WAS THERE ANY CHANGE IN THE TREATMENT OF WHOLESALE TRANSACTIONS WITH ENTITIES OUTSIDE OF SPS'S SERVICE AREA?

A. No. The same net metering approach was used in the 2016 Loss Study as was used in the 2013 Loss Study.

IV. CALCULATION OF LOSS FACTORS

Q. WHAT ARE "LOSS FACTORS"?

A. A loss factor is simply a number, which when multiplied by a given amount of Sales, yields the amount of energy that must be generated to produce the Sales amount. If, for example, losses at a specific service level are 10%, then 100 MWh have to be generated to yield 90 MWh of Sales. Thus, the loss factor at that level is 1.1111 (90 MWh sold x 1.1111 loss factor = 100 MWh generated).

Q. DOES THE 2016 LOSS STUDY CONTAIN CALCULATED LOSS FACTORS?

A. Yes. The Energy Loss Factor and the Demand Loss Factor for each SPS loss level are shown in Appendices O and P of Exhibit No. SPS-0005. Loss factor derivation is discussed in Section 12.0 of Exhibit No. SPS-0005. These loss factors were calculated using the same methodology as in previous loss studies.

In his Direct Testimony, Mr. Berger discusses the necessary adjustments to the results of the 2016 Loss Study he made to arrive at the real power loss factors (stated on a loss percentage basis) SPS is proposing in this filing to include in the Xcel Energy Tariff.

V. CONCLUSION

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

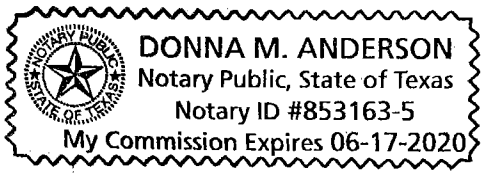
A. Yes.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Southwestern Public Service Company	)	**Docket No. ER19-____-000**
	)	

AFFIDAVIT

Duane J. Ripperger, being duly sworn, deposes and states: that the Direct Testimony of Duane J. Ripperger was prepared by me or under my direct supervision, and that the statements contained therein are true and correct to the best of my knowledge and belief.



Duane J. Ripperger

Subscribed and sworn before me this 29th day of January 2019.

Donna M. Anderson
Notary Public
My commission expires: 6/17/2020

Southwestern Public Service Company

2016 Loss Evaluation Study

January – December 2016

SPS Transmission Planning
Xcel Energy Services, Inc.

July 2017

Southwestern Public Service Company
Loss Evaluation Study for 2016 Study Period

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1.0 Overview

This report discusses an evaluation of transmission and distribution system losses for the 12 month period January – December 2016 (2016 Study Period). This evaluation was designed to be as introspective as technically possible and provide a significant level of confidence in determining the electrical losses on the Southwestern Public Service (SPS) transmission and distribution systems. This evaluation determines actual losses and then uses engineering principles to calculate both demand and energy losses at specific voltage levels.

SPS operates an electrical system consisting of 345 kV, 230 kV, 115 kV and 69 kV transmission lines and a distribution system with lines operating at 33 kV to 2.4 kV. The system spans a large 52,000 square mile area from the Oklahoma panhandle through the Texas panhandle and into eastern and southeastern New Mexico. SPS has generation on both 230 kV and 115 kV busses throughout this area. Since 2009 SPS and other power producers have installed significant wind and solar generation within the SPS boundary. Most of this generation is connected at transmission voltage levels and some at distribution primary voltage levels. The scope of this study was to determine the demand and energy losses for the following components:

Transmission System Components:

- Generation Unit Main Transformers
- Transmission Lines
- Autotransformers

Distribution System Components:

- Distribution Substation Transformers
- Distribution System, including Primary, Secondary and Service Lines
- Transformers

The losses related to these elements of the power system are frequently seen in accounting reports as "Unaccounted For Energy." The purpose of this study is to determine actual losses and then specifically assign losses by the components identified above for the 2016 Study Year.

The losses of customer-operated transformers, transmission systems and distribution systems are not considered in this study. Any losses occurring in auxiliary busses at power plants are not considered in this study.[1] Also, losses related to the generator step-up transformers are not included since net generation is recorded at the high voltage side of these transformers.

The analysis of losses requires consideration of both demand, or power, losses and energy losses. The demand losses are typically measured in megawatts (MW), kilowatts (kW), or watts. The energy losses are measured in megawatt-hours (MWh), kilowatt-hours (kWh), or watt-hours (Wh). Certain components of the energy losses are present even though there is very low electrical load passing through the device. An example of this is the magnetizing current and related losses of a transformer. After the transformer is energized, these losses will occur. Power flow through the transformer will increase the losses, but even in the absence of any power flow, the transformer will experience “no-load losses” simply because it is energized.

To provide a basis for the calculations in this study, data was gathered for the transmission and distribution systems. This data and associated calculations are shown in the Appendices of Attachment DJR-RD-2. All references in this document to a specific appendix are found in Attachment DJR-RD-2. Each Appendix corresponds to a section of the total loss calculation or provides data used in other appendices. Actual counts exist for the devices and miles of electric lines that cause losses at the transmission level. The calculation of losses at the transmission level involves very little engineering judgment. Actual counts of devices and line data exist for much of the

distribution system as well. In some cases, however, data does not exist for the distribution system and engineering approximations or judgments must be and were made to determine losses at specific voltage levels. These approximations are noted in the discussion.

1.1 Loss Levels

The energy losses for each physical category (lines, transformers, etc.) are grouped by the six Loss Levels. These Loss Levels, which are shown in Appendix H, are:

Loss Level 1 - Generation
Loss Level 2 – Backbone Transmission
Loss Level 3 – Sub - Transmission
Loss Level 4 - Primary Distribution
Loss Level 5 - Secondary Distribution Transformers
Loss Level 6 - Secondary Distribution Lines

Losses are not calculated at Level 1. The other levels are composed of the following physical loss categories:

Loss Level 2 – Backbone Transmission
- 345 kV, 230 kV and 115 kV Transmission Lines
- 345/230 kV, 230/115 kV Autotransformers

Loss Level 3 – Sub - Transmission
- 69 kV Lines
- 115/69 kV Autotransformers

Loss Level 4 - Primary Distribution
- Distribution Substation Transformers
- Distribution Primary Lines (33 kV to 2.4 kV lines)

Loss Level 5 - Secondary Distribution Transformer
- Distribution Line Transformers

Loss Level 6 - Secondary Distribution Lines

[1] Auxiliary busses are distribution busses which provide internal power plant distribution service for internal power

Distribution Secondary and Service Lines

Transmission losses are those at Levels 2 and 3. Losses attributable to distribution facilities are those calculated for levels 4, 5 and 6. In setting loss factors for rate classes, the losses calculated at levels 5 and 6 are combined and a composite loss factor is determined.

The results of the 2016 Loss Evaluation Study are shown in Appendix M and the rate class loss factors derived from the study are in Appendix Q.

1.2 Determination of Actual Losses

Appendix A contains the determination of actual losses measured in MWh for the total transmission and distribution system based on 2016 Study Period operating data. The general definition of losses is the difference between the total resources and total deliveries. Specifically, the Total Resources, shown in Appendix A, are:

Net Generation (line 6) – metered output of SPS's generating plants

Net Metered SPP Interchange and WECC HVDC Interchange (lines 7 & 8) – metered physical flows at all interchange tie points with the Southwest Power Pool (SPP) and the Western Electric Coordinating Council (WECC). Wherever SPS's transmission system interconnects with transmission systems of other utilities in the SPP or WECC, meters exist and data are captured to determine the energy either flowing into or out of SPS's system. The net flows into or out of the SPS system at these boundaries account for any purchases made from, or sales made to, entities outside the SPS boundary. In addition, if third parties enter into a sale and purchase transaction and SPS's transmission system is used to deliver power, the net metered flows at SPS's boundaries will reflect the

plant equipment (i.e. water wells, internal plan equipment, plant controls, pumps, etc.).

use of the transmission system by recording the inflow and the corresponding outflow. This process of calculating the net flows into or out of SPS's system is referred to as "net metering."

Firm Purchased Power

BEA, LPP (line 11) – SPS purchases energy pursuant to the contracts with Borger Energy Associates and Lea Power Partners, LLC.

LPL Generation (line 12) – SPS has a full requirements sales contract with West Texas Municipal Power Agency (WTMPA), an entity established by the cities of Lubbock, Tulia, Brownfield, and Floydada. SPS also contracts with the City of Lubbock to purchase the output of three Lubbock generating plants that operate only when requested by SPS. This generation is located within the Lubbock Power & Light (LPL) network and no SPS loss is attributable to this power. Line 12 is the total Lubbock generation during the 2016 Study Period.

Others (line 13) – SPS purchases relatively small amounts of energy from a number of other entities located within its system boundary pursuant to firm contracts. The collective purchases under these contracts are reported on this line.

Renewable Energy Purchases (lines 14-21) – these are energy purchases from renewable sources that have firm network transmission service.

Other Generation inside the SPS Boundary

Golden Spread Electric Cooperative (GSEC) owns the Mustang Plant near Denver City, Texas, and Antelope and Elk Stations located near Abernathy, Texas. GSEC has also purchased the output of the Panhandle Wind Ranch. Lines 23-27 show the GSEC resource outputs

for the 2016 Study Period. Since the GSEC generation is within SPS's boundary, its generation must be included in total area resources to prevent an under-statement of resources due to the net metering process described above.

Lea County Electric Cooperative (LCEC) Generation

This is renewable and fossil generation output that is connected to LCEC's 115 kV transmission line from SPS Hobbs Plant to SPS Denver City Substation. This is shown on lines 29-31.

Farmer's Electric Cooperative (FEC) Generation

This renewable generation is connected to FEC's transmission system and the value reported is the excess generation above FEC's load that flows back onto the SPS transmission system. This is shown on lines 33-34.

Export Renewables

The output of these renewable generators is scheduled or purchased by other companies outside of the SPS boundary. These energy values are shown on lines 36-42,

SPS Non-Firm Purchased Power

Lines 44-50 represent the output of various generators that are being purchased by SPS and flow onto the SPS transmission system.

Market Renewables

Lines 52-56 represent generators located within SPS's boundary sending power over SPS's transmission lines into the SPP Energy Market. Like GSEC's generation, this generation must be included in SPS's total

resources to prevent an under-statement of resources due to the net metering process described above.

The sum of these resources is the "Total Resources" (line 58) available on SPS's system for serving customer load within its system boundary.

Total Deliveries (line 64) consists of all retail sales, all full requirements wholesale sales within the system boundary, and all deliveries to Golden Spread load points within the system boundary.

Total Losses (line 66) are the actual losses experienced during the 2016 Study Period. Total Losses are calculated by subtracting the Total Deliveries on line 64 from the Total Resources on line 58. This value of Total Losses is the value that will be used to generate the loss factors by voltage level.

SPS's Total System Loss percentage during the 2016 Study Period is shown on line 67. This value is derived by dividing Total Losses (line 66) by Total Resources (line 58).

The "Net Output to Lines by Load Segment" data (lines 77-89) are simply the sums of monthly values for "Net Output to Lines" (line 74) for the months contained in each segment. The determination of segments is discussed in Section 3.1 and the Net Output to Lines by Load Segment data are used in determining transmission line losses in Section 4.3.

1.3 Distribution Connected Generation Sources

Appendix B contains a list of distribution-connected resources that deliver power directly onto the SPS distribution system at the primary level. These resource values

are used in the calculation of losses on the distribution system, specifically in Appendix J – Distribution Primary Loss.

2.0 Generation Step-Up Transformer Losses

Losses attributable to these transformers are included in station power and are not part of this study.

3.0 System Load Analysis

To determine the transmission line and autotransformer losses, it is necessary to perform powerflow studies at different system load levels throughout the year. The system loading levels must be determined before these studies can be done. For the period under study, the system loads are obtained from the operations center. The load represented in these studies is a composite of SPS retail load, GSEC and other wholesale loads within the SPS system boundary.

Any other sale or purchase of energy that either started in or was received into the SPS boundary, and including any through transactions from the east to west or west to east across the SPS system between the eastern and western grids are included when the powerflow models are developed to capture any transmission losses due to those transactions.

SPS's daily minimum and maximum load are summed to produce a daily average load. Then the corresponding values for tie line flows are obtained and summed for the same hour. This produces a daily minimum and daily maximum load to be analyzed. The results of this procedure are shown in Appendix D – System Load Data 6, Daily Maximum/Minimum Loads graph.

3.1 Segment Derivation

The daily maximum and minimum loads are still too detailed for the powerflow analysis, since there are 366 minimum and 366 maximum values for each load (2016 is a leap year). The next step is to produce a daily average load graph. The Average Value Analysis graph is shown in Appendix D – System Load Data 6. The average load is graphed for the study period. Then an average study value is fit to the graph. The goal of this fit is to minimize the sum of the errors between the average load values to be used in the study and the actual daily average load. Once this has been determined, the year can be broken into load segments which will be modeled in the powerflow program using the values of average load determined here. The load segments will typically be a spring period, summer period, and a fall/winter period. It is required that the segment boundary fall on whole calendar months because the all the data is based on a calendar month, For the 2016 Study Period, the best fit to model the loads for the 12 months was a four segment model. The sum of the errors in the 2016 Study Period is 0.28%. See Appendix D - System Load Data, line 8. The segment values used in this analysis were:

Segment 1:	January - February	3380 MW
Segment 2:	March - May	3323 MW
Segment 3:	June - August	4432 MW
Segment 4:	September - December	3387 MW

The average loads per segment, number of days in each segment and other values used in the analysis are shown on the chart in Appendix D - System Load Data.

3.2 Powerflow Loss Calculations

Once the segment loads have been determined, the powerflow analysis can be performed. The average segment load values determined above are used for the loads in the powerflow studies. Powerflow cases are run on each of the load segments under study. The generation patterns are varied between the segments to better represent

the mix of generators actually on-line at that time of the year. There is also a peak powerflow case prepared to analyze the system losses at the hour of the system peak.

The powerflow program used to perform studies is Power Technologies Inc.'s PSS/E program. Once the powerflows have been completed, the losses are summarized for the SPS system. The loss values for each transmission element and voltage class are tabulated for the peak hour case and for each segment period. The summary tabulations are shown in Appendix N. These losses represent the loss for that element for the segment load used. These values are then used to determine the transmission line and transformer losses.

Excluded from the loss tabulation are transmission systems that are not owned by SPS, but reside inside SPS's boundary and modelled in SPS's powerflow program. These systems are Lea County Electric, Lubbock Power and Light, and Tri-County Electric Cooperative.

4.0 Transmission Line Losses

The losses on transmission lines consist of several parts. Demand and energy losses on the transmission system consist of corona losses, insulator losses, and losses due to power flow through the transmission lines. These losses are tabulated by transmission voltage level in Appendix E.

4.1 Transmission Line Corona and Insulator Losses

Transmission systems have losses due to corona and insulator leakage. Corona loss occurs when the voltage gradient near the conductor surface exceeds the breakdown strength of the surrounding air. Insulator leakage is the small current that flows across the surface of the insulators attached to the electric conductor. The Transmission Line Reference Book published by Electric Power Research Institute contains information on determining the representative losses associated with corona and insulator leakage.

Using that reference, losses per mile for each transmission voltage level were determined and entered in the "KW Loss/mile" column. Transmission line mileage was taken from FERC Form 1 data. The demand loss due to corona and insulator leakage (Appendix E, "Demand Losses" column) is calculated by multiplying the kW loss per mile for a specific voltage level times the miles of transmission operating at that voltage and then dividing that product by 1,000 to yield a MW loss result. The energy loss is simply the demand loss times the number of hours per year. For 345 kV transmission lines, for example, the corona and insulator demand loss of 2.121 MW in Appendix E is the rounded value of this equation: (2.343 kW loss/mile x 905.42 miles) ÷ 1,000. The annual energy loss (18,634 MWH) for these same elements is the product of 2.121 MW (the unrounded value from the previous equation) x 8,784 hours/year.

4.2 Transmission Line Demand Losses

The losses calculated for transmission lines are shown in Appendix E, labeled Transmission Line Demand Loss. The peak demand losses were determined by tabulating the megawatt losses per transmission line as shown in the 2016 Study Period peak powerflow study in Appendix N. These losses are tabulated by voltage class.

4.3 Transmission Line Energy Losses

The energy loss for the transmission lines at each voltage level is determined by using the losses developed in the powerflows for each load segment. The segment loads are listed in Appendix E along with the net output of power to the transmission system during the segment. This value was determined in Appendix A and labeled "Net Output to Lines By Load Segment." The Net Output to Lines by Load Segment is the amount of generated and purchased energy put onto the transmission system to serve load. The determination of the energy losses for transmission lines of a specific voltage in a specific segment is calculated using the following equations.

$$\text{Segment Loss Factor} = \frac{\text{Segment Loss for Transmission Element, MW}}{\text{Segment Load, MW}} \quad (4.3.1)$$

$$\text{Segment Losses} = \text{Segment Loss Factor} \times \text{Segment Output to Lines, MWH} \quad (4.3.2)$$

Thus, the powerflows provide a determination of the energy loss as a single value for each segment. Dividing the segment loss by the segment load produces a per MW energy loss factor. Multiplying this per MW energy loss factor by the Segment Output to Lines produces the energy loss for that element in that load segment. The energy loss values for the year are simply the sum of the energy loss values for each element in each load segment and appear in Appendix E on lines 37-43 under the column heading "Total Segment Losses, MWH."

5.0 Autotransformer Demand Losses

SPS's transmission system autotransformers reduce voltage from one transmission voltage to a lower transmission voltage. The high side and low side autotransformer voltages are typically written as "345/230," "230/115" and "115/69." *See*, *e.g.*, Appendix G, column heading "Voltage", lines 2, 11 and 41. Each autotransformer in SPS's transmission system is identified in Appendix G. The load losses related to autotransformers can be separated into demand and energy components.

The demand component was determined in two steps. The first step was to determine the total demand loss for each voltage level of autotransformers from the summer peak powerflow study, summarized in Appendix N. This provided the MW loss due to loading at the peak time of the year. These losses are shown for each of three voltage classes of autotransformers at lines 3, 5 and 7 of Appendix F.

The second component of the autotransformer demand loss was provided by summing the individual transformer no-load demand losses for the different voltage classes of

individual transformers in Appendix G in the three columns under column heading "Demand Losses, KW." This component represents the demand loss incurred by simply energizing the transformer, as described below.

5.1 Autotransformer Energy Losses

The energy losses related to autotransformers can also be separated into two parts. The first part is the energy loss associated with no-load operation. This is the energy loss due to the magnetizing currents that exist when a transformer is energized. These losses were determined by multiplying the no-load loss in Watts as shown under column heading "No Load Loss, Watts" in Appendix G by the number of hours in the 2016 Study Period because these autotransformers are assumed to be energized throughout the study period.

The energy losses related to loading were determined using the same methodology as for transmission lines. For each powerflow study, a tabulation of the autotransformer demand losses by voltage level was calculated. A segment loss factor for each segment was calculated by dividing the MW Loss by the Segment Load in Appendix F. The autotransformer energy losses for each segment were calculated by multiplying the segment loss factor by the Segment Output to the Lines for that segment. This produces the average energy losses for each voltage level for each segment. The data needed to make these calculations and the results are shown in Appendix F. The equations used to obtain the energy losses for the autotransformers are the same as Equations 4.3.1 and 4.3.2.

All losses discussed to this point are transmission level losses. The losses discussed in the following sections 6 through 10 are losses at the distribution level.

6.0 Distribution Substation Transformer Losses

Distribution substation transformers are those transformers that reduce the transmission voltage, *e.g.*, 69 kV, to a distribution voltage, such as 33 kV, 22 kV or 12.5 kV. The data for each distribution substation transformer are in Appendix I. Manufacturers' data were used to determine losses. If manufacturers' data were not available for a specific transformer, data for a similar transformer manufactured by another company were used.

Column 9 has a code for verification of data. The codes used in this field mean:

R - ratings were verified from manufacturer's data

L - loss values were verified from manufacturer's data

E - loss values are an estimate

There are many transformers on SPS's system that are either owned by a specific customer or have metering or other arrangements to reflect the billing on the high side of the transformer, *i.e.*, before losses are incurred. These transformers are excluded from the loss calculations in Appendix I, and excluded from Appendix I's list of transformers, because SPS does not incur the losses associated with these transformers (the losses are borne by the customer leasing the transformer). In some situations, only a portion of a transformer's capacity is leased, and thus, only a portion of the losses associated with that transformer should be excluded. These transformers are identified by the letter "E" in column 10 of Appendix I, and the percentage of losses to be excluded is stated in column 15. The letter "I" in column 10 means that all of the transformer's losses are included in the loss calculations.

6.1 Distribution Substation Transformer Demand Losses

The demand losses associated with these transformers have two components. The first component is the magnetizing current losses that are present anytime the transformer is energized. The second component is the full load loss value for the transformer. Manufacturers' test report data was used to determine the no-load loss

and the loss when the distribution transformers were loaded to their nominal MVA ratings (Appendix I, column 4). Loading of transformers at their nominal MVA rating is referred to in Appendix I as "full load" but this label does not mean that the transformers have no additional capacity. The maximum MVA loading for each transformer is listed in Appendix I, column 5. As evidenced by the differences between the values in columns 4 and 5 of Appendix I, many transformers can handle loads in excess of their nominal "full load." The no-load losses and nominal "full load" losses for each transformer are tabulated in Appendix I, columns 6 and 7, and totaled for the entire system near the bottom of Columns 6, 7, and 8 on line 302.

It was assumed for the purposes of this study that the distribution transformers were operating at "full load" (their nominal MVA ratings) at the time of the system peak. This assumption was reasonable, conservative, and necessary. The transmission and distribution system is designed to handle the system's peak load and have additional capacity available in case peak load is greater than forecasted. And, of course, system load has grown since most of these transformers were originally sized and installed. Thus, at the time of system peak, it is likely that many transformers operated somewhere between their nominal and maximum MVA ratings. Thus, basing losses upon only the nominal MVA loading, as SPS has done, is conservative. Using this assumption was necessary since manufacturers typically provide test data only for losses at the nominal MVA rating.

6.2 Distribution Substation Transformer Energy Losses

The energy loss has two components. The first is the no-load loss, which occurs during every hour of the Study Period. Referring to Appendix I, this value was calculated by multiplying the no-load losses derived from manufacturers' test data, column 6, by the number of hours in the Study Period, which results in the energy loss during the Study Period, as shown in column 12.

The full load loss required the determination of the load characteristic of the load being served by a particular transformer. The load factor assigned to each transformer is shown in Appendix I, column 11.

The load factor for a study period is defined as:

$$\text{Load Factor} = \frac{\text{Total Study Period Energy Delivered}}{\text{Max. Demand} \times \text{Hours in Study Period}} \qquad (6.2.1)$$

For the purpose of determining the study period energy losses, the following equation was used:

$$\text{Losses} = \text{Full Load Loss} \times \text{Hours in Period} \times \text{Load Factor} \qquad (6.2.2)$$

The results of this calculation are shown in Appendix I, column 13.

The "Sum of demands adjusted for Primary Generation" is the estimated load at primary and shown on line 305. The 47.291 MW adjustment shown on line 304 is the coincident wind and solar primary generation from Attachment B at system peak hour and it thus reduces the total flow on the primary feeders. This generation connected to the primary voltage level may all flow into the primary voltage level and never get transformed to the transmission voltage level.

6.3 Calculation of Load at Each Feeder Voltage Level

The load at each feeder voltage level is calculated at lines 312-319 of Appendix I. The loading on 33 kV feeders, for example, is calculated by determining the ratio of the nominal MVA of transformers connected to 33 kV feeders (153.30 MVA on line 314) to the adjusted nominal MVA of all distribution substation transformers (3,026.08 on line 314) and then multiplying that ratio by total loading on all distribution feeders (line 305). Thus, for 33 kV feeders, the calculated loading is: (153.30/3,026.08) x 2,206.35 MW =

111.77 MW. This value appears at line 315, column 2 of Appendix I. From this value, the load on transformers with no feeders (line 316) is subtracted to yield the load on 33 kV feeders, which appears on line 319. Line 317 shows data on total numbers of feeders at each voltage level and line 318 shows the number of feeders after excluding the portions of transformers that are shared with customers.

7.0 Load Factor Derivation

The load factor used to calculate the study period full-load energy losses reflected in Appendix I, column 11, provides a representative load factor for substation loads. However, the load factor is not a pure load factor, such as might be found for a rate class. Rather it represents the composite mix of customer load which occurs on the power system. This load factor is calculated in Appendix H.

The data used in Appendix H comes from rate analysis of each customer class on SPS's system for the Study Period. Using this data, monthly demand peaks and monthly energy deliveries, a composite load is developed which represents the desired substation class load. With the summed energy and demands, a load factor can be calculated. The annual load factor for primary distribution, Loss Level 4 is shown in Appendix H, line 78 under table column heading "Total Loss Level 4."

8.0 Distribution Primary Feeder Losses

The primary distribution system (Level 4 in the loss study) includes the distribution lines (feeders) that transport power from the distribution substation to the distribution line transformers near each customer. The losses associated with these primary distribution feeders are calculated on Appendix J. At the top of Appendix J, the distribution loads and energy are summarized for the Study Period. They are broken into loss levels and they represent the demand and energy for each level of the distribution system. These values shown are derived from Appendix H and they will be

used throughout the distribution loss calculations. On lines 2 and 9, the demand and energy values are offset by the distribution connected generation, obtained from Appendix B.

Losses are calculated for 552.10 feeders operating at 6 nominal voltage levels (33 kV, 22 kV, 13.2 kV, 12.5 kV, 4.16 kV and 2.4 kV). There are 573 feeders connected to the transformers (Appendix I, line 317), but some feeders are connected to transformers whose capacity is shared with customers. Thus, the number of feeders at each voltage level has been reduced in proportion to the nominal MVA of substation transformers at each voltage level leased by customers. The percentage of each transformer's capacity leased to a customer is shown in column 15 of Appendix I. This process produces fractional feeders that are used to calculate primary distribution feeder losses.

8.1 Distribution Primary Feeder Demand Losses

The number of feeders and load at each distribution voltage level are derived from lines 318 and 319, respectively, of Appendix I.

The Feeder Current, in amps, is:

$$\text{Feeder Current} = \frac{\text{Feeder Load}}{(\sqrt{3}) \times \text{ Feeder Voltage}} \qquad (8.1.1)$$

The Feeder Loss, in watts, for a given voltage level is:

$$\text{Feeder Loss} = 3 \times (\text{Feeder Current})^2 \text{ x Resistance} \times \text{Average Length} \qquad (8.1.2)$$

The length of each feeder varies considerably as do the wire sizes (conductors) used in the construction, which affects resistance. The distribution system database consists of 552 feeders ranging in length from zero to 48.6 miles and many different wire sizes and materials. The typical conductor size was determined by summing the feeder lengths

by voltage and by conductor type and size, selecting the most common conductor based on length and conductor material and size. The results of this investigation appear under the column heading "Typical Conductor" in Appendix J.

The average feeder length was determined by sorting the feeders by voltage and dividing the sum of the lengths by the number of feeders in each voltage range. A feeder was counted if the length was greater than 0.05 miles. There were 552 feeders that fit this criterion. The results of this investigation appear under the column heading "Avg. Feeder Length, Miles" in Appendix J.

The total loss for a given voltage level is obtained by multiplying the loss determined above by the number of feeders in the given voltage level.

8.2 Distribution Primary Energy Losses

These losses were calculated by multiplying the demand energy loss for the entire load served via primary distribution line by the hours in the study year and by the loss factor for the entire distribution load. The load factor is determined in Appendix J from the Total Primary Demand and the Total Energy. Note that the Total Primary Demand and Energy have been offset by the distribution primary connected generation from Appendix B. The Loss Factor is determined by the following equation:[2]

$$\text{Loss Factor} = (0.3 \times \text{Load Factor}) + (0.7 \times (\text{Load Factor})^2) \qquad (8.2.1)$$

Thus, the losses over the year are determined by the following equation:

$$\text{Loss} = \text{Demand Loss} \times 8784\ \text{hours} \times \text{Loss Factor} \qquad (8.2.2)$$

9.0 Distribution Line Transformer Losses

[2] Westinghouse Electric Corporation, Distribution Systems, 1965, page 28.

Appendix K contains the loss calculations for distribution line transformers, which corresponds to Loss Level 5. The number of meters and transformers are actual counts derived from SPS's records. The meters per transformer data is derived by dividing the adjusted meter count by the number of transformers, *e.g.*, 331,812 single phase meters/97,184 transformers equals 3.41427 meters/transformer.

In calculating losses, it is necessary to distinguish between single phase transformers, which serve primarily residential customers, and three phase transformers, which serve primarily commercial customers. The "Adjusted Meters" column on Appendix K performs this function by assigning the single phase commercial meters to the "Residential" category, *i.e.*, Residential Adjusted Meters equals actual residential meters (301,809) plus the difference between all commercial meters and three phase commercial meters (30,003).

It was assumed that one residential customer took service directly from each distribution line transformer and that all other residential customers were served from secondary distribution lines. Secondary lines are the lines that typically run from a pole top transformer to another pole that has no transformer. From that second pole, a service line runs to the customer's premises. Losses on secondary lines and drops are addressed in Appendix L. For three phase commercial customers, the number of transformers essentially equals the number of meters, and thus, each such customer is assumed to be served directly from the transformer.

9.1 Distribution Line Transformer Demand Losses

Based on consultation with distribution system engineers, typical transformer sizes were chosen as 25 KVA (residential) and 100 KVA (commercial). The transformer loss data at no load and "full load" for each size are listed in Appendix K at lines 26 and 27. The average load per customer is developed by taking the demand served and dividing by the number of customers. Then the loss per transformer is developed by taking the load per customer and calculating the losses proportionally to the load served by the

transformer and its full load rating. The total demand loss is determined by multiplying the number of transformers by each no-load and full load loss component. The no-load and loaded losses are shown at Appendix K, lines 35 and 37, and totaled at lines 39 and 41.

9.2 Distribution Line Transformer Energy Losses

These losses were calculated by using the demand energy loss for the distribution line transformers and multiplying by the loss factor of the load served through the distribution transformers and by the number of hours in the Study Period. The load factor is determined from data in Appendix K using the Total Secondary Distribution Transformer Demand and the Total Secondary Distribution Transformer Energy. The Loss Factor is determined from equation 8.2.1. Thus, the losses over the year are determined by the following equation.

$$\text{Loss} = \text{Demand Loss} \times 8784\ \text{hours} \times \text{Loss Factor} \qquad (9.2.1)$$

10.0 Distribution Secondary Losses

The distribution secondary losses are determined in Appendix L. To determine the secondary losses, it was estimated that the secondary conductor was 1/0 MCM ACSR conductor and that there was 60 feet of conductor serving each residential meter not served directly from the transformer. The resistance of this secondary was 0.0127 ohms. The typical residential load and current and the commercial load and current were determined in Appendix K. There is no consideration of commercial load on secondary lines, as these customers are usually served directly from transformers.

10.1 Distribution Secondary Demand Losses

There was assumed to be 2 meters per 60 foot of secondary line. The loss, in watts, on the secondary was determined by the following equation:

$$\text{Loss} = \left(2 \times I^2 \times R\right) \qquad (10.1.1)$$

Multiplying by the number of meters (Appendix K) produces the total loss for the distribution secondary.

10.2 Distribution Service Line Demand Losses

It was estimated that residential service line consisted of 65 feet of #2 Triplex and commercial service line consisted of 30 feet of #1/0 Quadraplex service wire. The resistances for these service lines are 0.02028 ohms and 0.00636 ohms, respectively. The current for each type of customer is calculated and the losses are calculated by the following equations:

$$\text{Loss} = 2 \times I^2 \times R \text{ , for residential customers and} \qquad (10.2.1)$$

$$\text{Loss} = 3 \times I^2 \times R \text{ , for commercial customers} \qquad (10.2.2)$$

The total loss for each group was determined by multiplying the loss per meter by the number of meters, which are found on Appendix K.

10.3 Distribution Secondary and Service Lines Energy Losses

These losses were calculated by adding the demand loss of both the Secondary and Services and multiplying by the number of hours in the test year and also multiplying by the loss factor of the load that is served by Secondary and Services. The load factor is determined from data in Appendix L using the Total Secondary Distribution Transformer Demand and Total Secondary Distribution Lines demand and their associated energy. The Loss Factor is determined from equation 8.2.1. Thus, the losses over the year are determined by the following equation.

$$\text{Loss} = \text{Demand Loss} \times 8784 \text{ hours} \times \text{Loss Factor} \qquad (10.3.1)$$

The results of this calculation are shown in Appendix L.

11.0 Summary of Transmission Loss Study

Appendix M contains the results of all of the calculations discussed previously. The power system elements for which losses are determined are:

Transmission Lines
Autotransformers
Distribution Substation Transformers
Distribution Primary Lines
Distribution Line Transformers
Distribution Secondary and Service Lines

Line 42 shows the total of the loss values obtained by the study, labeled as "Total Determined Losses" or calculated losses. Line 44, labeled "Total Losses," is the actual energy losses determined in Section 1.2 of this report. The difference between the results of this study and the actual losses is shown on line 43 as "Undeterminable Losses". Typically, the results from a loss study will be within a few percent, plus or minus, of the actual losses. For the 2016 Study Period, the Total Determined Losses are over estimated by 1.79% of actual losses. ***It should be noted that nowhere in this study is the actual loss value used to force the loss study to produce a final answer equal to the actual loss value.***

The results of this study are used to determine loss factors for the different rate classes. To do this, the calculated losses must be adjusted to total to the actual losses, and thus, the Undeterminable Losses (Appendix M, line 43) have to be allocated to Loss Levels 2 through 6. Each category of energy losses is allocated a portion of the Undeterminable Losses equal to the ratio of that category's calculated losses to Total Determined Losses in MWh. For example, the "Adjusted Energy MWh" value for Transmission Lines – 345 kV (line 14), which is 80,473 MWh, is determined by: 81,914

MWh (line 14 determined energy loss) x (1,914,545 MWH Total Losses /1,948,829 MWH Total Determined Losses).

The values in Appendix M under the column headings “Demand Total Loss, KW” and “Energy Total Loss, kWh” are used in the development of the rate class loss factors.

12.0 Loss Factor Derivation

Appendices O and P contain the derivation of the rate class loss factors from summary data derived in various sections of the report. The rate class loss factors are determined for the loss levels shown in Appendix O and P.

The method to determine the loss factors is based on starting with the total resource input to the system at Generation Level, Level 1. This value is the starting point for the worksheet. Using Appendix O as an example, from this value, the deliveries for that level and the losses for that level are subtracted, leaving the ‘Net KWH into each Loss Level’. This calculation is done for each loss level, with the result that all losses and deliveries have been subtracted from the Total Resources, with a result of zero. This means that all deliveries and losses have been assigned to a loss level and there is no error. Loss factors are calculated at each level as the subtraction progresses to the right through the loss levels. The calculation is shown in the appendices along with the loss factors by rate classification.

The process of calculating the Demand Loss Factor in Appendix O is the same as described for the energy factor calculation. However, rather than redistributing the energy “Undeterminable Losses” among the different loss levels, the Demand MW from line 42 Appendix M is used.

Southwestern Public Service Company
Loss Evaluation Study for 2016 Study Period

Appendix Q contains the Demand and Energy Loss Factors by rate class in summarized form, without their respective derivations. The composite loss factors are shown for rate classes in loss levels 5 and 6.

APPENDIX A
DERIVATION OF ACTUAL LOSSES
January - December 2016
(MWh)

Line No.		Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016	Jul 2016	Aug 2016	Sept 2016	Oct 2016	Nov 2016	Dec 2016	TOTAL PERIOD
1														
2														
3	**Loss Derivation**													
4														
5	**Total Resources**													
6	SPS Net generation (+)	1,102,927	820,336	1,005,873	1,256,856	1,203,631	1,623,761	1,817,540	1,696,692	968,319	1,109,278	1,288,611	1,118,266	15,012,090
7	Net Metered SPP Interchange	199,670	50,584	23,559	57,215	-85,047	4,020	178,568	158,601	198,440	32,031	-10,628	123,598	930,611
8	WECC HVDC Net Interchange	-423	-1,633	-5,255	-6,008	-5,176	-18,952	-42,457	-7,626	-29,311	-4,390	0	0	-121,231
9														
10	**SPS Firm Purchased Power**													
11	BEA, LPP	509,996	448,624	450,648	291,067	445,062	357,564	468,722	471,956	439,929	454,842	278,369	474,668	5,091,447
12	LPL Generation	13,893	5,973	13	12	923	13,841	21,388	18,945	17,248	13,148	3,482	10,507	119,373
13	Others (Sid, DeGau)	10,508	9,778	9,606	5,700	6,191	11,076	11,953	7,739	7,663	3,159	5,292	7,500	96,165
14	Renewables													
15	Caprock Wind (unit 1)(Norton sub)	23,013	25,492	29,214	23,675	29,088	20,848	28,387	22,432	30,517	33,748	25,121	32,706	324,241
16	San Juan (unit 1)	32,956	36,171	42,787	34,672	36,017	23,933	32,523	20,347	30,744	33,117	32,176	42,113	397,556
17	Llano Wind Farm	14,072	22,934	23,776	20,004	19,184	14,631	17,772	11,723	16,465	21,247	17,196	21,011	220,015
18	Spinning Spur Wind	47,188	57,028	63,986	53,732	62,947	46,164	66,105	50,053	48,554	74,893	54,444	61,516	686,610
19	Wilderado (unit 1)	44,621	52,992	60,731	51,885	59,531	45,626	59,302	44,782	62,972	72,573	51,766	60,684	667,465
20	Roosevelt Wind Project	86,659	91,296	99,977	88,515	93,477	70,612	87,868	62,711	80,179	95,526	84,507	104,966	1,046,293
21	Chaves meter on Chaves & Roswell solar	0	0	0	0	0	0	6,811	15,189	16,441	30,272	21,680	15,104	105,497
22														
23	**GSEC Generation**													
24	Mustang Plant - GSEC	84,912	196,305	144,159	214,115	223,616	312,917	373,005	338,948	212,399	39,520	97,944	80,197	2,318,037
25	Antelope Plant -GSEC	2,099	2,640	17	0	3,491	16,767	17,922	20,531	2,699	921	1,922	4,536	73,545
26	Elk Plant-GSEC	0	7	1,833	0	0	0	0	1,601	0	0	0	0	3,441
27	Panhandle Wind Ranch-GSEC(Wildrado 2)	23,416	24,100	22,800	19,817	23,085	21,859	28,918	21,645	11,163	26,582	14,727	19,122	257,234
28														
29	**Lea Co Electric Cooperative**													
30	Wildcat Wind-Phase 2- LeaCo	8,611	8,711	8,890	8,729	9,257	6,187	7,224	5,197	5,770	7,571	8,088	7,699	91,934
31	WFEC -GAS PLT-LeaCo	2,156	930	525	2,579	2,632	4,980	4,847	4,714	5,603	7,552	4,604	12,830	53,952
32														
33	**Farmers Electric Cooperative**													
34	Brahms Wind	2,222	3,352	3,363	1,384	1,948	545	186	154	1,956	2,199	2,435	4,042	23,787
35														
36	**Export Renewables**													
37	Buffalo Dunes	67,464	83,617	86,867	80,792	71,729	56,750	60,437	55,994	78,367	82,159	74,680	73,795	872,651
38	Majestic (unit 1)	22,048	29,421	30,579	26,684	28,539	21,537	26,445	17,908	20,670	31,097	23,774	27,591	306,293
39	Majestic (unit 2)	17,606	19,620	18,941	23,505	28,632	22,408	28,520	19,874	25,461	31,558	23,392	27,369	286,886
40	Goodwell Wind	58,628	79,373	82,278	73,437	80,913	63,205	75,716	59,532	69,730	87,302	65,663	65,228	861,005
41	Caprock Solar	0	0	0	0	0	0	0	0	0	0	3,028	3,278	6,306
42	Bethel Wind	0	0	0	0	0	0	0	0	0	1,486	25,348	65,253	92,087
43														
44	**SPS Non-Firm Purchased Power**													
45	KODE NOVUS 1 & 11	22,146	30,379	27,293	22,754	27,837	22,849	24,894	3,285	4,199	11,438	3,195	889	201,158
46	Pantex above dist load	815	1,351	1,516	1,128	958	626	512	329	959	3,290	1,297	1,891	14,672
47	Cirrus Wind	9,614	11,380	13,366	13,786	13,682	9,490	10,837	6,957	8,263	12,538	10,676	9,695	130,284
48	Pleasant Hill - above SPEC load	1,676	2,816	3,072	1,781	1,258	751	34	2	2,232	2,905	2,190	2,658	21,376
49	JD Wind Unit 4 (Exelon)	16,735	22,493	25,455	21,620	22,481	17,216	20,998	12,561	22,745	26,533	19,960	21,227	250,024
50	KODE (DeWind) Friso Wind	2,577	3,747	3,721	2,950	3,013	2,325	2,053	2,165	1,387	1,444	1,549	1,892	28,823
51														
52	**Market Renewables**													
53	Noble Great Plains (unit 1)	21,418	27,383	21,697	19,939	20,940	21,497	29,214	22,334	9,900	23,483	9,694	13,428	240,927
54	Buffalo Dunes Wind	3,828	8,454	6,415	5,923	3,317	816	1,714	1,114	3,036	3,069	3,928	5,025	46,639
55	Milo Wind	13,172	18,153	19,459	17,814	19,459	13,803	17,540	12,803	15,141	17,314	17,132	19,271	201,061
56	Sunray 3-wind	10,998	14,789	14,484	13,308	13,017	9,018	661,379	8,658	11,961	15,619	12,946	13,845	800,022
57														
58	**Total Resources**	**2,477,222**	**2,208,596**	**2,341,644**	**2,449,370**	**2,465,633**	**2,838,670**	**4,146,876**	**3,189,851**	**2,401,802**	**2,405,024**	**2,280,188**	**2,553,401**	**31,758,276**
59														
60	**Total Deliveries**													
61	Retail/Wholesale Deliveries	2,373,529	2,134,921	2,282,910	2,279,558	2,407,034	2,719,865	3,329,070	3,064,511	2,310,541	2,311,025	2,216,346	2,414,422	29,843,731
62														
63	WTMPA Sales (FYI -In Total Sales above)	-	-	-	-	-	-	-	-	-	-	-	-	-
64	**Total Deliveries**	**2,373,529**	**2,134,921**	**2,282,910**	**2,279,558**	**2,407,034**	**2,719,865**	**3,329,070**	**3,064,511**	**2,310,541**	**2,311,025**	**2,216,346**	**2,414,422**	**29,843,731**
65														
66	**Total Losses**	**103,693**	**73,676**	**58,735**	**169,812**	**58,599**	**118,805**	**817,806**	**125,340**	**91,260**	**93,999**	**63,842**	**138,979**	**1,914,545**
67														**6.0285%**
68														
69														
70	**Net Output To Lines Derivation**													
71	Total Resources	2,477,222	2,208,596	2,341,644	2,449,370	2,465,633	2,838,670	4,146,876	3,189,851	2,401,802	2,405,024	2,280,188	2,553,401	31,758,276
72														
73														
74	**Net Output To Lines**	**2,477,222**	**2,208,596**	**2,341,644**	**2,449,370**	**2,465,633**	**2,838,670**	**4,146,876**	**3,189,851**	**2,401,802**	**2,405,024**	**2,280,188**	**2,553,401**	**31,758,276**
75														
76														
77	**Net Output to Lines By Load Segment**													
78														
79	**Load Segment Period 1: Jan. - Feb.**	**4,685,818**												
80														
81	**Load Segment Period 2: Mar. - May**	**7,256,647**												
82														
83	**Load Segment Period 3: Jun. - Aug.**	**10,175,397**												
84														
85	**Load Segment period 4: Sep. - Dec.**	**9,640,414**												
86														
87														
88														
89	**Total Region**	**31,758,276**												

Appendix B
Distribution Resources

Line No.		Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016	Jul 2016	Aug 2016	Sept 2016	Oct 2016	Nov 2016	Dec 2016	TOTAL PERIOD		MW Output at Peak	
1																	
2																	
3	**SPS Distribution Connected Resources at Level 4 - Distribution Primary**																
4																	
5	Aeolus Wind	8	3	5	5	4	10	6	4	4	4	6	7	67		0.00	No data
6	Sun Edison Dist Solars	6,935	8,788	10,911	11,577	11,126	11,694	12,016	9,154	8,453	8,215	5,199	4,744	108,812		39.67	
7	Subtotal DeWind - Pringle	2,902	4,433	3,788	2,971	2,872	2,375	2,531	1,429	934	895	1,864	2,424	29,418		-0.09	
8	West Texas A&M University	1	1	1	1	1	1	0	0	0	0	1	1	8		-0.02	
9	Suzlon 8 Wind	634	1,489	1,800	1,628	1,265	1,107	1,595	1,205	1,106	1,718	1,381	1,731	16,659		0.79	
10	High Plains Wind Farm (Exelon)	2,066	2,822	2,980	2,673	2,668	1,851	2,567	1,620	2,048	2,984	2,413	2,979	29,671		-0.03	
11	JD Wind (unit 1) (Exelon)	1,600	768	651	949	1,128	622	572	389	367	752	294	22	8,114		0.22	
12	JD Wind (unit 2) (Exelon)	1,706	1,264	1,333	1,275	1,017	597	776	829	1,064	1,292	836	485	12,474		0.22	
13	JD Wind (unit 3)(Exelon)	1,269	623	736	905	1,263	1,018	722	426	393	320	361	176	8,212		0.26	
14	JD Wind (unit 5)(Exelon)	1,696	2,956	2,780	2,273	2,383	1,849	2,313	1,590	2,248	2,466	1,360	1,948	25,862		0.03	
15	JD Wind (unit 6)(Exelon)	2,216	2,975	3,100	2,692	2,222	2,054	2,563	1,809	2,599	2,768	1,747	2,514	29,259		-0.01	
16	JD Wind (unit 7)(Exelon)	2,210	3,148	3,059	2,798	2,645	1,859	2,351	1,598	2,362	2,967	2,661	2,947	30,605		0.54	
17	JD Wind (unit 8)(Exelon)	2,154	3,215	3,041	2,718	2,433	1,698	2,298	1,623	2,218	2,977	2,621	2,908	29,904		0.38	
18	JD Wind (unit 9)(Exelon)	2,136	3,154	2,904	2,213	2,245	1,775	1,932	1,636	2,197	2,957	2,565	2,831	28,545		0.32	
19	JD Wind (unit 10)(Exelon)	2,126	2,897	3,002	2,483	2,128	1,386	2,134	1,443	2,035	2,751	2,569	2,748	27,702		-0.10	
20	JD Wind (unit 11)(Exelon)	2,228	2,993	2,744	2,300	2,044	1,443	2,113	1,494	2,006	2,840	2,512	2,876	27,593		0.43	
21	Mesalands CC Wind	15	7	7	8	6	10	9	9	22	17	7	11	128		0.00	No data
22	Llano Estacado (Texico)	115	42	52	61	52	66	50	76	60	40	81	71	764		0.00	No data
23	Ralls Wind Farm	1838	1954	2538	1675	1668	1855	2004	1575	1929	2695	2804	2,954	25,489		4.68	
24														**439,286**	**MWH**	**47.29**	**MW**
25																	

Appendix C

Not used in this loss evaluation study

	A	B	C	D	Y	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1											**Month**		**TNP/EPE**	**PNM**	**LAMAR**	**LPL FLOW**	**SWPP**	**WIND**	**SOLAR**
2						**Region**	**Avg Load**	**%Error**	**Start Da**	**End Day**	**Entry**		**Avg**	**Avg**	**Avg**	**Avg**	**Avg**	**Avg**	**Avg**
3						**1**	3379.70	0.06%	1	60	60	1	0.55	0.12	-0.21	188.59	-199.84	775.38	5.96
4						**2**	3323.40	0.11%	61	152	92	2	0.98	0.12	-9.40	176.87	29.02	870.39	10.04
5						**3**	4432.10	0.09%	153	244	92	3	34.80	-4.55	4.06	240.57	-173.61	648.24	25.33
6						**4**	3386.88	0.02%	245	366	122	4	1.39	6.66	-4.45	188.41	-147.71	788.83	34.22
7																			
8							**Total Error**	**0.28%**			366								

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
13	1	Jan	1	2016	17	3244	0	0	0	-252	199	299	1
14	2	Jan	2	2016	16	3130	0	0	0	-558	186	41	4
15	3	Jan	3	2016	17	3006	0	0	0	-327	164	34	15
16	4	Jan	4	2016	1	3235	34	0	0	-342	185	129	3
17	5	Jan	5	2016	3	3360	0	0	0	-198	163	1101	3
18	6	Jan	6	2016	3	3323	0	0	0	-2	150	1396	3
19	7	Jan	7	2016	3	3240	0	0	0	-103	144	1243	3
20	8	Jan	8	2016	4	3240	0	0	0	-708	138	374	3
21	9	Jan	9	2016	3	3422	0	0	0	-718	178	464	3
22	10	Jan	10	2016	4	3469	0	0	0	-331	194	355	3
23	11	Jan	11	2016	16	3340	0	0	0	-612	189	39	24
24	12	Jan	12	2016	17	3263	0	0	0	-441	177	116	17
25	13	Jan	13	2016	17	3224	0	0	0	-594	175	45	18
26	14	Jan	14	2016	16	3210	0	0	0	-580	164	629	19
27	15	Jan	15	2016	3	3231	0	0	0	-571	178	672	0
28	16	Jan	16	2016	2	3205	0	0	0	-131	173	618	0
29	17	Jan	17	2016	16	3294	0	0	0	-367	179	360	28
30	18	Jan	18	2016	17	3388	0	0	0	-187	189	996	18
31	19	Jan	19	2016	3	3266	0	0	0	-168	160	1147	0
32	20	Jan	20	2016	16	3235	0	0	0	41	174	1143	28
33	21	Jan	21	2016	3	3181	0	0	0	349	142	1368	0
34	22	Jan	22	2016	17	3207	0	0	0	-327	173	25	22
35	23	Jan	23	2016	16	3122	0	0	0	-473	176	689	30
36	24	Jan	24	2016	17	3066	0	0	0	320	169	1570	22
37	25	Jan	25	2016	2	3058	0	0	0	214	156	1371	0
38	26	Jan	26	2016	3	3191	0	0	0	-514	153	358	0
39	27	Jan	27	2016	17	3216	0	0	0	-611	153	139	24
40	28	Jan	28	2016	0	3143	0	0	0	394	170	1436	0
41	29	Jan	29	2016	18	3113	0	0	0	-315	174	918	3
42	30	Jan	30	2016	0	2997	0	0	0	436	149	1567	0
43	31	Jan	31	2016	3	2913	0	0	0	147	135	1257	0

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
44	32	Feb	1	2016	2	2980	0	0	0	-190	156	664	0
45	33	Feb	2	2016	2	3272	0	0	0	244	175	1659	7
46	34	Feb	3	2016	16	3334	0	0	0	-458	216	290	21
47	35	Feb	4	2016	17	3240	0	0	0	-349	161	148	27
48	36	Feb	5	2016	3	3329	0	0	0	233	165	1282	0
49	37	Feb	6	2016	17	3040	0	0	0	-368	154	414	27
50	38	Feb	7	2016	18	3069	0	0	0	9	152	921	2
51	39	Feb	8	2016	2	3157	0	0	0	148	151	1162	0
52	40	Feb	9	2016	17	3163	0	0	0	-38	190	474	33
53	41	Feb	10	2016	0	3090	0	0	0	170	156	748	0
54	42	Feb	11	2016	2	3016	0	0	0	482	148	1151	0
55	43	Feb	12	2016	2	3067	0	0	0	-423	159	393	0
56	44	Feb	13	2016	0	3049	0	0	0	-114	146	1191	0
57	45	Feb	14	2016	17	2975	0	0	50	-263	167	251	34
58	46	Feb	15	2016	1	3020	0	0	0	-414	159	373	0
59	47	Feb	16	2016	2	3053	0	0	0	0	146	1269	0
60	48	Feb	17	2016	0	3080	0	0	0	142	154	1457	0
61	49	Feb	18	2016	3	2944	0	0	0	132	135	1460	0
62	50	Feb	19	2016	4	2882	0	0	0	37	125	1253	0
63	51	Feb	20	2016	5	2869	0	0	0	-66	132	1071	0
64	52	Feb	21	2016	3	2837	0	0	0	-667	129	533	0
65	53	Feb	22	2016	3	2971	0	0	0	-751	119	490	0
66	54	Feb	23	2016	2	3119	0	0	0	-987	144	115	0
67	55	Feb	24	2016	18	3153	0	0	0	-14	165	869	15
68	56	Feb	25	2016	2	3180	0	0	0	-208	147	1071	0
69	57	Feb	26	2016	18	3122	0	0	0	-769	180	45	14
70	58	Feb	27	2016	0	2995	0	0	-26	595	144	1407	0
71	59	Feb	28	2016	4	2906	0	0	-50	420	135	1167	0
72	60	Feb	29	2016	2	2914	0	0	0	583	140	1320	0

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
73	61	Mar	1	2016	3	2893	0	0	-24	67	127	1164	0
74	62	Mar	2	2016	0	3046	0	0	0	-91	150	680	0
75	63	Mar	3	2016	2	2956	0	0	-50	227	136	1068	0
76	64	Mar	4	2016	3	3057	0	0	0	462	138	1480	0
77	65	Mar	5	2016	3	2983	0	0	0	-229	138	767	0
78	66	Mar	6	2016	4	2936	0	0	-114	257	124	1314	0
79	67	Mar	7	2016	3	2887	0	0	-49	-51	131	1155	0
80	68	Mar	8	2016	4	2954	0	0	0	-336	135	591	0
81	69	Mar	9	2016	2	2959	0	0	0	-222	135	374	0
82	70	Mar	10	2016	3	3025	0	0	0	-300	143	230	0
83	71	Mar	11	2016	3	3076	0	0	0	-154	140	668	0
84	72	Mar	12	2016	0	3032	0	0	-63	34	139	1067	0
85	73	Mar	13	2016	4	2933	0	0	0	-254	122	572	0
86	74	Mar	14	2016	4	2884	0	0	0	-79	128	982	0
87	75	Mar	15	2016	4	2942	0	0	0	-275	122	762	0
88	76	Mar	16	2016	3	3001	0	0	0	-437	84	551	0
89	77	Mar	17	2016	4	3057	0	0	0	-617	129	269	0
90	78	Mar	18	2016	4	3070	0	0	0	260	130	1381	0
91	79	Mar	19	2016	19	3187	0	0	0	-839	158	352	17
92	80	Mar	20	2016	18	3109	0	0	0	-79	165	293	32
93	81	Mar	21	2016	3	3137	0	0	0	228	143	1423	0
94	82	Mar	22	2016	3	3055	0	0	-124	503	133	1422	0
95	83	Mar	23	2016	4	3017	0	0	-37	86	129	1322	0
96	84	Mar	24	2016	2	3167	0	0	0	8	150	1228	0
97	85	Mar	25	2016	3	3204	0	0	0	259	146	1375	0
98	86	Mar	26	2016	3	3097	0	0	0	227	134	1087	0
99	87	Mar	27	2016	17	3070	0	0	81	42	151	41	34
100	88	Mar	28	2016	2	3079	0	0	0	73	139	1448	0
101	89	Mar	29	2016	4	3049	0	0	-100	97	124	1282	0
102	90	Mar	30	2016	4	3078	0	0	-86	51	134	1162	0
103	91	Mar	31	2016	3	3138	0	0	-50	136	133	1235	0

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
104	92	Apr	1	2016	4	3202.00	0	0	0	-513	136	593	0
105	93	Apr	2	2016	0	3274.00	0	0	0	-188	152	1091	0
106	94	Apr	3	2016	4	3186.00	0	0	-89	112	135	1419	0
107	95	Apr	4	2016	3	3016.00	0	0	0	-158	125	424	0
108	96	Apr	5	2016	4	3080.00	0	0	-26	291	129	1416	0
109	97	Apr	6	2016	4	3100.00	0	0	0	-20	131	1301	0
110	98	Apr	7	2016	4	3133.00	0	0	0	385	127	1228	0
111	99	Apr	8	2016	4	3151.00	0	0	0	-18	131	698	0
112	100	Apr	9	2016	4	3155.00	0	0	0	-32	128	1047	0
113	101	Apr	10	2016	5	3118.00	0	0	-101	36	120	1372	0
114	102	Apr	11	2016	4	3039.00	0	0	-26	-92	131	945	0
115	103	Apr	12	2016	4	3199.00	0	0	0	-619	135	53	0
116	104	Apr	13	2016	4	3216.00	0	0	0	-299	141	573	0
117	105	Apr	14	2016	4	3076.00	0	0	-26	190	132	1283	0
118	106	Apr	15	2016	4	3033.00	0	0	-50	212	126	1331	0
119	107	Apr	16	2016	5	2971.00	0	0	0	419	131	1273	0
120	108	Apr	17	2016	5	2941.00	0	0	0	757	123	1254	0
121	109	Apr	18	2016	3	2981.00	0	0	0	411	132	1223	0
122	110	Apr	19	2016	3	3033.00	0	0	0	-232	135	247	0
123	111	Apr	20	2016	4	2972.00	0	0	0	-275	132	73	0
124	112	Apr	21	2016	4	2940.00	0	0	0	-453	134	265	0
125	113	Apr	22	2016	4	2957.00	39	0	0	-79	134	368	0
126	114	Apr	23	2016	5	2982.00	42	0	-50	278	131	1578	0
127	115	Apr	24	2016	5	2971.00	41	0	-50	145	130	1318	0
128	116	Apr	25	2016	4	2932.00	0	0	0	238	135	886	0
129	117	Apr	26	2016	5	3064.00	0	0	0	85	138	1125	0
130	118	Apr	27	2016	4	3023.00	0	0	0	219	126	1211	0
131	119	Apr	28	2016	4	3051.00	0	0	0	-307	130	728	0
132	120	Apr	29	2016	4	3076.00	0	0	0	-49	145	947	0
133	121	Apr	30	2016	4	3018.00	0	0	0	-217	131	322	0

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
134	122	May	1	2016	4	2988.00	0	0	0	539	118	1524	0
135	123	May	2	2016	3	3046.00	0	0	0	-321	139	247	0
136	124	May	3	2016	3	2992.00	0	0	0	294	132	797	0
137	125	May	4	2016	3	2947.00	0	0	0	-426	133	160	0
138	126	May	5	2016	5	2986.00	0	0	0	216	132	560	0
139	127	May	6	2016	5	3080.00	0	0	0	534	136	1562	0
140	128	May	7	2016	5	3130.00	0	0	0	249	137	1347	0
141	129	May	8	2016	6	3079.00	0	0	0	-55	140	470	0
142	130	May	9	2016	4	3043.00	0	0	0	-262	141	948	0
143	131	May	10	2016	5	3122.00	0	0	0	-109	143	419	0
144	132	May	11	2016	5	3236.00	0	0	0	105	140	1114	0
145	133	May	12	2016	4	3187.00	0	0	0	-384	143	654	0
146	134	May	13	2016	5	3226.00	0	0	-52	298	143	1373	0
147	135	May	14	2016	5	3159.00	0	0	-110	-225	143	1218	0
148	136	May	15	2016	5	2980.00	0	0	0	-198	126	458	0
149	137	May	16	2016	4	2979.00	0	0	0	-127	134	923	0
150	138	May	17	2016	4	3010.00	0	0	0	277	140	1391	0
151	139	May	18	2016	4	2937.00	0	0	0	-312	135	429	0
152	140	May	19	2016	4	2877.00	0	0	0	-292	134	195	0
153	141	May	20	2016	4	2817.00	0	0	0	225	132	1380	0
154	142	May	21	2016	5	2867.00	0	0	-100	117	140	1436	0
155	143	May	22	2016	8	2877.00	0	0	-118	230	150	1134	7
156	144	May	23	2016	5	2860.00	0	0	0	326	156	1123	0
157	145	May	24	2016	5	3055.00	0	0	0	276	166	1448	0
158	146	May	25	2016	5	3058.00	0	0	0	-94	158	1121	0
159	147	May	26	2016	5	3145.00	0	0	0	301	167	1450	0
160	148	May	27	2016	5	3101.00	0	0	0	-507	145	544	0
161	149	May	28	2016	6	3077.00	0	0	0	-517	139	451	0
162	150	May	29	2016	5	3079.00	0	0	0	-154	140	990	0
163	151	May	30	2016	5	2875.00	0	0	0	-304	126	481	2
164	152	May	31	2016	5	2939.00	0	0	-26	-234	147	956	2

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
165	153	Jun	1	2016	5	2881.00	0	0	0	-409	141	124	0
166	154	Jun	2	2016	5	2804.00	0	0	0	-481	135	181	0
167	155	Jun	3	2016	4	2860.00	0	0	0	-569	139	26	0
168	156	Jun	4	2016	5	2904.00	0	0	0	-444	142	335	0
169	157	Jun	5	2016	8	2858.00	0	0	0	-655	141	38	15
170	158	Jun	6	2016	5	2954.00	0	0	0	-232	149	593	0
171	159	Jun	7	2016	5	3085.00	52	0	0	-144	156	614	8
172	160	Jun	8	2016	5	3122.00	50	0	0	348	153	1100	0
173	161	Jun	9	2016	5	3246.00	50	0	0	538	160	1329	0
174	162	Jun	10	2016	5	3146.00	50	0	0	41	165	792	0
175	163	Jun	11	2016	7	3323.00	50	0	0	-226	167	1071	0
176	164	Jun	12	2016	8	3145.00	0	0	0	267	155	908	7
177	165	Jun	13	2016	5	3360.00	0	0	0	237	186	905	1
178	166	Jun	14	2016	5	3342.00	40	0	0	-765	154	297	1
179	167	Jun	15	2016	5	3500.00	40	0	0	-38	208	1348	1
180	168	Jun	16	2016	5	3370.00	40	0	0	314	168	1526	1
181	169	Jun	17	2016	6	3634.00	40	0	0	-183	206	1351	1
182	170	Jun	18	2016	8	3643.00	39	0	0	-164	206	748	12
183	171	Jun	19	2016	8	3622.00	40	0	0	-394	190	267	6
184	172	Jun	20	2016	5	3583.00	40	0	0	-334	181	1075	1
185	173	Jun	21	2016	5	3661.00	40	0	0	-234	178	1254	1
186	174	Jun	22	2016	5	3805.00	40	0	0	177	182	1625	1
187	175	Jun	23	2016	6	3872.00	40	0	0	-398	200	471	1
188	176	Jun	24	2016	5	3865.00	40	0	0	-227	190	727	1
189	177	Jun	25	2016	7	3833.00	40	0	-92	-297	156	1245	1
190	178	Jun	26	2016	8	3719.00	0	0	0	-351	185	151	11
191	179	Jun	27	2016	5	3615.00	0	0	0	-247	176	339	1
192	180	Jun	28	2016	5	3748.00	0	0	0	-332	175	415	0
193	181	Jun	29	2016	5	3806.00	0	0	0	-20	170	906	0
194	182	Jun	30	2016	5	3854.00	40	0	0	-764	190	462	0

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
195	183	Jul	1	2016	5	3789.00	40	0	0	-304	182	708	0
196	184	Jul	2	2016	6	3834.00	40	0	0	-688	176	989	0
197	185	Jul	3	2016	8	3738.00	40	0	0	-169	186	373	15
198	186	Jul	4	2016	7	3701.00	40	0	0	-479	167	286	0
199	187	Jul	5	2016	6	3934.00	40	0	0	-627	220	641	0
200	188	Jul	6	2016	6	3997.00	40	0	0	91	194	1215	0
201	189	Jul	7	2016	5	4054.00	40	0	0	-184	170	1562	0
202	190	Jul	8	2016	5	4220.00	40	0	0	-589	206	1147	0
203	191	Jul	9	2016	8	3958.00	40	0	0	72	159	1035	6
204	192	Jul	10	2016	8	4091.00	40	0	0	-50	175	1283	18
205	193	Jul	11	2016	5	4245.00	40	0	0	-124	209	1421	0
206	194	Jul	12	2016	6	4309.00	40	0	0	-659	221	800	0
207	195	Jul	13	2016	6	4366.00	40	0	0	-83	228	1481	0
208	196	Jul	14	2016	6	4373.00	40	0	0	-549	215	1117	0
209	197	Jul	15	2016	5	4061.00	40	0	0	-547	178	314	0
210	198	Jul	16	2016	7	3881.00	40	0	0	-443	172	564	0
211	199	Jul	17	2016	8	4035.00	49	0	0	178	186	1523	8
212	200	Jul	18	2016	5	4085.00	0	0	0	-299	187	1324	0
213	201	Jul	19	2016	6	4168.00	0	0	0	-189	195	984	0
214	202	Jul	20	2016	5	4226.00	40	0	0	-70	198	1505	0
215	203	Jul	21	2016	6	4325.00	40	0	0	-70	205	1504	0
216	204	Jul	22	2016	6	4299.00	40	0	0	-53	202	1318	0
217	205	Jul	23	2016	8	4207.00	40	-16	0	244	193	1332	25
218	206	Jul	24	2016	8	4172.00	40	-17	0	-119	191	762	23
219	207	Jul	25	2016	6	4223.00	40	13	0	-926	212	79	0
220	208	Jul	26	2016	5	4209.00	40	-16	0	-1129	198	291	0
221	209	Jul	27	2016	5	4197.00	40	-16	0	-1172	145	401	0
222	210	Jul	28	2016	5	4100.00	40	-16	74	-1339	183	291	0
223	211	Jul	29	2016	5	4217.00	0	-23	0	-559	193	950	0
224	212	Jul	30	2016	8	4032.00	50	-25	0	-526	188	430	23
225	213	Jul	31	2016	8	4066.00	0	-107	0	-103	188	1204	27

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
226	214	Aug	1	2016	5	4145.00	0	-21	0	-146	202	1401	7
227	215	Aug	2	2016	5	4275.00	40	-21	0	-1099	208	550	7
228	216	Aug	3	2016	5	4098.00	45	-91	0	-1018	207	192	7
229	217	Aug	4	2016	5	4229.00	0	-21	0	-571	205	1258	0
230	218	Aug	5	2016	5	4220.00	0	-21	0	-564	208	218	0
231	219	Aug	6	2016	8	4165.00	0	-16	0	-588	200	251	21
232	220	Aug	7	2016	8	4106.00	0	-20	0	-771	191	355	21
233	221	Aug	8	2016	5	4096.00	0	-21	0	-956	205	617	0
234	222	Aug	9	2016	5	3994.00	40	14	0	-746	189	739	0
235	223	Aug	10	2016	5	4030.00	40	-94	0	-151	194	1229	0
236	224	Aug	11	2016	5	4096.00	40	-182	0	-668	196	822	0
237	225	Aug	12	2016	5	3967.00	40	-21	0	-828	202	149	0
238	226	Aug	13	2016	6	3787.00	40	-21	0	-734	148	149	0
239	227	Aug	14	2016	8	3704.00	40	-21	0	-553	157	62	1
240	228	Aug	15	2016	5	3683.00	40	14	0	-195	158	589	0
241	229	Aug	16	2016	5	3869.00	40	14	0	-317	168	1188	0
242	230	Aug	17	2016	5	3911.00	40	14	0	-543	165	815	0
243	231	Aug	18	2016	5	3999.00	40	-21	0	-696	185	668	0
244	232	Aug	19	2016	5	4024.00	40	-16	0	-900	182	316	0
245	233	Aug	20	2016	5	3867.00	0	-20	0	-532	180	1011	0
246	234	Aug	21	2016	8	3646.00	0	13	0	-818	151	299	2
247	235	Aug	22	2016	5	3616.00	0	14	0	-258	158	1097	0
248	236	Aug	23	2016	5	3850.00	40	14	0	65	175	1392	0
249	237	Aug	24	2016	5	3675.00	75	-16	0	-348	171	1095	0
250	238	Aug	25	2016	5	3552.00	75	-20	0	-646	168	110	0
251	239	Aug	26	2016	5	3426.00	0	-21	0	-219	158	250	0
252	240	Aug	27	2016	5	3393.00	0	15	0	-114	155	1103	0
253	241	Aug	28	2016	6	3284.00	0	14	0	-145	162	460	0
254	242	Aug	29	2016	5	3157.00	0	14	0	-105	166	193	0
255	243	Aug	30	2016	5	3086.00	0	-21	0	-205	159	24	0
256	244	Aug	31	2016	5	2977.00	0	-21	0	-167	157	8	0

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
257	245	Sep	1	2016	4	2918.00	0	-30	0	-550	155	36	0
258	246	Sep	2	2016	4	2962.00	0	14	0	-544	160	377	0
259	247	Sep	3	2016	5	3034.00	0	108	0	-366	159	1027	0
260	248	Sep	4	2016	6	3028.00	0	114	-50	-118	165	1043	0
261	249	Sep	5	2016	5	3017.00	0	19	-91	-33	162	1251	0
262	250	Sep	6	2016	5	3036.00	0	161	0	-147	173	1140	0
263	251	Sep	7	2016	5	3047.00	0	-16	-1	29	173	1000	0
264	252	Sep	8	2016	5	3078.00	0	14	0	-516	179	860	0
265	253	Sep	9	2016	5	3062.00	0	64	-49	-667	175	651	0
266	254	Sep	10	2016	6	2921.00	0	161	-124	-671	161	878	0
267	255	Sep	11	2016	5	2838.00	0	155	-129	-232	139	1176	0
268	256	Sep	12	2016	4	2933.00	0	180	-183	-273	154	1298	0
269	257	Sep	13	2016	5	2979.00	0	29	-106	-639	162	443	0
270	258	Sep	14	2016	4	2952.00	0	-16	0	-544	163	149	0
271	259	Sep	15	2016	4	2980.00	0	180	0	-516	160	973	0
272	260	Sep	16	2016	5	2776.00	0	27	0	-461	130	595	0
273	261	Sep	17	2016	5	2840.00	0	-16	0	-433	150	152	0
274	262	Sep	18	2016	5	2825.00	0	170	0	-431	147	1089	0
275	263	Sep	19	2016	5	2882.00	0	180	-39	-671	168	832	0
276	264	Sep	20	2016	5	2981.00	0	-16	-99	-82	171	958	4
277	265	Sep	21	2016	5	3049.00	0	90	-110	-239	168	1072	4
278	266	Sep	22	2016	5	3008.00	0	-16	-69	-181	168	963	0
279	267	Sep	23	2016	5	3000.00	0	-16	0	-105	162	1153	0
280	268	Sep	24	2016	6	3061.00	0	-13	0	-950	173	369	0
281	269	Sep	25	2016	5	2915.00	0	-30	32	-166	152	341	0
282	270	Sep	26	2016	4	2763.00	0	-16	0	-737	133	208	0
283	271	Sep	27	2016	4	2867.00	0	-60	0	-23	132	562	0
284	272	Sep	28	2016	5	2885.00	0	-16	0	-509	137	492	0
285	273	Sep	29	2016	5	2931.00	0	-71	0	-164	141	362	0
286	274	Sep	30	2016	5	2966.00	0	-16	0	-92	138	1051	0

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
287	275	Oct	1	2016	5	3004.00	0	14	0	-56	143	1119	0
288	276	Oct	2	2016	6	2977.00	0	0	0	-312	142	785	0
289	277	Oct	3	2016	5	3001.00	0	0	0	44	152	1298	0
290	278	Oct	4	2016	5	3086.00	0	0	0	-234	156	1021	0
291	279	Oct	5	2016	4	2914.00	0	0	0	-107	133	413	0
292	280	Oct	6	2016	4	3001.00	0	0	0	-126	145	1207	0
293	281	Oct	7	2016	4	2946.00	0	0	0	-14	133	1252	0
294	282	Oct	8	2016	4	2944.00	0	0	0	108	131	1018	0
295	283	Oct	9	2016	5	2896.00	0	0	0	-317	131	249	0
296	284	Oct	10	2016	4	2827.00	0	0	0	-179	135	1193	0
297	285	Oct	11	2016	4	2939.00	0	0	0	-208	147	1244	0
298	286	Oct	12	2016	5	2998.00	0	0	0	-526	153	900	0
299	287	Oct	13	2016	4	2882.00	0	0	0	-670	133	105	0
300	288	Oct	14	2016	4	2900.00	0	0	0	272	135	1118	0
301	289	Oct	15	2016	5	2931.00	0	0	0	28	141	1385	0
302	290	Oct	16	2016	5	2865.00	0	0	0	-250	142	1190	0
303	291	Oct	17	2016	5	2877.00	0	0	0	-28	150	1518	0
304	292	Oct	18	2016	5	2909.00	40	0	0	-20	144	1094	0
305	293	Oct	19	2016	4	2898.00	40	0	0	230	136	1131	0
306	294	Oct	20	2016	4	2919.00	40	0	0	-3	134	879	0
307	295	Oct	21	2016	4	2944.00	40	0	0	225	133	1351	0
308	296	Oct	22	2016	4	2932.00	0	0	0	64	130	1478	0
309	297	Oct	23	2016	5	2891.00	0	0	0	-127	128	1150	0
310	298	Oct	24	2016	4	2892.00	0	0	0	-101	139	152	0
311	299	Oct	25	2016	4	3025.00	0	0	0	79	146	1263	0
312	300	Oct	26	2016	5	3004.00	0	0	0	545	134	910	0
313	301	Oct	27	2016	5	3019.00	0	0	0	418	143	832	0
314	302	Oct	28	2016	4	3025.00	0	0	0	69	143	1398	0
315	303	Oct	29	2016	5	3028.00	0	0	0	248	138	1516	0
316	304	Oct	30	2016	6	2974.00	0	0	0	-148	135	656	0
317	305	Oct	31	2016	4	2941.00	0	0	0	35	138	1407	0

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
318	306	Nov	1	2016	4	2995.00	0	0	0	-123	143	852	0
319	307	Nov	2	2016	4	3009.00	0	0	0	-453	144	458	0
320	308	Nov	3	2016	3	2872.00	0	0	0	-90	136	295	0
321	309	Nov	4	2016	5	2959.00	0	0	0	-159	140	49	0
322	310	Nov	5	2016	5	2936.00	0	0	0	-86	134	431	0
323	311	Nov	6	2016	4	2802.00	0	0	0	-260	129	887	0
324	312	Nov	7	2016	3	2788.00	0	0	0	159	136	318	0
325	313	Nov	8	2016	3	2860.00	0	0	0	133	135	945	0
326	314	Nov	9	2016	3	2965.00	0	0	0	-204	144	185	0
327	315	Nov	10	2016	4	3023.00	0	0	0	-175	143	842	0
328	316	Nov	11	2016	3	2990.00	0	0	0	-160	141	752	0
329	317	Nov	12	2016	3	3001.00	0	0	0	-552	143	115	0
330	318	Nov	13	2016	0	2999.00	0	0	0	-210	153	282	0
331	319	Nov	14	2016	3	2893.00	0	0	0	-197	136	482	0
332	320	Nov	15	2016	3	2949.00	0	0	0	-211	138	741	0
333	321	Nov	16	2016	4	2941.00	0	0	0	403	133	1225	0
334	322	Nov	17	2016	3	2926.00	0	0	0	278	135	1407	0
335	323	Nov	18	2016	3	3026.00	0	0	0	-115	140	1021	0
336	324	Nov	19	2016	17	3249.00	0	0	0	350	177	1573	68
337	325	Nov	20	2016	0	3056.00	0	0	0	166	159	690	0
338	326	Nov	21	2016	2	2980.00	0	0	0	39	148	555	0
339	327	Nov	22	2016	3	3040.00	0	0	0	159	140	1422	0
340	328	Nov	23	2016	3	3162.00	0	0	0	-13	151	1108	0
341	329	Nov	25	2016	17	3023.00	0	0	0	43	146	1231	35
342	330	Nov	25	2016	3	3071.00	0	0	0	-351	124	673	0
343	331	Nov	26	2016	4	3138.00	0	0	0	-113	149	903	0
344	332	Nov	27	2016	5	3008.00	0	0	0	230	134	1418	0
345	333	Nov	28	2016	3	3033.00	0	0	0	78	145	1349	0
346	334	Nov	29	2016	3	3171.00	0	0	0	-245	154	1086	0
347	335	Nov	30	2016	16	3328.00	0	0	0	-344	199	765	172

	A	B	C	D	E	F	G	H	I	J	K	L	M
10					Hr @	Min Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
11	Seq #	Month	Day	Year	Min	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR
12											TIE FLOW		
348	336	Dec	1	2016	16	3296.00	0	0	0	-116	199	59	150
349	337	Dec	2	2016	2	3278.00	0	0	0	-102	179	291	0
350	338	Dec	3	2016	4	3289.00	0	0	0	-519	175	415	0
351	339	Dec	4	2016	16	3190.00	0	0	0	-557	186	28	158
352	340	Dec	5	2016	17	3289.00	0	0	0	-255	141	938	27
353	341	Dec	6	2016	2	3273.00	0	0	0	-220	173	1161	0
354	342	Dec	7	2016	3	3516.00	0	0	0	-85	202	1330	0
355	343	Dec	8	2016	2	3614.00	0	0	0	-339	223	777	0
356	344	Dec	9	2016	17	3633.00	0	0	0	165	240	752	58
357	345	Dec	10	2016	17	3276.00	0	0	0	207	192	1331	13
358	346	Dec	11	2016	17	3253.00	0	0	0	-270	185	670	25
359	347	Dec	12	2016	2	3274.00	0	0	0	-48	138	423	0
360	348	Dec	13	2016	3	3239.00	0	0	0	-473	167	667	0
361	349	Dec	14	2016	3	3435.00	0	0	0	276	197	1086	0
362	350	Dec	15	2016	1	3540.00	0	0	0	-32	165	377	0
363	351	Dec	16	2016	0	3291.00	0	0	0	519	173	1577	0
364	352	Dec	17	2016	3	3175.00	0	0	0	459	157	1534	0
365	353	Dec	18	2016	16	3409.00	0	0	0	531	197	349	72
366	354	Dec	19	2016	16	3436.00	0	0	0	24	231	1166	143
367	355	Dec	20	2016	17	3263.00	0	0	0	-267	201	23	59
368	356	Dec	21	2016	3	3341.00	0	0	0	-454	186	1252	0
369	357	Dec	22	2016	3	3310.00	0	0	0	-906	182	356	0
370	358	Dec	23	2016	17	3174.00	0	0	0	-242	177	587	63
371	359	Dec	24	2016	16	3036.00	0	0	0	201	161	1414	47
372	360	Dec	25	2016	5	2860.00	0	0	0	217	134	1521	0
373	361	Dec	26	2016	16	3113.00	0	0	0	-393	168	320	147
374	362	Dec	27	2016	2	3244.00	0	0	0	-635	175	734	0
375	363	Dec	28	2016	3	3202.00	0	0	0	-48	159	1488	0
376	364	Dec	29	2016	3	3274.00	0	0	0	-578	157	1115	0
377	365	Dec	30	2016	3	3476.00	0	0	0	-292	186	1618	0
378	366	Dec	31	2016	17	3256.00	0	0	0	-761	178	44	21

	A	B	C	D	P	Q	R	S	T	U	V	W	X	Y	AA	AB	AC	AD	AE	AF
10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
13	1	Jan	1	2016	3244	20	3494	0	0	0	-373	224	474	0		3494	3369	3379.7	-0.32%	
14	2	Jan	2	2016	3130	21	3481	0	0	0	-431	242	85	0		3481	3306	3379.7	-2.20%	
15	3	Jan	3	2016	3006	8	3491	0	0	0	-441	206	396	0		3491	3249	3379.7	-3.88%	
16	4	Jan	4	2016	3235	8	3735	40	0	0	-124	235	301	3		3735	3485	3379.7	3.12%	
17	5	Jan	5	2016	3360	20	3847	0	0	0	-104	220	1512	3		3847	3604	3379.7	6.62%	
18	6	Jan	6	2016	3323	8	3707	0	0	0	-557	206	968	3		3707	3515	3379.7	4.00%	
19	7	Jan	7	2016	3240	8	3697	0	0	0	-244	196	783	3		3697	3469	3379.7	2.63%	
20	8	Jan	8	2016	3240	19	3691	0	0	0	-673	213	504	3		3691	3466	3379.7	2.54%	
21	9	Jan	9	2016	3422	10	3724	0	0	0	-899	220	339	16		3724	3573	3379.7	5.72%	
22	10	Jan	10	2016	3469	21	3780	0	0	0	-859	235	278	3		3780	3625	3379.7	7.24%	
23	11	Jan	11	2016	3340	8	3963	0	0	0	-666	242	160	3		3963	3652	3379.7	8.04%	
24	12	Jan	12	2016	3263	8	3926	0	0	0	-512	232	515	3		3926	3595	3379.7	6.36%	
25	13	Jan	13	2016	3224	8	3879	0	0	0	-355	225	785	3		3879	3552	3379.7	5.08%	
26	14	Jan	14	2016	3210	8	3812	0	0	0	-252	215	1202	3		3812	3511	3379.7	3.88%	
27	15	Jan	15	2016	3231	8	3749	0	0	0	-738	246	185	0		3749	3490	3379.7	3.26%	
28	16	Jan	16	2016	3205	11	3559	0	0	0	-472	229	85	28		3559	3382	3379.7	0.07%	
29	17	Jan	17	2016	3294	21	3641	0	0	0	-447	228	96	0		3641	3468	3379.7	2.60%	
30	18	Jan	18	2016	3388	10	3880	0	0	0	-35	230	172	11		3880	3634	3379.7	7.52%	
31	19	Jan	19	2016	3266	8	3729	0	0	0	263	224	1254	0		3729	3498	3379.7	3.49%	
32	20	Jan	20	2016	3235	8	3766	0	0	0	244	221	1439	0		3766	3501	3379.7	3.57%	
33	21	Jan	21	2016	3181	8	3703	0	0	0	603	208	1462	0		3703	3442	3379.7	1.84%	
34	22	Jan	22	2016	3207	8	3872	0	0	0	-516	236	157	0		3872	3540	3379.7	4.73%	
35	23	Jan	23	2016	3122	9	3638	0	0	0	-53	204	1128	13		3638	3380	3379.7	0.01%	
36	24	Jan	24	2016	3066	10	3411	0	0	0	-181	206	1227	26		3411	3239	3379.7	-4.18%	
37	25	Jan	25	2016	3058	8	3612	0	0	0	-18	228	1294	0		3612	3335	3379.7	-1.32%	
38	26	Jan	26	2016	3191	8	3669	0	0	0	-556	215	272	0		3669	3430	3379.7	1.49%	
39	27	Jan	27	2016	3216	8	3900	0	0	0	-256	242	542	0		3900	3558	3379.7	5.28%	
40	28	Jan	28	2016	3143	8	3774	0	0	0	-723	248	150	0		3774	3459	3379.7	2.33%	
41	29	Jan	29	2016	3113	8	3622	0	0	0	-161	223	1116	0		3622	3368	3379.7	-0.36%	
42	30	Jan	30	2016	2997	8	3297	0	0	0	-24	181	1184	0		3297	3147	3379.7	-6.89%	
43	31	Jan	31	2016	2913	21	3235	0	0	0	-18	198	791	7		3235	3074	3379.7	-9.05%	

	A	B	C	D	P	Q	R	S	T	U	V	W	X	Y	AA	AB	AC	AD	AE	AF
10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
44	32	Feb	1	2016	2980	8	3568	0	0	0	259	227	1265	0		3568	3274	3379.7	-3.13%	
45	33	Feb	2	2016	3272	8	3741	0	0	0	140	240	1507	7		3741	3507	3379.7	3.75%	
46	34	Feb	3	2016	3334	8	3889	0	0	0	-448	268	341	0		3889	3612	3379.7	6.86%	
47	35	Feb	4	2016	3240	8	3938	0	0	0	127	234	852	0		3938	3589	3379.7	6.19%	
48	36	Feb	5	2016	3329	8	3789	0	0	0	40	229	920	0		3789	3559	3379.7	5.31%	
49	37	Feb	6	2016	3040	8	3654	0	0	0	-451	211	216	1		3654	3347	3379.7	-0.97%	
50	38	Feb	7	2016	3069	9	3408	0	0	0	-382	176	857	19		3408	3239	3379.7	-4.18%	
51	39	Feb	8	2016	3157	8	3761	0	0	0	-75	226	939	0		3761	3459	3379.7	2.35%	
52	40	Feb	9	2016	3163	8	3759	0	0	0	-117	245	950	1		3759	3461	3379.7	2.41%	
53	41	Feb	10	2016	3090	8	3677	0	0	0	561	226	1318	1		3677	3384	3379.7	0.11%	
54	42	Feb	11	2016	3016	8	3542	0	0	0	-9	214	443	1		3542	3279	3379.7	-2.98%	
55	43	Feb	12	2016	3067	8	3570	0	0	0	-61	223	746	1		3570	3319	3379.7	-1.81%	
56	44	Feb	13	2016	3049	9	3418	0	0	0	620	193	1296	27		3418	3234	3379.7	-4.33%	
57	45	Feb	14	2016	2975	10	3266	0	0	0	24	176	624	15		3266	3121	3379.7	-7.67%	
58	46	Feb	15	2016	3020	8	3480	0	0	0	-770	218	356	2		3480	3250	3379.7	-3.84%	
59	47	Feb	16	2016	3053	8	3529	0	0	0	-665	208	950	2		3529	3291	3379.7	-2.62%	
60	48	Feb	17	2016	3080	8	3558	0	0	0	-532	206	1045	3		3558	3319	3379.7	-1.80%	
61	49	Feb	18	2016	2944	8	3397	0	0	0	60	187	1608	2		3397	3171	3379.7	-6.19%	
62	50	Feb	19	2016	2882	20	3309	0	0	0	-306	199	953	0		3309	3096	3379.7	-8.41%	
63	51	Feb	20	2016	2869	20	3222	0	0	0	-220	199	478	0		3222	3046	3379.7	-9.89%	
64	52	Feb	21	2016	2837	20	3270	0	0	0	-420	176	445	0		3270	3054	3379.7	-9.65%	
65	53	Feb	22	2016	2971	20	3456	0	0	0	-381	197	472	0		3456	3214	3379.7	-4.92%	
66	54	Feb	23	2016	3119	20	3694	0	0	0	-279	219	1159	0		3694	3407	3379.7	0.79%	
67	55	Feb	24	2016	3153	8	3753	0	0	0	-334	214	835	6		3753	3453	3379.7	2.17%	
68	56	Feb	25	2016	3180	8	3628	0	0	0	-626	205	522	5		3628	3404	3379.7	0.72%	
69	57	Feb	26	2016	3122	8	3699	0	0	0	-11	206	1522	6		3699	3411	3379.7	0.91%	
70	58	Feb	27	2016	2995	8	3332	0	0	0	-16	183	1311	6		3332	3164	3379.7	-6.40%	
71	59	Feb	28	2016	2906	20	3206	0	0	0	-53	194	343	0		3206	3056	3379.7	-9.58%	
72	60	Feb	29	2016	2914	8	3413	0	0	0	339	195	1375	6		3413	3164	3379.7	-6.40%	

	A	B	C	D	P	Q	R	S	T	U	V	W	X	Y	AA	AB	AC	AD	AE	AF
10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
73	61	Mar	1	2016	2893	8	3359	0	0	0	121	188	1193	7		3359	3126	3323.4	-5.94%	
74	62	Mar	2	2016	3046	8	3490	0	0	0	338	199	1522	3		3490	3268	3323.4	-1.67%	
75	63	Mar	3	2016	2956	19	3379	0	0	0	340	201	287	0		3379	3168	3323.4	-4.69%	
76	64	Mar	4	2016	3057	8	3458	0	0	0	399	190	1462	5		3458	3258	3323.4	-1.98%	
77	65	Mar	5	2016	2983	20	3249	0	0	-55	157	181	1347	0		3249	3116	3323.4	-6.24%	
78	66	Mar	6	2016	2936	20	3270	0	0	0	37	195	1387	0		3270	3103	3323.4	-6.63%	
79	67	Mar	7	2016	2887	20	3377	0	0	0	-218	206	999	0		3377	3132	3323.4	-5.76%	
80	68	Mar	8	2016	2954	20	3375	0	0	0	-78	206	379	0		3375	3165	3323.4	-4.78%	
81	69	Mar	9	2016	2959	21	3371	0	0	0	-310	202	294	0		3371	3165	3323.4	-4.77%	
82	70	Mar	10	2016	3025	8	3417	0	0	0	-163	189	206	9		3417	3221	3323.4	-3.08%	
83	71	Mar	11	2016	3076	8	3472	0	0	0	-306	190	116	13		3472	3274	3323.4	-1.49%	
84	72	Mar	12	2016	3032	11	3259	0	0	0	374	171	1047	43		3259	3146	3323.4	-5.35%	
85	73	Mar	13	2016	2933	21	3236	0	0	0	152	187	367	0		3236	3085	3323.4	-7.19%	
86	74	Mar	14	2016	2884	21	3395	0	0	0	223	196	1601	0		3395	3140	3323.4	-5.53%	
87	75	Mar	15	2016	2942	21	3388	0	0	0	-183	135	569	0		3388	3165	3323.4	-4.77%	
88	76	Mar	16	2016	3001	9	3416	0	0	0	174	168	919	13		3416	3209	3323.4	-3.46%	
89	77	Mar	17	2016	3057	9	3440	0	0	0	-84	174	91	9		3440	3249	3323.4	-2.25%	
90	78	Mar	18	2016	3070	12	3572	43	0	0	-146	179	1361	35		3572	3321	3323.4	-0.07%	
91	79	Mar	19	2016	3187	11	3516	0	0	0	-875	190	236	33		3516	3352	3323.4	0.85%	
92	80	Mar	20	2016	3109	9	3368	0	0	0	-420	169	45	15		3368	3239	3323.4	-2.55%	
93	81	Mar	21	2016	3137	8	3663	0	0	0	75	205	1578	0		3663	3400	3323.4	2.30%	
94	82	Mar	22	2016	3055	8	3493	0	0	0	456	190	1408	0		3493	3274	3323.4	-1.49%	
95	83	Mar	23	2016	3017	22	3458	0	0	0	-273	189	1278	0		3458	3238	3323.4	-2.58%	
96	84	Mar	24	2016	3167	8	3624	0	0	0	-243	212	855	0		3624	3396	3323.4	2.17%	
97	85	Mar	25	2016	3204	10	3557	0	0	0	63	189	1117	21		3557	3381	3323.4	1.72%	
98	86	Mar	26	2016	3097	10	3385	0	0	0	96	169	915	34		3385	3241	3323.4	-2.48%	
99	87	Mar	27	2016	3070	10	3395	0	0	0	-63	175	334	34		3395	3233	3323.4	-2.74%	
100	88	Mar	28	2016	3079	8	3537	0	0	0	97	189	1491	0		3537	3308	3323.4	-0.46%	
101	89	Mar	29	2016	3049	21	3588	0	0	0	343	209	1618	0		3588	3319	3323.4	-0.15%	
102	90	Mar	30	2016	3078	17	3548	0	0	0	151	214	1316	45		3548	3313	3323.4	-0.31%	
103	91	Mar	31	2016	3138	8	3591	0	0	0	-382	182	612	1		3591	3365	3323.4	1.24%	

	A	B	C	D	P	Q	R	S	T	U	V	W	X	Y	AA	AB	AC	AD	AE	AF
10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
104	92	Apr	1	2016	3202	11	3676.00	0	0	0	-343	197	608	2		3676	3439	3323.4	3.48%	
105	93	Apr	2	2016	3274	8	3628.00	0	0	0	-548	185	339	1		3628	3451	3323.4	3.84%	
106	94	Apr	3	2016	3186	22	3422.00	0	0	0	-481	183	397	0		3422	3304	3323.4	-0.58%	
107	95	Apr	4	2016	3016	21	3637.00	0	0	0	248	221	1142	0		3637	3327	3323.4	0.09%	
108	96	Apr	5	2016	3080	19	3681.00	0	0	0	-104	216	1541	18		3681	3381	3323.4	1.72%	
109	97	Apr	6	2016	3100	18	3631.00	0	0	0	-737	213	226	26		3631	3366	3323.4	1.27%	
110	98	Apr	7	2016	3133	21	3596.00	0	0	0	-128	200	554	0		3596	3365	3323.4	1.24%	
111	99	Apr	8	2016	3151	11	3555.00	0	0	0	109	185	493	9		3555	3353	3323.4	0.89%	
112	100	Apr	9	2016	3155	18	3524.00	0	0	0	-57	183	1235	39		3524	3340	3323.4	0.48%	
113	101	Apr	10	2016	3118	21	3556.00	0	0	0	-304	215	879	0		3556	3337	3323.4	0.41%	
114	102	Apr	11	2016	3039	21	3618.00	0	0	0	-352	200	439	0		3618	3329	3323.4	0.15%	
115	103	Apr	12	2016	3199	22	3634.00	0	0	0	-292	192	619	0		3634	3417	3323.4	2.80%	
116	104	Apr	13	2016	3216	22	3557.00	0	0	0	156	194	911	0		3557	3387	3323.4	1.90%	
117	105	Apr	14	2016	3076	17	3600.00	0	0	-26	181	214	1185	43		3600	3338	3323.4	0.44%	
118	106	Apr	15	2016	3033	16	3490.00	0	0	0	292	185	1413	42		3490	3262	3323.4	-1.86%	
119	107	Apr	16	2016	2971	17	3363.00	0	0	0	159	214	1125	44		3363	3167	3323.4	-4.71%	
120	108	Apr	17	2016	2941	22	3350.00	0	0	0	18	188	907	0		3350	3146	3323.4	-5.35%	
121	109	Apr	18	2016	2981	22	3444.00	0	0	0	193	189	554	0		3444	3213	3323.4	-3.34%	
122	110	Apr	19	2016	3033	12	3423.00	0	0	0	289	190	44	19		3423	3228	3323.4	-2.87%	
123	111	Apr	20	2016	2972	18	3475.00	0	0	0	429	215	349	40		3475	3224	3323.4	-3.01%	
124	112	Apr	21	2016	2940	18	3494.00	0	0	0	-320	219	212	40		3494	3217	3323.4	-3.20%	
125	113	Apr	22	2016	2957	18	3617.00	41	0	-1	406	235	542	39		3617	3287	3323.4	-1.10%	
126	114	Apr	23	2016	2982	18	3570.00	42	0	0	187	224	1559	34		3570	3276	3323.4	-1.43%	
127	115	Apr	24	2016	2971	19	3638.00	-41	0	0	227	246	1127	31		3638	3305	3323.4	-0.57%	
128	116	Apr	25	2016	2932	18	3920.00	0	0	0	957	271	1061	41		3920	3426	3323.4	3.09%	
129	117	Apr	26	2016	3064	15	3659.00	0	0	0	647	238	885	38		3659	3362	3323.4	1.15%	
130	118	Apr	27	2016	3023	18	3686.00	0	0	0	-200	239	176	41		3686	3355	3323.4	0.94%	
131	119	Apr	28	2016	3051	18	3755.00	0	0	0	650	242	1377	41		3755	3403	3323.4	2.40%	
132	120	Apr	29	2016	3076	17	3531.00	0	0	0	31	228	450	35		3531	3304	3323.4	-0.60%	
133	121	Apr	30	2016	3018	18	3374.00	0	0	0	112	202	434	35		3374	3196	3323.4	-3.83%	

	A	B	C	D	P	Q	R	S	T	U	V	W	X	Y	AA	AB	AC	AD	AE	AF
10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
134	122	May	1	2016	2988	22	3430.00	0	0	0	333	183	467	0		3430	3209	3323.4	-3.44%	
135	123	May	2	2016	3046	22	3419.00	0	0	0	324	194	37	2		3419	3233	3323.4	-2.74%	
136	124	May	3	2016	2992	17	3392.00	0	0	0	172	191	931	36		3392	3192	3323.4	-3.95%	
137	125	May	4	2016	2947	19	3691.00	0	0	0	-19	240	-4	35		3691	3319	3323.4	-0.13%	
138	126	May	5	2016	2986	18	3943.00	0	0	0	576	282	444	39		3943	3465	3323.4	4.25%	
139	127	May	6	2016	3080	18	3940.00	0	0	0	482	256	1614	33		3940	3510	3323.4	5.61%	
140	128	May	7	2016	3130	18	4001.00	0	0	0	347	278	1560	34		4001	3566	3323.4	7.28%	
141	129	May	8	2016	3079	18	3786.00	0	0	0	245	260	1521	32		3786	3433	3323.4	3.28%	
142	130	May	9	2016	3043	19	3882.00	0	0	0	-3	254	473	33		3882	3463	3323.4	4.19%	
143	131	May	10	2016	3122	18	4313.00	0	0	0	702	298	1173	40		4313	3718	3323.4	11.86%	
144	132	May	11	2016	3236	18	4194.00	0	0	0	-41	304	238	17		4194	3715	3323.4	11.78%	
145	133	May	12	2016	3187	19	3947.00	0	0	0	371	251	95	26		3947	3567	3323.4	7.33%	
146	134	May	13	2016	3226	17	4232.00	0	0	0	-428	299	452	40		4232	3729	3323.4	12.20%	
147	135	May	14	2016	3159	1	3436.00	0	0	-110	-75	170	1099	0		3436	3298	3323.4	-0.78%	
148	136	May	15	2016	2980	22	3388.00	0	0	0	127	183	902	0		3388	3184	3323.4	-4.19%	
149	137	May	16	2016	2979	19	3736.00	0	0	0	484	264	1051	26		3736	3358	3323.4	1.03%	
150	138	May	17	2016	3010	12	3384.00	0	0	0	129	189	1350	9		3384	3197	3323.4	-3.80%	
151	139	May	18	2016	2937	11	3283.00	0	0	0	-30	193	173	4		3283	3110	3323.4	-6.42%	
152	140	May	19	2016	2877	12	3210.00	0	0	0	-182	190	303	11		3210	3044	3323.4	-8.42%	
153	141	May	20	2016	2817	19	3497.00	0	0	0	308	211	1148	31		3497	3157	3323.4	-5.01%	
154	142	May	21	2016	2867	18	3718.00	0	0	0	162	262	1488	37		3718	3293	3323.4	-0.93%	
155	143	May	22	2016	2877	18	3795.00	0	0	-126	121	288	1229	35		3795	3336	3323.4	0.38%	
156	144	May	23	2016	2860	18	4159.00	0	0	0	-432	310	457	36		4159	3510	3323.4	5.60%	
157	145	May	24	2016	3055	17	4222.00	0	0	0	-42	324	1031	20		4222	3639	3323.4	9.48%	
158	146	May	25	2016	3058	18	4327.00	0	0	0	614	332	1022	37		4327	3693	3323.4	11.11%	
159	147	May	26	2016	3145	18	4300.00	0	0	0	153	302	1568	33		4300	3723	3323.4	12.01%	
160	148	May	27	2016	3101	18	3970.00	0	0	0	51	265	734	38		3970	3536	3323.4	6.38%	
161	149	May	28	2016	3077	18	4069.00	0	0	26	232	284	118	38		4069	3573	3323.4	7.51%	
162	150	May	29	2016	3079	16	3756.00	0	0	0	509	268	1145	15		3756	3418	3323.4	2.83%	
163	151	May	30	2016	2875	18	3831.00	0	0	0	207	275	772	11		3831	3353	3323.4	0.89%	
164	152	May	31	2016	2939	17	3790.00	0	0	0	-83	269	189	28		3790	3365	3323.4	1.24%	

	A	B	C	D	P	Q	R	S	T	U	V	W	X	Y	AA	AB	AC	AD	AE	AF
10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
165	153	Jun	1	2016	2881	16	3373.00	0	0	0	130	190	482	31		3373	3127	4432.1	-29.45%	
166	154	Jun	2	2016	2804	17	3509.00	0	0	0	152	222	314	18		3509	3157	4432.1	-28.78%	
167	155	Jun	3	2016	2860	18	3888.00	0	0	0	-160	265	104	37		3888	3374	4432.1	-23.87%	
168	156	Jun	4	2016	2904	18	3820.00	0	0	0	-418	261	484	17		3820	3362	4432.1	-24.14%	
169	157	Jun	5	2016	2858	18	4002.00	0	0	49	287	298	75	36		4002	3430	4432.1	-22.61%	
170	158	Jun	6	2016	2954	17	4290.00	51	0	86	252	310	285	20		4290	3622	4432.1	-18.28%	
171	159	Jun	7	2016	3085	17	4383.00	40	0	101	888	269	1015	41		4383	3734	4432.1	-15.75%	
172	160	Jun	8	2016	3122	18	4499.00	50	0	0	426	320	1416	39		4499	3811	4432.1	-14.02%	
173	161	Jun	9	2016	3246	17	4623.00	50	0	0	420	327	1232	40		4623	3935	4432.1	-11.23%	
174	162	Jun	10	2016	3146	17	4604.00	50	0	0	409	280	824	38		4604	3875	4432.1	-12.57%	
175	163	Jun	11	2016	3323	17	4438.00	0	0	0	598	267	783	22		4438	3881	4432.1	-12.45%	
176	164	Jun	12	2016	3145	18	4489.00	0	0	0	320	262	353	30		4489	3817	4432.1	-13.88%	
177	165	Jun	13	2016	3360	17	4823.00	40	0	0	29	300	403	22		4823	4092	4432.1	-7.68%	
178	166	Jun	14	2016	3342	18	4830.00	40	0	0	57	310	343	30		4830	4086	4432.1	-7.81%	
179	167	Jun	15	2016	3500	17	5057.00	40	0	0	398	333	735	13		5057	4279	4432.1	-3.47%	
180	168	Jun	16	2016	3370	17	5076.00	40	0	0	470	309	969	32		5076	4223	4432.1	-4.72%	
181	169	Jun	17	2016	3634	17	5219.00	40	0	0	-293	354	145	31		5219	4427	4432.1	-0.13%	
182	170	Jun	18	2016	3643	18	5005.00	40	0	0	-160	324	269	29		5005	4324	4432.1	-2.44%	
183	171	Jun	19	2016	3622	18	4698.00	40	0	0	-300	307	410	24		4698	4160	4432.1	-6.14%	
184	172	Jun	20	2016	3583	17	5021.00	47	0	0	-545	297	507	29		5021	4302	4432.1	-2.94%	
185	173	Jun	21	2016	3661	18	5114.00	81	0	0	131	276	803	25		5114	4388	4432.1	-1.01%	
186	174	Jun	22	2016	3805	18	5448.00	40	0	0	-393	335	218	29		5448	4627	4432.1	4.39%	
187	175	Jun	23	2016	3872	17	5384.00	70	0	0	28	319	337	32		5384	4628	4432.1	4.42%	
188	176	Jun	24	2016	3865	18	5232.00	70	0	0	362	277	1315	30		5232	4549	4432.1	2.63%	
189	177	Jun	25	2016	3833	18	5113.00	40	0	0	19	264	1283	30		5113	4473	4432.1	0.92%	
190	178	Jun	26	2016	3719	16	4618.00	0	0	50	623	250	252	27		4618	4169	4432.1	-5.95%	
191	179	Jun	27	2016	3615	17	5026.00	0	0	0	94	284	139	18		5026	4321	4432.1	-2.52%	
192	180	Jun	28	2016	3748	17	5218.00	0	0	0	-181	355	53	39		5218	4483	4432.1	1.15%	
193	181	Jun	29	2016	3806	18	5304.00	40	0	0	3	298	129	35		5304	4555	4432.1	2.77%	
194	182	Jun	30	2016	3854	17	5227.00	40	0	0	141	276	553	48		5227	4541	4432.1	2.45%	

	A	B	C	D	P	Q	R	S	T	U	V	W	X	Y	AA	AB	AC	AD	AE	AF
10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
195	183	Jul	1	2016	3789	17	5077.00	40	0	0	8	276	1023	30		5077	4433	4432.1	0.02%	
196	184	Jul	2	2016	3834	19	4997.00	40	0	0	-199	292	865	33		4997	4416	4432.1	-0.37%	
197	185	Jul	3	2016	3738	18	5024.00	40	0	27	-721	284	33	33		5024	4381	4432.1	-1.15%	
198	186	Jul	4	2016	3701	18	5277.00	40	0	0	-349	309	49	25		5277	4489	4432.1	1.28%	
199	187	Jul	5	2016	3934	17	5604.00	70	0	0	-291	326	318	26		5604	4769	4432.1	7.60%	
200	188	Jul	6	2016	3997	16	5647.00	100	0	0	-498	328	446	23		5647	4822	4432.1	8.80%	
201	189	Jul	7	2016	4054	17	5735.00	70	0	0	-722	348	180	10		5735	4895	4432.1	10.43%	
202	190	Jul	8	2016	4220	18	5136.00	70	0	0	307	277	994	32		5136	4678	4432.1	5.55%	
203	191	Jul	9	2016	3958	18	5499.00	40	0	0	-25	294	460	29		5499	4729	4432.1	6.69%	
204	192	Jul	10	2016	4091	17	5534.00	70	0	0	708	295	1043	46		5534	4813	4432.1	8.58%	
205	193	Jul	11	2016	4245	17	5849.00	100	0	0	149	345	1021	36		5849	5047	4432.1	13.87%	
206	194	Jul	12	2016	4309	18	5917.00	100	0	0	-557	355	148	49		5917	5113	4432.1	15.36%	
207	195	Jul	13	2016	4366	17	6003.00	100	0	0	-654	367	105	42		6003	5185	4432.1	16.98%	
208	196	Jul	14	2016	4373	16	5772.00	100	0	0	-772	333	501	38		5772	5073	4432.1	14.45%	
209	197	Jul	15	2016	4061	17	5624.00	100	0	0	-181	305	739	55		5624	4843	4432.1	9.26%	
210	198	Jul	16	2016	3881	18	5410.00	100	0	0	-122	328	1241	56		5410	4646	4432.1	4.81%	
211	199	Jul	17	2016	4035	18	5467.00	100	0	0	167	303	1220	52		5467	4751	4432.1	7.20%	
212	200	Jul	18	2016	4085	17	5654.00	0	0	0	400	305	697	60		5654	4870	4432.1	9.87%	
213	201	Jul	19	2016	4168	18	5635.00	34	0	0	113	338	682	59		5635	4902	4432.1	10.59%	
214	202	Jul	20	2016	4226	18	5746.00	100	0	0	-70	337	863	55		5746	4986	4432.1	12.50%	
215	203	Jul	21	2016	4325	17	5842.00	0	0	0	-156	385	634	60		5842	5084	4432.1	14.70%	
216	204	Jul	22	2016	4299	18	5812.00	100	-16	0	277	307	752	68		5812	5056	4432.1	14.07%	
217	205	Jul	23	2016	4207	18	5699.00	75	-16	0	111	320	690	69		5699	4953	4432.1	11.75%	
218	206	Jul	24	2016	4172	18	5665.00	40	-16	0	159	310	476	76		5665	4919	4432.1	10.97%	
219	207	Jul	25	2016	4223	16	5726.00	75	-16	0	-81	339	230	58		5726	4975	4432.1	12.24%	
220	208	Jul	26	2016	4209	17	5639.00	133	-16	0	-250	324	133	24		5639	4924	4432.1	11.10%	
221	209	Jul	27	2016	4197	16	5440.00	133	89	0	-30	363	585	78		5440	4819	4432.1	8.72%	
222	210	Jul	28	2016	4100	18	5651.00	133	194	0	-303	310	172	60		5651	4876	4432.1	10.00%	
223	211	Jul	29	2016	4217	17	5489.00	0	153	0	414	325	837	88		5489	4853	4432.1	9.50%	
224	212	Jul	30	2016	4032	18	5386.00	0	13	0	7	311	961	88		5386	4709	4432.1	6.25%	
225	213	Jul	31	2016	4066	18	5362.00	0	-24	0	255	327	1265	27		5362	4714	4432.1	6.36%	

	A	B	C	D	P	Q	R	S	T	U	V	W	X	Y	AA	AB	AC	AD	AE	AF
10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
226	214	Aug	1	2016	4145	17	5704.00	40	-21	0	72	323	993	43		5704	4925	4432.1	11.11%	
227	215	Aug	2	2016	4275	17	5801.00	75	-32	0	210	336	538	92		5801	5038	4432.1	13.67%	
228	216	Aug	3	2016	4098	17	5611.00	0	14	0	400	336	818	93		5611	4855	4432.1	9.53%	
229	217	Aug	4	2016	4229	17	5790.00	0	13	0	-117	359	749	105		5790	5010	4432.1	13.03%	
230	218	Aug	5	2016	4220	17	5677.00	0	14	0	-352	360	224	106		5677	4949	4432.1	11.65%	
231	219	Aug	6	2016	4165	18	5519.00	0	-16	0	-18	334	651	52		5519	4842	4432.1	9.25%	
232	220	Aug	7	2016	4106	16	5417.00	0	-21	0	37	301	407	107		5417	4762	4432.1	7.43%	
233	221	Aug	8	2016	4096	16	5510.00	35	-22	0	-43	318	683	65		5510	4803	4432.1	8.37%	
234	222	Aug	9	2016	3994	17	5326.00	40	14	174	86	328	598	35		5326	4660	4432.1	5.14%	
235	223	Aug	10	2016	4030	16	5452.00	40	13	0	-260	306	675	78		5452	4741	4432.1	6.97%	
236	224	Aug	11	2016	4096	16	5504.00	40	14	100	-93	330	558	20		5504	4800	4432.1	8.30%	
237	225	Aug	12	2016	3967	17	5196.00	40	-22	0	101	326	786	69		5196	4582	4432.1	3.37%	
238	226	Aug	13	2016	3787	17	4830.00	40	-22	0	-322	275	326	17		4830	4309	4432.1	-2.79%	
239	227	Aug	14	2016	3704	18	4467.00	40	-14	0	-177	205	130	52		4467	4086	4432.1	-7.82%	
240	228	Aug	15	2016	3683	18	5181.00	40	54	0	-325	294	186	88		5181	4432	4432.1	0.00%	
241	229	Aug	16	2016	3869	17	5344.00	40	-14	0	-307	298	174	93		5344	4607	4432.1	3.93%	
242	230	Aug	17	2016	3911	17	5325.00	40	61	0	-166	298	263	86		5325	4618	4432.1	4.19%	
243	231	Aug	18	2016	3999	17	5379.00	40	-22	0	-191	303	183	92		5379	4689	4432.1	5.80%	
244	232	Aug	19	2016	4024	17	5355.00	40	-16	0	-830	363	160	40		5355	4690	4432.1	5.81%	
245	233	Aug	20	2016	3867	18	4405.00	0	-21	26	-627	203	41	61		4405	4136	4432.1	-6.68%	
246	234	Aug	21	2016	3646	18	4388.00	0	13	0	-158	232	589	53		4388	4017	4432.1	-9.37%	
247	235	Aug	22	2016	3616	18	4806.00	0	14	0	-201	265	1154	36		4806	4211	4432.1	-4.99%	
248	236	Aug	23	2016	3850	17	5117.00	40	14	0	-72	293	927	27		5117	4484	4432.1	1.16%	
249	237	Aug	24	2016	3675	17	4541.00	75	-16	26	472	248	744	83		4541	4108	4432.1	-7.31%	
250	238	Aug	25	2016	3552	17	4542.00	75	-21	51	457	239	212	25		4542	4047	4432.1	-8.69%	
251	239	Aug	26	2016	3426	17	4475.00	0	-21	0	-36	251	226	44		4475	3951	4432.1	-10.87%	
252	240	Aug	27	2016	3393	17	4483.00	0	-41	0	599	288	441	86		4483	3938	4432.1	-11.15%	
253	241	Aug	28	2016	3284	17	4333.00	0	-125	76	154	287	271	81		4333	3809	4432.1	-14.07%	
254	242	Aug	29	2016	3157	15	3879.00	0	-46	0	489	229	225	74		3879	3518	4432.1	-20.62%	
255	243	Aug	30	2016	3086	16	3687.00	0	-43	0	949	235	50	43		3687	3387	4432.1	-23.59%	
256	244	Aug	31	2016	2977	15	3622.00	0	-70	0	425	238	39	57		3622	3300	4432.1	-25.55%	

	A	B	C	D	P	Q	R	S	T	U	V	W	X	Y	AA	AB	AC	AD	AE	AF
10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
257	245	Sep	1	2016	2918	18	3858.00	0	166	0	-498	299	144	89		3858	3388	3386.9	0.03%	
258	246	Sep	2	2016	2962	17	3940.00	0	150	0	-143	293	395	96		3940	3451	3386.9	1.89%	
259	247	Sep	3	2016	3034	17	3962.00	0	14	-50	-368	277	1141	36		3962	3498	3386.9	3.28%	
260	248	Sep	4	2016	3028	17	3990.00	0	72	-50	-133	209	1388	99		3990	3509	3386.9	3.61%	
261	249	Sep	5	2016	3017	18	4129.00	0	-30	-75	-147	245	1387	89		4129	3573	3386.9	5.50%	
262	250	Sep	6	2016	3036	17	4229.00	0	-15	0	-488	270	987	16		4229	3633	3386.9	7.25%	
263	251	Sep	7	2016	3047	18	4054.00	0	-30	0	-196	230	1110	71		4054	3551	3386.9	4.83%	
264	252	Sep	8	2016	3078	17	4344.00	0	-15	0	-597	283	385	101		4344	3711	3386.9	9.57%	
265	253	Sep	9	2016	3062	17	4479.00	0	-16	0	-820	293	66	89		4479	3771	3386.9	11.33%	
266	254	Sep	10	2016	2921	18	3583.00	0	-64	84	-106	259	70	91		3583	3252	3386.9	-3.98%	
267	255	Sep	11	2016	2838	18	3857.00	0	-16	-119	-619	232	901	78		3857	3348	3386.9	-1.16%	
268	256	Sep	12	2016	2933	17	4173.00	0	97	0	-387	311	524	43		4173	3553	3386.9	4.90%	
269	257	Sep	13	2016	2979	17	3901.00	0	-17	26	-141	304	133	102		3901	3440	3386.9	1.57%	
270	258	Sep	14	2016	2952	17	3765.00	0	-48	119	-40	269	400	58		3765	3359	3386.9	-0.84%	
271	259	Sep	15	2016	2980	18	3834.00	0	-16	0	-432	250	704	18		3834	3407	3386.9	0.59%	
272	260	Sep	16	2016	2776	18	3713.00	0	-16	25	-130	218	108	86		3713	3245	3386.9	-4.20%	
273	261	Sep	17	2016	2840	18	3648.00	0	-16	76	161	196	665	53		3648	3244	3386.9	-4.22%	
274	262	Sep	18	2016	2825	18	4083.00	0	-29	114	153	253	157	87		4083	3454	3386.9	1.98%	
275	263	Sep	19	2016	2882	17	4357.00	0	-16	103	367	294	172	87		4357	3620	3386.9	6.87%	
276	264	Sep	20	2016	2981	17	4281.00	0	-16	-131	-220	290	549	95		4281	3631	3386.9	7.21%	
277	265	Sep	21	2016	3049	17	4202.00	0	90	-191	-127	275	1056	33		4202	3626	3386.9	7.05%	
278	266	Sep	22	2016	3008	17	4193.00	0	95	0	-71	268	1038	94		4193	3601	3386.9	6.31%	
279	267	Sep	23	2016	3000	17	4157.00	0	-16	0	-173	281	1313	107		4157	3579	3386.9	5.66%	
280	268	Sep	24	2016	3061	18	3782.00	0	-16	0	-383	210	395	105		3782	3422	3386.9	1.02%	
281	269	Sep	25	2016	2915	21	3285.00	0	33	0	-511	156	589	0		3285	3100	3386.9	-8.47%	
282	270	Sep	26	2016	2763	18	3396.00	0	-15	0	-517	160	30	14		3396	3080	3386.9	-9.08%	
283	271	Sep	27	2016	2867	18	3737.00	0	14	0	-414	204	7	126		3737	3302	3386.9	-2.51%	
284	272	Sep	28	2016	2885	18	3949.00	0	-16	0	-589	285	100	122		3949	3417	3386.9	0.89%	
285	273	Sep	29	2016	2931	17	3716.00	0	-15	0	-231	207	89	126		3716	3324	3386.9	-1.87%	
286	274	Sep	30	2016	2966	17	3681.00	0	-16	0	63	199	911	146		3681	3324	3386.9	-1.87%	

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10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
287	275	Oct	1	2016	3004	18	3826.00	0	0	0	-279	222	636	82		3826	3415	3386.9	0.83%	
288	276	Oct	2	2016	2977	18	3946.00	0	0	0	28	283	985	102		3946	3462	3386.9	2.20%	
289	277	Oct	3	2016	3001	18	4019.00	0	0	0	-34	224	1593	104		4019	3510	3386.9	3.64%	
290	278	Oct	4	2016	3086	17	3909.00	0	0	0	314	220	810	147		3909	3498	3386.9	3.27%	
291	279	Oct	5	2016	2914	18	3849.00	0	0	0	591	191	615	146		3849	3382	3386.9	-0.16%	
292	280	Oct	6	2016	3001	17	4026.00	0	0	0	181	237	506	164		4026	3514	3386.9	3.74%	
293	281	Oct	7	2016	2946	17	3364.00	0	0	0	-483	143	41	40		3364	3155	3386.9	-6.85%	
294	282	Oct	8	2016	2944	21	3322.00	0	0	0	-391	143	660	0		3322	3133	3386.9	-7.50%	
295	283	Oct	9	2016	2896	21	3365.00	0	0	0	-243	167	1196	0		3365	3131	3386.9	-7.57%	
296	284	Oct	10	2016	2827	18	3814.00	0	0	0	-829	213	250	123		3814	3321	3386.9	-1.96%	
297	285	Oct	11	2016	2939	17	4036.00	0	0	0	-349	247	726	155		4036	3488	3386.9	2.97%	
298	286	Oct	12	2016	2998	17	3490.00	0	0	0	-671	176	589	170		3490	3244	3386.9	-4.22%	
299	287	Oct	13	2016	2882	21	3365.00	0	0	0	206	199	1065	0		3365	3124	3386.9	-7.78%	
300	288	Oct	14	2016	2900	17	3527.00	0	0	0	-106	225	1245	103		3527	3214	3386.9	-5.12%	
301	289	Oct	15	2016	2931	18	3817.00	0	0	0	-404	224	392	128		3817	3374	3386.9	-0.38%	
302	290	Oct	16	2016	2865	18	3876.00	0	0	0	-191	273	1286	126		3876	3371	3386.9	-0.48%	
303	291	Oct	17	2016	2877	18	4048.00	39	0	0	-141	222	1206	85		4048	3463	3386.9	2.23%	
304	292	Oct	18	2016	2909	17	3697.00	39	0	0	522	228	58	159		3697	3303	3386.9	-2.48%	
305	293	Oct	19	2016	2898	17	3748.00	39	0	0	420	275	922	158		3748	3323	3386.9	-1.89%	
306	294	Oct	20	2016	2919	17	3446.00	40	0	0	-262	170	17	148		3446	3183	3386.9	-6.03%	
307	295	Oct	21	2016	2944	17	3439.00	40	0	0	-371	203	399	170		3439	3192	3386.9	-5.77%	
308	296	Oct	22	2016	2932	18	3549.00	0	0	0	-561	216	1011	112		3549	3241	3386.9	-4.32%	
309	297	Oct	23	2016	2891	18	3639.00	0	0	0	30	207	228	101		3639	3265	3386.9	-3.60%	
310	298	Oct	24	2016	2892	17	3806.00	0	0	0	234	225	172	138		3806	3349	3386.9	-1.12%	
311	299	Oct	25	2016	3025	18	3764.00	0	0	0	-642	238	777	96		3764	3395	3386.9	0.22%	
312	300	Oct	26	2016	3004	17	3816.00	0	0	0	341	198	256	158		3816	3410	3386.9	0.68%	
313	301	Oct	27	2016	3019	17	3817.00	0	0	0	275	258	617	161		3817	3418	3386.9	0.92%	
314	302	Oct	28	2016	3025	17	3829.00	0	0	0	-141	257	1380	49		3829	3427	3386.9	1.18%	
315	303	Oct	29	2016	3028	18	3863.00	0	0	0	-780	250	163	93		3863	3446	3386.9	1.73%	
316	304	Oct	30	2016	2974	18	3571.00	0	0	0	-138	199	136	85		3571	3273	3386.9	-3.38%	
317	305	Oct	31	2016	2941	17	3856.00	0	0	0	-561	264	1226	142		3856	3399	3386.9	0.34%	

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10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
318	306	Nov	1	2016	2995	17	3825.00	0	0	0	10	236	113	147		3825	3410	3386.9	0.68%	
319	307	Nov	2	2016	3009	20	3487.00	0	0	0	82	210	482	0		3487	3248	3386.9	-4.10%	
320	308	Nov	3	2016	2872	20	3433.00	0	0	0	40	209	66	0		3433	3153	3386.9	-6.92%	
321	309	Nov	4	2016	2959	9	3361.00	0	0	0	-16	189	173	2		3361	3160	3386.9	-6.70%	
322	310	Nov	5	2016	2936	20	3277.00	0	0	0	172	185	1013	0		3277	3107	3386.9	-8.28%	
323	311	Nov	6	2016	2802	19	3282.00	0	0	0	-205	210	436	0		3282	3042	3386.9	-10.18%	
324	312	Nov	7	2016	2788	19	3402.00	0	0	0	819	218	488	0		3402	3095	3386.9	-8.62%	
325	313	Nov	8	2016	2860	19	3387.00	0	0	0	117	211	892	0		3387	3124	3386.9	-7.78%	
326	314	Nov	9	2016	2965	19	3432.00	0	0	0	304	214	259	0		3432	3199	3386.9	-5.56%	
327	315	Nov	10	2016	3023	19	3397.00	0	0	0	-270	208	437	0		3397	3210	3386.9	-5.22%	
328	316	Nov	11	2016	2990	10	3334.00	0	0	0	-233	191	955	61		3334	3162	3386.9	-6.64%	
329	317	Nov	12	2016	3001	19	3273.00	0	0	0	601	187	616	0		3273	3137	3386.9	-7.38%	
330	318	Nov	13	2016	2999	20	3277.00	0	0	0	-561	195	233	0		3277	3138	3386.9	-7.35%	
331	319	Nov	14	2016	2893	19	3444.00	0	0	0	604	203	463	0		3444	3169	3386.9	-6.45%	
332	320	Nov	15	2016	2949	19	3477.00	0	0	0	585	218	515	0		3477	3213	3386.9	-5.13%	
333	321	Nov	16	2016	2941	19	3462.00	0	0	0	275	219	1383	0		3462	3202	3386.9	-5.47%	
334	322	Nov	17	2016	2926	19	3467.00	0	0	0	-298	216	1404	0		3467	3197	3386.9	-5.62%	
335	323	Nov	18	2016	3026	9	3504.00	0	0	0	-272	203	1067	150		3504	3265	3386.9	-3.60%	
336	324	Nov	19	2016	3249	9	3527.00	0	0	0	837	204	721	153		3527	3388	3386.9	0.03%	
337	325	Nov	20	2016	3056	9	3359.00	0	0	0	-289	182	983	153		3359	3208	3386.9	-5.30%	
338	326	Nov	21	2016	2980	19	3516.00	0	0	0	-187	211	1376	0		3516	3248	3386.9	-4.10%	
339	327	Nov	22	2016	3040	19	3495.00	0	0	0	-240	185	1374	0		3495	3268	3386.9	-3.52%	
340	328	Nov	23	2016	3162	9	3516.00	0	0	0	-543	200	218	147		3516	3339	3386.9	-1.41%	
341	329	Nov	25	2016	3023	10	3368.00	0	0	0	-304	184	493	118		3368	3196	3386.9	-5.65%	
342	330	Nov	25	2016	3071	21	3391.00	0	0	0	16	165	856	0		3391	3231	3386.9	-4.60%	
343	331	Nov	26	2016	3138	19	3409.00	0	0	0	-120	191	1337	0		3409	3274	3386.9	-3.35%	
344	332	Nov	27	2016	3008	19	3403.00	0	0	0	129	164	1347	0		3403	3206	3386.9	-5.36%	
345	333	Nov	28	2016	3033	19	3624.00	0	0	0	193	206	1249	0		3624	3329	3386.9	-1.72%	
346	334	Nov	29	2016	3171	21	3674.00	0	0	0	-747	155	296	0		3674	3423	3386.9	1.05%	
347	335	Nov	30	2016	3328	8	3817.00	0	0	0	-1023	194	288	2		3817	3573	3386.9	5.48%	

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10					Total	Hr @	Max Sys	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL		Total	Average	Study	%	
11	Seq #	Month	Day	Year	Min	Max	Net Load	EDDY	BLKW	LAMAR	SWPP	LPL	WIND	SOLAR		Max	Load	Value	Error	
12												TIE FLOW								
348	336	Dec	1	2016	3296	8	3754.00	0	0	0	-391	177	375	1		3754	3525	3386.9	4.08%	
349	337	Dec	2	2016	3278	19	3733.00	0	0	0	-238	245	808	0		3733	3506	3386.9	3.50%	
350	338	Dec	3	2016	3289	19	3661.00	0	0	0	-442	236	74	0		3661	3475	3386.9	2.60%	
351	339	Dec	4	2016	3190	21	3596.00	0	0	0	48	230	1000	0		3596	3393	3386.9	0.18%	
352	340	Dec	5	2016	3289	8	3783.00	0	0	0	-236	203	1399	0		3783	3536	3386.9	4.40%	
353	341	Dec	6	2016	3273	21	3878.00	0	0	0	-38	214	1282	0		3878	3576	3386.9	5.57%	
354	342	Dec	7	2016	3516	20	4024.00	0	0	0	-419	273	1229	0		4024	3770	3386.9	11.31%	
355	343	Dec	8	2016	3614	19	4126.00	0	0	0	-26	248	135	0		4126	3870	3386.9	14.26%	
356	344	Dec	9	2016	3633	8	4057.00	0	0	0	439	276	1205	0		4057	3845	3386.9	13.53%	
357	345	Dec	10	2016	3276	8	3805.00	0	0	0	-374	238	963	0		3805	3541	3386.9	4.54%	
358	346	Dec	11	2016	3253	20	3546.00	0	0	0	-502	201	311	0		3546	3400	3386.9	0.37%	
359	347	Dec	12	2016	3274	8	3832.00	0	0	0	596	204	1364	0		3832	3553	3386.9	4.90%	
360	348	Dec	13	2016	3239	21	3761.00	0	0	0	806	196	1015	0		3761	3500	3386.9	3.34%	
361	349	Dec	14	2016	3435	8	3894.00	0	0	0	477	208	653	0		3894	3665	3386.9	8.20%	
362	350	Dec	15	2016	3540	8	4035.00	0	0	0	309	220	1281	0		4035	3788	3386.9	11.83%	
363	351	Dec	16	2016	3291	8	3782.00	0	0	0	22	234	1732	0		3782	3537	3386.9	4.42%	
364	352	Dec	17	2016	3175	21	4187.00	0	0	0	60	268	1015	3		4187	3681	3386.9	8.68%	
365	353	Dec	18	2016	3409	8	3936.00	0	0	0	167	253	168	3		3936	3673	3386.9	8.43%	
366	354	Dec	19	2016	3436	8	3945.00	0	0	0	-199	248	690	0		3945	3691	3386.9	8.96%	
367	355	Dec	20	2016	3263	8	3821.00	0	0	0	-421	259	958	0		3821	3542	3386.9	4.58%	
368	356	Dec	21	2016	3341	8	3651.00	0	0	0	-128	179	1343	0		3651	3496	3386.9	3.22%	
369	357	Dec	22	2016	3310	19	3769.00	0	0	0	-414	194	201	5		3769	3540	3386.9	4.51%	
370	358	Dec	23	2016	3174	9	3697.00	0	0	0	-344	136	1449	17		3697	3436	3386.9	1.44%	
371	359	Dec	24	2016	3036	8	3389.00	0	0	0	-479	198	450	0		3389	3213	3386.9	-5.15%	
372	360	Dec	25	2016	2860	22	3273.00	0	0	0	-307	179	1266	0		3273	3067	3386.9	-9.46%	
373	361	Dec	26	2016	3113	21	3461.00	0	0	0	-541	204	533	0		3461	3287	3386.9	-2.95%	
374	362	Dec	27	2016	3244	9	3666.00	0	0	0	-418	222	614	64		3666	3455	3386.9	2.01%	
375	363	Dec	28	2016	3202	10	3563.00	0	0	0	-469	204	1111	99		3563	3383	3386.9	-0.13%	
376	364	Dec	29	2016	3274	21	3751.00	0	0	0	387	181	1183	0		3751	3513	3386.9	3.71%	
377	365	Dec	30	2016	3476	9	3798.00	0	0	0	-631	223	1564	21		3798	3637	3386.9	7.38%	
378	366	Dec	31	2016	3256	10	3517.00	0	0	0	-530	190	1294	131		3517	3387	3386.2	0.01%	

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
13	1	Jan	1	2016		0	0	0	211	-313	387	1
14	2	Jan	2	2016		0	0	0	214	-495	63	2
15	3	Jan	3	2016		0	0	0	185	-384	215	7
16	4	Jan	4	2016		37	0	0	210	-233	215	3
17	5	Jan	5	2016		0	0	0	191	-151	1,306	3
18	6	Jan	6	2016		0	0	0	178	-279	1,182	3
19	7	Jan	7	2016		0	0	0	170	-174	1,013	3
20	8	Jan	8	2016		0	0	0	176	-690	439	3
21	9	Jan	9	2016		0	0	0	199	-809	401	10
22	10	Jan	10	2016		0	0	0	215	-595	316	3
23	11	Jan	11	2016		0	0	0	215	-639	99	14
24	12	Jan	12	2016		0	0	0	205	-477	316	10
25	13	Jan	13	2016		0	0	0	200	-475	415	10
26	14	Jan	14	2016		0	0	0	190	-416	915	11
27	15	Jan	15	2016		0	0	0	212	-654	429	0
28	16	Jan	16	2016		0	0	0	201	-302	352	14
29	17	Jan	17	2016		0	0	0	203	-407	228	14
30	18	Jan	18	2016		0	0	0	210	-111	584	15
31	19	Jan	19	2016		0	0	0	192	48	1,201	0
32	20	Jan	20	2016		0	0	0	197	142	1,291	14
33	21	Jan	21	2016		0	0	0	175	476	1,415	0
34	22	Jan	22	2016		0	0	0	205	-422	91	11
35	23	Jan	23	2016		0	0	0	190	-263	908	21
36	24	Jan	24	2016		0	0	0	187	69	1,399	24
37	25	Jan	25	2016		0	0	0	192	98	1,332	0
38	26	Jan	26	2016		0	0	0	184	-535	315	0
39	27	Jan	27	2016		0	0	0	198	-433	341	12
40	28	Jan	28	2016		0	0	0	209	-165	793	0
41	29	Jan	29	2016		0	0	0	198	-238	1,017	1
42	30	Jan	30	2016		0	0	0	165	206	1,376	0
43	31	Jan	31	2016		0	0	0	167	65	1,024	4

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
44	32	Feb	1	2016		0	0	0	192	35	965	0
45	33	Feb	2	2016		0	0	0	208	192	1,583	7
46	34	Feb	3	2016		0	0	0	242	-453	315	11
47	35	Feb	4	2016		0	0	0	197	-111	500	13
48	36	Feb	5	2016		0	0	0	197	137	1,101	0
49	37	Feb	6	2016		0	0	0	182	-410	315	14
50	38	Feb	7	2016		0	0	0	164	-186	889	10
51	39	Feb	8	2016		0	0	0	188	36	1,051	0
52	40	Feb	9	2016		0	0	0	218	-78	712	17
53	41	Feb	10	2016		0	0	0	191	366	1,033	0
54	42	Feb	11	2016		0	0	0	181	237	797	1
55	43	Feb	12	2016		0	0	0	191	-242	569	1
56	44	Feb	13	2016		0	0	0	170	253	1,243	14
57	45	Feb	14	2016		0	0	25	171	-120	437	24
58	46	Feb	15	2016		0	0	0	188	-592	365	1
59	47	Feb	16	2016		0	0	0	177	-333	1,109	1
60	48	Feb	17	2016		0	0	0	180	-195	1,251	1
61	49	Feb	18	2016		0	0	0	161	96	1,534	1
62	50	Feb	19	2016		0	0	0	162	-135	1,103	0
63	51	Feb	20	2016		0	0	0	165	-143	774	0
64	52	Feb	21	2016		0	0	0	153	-543	489	0
65	53	Feb	22	2016		0	0	0	158	-566	481	0
66	54	Feb	23	2016		0	0	0	182	-633	637	0
67	55	Feb	24	2016		0	0	0	190	-174	852	10
68	56	Feb	25	2016		0	0	0	176	-417	796	3
69	57	Feb	26	2016		0	0	0	193	-390	783	10
70	58	Feb	27	2016		0	0	-13	163	289	1,359	3
71	59	Feb	28	2016		0	0	-25	165	183	755	0
72	60	Feb	29	2016		0	0	0	167	461	1,348	3

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
73	61	Mar	1	2016		0	0	-12	158	94	1,179	4
74	62	Mar	2	2016		0	0	0	175	124	1,101	2
75	63	Mar	3	2016		0	0	-25	168	284	677	0
76	64	Mar	4	2016		0	0	0	164	430	1,471	3
77	65	Mar	5	2016		0	0	-28	160	-36	1,057	0
78	66	Mar	6	2016		0	0	-57	160	147	1,350	0
79	67	Mar	7	2016		0	0	-25	168	-134	1,077	0
80	68	Mar	8	2016		0	0	0	171	-207	485	0
81	69	Mar	9	2016		0	0	0	168	-266	334	0
82	70	Mar	10	2016		0	0	0	166	-231	218	4
83	71	Mar	11	2016		0	0	0	165	-230	392	7
84	72	Mar	12	2016		0	0	-31	155	204	1,057	22
85	73	Mar	13	2016		0	0	0	155	-51	469	0
86	74	Mar	14	2016		0	0	0	162	72	1,291	0
87	75	Mar	15	2016		0	0	0	128	-229	665	0
88	76	Mar	16	2016		0	0	0	126	-132	735	6
89	77	Mar	17	2016		0	0	0	152	-350	180	4
90	78	Mar	18	2016		22	0	0	155	57	1,371	18
91	79	Mar	19	2016		0	0	0	174	-857	294	25
92	80	Mar	20	2016		0	0	0	167	-249	169	23
93	81	Mar	21	2016		0	0	0	174	151	1,500	0
94	82	Mar	22	2016		0	0	-62	162	479	1,415	0
95	83	Mar	23	2016		0	0	-18	159	-94	1,300	0
96	84	Mar	24	2016		0	0	0	181	-117	1,041	0
97	85	Mar	25	2016		0	0	0	167	161	1,246	11
98	86	Mar	26	2016		0	0	0	151	162	1,001	17
99	87	Mar	27	2016		0	0	41	163	-11	187	34
100	88	Mar	28	2016		0	0	0	164	85	1,469	0
101	89	Mar	29	2016		0	0	-50	166	220	1,450	0
102	90	Mar	30	2016		0	0	-43	174	101	1,239	22
103	91	Mar	31	2016		0	0	-25	158	-123	923	0

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
104	92	Apr	1	2016		0	0	0	166	-428	601	1
105	93	Apr	2	2016		0	0	0	168	-368	715	0
106	94	Apr	3	2016		0	0	-44	159	-185	908	0
107	95	Apr	4	2016		0	0	0	173	45	783	0
108	96	Apr	5	2016		0	0	-13	173	94	1,478	9
109	97	Apr	6	2016		0	0	0	172	-379	764	13
110	98	Apr	7	2016		0	0	0	163	129	891	0
111	99	Apr	8	2016		0	0	0	158	46	596	5
112	100	Apr	9	2016		0	0	0	155	-45	1,141	20
113	101	Apr	10	2016		0	0	-50	167	-134	1,126	0
114	102	Apr	11	2016		0	0	-13	165	-222	692	0
115	103	Apr	12	2016		0	0	0	164	-455	336	0
116	104	Apr	13	2016		0	0	0	167	-72	742	0
117	105	Apr	14	2016		0	0	-26	173	185	1,234	22
118	106	Apr	15	2016		0	0	-25	155	252	1,372	21
119	107	Apr	16	2016		0	0	0	172	289	1,199	22
120	108	Apr	17	2016		0	0	0	155	387	1,080	0
121	109	Apr	18	2016		0	0	0	160	302	889	0
122	110	Apr	19	2016		0	0	0	163	29	145	9
123	111	Apr	20	2016		0	0	0	173	77	211	20
124	112	Apr	21	2016		0	0	0	176	-387	238	20
125	113	Apr	22	2016		40	0	-1	185	164	455	20
126	114	Apr	23	2016		42	0	-25	178	232	1,568	17
127	115	Apr	24	2016		0	0	-25	188	186	1,222	15
128	116	Apr	25	2016		0	0	0	203	597	974	21
129	117	Apr	26	2016		0	0	0	188	366	1,005	19
130	118	Apr	27	2016		0	0	0	183	10	693	20
131	119	Apr	28	2016		0	0	0	186	172	1,052	20
132	120	Apr	29	2016		0	0	0	187	-9	698	17
133	121	Apr	30	2016		0	0	0	166	-52	378	18

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
134	122	May	1	2016		0	0	0	150	436	996	0
135	123	May	2	2016		0	0	0	167	2	142	1
136	124	May	3	2016		0	0	0	161	233	864	18
137	125	May	4	2016		0	0	0	187	-222	78	17
138	126	May	5	2016		0	0	0	207	396	502	20
139	127	May	6	2016		0	0	0	196	508	1,588	16
140	128	May	7	2016		0	0	0	207	298	1,454	17
141	129	May	8	2016		0	0	0	200	95	996	16
142	130	May	9	2016		0	0	0	198	-132	711	17
143	131	May	10	2016		0	0	0	221	296	796	20
144	132	May	11	2016		0	0	0	222	32	676	9
145	133	May	12	2016		0	0	0	197	-6	374	13
146	134	May	13	2016		0	0	-26	221	-65	913	20
147	135	May	14	2016		0	0	-110	157	-150	1,159	0
148	136	May	15	2016		0	0	0	155	-35	680	0
149	137	May	16	2016		0	0	0	199	179	987	13
150	138	May	17	2016		0	0	0	164	203	1,371	4
151	139	May	18	2016		0	0	0	164	-171	301	2
152	140	May	19	2016		0	0	0	162	-237	249	5
153	141	May	20	2016		0	0	0	171	267	1,264	16
154	142	May	21	2016		0	0	-50	201	140	1,462	19
155	143	May	22	2016		0	0	-122	219	175	1,181	21
156	144	May	23	2016		0	0	0	233	-53	790	18
157	145	May	24	2016		0	0	0	245	117	1,239	10
158	146	May	25	2016		0	0	0	245	260	1,071	19
159	147	May	26	2016		0	0	0	234	227	1,509	16
160	148	May	27	2016		0	0	0	205	-228	639	19
161	149	May	28	2016		0	0	13	212	-142	285	19
162	150	May	29	2016		0	0	0	204	177	1,068	7
163	151	May	30	2016		0	0	0	201	-48	627	7
164	152	May	31	2016		0	0	-13	208	-158	573	15

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
165	153	Jun	1	2016		0	0	0	166	-139	303	16
166	154	Jun	2	2016		0	0	0	178	-165	248	9
167	155	Jun	3	2016		0	0	0	202	-364	65	18
168	156	Jun	4	2016		0	0	0	201	-431	409	9
169	157	Jun	5	2016		0	0	25	220	-184	56	26
170	158	Jun	6	2016		26	0	43	229	10	439	10
171	159	Jun	7	2016		46	0	50	212	372	814	24
172	160	Jun	8	2016		50	0	0	236	387	1,258	19
173	161	Jun	9	2016		50	0	0	243	479	1,281	20
174	162	Jun	10	2016		50	0	0	222	225	808	19
175	163	Jun	11	2016		25	0	0	217	186	927	11
176	164	Jun	12	2016		0	0	0	209	294	630	18
177	165	Jun	13	2016		20	0	0	243	133	654	11
178	166	Jun	14	2016		40	0	0	232	-354	320	15
179	167	Jun	15	2016		40	0	0	271	180	1,041	7
180	168	Jun	16	2016		40	0	0	238	392	1,248	16
181	169	Jun	17	2016		40	0	0	280	-238	748	16
182	170	Jun	18	2016		40	0	0	265	-162	508	21
183	171	Jun	19	2016		40	0	0	248	-347	338	15
184	172	Jun	20	2016		44	0	0	239	-440	791	15
185	173	Jun	21	2016		60	0	0	227	-51	1,028	13
186	174	Jun	22	2016		40	0	0	259	-108	921	15
187	175	Jun	23	2016		55	0	0	260	-185	404	16
188	176	Jun	24	2016		55	0	0	234	68	1,021	15
189	177	Jun	25	2016		40	0	-46	210	-139	1,264	16
190	178	Jun	26	2016		0	0	25	218	136	202	19
191	179	Jun	27	2016		0	0	0	230	-76	239	9
192	180	Jun	28	2016		0	0	0	265	-257	234	20
193	181	Jun	29	2016		20	0	0	234	-8	517	17
194	182	Jun	30	2016		40	0	0	233	-312	507	24

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
195	183	Jul	1	2016		40	0	0	229	-148	866	15
196	184	Jul	2	2016		40	0	0	234	-443	927	17
197	185	Jul	3	2016		40	0	14	235	-445	203	24
198	186	Jul	4	2016		40	0	0	238	-414	168	13
199	187	Jul	5	2016		55	0	0	273	-459	479	13
200	188	Jul	6	2016		70	0	0	261	-203	831	11
201	189	Jul	7	2016		55	0	0	259	-453	871	5
202	190	Jul	8	2016		55	0	0	241	-141	1,070	16
203	191	Jul	9	2016		40	0	0	226	24	748	17
204	192	Jul	10	2016		55	0	0	235	329	1,163	32
205	193	Jul	11	2016		70	0	0	277	13	1,221	18
206	194	Jul	12	2016		70	0	0	288	-608	474	25
207	195	Jul	13	2016		70	0	0	298	-368	793	21
208	196	Jul	14	2016		70	0	0	274	-660	809	19
209	197	Jul	15	2016		70	0	0	241	-364	526	28
210	198	Jul	16	2016		70	0	0	250	-283	902	28
211	199	Jul	17	2016		75	0	0	244	173	1,371	30
212	200	Jul	18	2016		0	0	0	246	51	1,010	30
213	201	Jul	19	2016		17	0	0	266	-38	833	30
214	202	Jul	20	2016		70	0	0	268	-70	1,184	28
215	203	Jul	21	2016		20	0	0	295	-113	1,069	30
216	204	Jul	22	2016		70	-8	0	255	112	1,035	34
217	205	Jul	23	2016		58	-16	0	256	178	1,011	47
218	206	Jul	24	2016		40	-16	0	250	20	619	49
219	207	Jul	25	2016		58	-1	0	275	-503	154	29
220	208	Jul	26	2016		86	-16	0	261	-689	212	12
221	209	Jul	27	2016		86	37	0	254	-601	493	39
222	210	Jul	28	2016		86	89	37	247	-821	231	30
223	211	Jul	29	2016		0	65	0	259	-73	894	44
224	212	Jul	30	2016		25	-6	0	249	-259	696	55
225	213	Jul	31	2016		0	-65	0	257	76	1,235	27

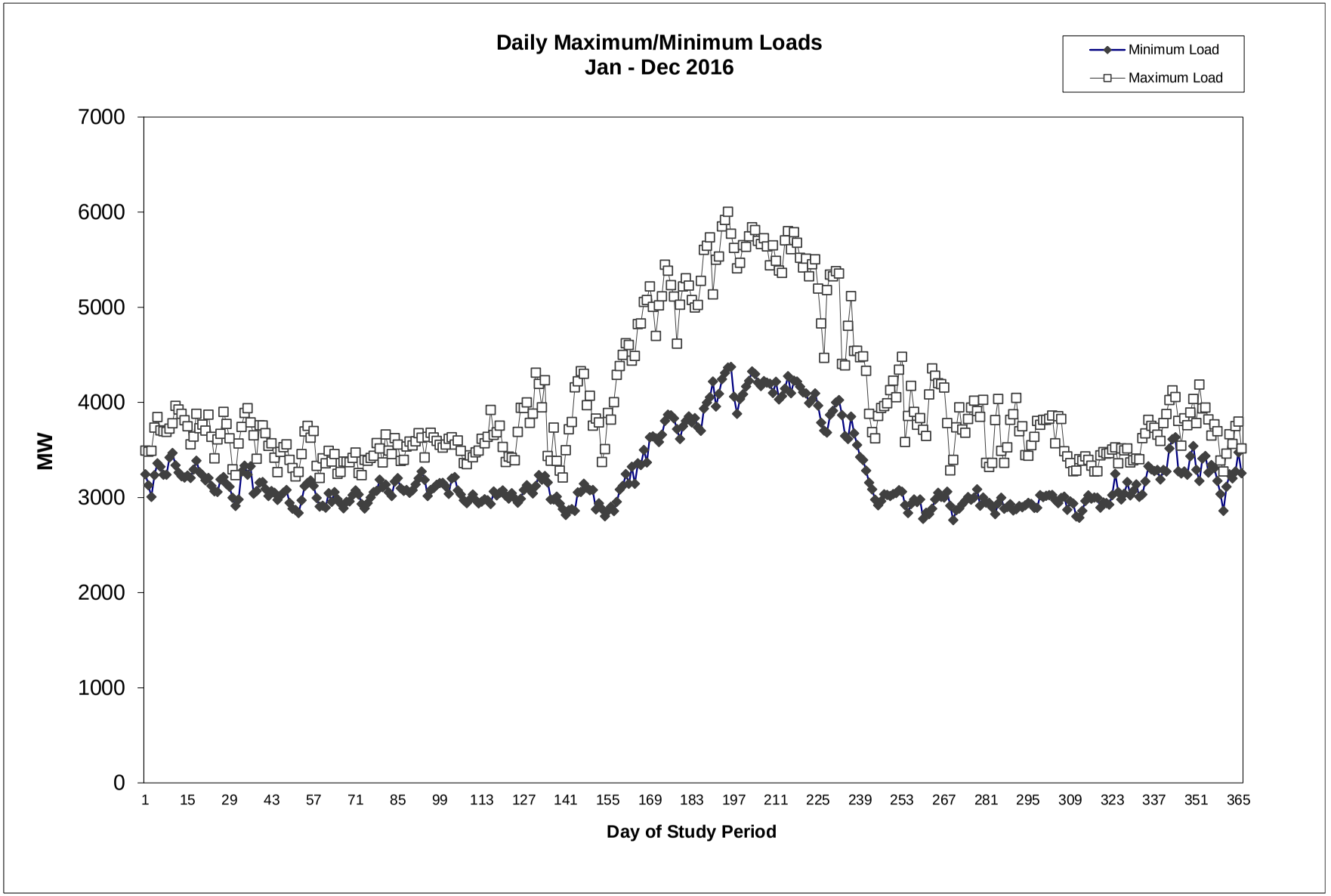
	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
226	214	Aug	1	2016		20	-21	0	263	-37	1,197	25
227	215	Aug	2	2016		57	-26	0	272	-445	544	50
228	216	Aug	3	2016		23	-39	0	271	-309	505	50
229	217	Aug	4	2016		0	-4	0	282	-344	1,003	52
230	218	Aug	5	2016		0	-3	0	284	-458	221	53
231	219	Aug	6	2016		0	-16	0	267	-303	451	37
232	220	Aug	7	2016		0	-21	0	246	-367	381	64
233	221	Aug	8	2016		18	-21	0	262	-500	650	33
234	222	Aug	9	2016		40	14	87	258	-330	668	17
235	223	Aug	10	2016		40	-40	0	250	-206	952	39
236	224	Aug	11	2016		40	-84	50	263	-380	690	10
237	225	Aug	12	2016		40	-21	0	264	-363	467	35
238	226	Aug	13	2016		40	-21	0	212	-528	238	8
239	227	Aug	14	2016		40	-18	0	181	-365	96	27
240	228	Aug	15	2016		40	34	0	226	-260	387	44
241	229	Aug	16	2016		40	0	0	233	-312	681	47
242	230	Aug	17	2016		40	38	0	232	-355	539	43
243	231	Aug	18	2016		40	-21	0	244	-443	426	46
244	232	Aug	19	2016		40	-16	0	273	-865	238	20
245	233	Aug	20	2016		0	-21	13	192	-580	526	31
246	234	Aug	21	2016		0	13	0	191	-488	444	27
247	235	Aug	22	2016		0	14	0	212	-229	1,126	18
248	236	Aug	23	2016		40	14	0	234	-4	1,159	14
249	237	Aug	24	2016		75	-16	13	210	62	920	41
250	238	Aug	25	2016		75	-21	25	204	-95	161	13
251	239	Aug	26	2016		0	-21	0	204	-128	238	22
252	240	Aug	27	2016		0	-13	0	222	243	772	43
253	241	Aug	28	2016		0	-55	38	225	5	366	40
254	242	Aug	29	2016		0	-16	0	198	192	209	37
255	243	Aug	30	2016		0	-32	0	197	372	37	21
256	244	Aug	31	2016		0	-45	0	198	129	24	29

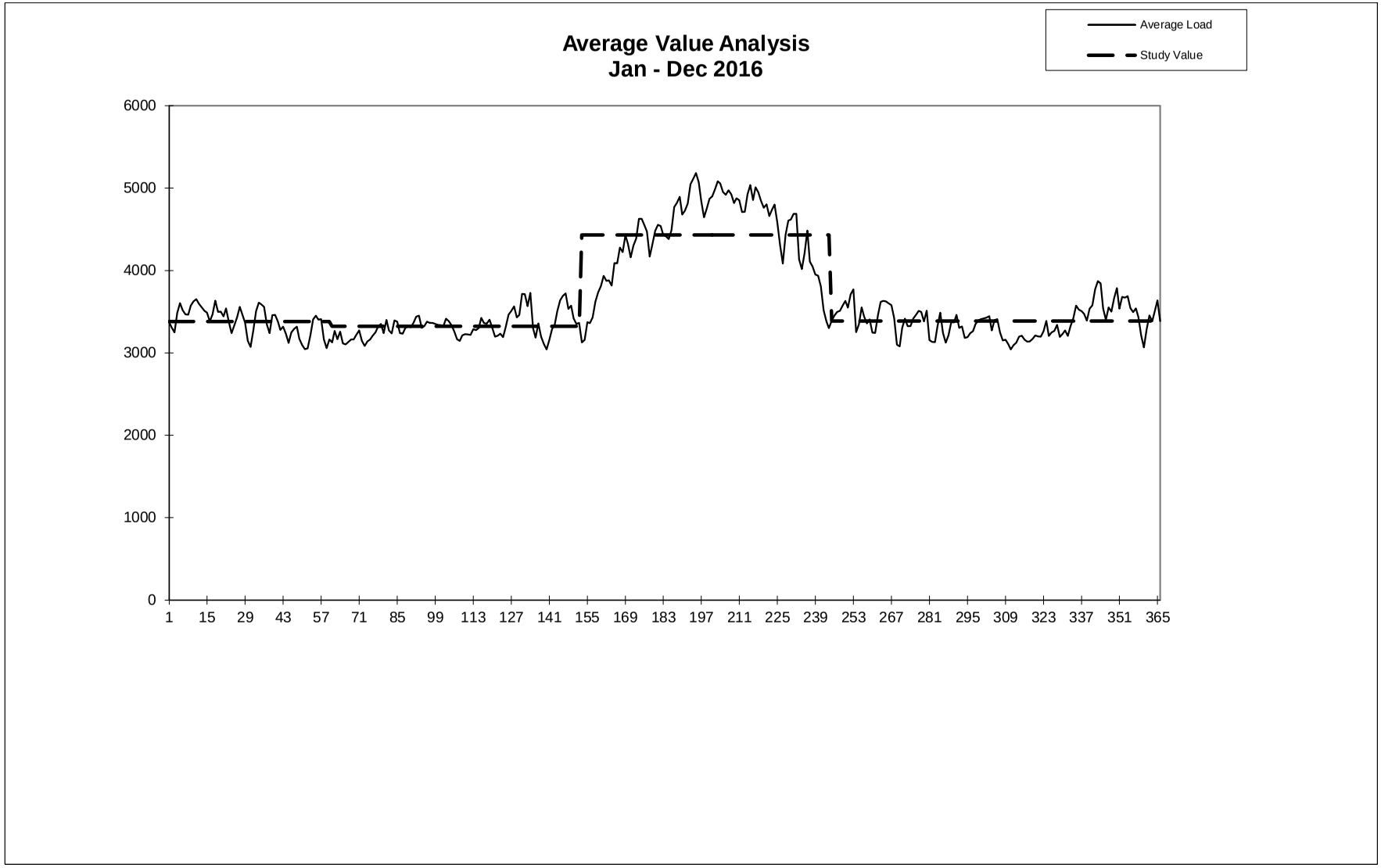
	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
257	245	Sep	1	2016		0	68	0	227	-524	90	44
258	246	Sep	2	2016		0	82	0	226	-343	386	48
259	247	Sep	3	2016		0	61	-25	218	-367	1,084	18
260	248	Sep	4	2016		0	93	-50	187	-126	1,216	49
261	249	Sep	5	2016		0	-6	-83	204	-90	1,319	45
262	250	Sep	6	2016		0	73	0	221	-318	1,063	8
263	251	Sep	7	2016		0	-23	-1	201	-83	1,055	35
264	252	Sep	8	2016		0	-1	0	231	-556	622	50
265	253	Sep	9	2016		0	24	-25	234	-743	358	45
266	254	Sep	10	2016		0	48	-20	210	-389	474	46
267	255	Sep	11	2016		0	69	-124	185	-426	1,038	39
268	256	Sep	12	2016		0	138	-91	232	-330	911	22
269	257	Sep	13	2016		0	6	-40	233	-390	288	51
270	258	Sep	14	2016		0	-32	60	216	-292	275	29
271	259	Sep	15	2016		0	82	0	205	-474	838	9
272	260	Sep	16	2016		0	6	13	174	-295	352	43
273	261	Sep	17	2016		0	-16	38	173	-136	409	26
274	262	Sep	18	2016		0	71	57	200	-139	623	44
275	263	Sep	19	2016		0	82	32	231	-152	502	43
276	264	Sep	20	2016		0	-16	-115	230	-151	753	50
277	265	Sep	21	2016		0	90	-150	221	-183	1,064	19
278	266	Sep	22	2016		0	40	-35	218	-126	1,000	47
279	267	Sep	23	2016		0	-16	0	222	-139	1,233	54
280	268	Sep	24	2016		0	-15	0	192	-666	382	53
281	269	Sep	25	2016		0	2	16	154	-338	465	0
282	270	Sep	26	2016		0	-15	0	147	-627	119	7
283	271	Sep	27	2016		0	-23	0	168	-219	284	63
284	272	Sep	28	2016		0	-16	0	211	-549	296	61
285	273	Sep	29	2016		0	-43	0	174	-197	225	63
286	274	Sep	30	2016		0	-16	0	169	-15	981	73

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
287	275	Oct	1	2016		0	7	0	182	-168	878	41
288	276	Oct	2	2016		0	0	0	213	-142	885	51
289	277	Oct	3	2016		0	0	0	188	5	1,445	52
290	278	Oct	4	2016		0	0	0	188	40	915	74
291	279	Oct	5	2016		0	0	0	162	242	514	73
292	280	Oct	6	2016		0	0	0	191	28	856	82
293	281	Oct	7	2016		0	0	0	138	-249	646	20
294	282	Oct	8	2016		0	0	0	137	-142	839	0
295	283	Oct	9	2016		0	0	0	149	-280	723	0
296	284	Oct	10	2016		0	0	0	174	-504	721	62
297	285	Oct	11	2016		0	0	0	197	-278	985	78
298	286	Oct	12	2016		0	0	0	164	-599	745	85
299	287	Oct	13	2016		0	0	0	166	-232	585	0
300	288	Oct	14	2016		0	0	0	180	83	1,181	51
301	289	Oct	15	2016		0	0	0	182	-188	888	64
302	290	Oct	16	2016		0	0	0	207	-221	1,238	63
303	291	Oct	17	2016		20	0	0	186	-84	1,362	42
304	292	Oct	18	2016		40	0	0	186	251	576	80
305	293	Oct	19	2016		40	0	0	205	325	1,027	79
306	294	Oct	20	2016		40	0	0	152	-133	448	74
307	295	Oct	21	2016		40	0	0	168	-73	875	85
308	296	Oct	22	2016		0	0	0	173	-248	1,245	56
309	297	Oct	23	2016		0	0	0	167	-49	689	51
310	298	Oct	24	2016		0	0	0	182	66	162	69
311	299	Oct	25	2016		0	0	0	192	-281	1,020	48
312	300	Oct	26	2016		0	0	0	166	443	583	79
313	301	Oct	27	2016		0	0	0	200	347	725	80
314	302	Oct	28	2016		0	0	0	200	-36	1,389	25
315	303	Oct	29	2016		0	0	0	194	-266	840	46
316	304	Oct	30	2016		0	0	0	167	-143	396	43
317	305	Oct	31	2016		0	0	0	201	-263	1,316	71

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
318	306	Nov	1	2016		0	0	0	190	-57	483	73
319	307	Nov	2	2016		0	0	0	177	-186	470	0
320	308	Nov	3	2016		0	0	0	172	-25	181	0
321	309	Nov	4	2016		0	0	0	165	-88	111	1
322	310	Nov	5	2016		0	0	0	159	43	722	0
323	311	Nov	6	2016		0	0	0	170	-233	661	0
324	312	Nov	7	2016		0	0	0	177	489	403	0
325	313	Nov	8	2016		0	0	0	173	125	918	0
326	314	Nov	9	2016		0	0	0	179	50	222	0
327	315	Nov	10	2016		0	0	0	176	-223	639	0
328	316	Nov	11	2016		0	0	0	166	-197	854	31
329	317	Nov	12	2016		0	0	0	165	24	366	0
330	318	Nov	13	2016		0	0	0	174	-386	258	0
331	319	Nov	14	2016		0	0	0	170	204	473	0
332	320	Nov	15	2016		0	0	0	178	187	628	0
333	321	Nov	16	2016		0	0	0	176	339	1,304	0
334	322	Nov	17	2016		0	0	0	176	-10	1,405	0
335	323	Nov	18	2016		0	0	0	172	-194	1,044	75
336	324	Nov	19	2016		0	0	0	191	594	1,147	110
337	325	Nov	20	2016		0	0	0	171	-61	836	76
338	326	Nov	21	2016		0	0	0	179	-74	966	0
339	327	Nov	22	2016		0	0	0	163	-41	1,398	0
340	328	Nov	23	2016		0	0	0	175	-278	663	74
341	329	Nov	25	2016		0	0	0	165	-131	862	77
342	330	Nov	25	2016		0	0	0	145	-168	765	0
343	331	Nov	26	2016		0	0	0	170	-116	1,120	0
344	332	Nov	27	2016		0	0	0	149	179	1,383	0
345	333	Nov	28	2016		0	0	0	175	136	1,299	0
346	334	Nov	29	2016		0	0	0	154	-496	691	0
347	335	Nov	30	2016		0	0	0	197	-684	527	87

	A	B	C	D	AG	AH	AI	AJ	AK	AL	AM	AN
10						**EDDY CO**	**PNM**	**LAMAR**	**LPL**	**SWPP**	**WIND**	**SOLAR**
11	**Seq #**	**Month**	**Day**	**Year**		**Avg**	**Avg**	**Avg**	**FLOW Avg**	**Avg**	**Avg**	**Avg**
12												
348	336	Dec	1	2016		0	0	0	188	-253	217	76
349	337	Dec	2	2016		0	0	0	212	-170	550	0
350	338	Dec	3	2016		0	0	0	205	-481	245	0
351	339	Dec	4	2016		0	0	0	208	-255	514	79
352	340	Dec	5	2016		0	0	0	172	-245	1,169	13
353	341	Dec	6	2016		0	0	0	193	-129	1,221	0
354	342	Dec	7	2016		0	0	0	238	-252	1,280	0
355	343	Dec	8	2016		0	0	0	235	-182	456	0
356	344	Dec	9	2016		0	0	0	258	302	979	29
357	345	Dec	10	2016		0	0	0	215	-83	1,147	7
358	346	Dec	11	2016		0	0	0	193	-386	491	12
359	347	Dec	12	2016		0	0	0	171	274	894	0
360	348	Dec	13	2016		0	0	0	181	167	841	0
361	349	Dec	14	2016		0	0	0	202	377	870	0
362	350	Dec	15	2016		0	0	0	193	138	829	0
363	351	Dec	16	2016		0	0	0	204	271	1,655	0
364	352	Dec	17	2016		0	0	0	213	259	1,274	1
365	353	Dec	18	2016		0	0	0	225	349	259	38
366	354	Dec	19	2016		0	0	0	239	-87	928	72
367	355	Dec	20	2016		0	0	0	230	-344	490	30
368	356	Dec	21	2016		0	0	0	183	-291	1,297	0
369	357	Dec	22	2016		0	0	0	188	-660	279	3
370	358	Dec	23	2016		0	0	0	157	-293	1,018	40
371	359	Dec	24	2016		0	0	0	179	-139	932	23
372	360	Dec	25	2016		0	0	0	157	-45	1,393	0
373	361	Dec	26	2016		0	0	0	186	-467	427	74
374	362	Dec	27	2016		0	0	0	199	-526	674	32
375	363	Dec	28	2016		0	0	0	182	-259	1,300	49
376	364	Dec	29	2016		0	0	0	169	-95	1,149	0
377	365	Dec	30	2016		0	0	0	205	-461	1,591	10
378	366	Dec	31	2016		0	0	0	184	-645	669	76


Daily Maximum/Minimum Loads
Jan - Dec 2016
Minimum Load
Maximum Load
MW
7000
6000
5000
4000
3000
2000
1000
0
1
15
29
43
57
71
85
99
113
127
141
155
169
183
197
211
225
239
253
267
281
295
309
323
337
351
365
Day of Study Period


Average Value Analysis
Jan - Dec 2016
Average Load
Study Value
6000
5000
4000
3000
2000
1000
0
1
15
29
43
57
71
85
99
113
127
141
155
169
183
197
211
225
239
253
267
281
295
309
323
337
351
365

Appendix E
Transmission Losses

Corona & Insulator Leakage Demand and Energy Losses

	Miles	KW Loss/mile	Energy Losses MWH	Demand Losses MW
345 kV Line	905.42	2.343	**18,634**	**2.12**
230 kV Line	1,862.03	1.185	**19,382**	**2.21**
115 Kv Line	3,140.28	0.403	**11,116**	**1.27**
69 kV LIne	1,547.58	0.197	**2,678**	**0.30**
	7,455.31	**Annual Losses**	**51,811 MWH**	**5.90 MW**

Transmission Line Demand Loss

		MW
345 kV Line	This data comes from the peak hour powerflow Case. App. N.	**8.26**
230 kV Line		**47.35**
115 Kv Line		**66.32**
69 kV LIne		**19.19**

Transmission Line Energy Loss

Segment Name	**Segment 1**	**Segment 2**	**Segment 3**	**Segment 4**
Segment Load, MW	3379.7	3323.4	4432.1	3386.9
Segment Output to Lines, MWH	4,685,818	7,256,647	10,175,397	9,640,414

	Segment 1			Segment 2			Segment 3			Segment 4			Total Segment
	MW Loss	Factor	MWH Loss	MW Loss	Factor	MWH Loss	MW Loss	Factor	MWH Loss	MW Loss	Factor	MWH Loss	Losses, MWH
345 kV Line	8.960	0.0027	12,422	9.852	0.0030	21,512	7.401	0.0017	16,991	10.887	0.0032	30,989	**81,914**
230 kV Line	27.264	0.0081	37,801	48.481	0.0146	105,858	40.522	0.0091	93,033	44.961	0.0133	127,976	**364,668**
115 Kv Line	29.519	0.0087	40,927	41.440	0.0125	90,484	43.111	0.0097	98,975	44.789	0.0132	127,488	**357,874**
69 kV LIne	6.118	0.0018	8,482	6.090	0.0018	13,298	10.916	0.0025	25,061	5.294	0.0016	15,068	**61,909**

Appendix F
Autotransformer Losses
Under Load

Line No.			
1	**Autotransformer Line Demand Loss**		
2			**MW**
3	**345/230 kV Autos**	This data comes from the peak	**0.80**
4		hour powerflow.	
5	**230/115 kV Autos**		**7.40**
6			
7	**115/69 Kv Autos**		**4.36**
8			
9			
10	**Autotransformer Energy Loss**		
11			

12	**Segment Name**	**Segment 1**	**Segment 2**	**Segment 3**	**Segment 4**
13					
14	**Segment Load, MW**	3379.7	3323.4	4432.1	3386.9
15					
16	**Segment Output to Lines, MWH**	4,685,818	7,256,647	10,175,397	9,640,414
17					

18		**Segment 1**			**Segment 2**			**Segment 3**			**Segment 4**			**Total Segment**
19		**MW Loss**	**Factor**	**MWH Loss**	**MW Loss**	**Factor**	**MWH Loss**	**MW Loss**	**Factor**	**MWH Loss**	**MW Loss**	**Factor**	**MWH Loss**	**Losses, MWH**
20	**345/230 kV Autos**	0.674	0.0002	934	0.764	0.0002	1,669	0.853	0.0002	1,959	0.734	0.0002	2,089	**6,651**
21														
22	**230/115 kV Autos**	4.880	0.0014	6,766	4.626	0.0014	10,101	5.503	0.0012	12,634	4.827	0.0014	13,740	**43,241**
23														
24	**115/69 Kv Autos**	2.564	0.0008	3,555	2.541	0.0008	5,548	3.202	0.0007	7,350	2.384	0.0007	6,785	**23,239**
25														

Appendix G
Autotransformer
No-Load Losses

Line No.	Location	Voltage	Nominal Rating MVA	Max Rating MVA	No Load Loss, Watts	Energy Losses, MWH 345 Kv	230 kV	115 kV	Demand Losses, KW 345 Kv	230 kV	115 kV
1	AMA_SOUTH	230/120	135	252	55,500		487.51			55.50	
2	ARTESIA	115/69	23.77	39.6	15,268			134.11			15.27
3	ARTESIA	115/69	23.77	39.6	15,268			134.11			15.27
4	ATOKA	115/69	23.77	39.62	21,060			184.99			21.06
5	BAILEYCO	115/69	50	84	17,540			154.07			17.54
6	BAILEYCO	115/69	50	84	18,460			162.15			18.46
7	BLACKHAWK	115/69	45	75	14,249			125.16			14.25
8	BLACKHAWK	115/69	45	75	14,335			125.92			14.34
9	BOWERS	120/69	45	84	14,340			125.96			14.34
10	BOWERS	115/69	50	84	20,615			181.08			20.62
11	BUSHLAND	230/115	90	150	86,001		755.43			86.00	
12	CARLISLE	230/115	90	150	57,968		509.19			57.97	
13	CARLISLE	115/69	23.77	39.62	18,380			161.45			18.38
14	CARLSBAD	115/69	23.77	39.62	22,450			197.20			22.45
15	CARLSBAD	115/69	23.77	39.62	16,900			148.45			16.90
16	CASTRO_N	120/69	45	84	14,901			130.89			14.90
17	CASTRO_S	120/69	45	84	14,917			131.03			14.92
18	CHAVES CO INT E	230/120	150	288	50,458		443.22			50.46	
19	CHAVES CO INT W	230/120	135	252	61,380		539.16			61.38	
20	CHAVES INT	115/69	23.77	39.62	18,700			164.26			18.70
21	COCHRAN	115/69	50	84	25,750			226.19			25.75
22	COCHRAN	115/69	50	84	26,050			228.82			26.05
23	COULTER	115/69	45	75	25,659			225.39			25.66
24	COX	120/69	45	84	17,390			152.75			17.39
25	CROSBY	115/69	50	84	18,920			166.19			18.92
26	CROSBY	115/69	50.4	84	19,647			172.58			19.65
27	CUNNINHAM	230/115	90	150	84,128		738.98			84.13	
28	CURRY	115/69	23.77	39.62	18,205			159.91			18.21
29	CURRY	115/69	23.77	39.62	20,110			176.65			20.11
30	DALHART	115/69	23.77	39.62	20,200			177.44			20.20
31	DALLAM	115/69	23.77	39.6	17,840			156.71			17.84
32	DEAFSMITH	230/120	150	250	39,230		344.60			39.23	
33	DEAFSMITH	230/120	150	250	39,520		347.14			39.52	
34	DENVER_N	115/69	50	84	18,660			163.91			18.66
35	DENVER_S	115/69	50	84	18,860			165.67			18.86
36	DOSS	115/69	50	84	17,000			149.33			17.00
37	EAGLE_CREEK	115/69	23.77	39.6	18,205			159.91			18.21
38	EAST_PLANT	230/120	135	252	71,492		627.99			71.49	
39	EAST_PLANT	115/69	50	84	18,200			159.87			18.20
40	EAST_PLANT	115/69	50	84	17,340			152.31			17.34
41	EDDY_CNTY	345/230	300	560	75,788	665.72			75.79		
42	EDDY_NORTH	230/115	150	250	37,500		329.40			37.50	
43	EDDY_SOUTH	230/115	150	250	40,891		359.19			40.89	
44	FLOYD_CNTY	115/69	50	84	26,300			231.02			26.30
45	FLOYD_CNTY	120/69	45	84	13,970			122.71			13.97
46	GAINES	115/69	23.77	39.6	10,900			95.75			10.90
47	GAINES	115/69	23.77	39.6	27,500			241.56			27.50
48	GEORGIA	115/69	45	75	20,602			180.97			20.60
49	GRAHAM	115/69	50	84	21,581			189.57			21.58
50	GRAPEVINE	230/115	150	250	38,500		338.18			38.50	
51	GRASSLAND	230/115	150	250	41,860		367.70			41.86	
52	GRAY_CNTY	115/69	45	75	24,519			215.37			24.52
53	HALE_CNTY	115/69	50	84	23,520			206.60			23.52
54	HALE_CNTY	115/69	50	84	23,910			210.03			23.91
55	HAPPY_INT	115/69	50	84	20,982			184.31			20.98
56	HAPPY_INT	115/69	50	84	22,351			196.33			22.35
57	HEREFORD	115/66	23.77	39.6	21,030			184.73			21.03
58	HEREFORD	115/69	23.77	39.6	23,340			205.02			23.34
59	HITCHLAND	345/230	336	560	86,954	763.80			86.95		
60	HITCHLAND	230/115	150	250	62,938			552.85		62.94	
61	HITCHLAND	345/230	336	560	74,704	656.20			74.70		
62	HOCKLEY	115/69	50	84	25,080			220.30			
63	HOCKLEY	115/69	50	84	23,650			207.74			23.65
64	HOWARD	115/69	50	84	24,939			219.06			24.94
65	HUTCH_S	115/69	45	75	28,199			247.70			28.20
66	HUTCHISON	230/115	90	150	84,172		739.37			84.17	
67	HUTCHISON	230/115	90	150	90,549		795.38			90.55	
68	KINGSMILL	115/69	50	84	18,560			163.03			18.56
69	KINGSMILL	115/69	45	75	33,190			291.54			33.19
70	KRESS_INT	115/69	50	84	24,100			211.69			24.10
71	LAMB_CNTY	230/120	135	252	69,698		612.23			69.70	
72	LAMB_CNTY	120/69	45	84	17,020			149.50			17.02
73	LAMB_CNTY	120/69	45	84	17,600			154.60			17.60
74	LAMTON	115/69	45	75	14,230			125.00			14.23
75	LEGACY	115/69	50	84	25,140			220.83			25.14
76	LUBBCK_EST	230/115	150	250	65,770		577.72			65.77	
77	LUBBCK_EST	115/69	50	84	26,330			231.28			26.33
78	LUBBCK_EST	115/69	50	84	25,300			222.24			25.30
79	LUBBCK_STH	120/69	45	84	15,020			131.94			15.02
80	LUBBCK_STH	230/120	135	225	60,232		529.08	529.08		60.23	
81	LUBBCK_STH	230/115	150	288	40,980		359.97			40.98	

Appendix G
Autotransformer
No-Load Losses

Line No.	Location	Voltage	Nominal Rating MVA	Max Rating MVA	No Load Loss, Watts	Energy Losses, MWH 345 Kv	230 kV	115 kV	Demand Losses, KW 345 Kv	230 kV	115 kV
82	LYNN_CNTY	115/69	23.77	39.52	16,670			146.43			16.67
83	LYNN_CNTY	115/69	27	45	10,100			88.72			10.10
84	MOORE_CNTY	230/120	150	250	67,370		591.78			67.37	
85	MUSTANG	230/115	150	250	66,670		585.63			66.67	
86	NE_HEREFORD	120/69	50	84	19,000			166.90			19.00
87	NE_HEREFORD	115/69	50	84	18,840			165.49			18.84
88	NEWHART	230/120	150	250	37,900			332.91			37.90
89	NICHOLS	230/120	150	250	65,000		570.96			65.00	
90	NICHOLS	230/120	150	250	66,200		581.50			66.20	
91	NORTHWEST	120/69	45	84	14,390			126.40			14.39
92	OASIS	230/115	135	225	53,021		465.74			53.02	
93	OCHILTREE	230/115	100	168	51,758		454.64			51.76	
94	PCA	115/69	50	84	19,040			167.25			19.04
95	PECOS	230/115	90	150	50,428		442.96			50.43	
96	PERRYTON	115/66	15	18.75	6,708			58.92			6.71
97	PLANT_X	230/120	135	225	71,721		630.00			71.72	
98	PORTALES	115/69	45	70	11,167			98.09			11.17
99	PORTALES	115/69	45	70	14,894			130.83			14.89
100	POTASH_JCT	230/120	150	250	40,070		351.97			40.07	
101	POTASH_JCT	115/69	50	84	20,961	184.12		184.12			20.96
102	POTASH_JCT	115/69	23.77	39.62	25,320			222.41			25.32
103	POTTER_CO	345/230	150	250	65,980	579.57			65.98		
104	PRINGLE	230/120	100	168	37,390		328.43			37.39	
105	RANDALL	230/115	150	250	37,900		332.91			37.90	
106	RANDALL	230/115	135	225	99,620		875.06			99.62	
107	RDRUNNER	230/120	150	288	41,000		360.14			41.00	
108	RIVERVIEW	115/69	23.77	39.63	24,770			217.58			24.77
109	ROSEVELT_N	230/115	135	225	52,272		459.16			52.27	
110	ROSWLL_INT	115/69	23.77	39.62	18,740			164.61			18.74
111	ROSWLL_INT	115/69	23.77	44.37	17,400		152.84	152.84			17.40
112	SEAGRAVES	120/69	45	75	14,103			123.88			14.10
113	SEMINOLE	230/115	90	150	63,300		556.03	556.03		63.30	
114	SEMINOLE	230/115	90	150	58,700		515.62			58.70	
115	SEVEN_RIVERS	115/69	90	150	58,220			511.40			58.22
116	SEVEN_RIVERS	230/115	23.77	39.62	15,520		136.33			15.52	
117	SPEARMAN	115/69	50	84	24,620			216.26			24.62
118	SULPHUR	120/69	24	44.8	6,280			55.16			6.28
119	SULPHUR	120/69	24	44.8	8,900			78.18			8.90
120	SUNDOWN	230/118	100	166.66	60,604		532.35			60.60	
121	SWISHER	230/115	150	288	40,270		353.73			40.27	
122	TERRY_CNTY	115/69	50	84	24,480			215.03			24.48
123	TERRY_CNTY	115/69	50	84	24,050			211.26			24.05
124	TOLK	345/230	300	560	80,850	710.19			80.85		
125	TUCO_INT	230/115	135	252	54,435			478.16			54.44
126	TUCO_INT	230/115	150	250	66,740			586.24			66.74
127	TUCO_INT	120/69	45	84	14,980			131.58			14.98
128	TUCO_INT	120/69	45	84	14,950			131.32			14.95
129	TUCO_INT	345/230	336	560	75,800	665.83			75.80		
130	TUCO_INT	345/230	300	560	58,730	515.88			58.73		
131	TUCO_INT	115/69	50	84	18,300			160.75			18.30
132	TUCO_SVC	230/13	90	150	39,090		343.37			39.09	
133	WHEELER	230/120	150	250	62,631		550.15			62.63	
134	WOLFFORTH	230/115	90	150	80,106		703.65			80.11	
135	YOAKUM	230/115	90	150	69,850		613.56			69.85	
136	YOAKUM	230/115	90	150	69,990		614.79			69.99	

			Total Energy Losses, MWH 345 Kv	230 kV	115 kV	Total Demand Losses, KW 345 Kv	230 kV	115 kV
Hours in Period	**8784**		**4,741**	**21,905**	**17,276**	**519**	**2,539**	**1,755**

APPENDIX H
USE BY LOSS LEVEL

Line No.

1 **SOUTHWESTERN PUBLIC SERVICE COMPANY**
2 **SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS**
3 **TOTAL SYSTEM**
4 **FOR THE YEAR ENDED: DECEMBER 31, 2016**
5 **KWH ENERGY DELIVERED AT THE METER** (754,595,533)

	Total Loss Level 6	Total Loss Level 5	Total Loss Level 4	Total Loss Level 3	Total Loss Level 2	Total Retail	Wholesale 4	Wholesale 3	Wholesale 2	Wholesale "@generator	Total Wholesale	Total System Energy
10 JANUARY 16	411,818,678	239,445,487	290,019,002	112,669,984	575,096,269	1,629,049,420	6,119,318	212,667,734	524,698,747	994,014	744,479,813	2,373,529,233
11 FEBRUARY	306,426,002	215,233,752	284,345,595	106,304,866	536,379,707	1,448,689,922	5,703,770	197,239,396	482,072,342	1,215,180	686,230,688	2,134,920,610
12 MARCH	274,044,235	235,445,146	307,275,100	115,241,024	575,920,592	1,507,926,097	6,627,423	251,879,763	515,210,580	1,265,837	774,983,603	2,282,909,700
13 APRIL	253,608,063	236,825,335	295,917,648	109,790,407	556,075,883	1,452,217,336	5,705,558	296,724,173	523,645,813	1,265,402	827,340,946	2,279,558,282
14 MAY	298,475,419	256,989,020	299,289,662	109,428,376	578,306,297	1,542,488,774	6,046,872	289,265,841	568,654,679	577,605	864,544,997	2,407,033,771
15 JUNE	406,851,507	300,650,169	296,223,566	107,902,611	579,057,304	1,690,685,157	8,904,907	353,598,849	666,014,213	661,620	1,029,179,589	2,719,864,746
16 JULY	507,898,858	363,164,023	316,969,540	112,379,089	602,921,193	1,903,332,703	10,761,338	596,542,978	817,704,745	728,004	1,425,737,065	3,329,069,768
17 AUGUST	428,304,713	329,159,595	314,011,852	114,821,152	610,492,606	1,796,789,918	10,046,554	516,345,423	740,498,309	830,898	1,267,721,184	3,064,511,102
18 SEPTEMBER	321,160,706	262,516,234	301,336,391	111,072,247	580,209,111	1,576,294,689	7,429,123	187,514,928	538,853,371	449,071	734,246,493	2,310,541,182
19 OCTOBER	272,553,649	259,186,166	314,376,279	107,582,599	594,932,988	1,548,631,681	6,546,395	245,790,726	509,808,761	247,567	762,393,449	2,311,025,130
20 NOVEMBER	289,834,829	249,034,387	297,597,740	105,655,493	574,825,618	1,516,948,067	6,160,347	222,508,772	470,704,438	24,434	699,397,991	2,216,346,058
21 DECEMBER	390,432,501	257,837,374	300,794,911	106,053,432	576,070,355	1,631,188,573	6,585,523	253,521,253	523,090,845	35,450	783,233,071	2,414,421,644
23 TOTAL YEAR	4,161,409,160	3,205,486,688	3,618,157,286	1,318,901,280	6,940,287,923	19,244,242,337	86,637,128	3,623,599,836	6,880,956,843	8,295,082	10,599,488,889	29,843,731,226

26 **SOUTHWESTERN PUBLIC SERVICE COMPANY** 3,704,794,414 4,942,501,116 13,821,244,766
27 **SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS**
28 **TOTAL SYSTEM**
29 **ADJUSTED CLASS COINCIDENT PEAK DEMAND**
30 **FOR THE YEAR ENDED: DECEMBER 31, 2016**
32 **ADJUSTED COINCIDENT PEAK DEMAND AT THE METER USING EXISTING LOSS FACTORS**

	Total Loss Level 6	Total Loss Level 5	Total Loss Level 4	Total Loss Level 3	Total Loss Level 2	Total Retail	Total Wholesale 4	Total Wholesale 3	Total Wholesale 2	Total Wholesale "@generator	Total Wholesale	Total System Demand
37 JANUARY 16	768,056	397,356	412,755	162,425	753,781	2,494,373	8,465	323,429	824,078	170	1,156,142	3,650,515
38 FEBRUARY	749,564	361,951	424,358	162,962	753,466	2,452,301	8,210	324,735	823,204	152	1,156,301	3,608,602
39 MARCH	540,750	360,817	416,098	162,601	712,659	2,192,925	9,207	366,248	762,313	4,381	1,142,149	3,335,074
40 APRIL	563,698	391,933	433,768	141,457	789,852	2,320,709	8,880	449,421	900,314	3,558	1,362,173	3,682,882
41 MAY	757,242	450,157	464,521	138,811	766,392	2,577,123	12,785	430,713	1,054,747	-	1,498,245	4,075,368
42 JUNE	1,069,093	541,535	457,105	157,320	853,290	3,078,342	16,599	700,985	1,289,058	2,469	2,009,111	5,087,453
43 JULY	1,114,734	640,746	419,391	155,553	834,859	3,165,282	17,363	934,932	1,409,556	-	2,361,851	5,527,133
44 AUGUST	1,059,316	609,767	467,850	170,214	851,140	3,158,287	16,535	935,031	1,315,108	422	2,267,096	5,425,383
45 SEPTEMBER	854,761	498,727	409,245	164,359	850,193	2,777,286	14,873	333,502	1,005,683	984	1,355,042	4,132,328
46 OCTOBER	613,085	446,605	480,798	145,216	785,718	2,471,422	10,345	384,042	824,450	189	1,219,026	3,690,448
47 NOVEMBER	440,239	463,422	436,073	144,537	829,025	2,313,297	11,136	393,490	808,463	42	1,213,131	3,526,428
48 DECEMBER	823,122	354,194	380,230	156,220	723,397	2,437,162	11,398	398,065	857,860	334	1,267,657	3,704,819
50 AT Peak Hour	1,114,734	640,746	419,391	155,553	834,859	3,165,282	17,363	934,932	1,409,556	-	2,361,851	5,527,133
51 MAX PEAK	1,114,734	640,746	480,798	170,214	853,290	3,165,282	17,363	935,031	1,409,556	4,381	2,361,851	5,527,133
52		1,755,480										

54 **SOUTHWESTERN PUBLIC SERVICE COMPANY**
55 **SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS**
56 **TOTAL SYSTEM**
57 **LOAD FACTOR USING KWH DELIVERED AND MAX KW AT THE METER**
58 **FOR THE YEAR ENDED: DECEMBER 31, 2016**
60 **LOAD FACTOR AT THE LOSS LEVEL**

	Total Loss Level 6	Total Loss Level 5	Total Loss Level 4	Total Loss Level 3	Total Loss Level 2	Total Loss Level 1	Total System Demand	HOURS	
65 JANUARY 16	0.720676	0.751112	0.802575	0.825421	0.873586	0.873912	0.873912	744	
66 FEBRUARY	0.587364	0.674315	0.755302	0.788656	0.849581	0.850029	0.850029	696	29 days
67 MARCH	0.681163	0.759563	0.834074	0.862280	0.920747	0.920048	0.920048	744	
68 APRIL	0.624862	0.712783	0.786737	0.836878	0.860021	0.859667	0.859667	720	
69 MAY	0.529786	0.618347	0.686761	0.750975	0.793667	0.793857	0.793857	744	
70 JUNE	0.528552	0.610098	0.674764	0.695772	0.742710	0.742531	0.742531	720	
71 JULY	0.612397	0.666931	0.734996	0.781101	0.809385	0.809562	0.809562	744	
72 AUGUST	0.543443	0.609974	0.675032	0.706414	0.759056	0.759203	0.759203	744	
73 SEPTEMBER	0.521849	0.598943	0.697288	0.726975	0.776614	0.776580	0.776580	720	
74 OCTOBER	0.597528	0.674446	0.738991	0.779300	0.841644	0.841691	0.841691	744	
75 NOVEMBER	0.914387	0.828219	0.866342	0.860872	0.872912	0.872911	0.872911	720	
76 DECEMBER	0.637542	0.740099	0.818689	0.832588	0.876004	0.875938	0.875938	744	
78 ANNUAL LF	0.424988	0.477745	0.559290	0.542772	0.604185	0.614697	0.614697	8784	

APPENDIX H
USE BY LOSS LEVEL

SOUTHWESTERN PUBLIC SERVICE COMPANY
SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS

TOTAL SYSTEM

FOR THE YEAR ENDED: DECEMBER 31, 2016

KWH ENERGY DELIVERED AT THE METER

	Residential - NM Water Heating	Residential RTX & RLNM	Residential RHTX & RHNM	Total Residential	NM & TX Small General Service	NM & TX Street Lighting	NM & TX Area Lighting	NM & TX Small Muni and School Service	TX Large Municipal Service	Total Loss Level 6
JANUARY 16	-	206,412,082	145,317,508	351,729,590	37,790,297	3,996,739	3,431,824	3,085,235	11,784,993	411,818,678
FEBRUARY	-	154,814,527	99,594,841	254,409,369	30,777,989	3,738,885	3,210,416	2,457,716	11,831,628	306,426,002
MARCH	-	140,862,410	80,070,342	220,932,752	30,501,449	3,996,739	3,431,824	2,329,987	12,851,485	274,044,235
APRIL	-	133,520,374	68,171,570	201,691,944	30,508,950	3,867,812	3,321,120	2,172,300	12,045,938	253,608,063
MAY	-	166,311,838	75,982,323	242,294,161	33,743,022	3,996,739	3,431,824	2,249,578	12,760,096	298,475,419
JUNE	-	240,357,451	100,559,271	340,916,722	41,867,532	3,867,812	3,321,120	2,506,365	14,371,957	406,851,507
JULY	-	303,377,266	122,396,782	425,774,048	55,311,750	4,010,381	3,437,253	3,024,990	16,340,435	507,898,858
AUGUST	-	253,154,894	101,177,980	354,332,874	48,855,990	4,010,381	3,437,253	2,786,668	14,881,545	428,304,713
SEPTEMBER	-	188,659,155	76,249,227	264,908,382	34,491,249	3,881,014	3,326,374	2,351,288	12,202,398	321,160,706
OCTOBER	-	154,662,037	65,113,598	219,775,634	30,642,944	4,010,381	3,437,253	2,281,667	12,405,769	272,553,649
NOVEMBER	-	158,701,686	80,634,409	239,336,094	29,814,985	3,881,014	3,326,374	2,352,235	11,124,126	289,834,829
DECEMBER	-	211,189,576	121,593,034	332,782,610	35,957,942	4,010,381	3,437,253	2,968,329	11,275,985	390,432,501
TOTAL YEAR	-	2,312,023,296	1,136,860,884	3,448,884,181	440,264,100	47,268,278	40,549,888	30,566,358	153,876,356	4,161,409,160

SOUTHWESTERN PUBLIC SERVICE COMPANY
SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS

TOTAL SYSTEM

ADJUSTED CLASS COINCIDENT PEAK DEMAND
FOR THE YEAR ENDED: DECEMBER 31, 2016

ADJUSTED COINCIDENT PEAK DEMAND AT THE METER USING EXISTING LOSS FACTORS

	Residential - NM Water Heating	Residential RTX & RLNM	Residential RHTX & RHNM	Total Residential	NM & TX Small General Service	NM & TX Street Lighting	NM & TX Area Lighting	TX Small Muni and School Service	TX Large Municipal Service	Total Loss Level 6
JANUARY 16	-	385,452	296,647	682,099	61,122	-	-	5,193	19,642	768,056
FEBRUARY	-	358,920	312,555	671,475	56,988	-	-	4,601	16,500	749,564
MARCH	-	268,519	205,400	473,919	45,250	-	-	4,169	17,412	540,750
APRIL	-	298,379	192,169	490,549	49,912	-	-	2,736	20,501	563,698
MAY	-	446,078	211,003	657,081	76,323	-	-	3,100	20,738	757,242
JUNE	-	678,538	289,848	968,386	75,393	-	-	3,748	21,565	1,069,093
JULY	-	690,776	282,008	972,784	108,913	-	-	4,804	28,234	1,114,734
AUGUST	-	658,402	271,598	929,999	101,620	-	-	4,501	23,196	1,059,316
SEPTEMBER	-	541,825	223,253	765,078	66,990	-	-	4,282	18,411	854,761
OCTOBER	-	380,801	163,983	544,783	47,173	-	-	3,558	17,571	613,085
NOVEMBER	-	270,287	104,300	374,587	43,941	-	-	3,410	18,302	440,239
DECEMBER	-	439,543	287,496	727,040	62,090	5,390	4,620	5,160	18,823	823,122
AT Peak Hour	-	690,776	282,008	972,784	108,913	-	-	4,804	28,234	1,114,734
MAX PEAK	-	690,776	312,555	972,784	108,913	5,390	4,620	5,194	28,234	1,114,734

APPENDIX H
USE BY LOSS LEVEL

SOUTHWESTERN PUBLIC SERVICE COMPANY
SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS

TOTAL SYSTEM

FOR THE YEAR ENDED: DECEMBER 31, 2016

KWH ENERGY DELIVERED AT THE METER

	NM Irrigation Service	NM Municipal and Schoc Service	NM & TX Sec General Service	TX LSSTX Large School	Total Loss Level 5	CRMWA TX Interruptible SAS-4	TX LMSTX - Pri Large Municipal	TX LSSTX - Pri Large School	TX Primary LGS SAS-8	TX Primary QF Stand by	Primary Low Load Factor	NM & TX Primary General Service	Total Loss Level 4
JANUARY 16	977,762	8,774,453	214,991,258	14,702,014	239,445,487	6,124,991	1,778,647	207,572	3,683,994	190,911	101,005	277,931,882	290,019,002
FEBRUARY	2,545,415	8,207,735	190,782,740	13,697,862	215,233,752	3,701,815	2,188,310	209,398	3,662,443	97,754	13,772	274,472,103	284,345,595
MARCH	6,370,296	8,561,678	207,692,633	12,820,539	235,445,146	4,620,164	2,854,454	214,908	3,853,127	117,964	115,790	295,498,694	307,275,100
APRIL	7,572,058	8,883,421	207,302,890	13,066,966	236,825,335	11,396,673	2,633,848	229,256	3,030,499	118,459	16,759	278,492,154	295,917,648
MAY	8,426,599	10,006,879	224,789,925	13,765,617	256,989,020	11,500,048	2,759,627	241,853	3,499,170	97,208	134,799	281,056,957	299,289,662
JUNE	10,962,920	10,549,469	266,246,677	12,891,103	300,650,169	10,406,244	3,435,884	253,817	3,792,823	122,308	16,769	278,195,721	296,223,566
JULY	14,315,816	12,461,836	321,633,492	14,752,879	363,164,023	14,826,497	4,027,282	291,553	3,948,912	111,565	11,591	293,752,140	316,969,540
AUGUST	9,913,819	12,163,143	290,137,385	16,945,248	329,159,595	13,511,453	3,100,136	315,884	3,966,164	144,552	178,150	292,795,512	314,011,852
SEPTEMBER	4,932,125	10,542,900	230,852,242	16,188,967	262,516,234	11,776,750	2,370,714	300,147	3,902,989	121,852	14,552	282,849,387	301,336,391
OCTOBER	4,346,827	9,560,621	230,871,985	14,406,732	259,186,166	12,282,909	2,594,945	262,614	6,341,813	107,382	12,976	292,773,640	314,376,279
NOVEMBER	1,874,033	8,225,042	226,302,665	12,632,647	249,034,387	10,522,227	1,917,392	215,755	2,977,433	130,046	126,389	281,708,498	297,597,740
DECEMBER	1,085,803	8,268,859	235,515,551	12,967,162	257,837,374	8,865,380	1,735,944	187,880	2,714,916	133,606	16,837	287,140,348	300,794,911
TOTAL YEAR	73,323,473	116,206,036	2,847,119,444	168,837,734	3,205,486,687	119,535,151	31,397,184	2,612,153	45,374,283	1,493,607	759,389	3,416,667,036	3,618,157,288

SOUTHWESTERN PUBLIC SERVICE COMPANY
SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS

TOTAL SYSTEM

ADJUSTED CLASS COINCIDENT PEAK DEMAND
FOR THE YEAR ENDED: DECEMBER 31, 2016

ADJUSTED COINCIDENT PEAK DEMAND AT THE METER USING EXISTING LOSS FACTORS

	NM Irrigation Service	NM Municipal and Schoc Service	NM & TX Sec General Service	TX LSSTX Large School	Total Loss Level 5	CRMWA TX Interruptible SAS-4	TX LMSTX - Pri Large Municipal	TX LSSTX - Pri Large School	TX Primary LGS SAS-8	TX Primary QF Stand by	Primary Low Load Factor	NM & TX Primary General Service	Total Loss Level 4
JANUARY 16	712	14,731	345,139	36,774	397,356	13,999	2,964	519	5,419	325	18	389,511	412,755
FEBRUARY	1,279	14,450	316,391	29,832	361,951	9,929	3,052	456	5,051	168	18	405,684	424,358
MARCH	6,684	12,863	310,004	31,267	360,817	15,853	3,867	524	5,650	140	18	390,044	416,098
APRIL	11,252	15,724	342,863	22,094	391,933	18,727	4,483	388	3,580	32	16	406,543	433,768
MAY	16,159	18,062	393,826	22,111	450,157	20,888	4,485	388	5,129	34	18	433,579	464,521
JUNE	18,059	21,400	480,501	21,575	541,535	20,795	5,156	425	5,085	146	16	425,482	457,105
JULY	18,905	23,942	567,327	30,572	640,746	14,425	6,958	604	5,172	83	26	392,123	419,391
AUGUST	18,152	23,425	537,148	31,042	609,767	24,255	4,832	579	5,146	131	15	432,892	467,850
SEPTEMBER	9,423	24,697	427,904	36,704	498,727	18,612	3,577	680	4,629	459	32	381,256	409,245
OCTOBER	6,366	18,583	396,008	25,648	446,605	18,646	3,675	468	6,612	53	16	451,328	480,798
NOVEMBER	5,352	22,268	406,768	29,034	463,422	17,903	3,155	496	5,120	509	1,241	407,649	436,073
DECEMBER	1,629	11,223	323,608	17,734	354,194	10,664	2,898	257	3,967	140	19	362,284	380,230
AT Peak Hour	18,905	23,942	567,327	30,572	640,746	14,425	6,958	604	5,172	83	26	392,123	419,391
MAX PEAK	18,905	24,697	567,327	36,774	640,746	24,255	6,959	681	6,612	509	1,241	451,328	480,798
												404,589	

Line No.

1 **SOUTHWESTERN PUBLIC SERVICE COMPANY**
2 **SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS**
3 **TOTAL SYSTEM**
4 **FOR THE YEAR ENDED: DECEMBER 31, 2016**
5
6 **KWH ENERGY DELIVERED AT THE METER**

	Sub-Trans. LGS Standard	Sub-Trans. Standby	Total Loss Level 3	Transmission LGS Standard	Transmission QF	Transmission LGS Generation	Total Loss Level 2
JANUARY 16	112,596,022	73,962	112,669,984	560,475,226	14,621,043	-	575,096,269
FEBRUARY	106,006,863	298,003	106,304,866	522,815,224	13,564,483	-	536,379,707
MARCH	114,132,955	1,108,069	115,241,024	562,528,780	13,391,812	-	575,920,592
APRIL	106,475,977	3,314,430	109,790,407	542,216,069	13,859,814	-	556,075,883
MAY	109,373,566	54,810	109,428,376	564,665,497	13,640,800	-	578,306,297
JUNE	107,859,487	43,124	107,902,611	564,136,895	14,920,409	-	579,057,304
JULY	112,184,602	194,487	112,379,089	586,728,435	16,192,758	-	602,921,193
AUGUST	112,493,510	2,327,642	114,821,152	595,004,183	15,488,423	-	610,492,606
SEPTEMBER	111,067,837	4,410	111,072,247	567,338,569	12,870,542	-	580,209,111
OCTOBER	107,552,453	30,146	107,582,599	580,964,046	13,968,942	-	594,932,988
NOVEMBER	102,284,646	3,370,847	105,655,493	560,571,541	14,254,077	-	574,825,618
DECEMBER	105,685,021	368,411	106,053,432	562,708,759	13,361,596	-	576,070,355
TOTAL YEAR	1,307,712,939	11,188,341	1,318,901,280	6,770,153,224	170,134,699	-	6,940,287,923

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26 **SOUTHWESTERN PUBLIC SERVICE COMPANY**
27 **SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS**
28 **TOTAL SYSTEM**
29 **ADJUSTED CLASS COINCIDENT PEAK DEMAND**
30 **FOR THE YEAR ENDED: DECEMBER 31, 2016**
31
32 **ADJUSTED COINCIDENT PEAK DEMAND AT THE METER USING EXISTING LOSS FACTORS**

	Sub-Trans. LGS Standard	Sub-Trans. Generation QF	Total Loss Level 3	Transmission LGS Standard	Transmission Standby QF	Transmission LGS Generation	Total Loss Level 2
JANUARY 16	162,425	-	162,425	747,076	6,706	-	753,781
FEBRUARY	162,962	-	162,962	745,561	7,904	-	753,466
MARCH	161,694	907	162,601	706,154	6,505	-	712,659
APRIL	141,457	-	141,457	779,503	10,349	-	789,852
MAY	138,811	-	138,811	760,317	6,075	-	766,392
JUNE	157,320	-	157,320	844,372	8,918	-	853,290
JULY	155,553	-	155,553	805,486	29,373	-	834,859
AUGUST	163,977	6,237	170,214	828,539	22,601	-	851,140
SEPTEMBER	164,359	-	164,359	825,122	25,071	-	850,193
OCTOBER	145,216	-	145,216	763,667	22,051	-	785,718
NOVEMBER	144,537	-	144,537	804,178	24,847	-	829,025
DECEMBER	154,672	1,548	156,220	708,328	15,069	-	723,397
AT Peak Hour	155,553	-	155,553	805,486	29,373	-	834,859
MAX PEAK	164,359	6,237	170,214	844,372	29,373	-	853,290

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APPENDIX H
USE BY LOSS LEVEL

SOUTHWESTERN PUBLIC SERVICE COMPANY
SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS

TOTAL SYSTEM

FOR THE YEAR ENDED: DECEMBER 31, 2016

KWH ENERGY DELIVERED AT THE METER

	Total Wholesale Loss Level 4	Total Wholesale LL 3	Total Wholesale LL2	@ Generation Wholesale LL1	Total Wholesale
JANUARY 16	6,119,318	212,667,734	524,698,747	994,014	744,479,814
FEBRUARY	5,703,770	197,239,396	482,072,342	1,215,180	686,230,688
MARCH	6,627,423	251,879,763	515,210,580	1,265,837	774,983,603
APRIL	5,705,558	296,724,173	523,645,813	1,265,402	827,340,946
MAY	6,046,872	289,265,841	568,654,679	577,605	864,544,996
JUNE	8,904,907	353,598,849	666,014,213	661,620	1,029,179,589
JULY	10,761,338	596,542,978	817,704,745	728,004	1,425,737,065
AUGUST	10,046,554	516,345,423	740,498,309	830,898	1,267,721,184
SEPTEMBER	7,429,123	187,514,928	538,853,371	449,071	734,246,492
OCTOBER	6,546,395	245,790,726	509,808,761	247,567	762,393,449
NOVEMBER	6,160,347	222,508,772	470,704,438	24,434	699,397,991
DECEMBER	6,585,523	253,521,253	523,090,845	35,450	783,233,072
TOTAL YEAR	147,312,062	344,822,539	492,134,601	8,295,083	10,599,488,890

SOUTHWESTERN PUBLIC SERVICE COMPANY
SCHEDULE: ADJUSTED TEST YEAR DATA BY RATE CLASS

TOTAL SYSTEM

ADJUSTED CLASS COINCIDENT PEAK DEMAND
FOR THE YEAR ENDED: DECEMBER 31, 2016

ADJUSTED COINCIDENT PEAK DEMAND AT THE METER USING EXISTING LOSS FACTORS

	Total Loss Level 4	Total Wholesale LL 3	Total Wholesale LL2	@ Generation Wholesale LL1	Total Wholesale
JANUARY 16	8,465	323,429	824,078	170	1,156,142
FEBRUARY	8,210	324,735	823,204	152	1,156,300
MARCH	9,207	366,248	762,313	4,381	1,142,149
APRIL	8,880	449,421	900,314	3,558	1,362,173
MAY	12,785	430,713	1,054,747	-	1,498,245
JUNE	16,599	700,985	1,289,058	2,469	2,009,111
JULY	17,363	934,932	1,409,556	-	2,361,850
AUGUST	16,535	935,031	1,315,108	422	2,267,095
SEPTEMBER	14,873	333,502	1,005,683	984	1,355,042
OCTOBER	10,345	384,042	824,450	189	1,219,027
NOVEMBER	11,136	393,490	808,463	42	1,213,131
DECEMBER	11,398	398,065	857,860	334	1,267,657
AT Peak Hour	17,363	934,932	1,409,556	-	2,361,850
MAX PEAK	17,363	935,031	1,409,556	4,381	2,361,850

Appendix I
Distribution Substation Transformer Loss

Line No.	1	Voltage High Side, kV 2	Low Side, kV 3	Ratings Nominal MVA 4	Max MVA 5	No Load Losses WATTS 6	Full Load Losses WATTS 7	Low Side Class 8	Verify Flag R,L,E 9	Exclude Flag 10	Primary Load Factor 11	No Load Losses MWH 12	Full Load Losses MWH 13	Number of Feeder Circuits 14	Percent Transf. Excluded 15
											0.5592897				
1	34TH STREET	115	13.2	22.4	37.3	19,005	64,617	13.2	R,L	I	0.55929	166.94	317.45	4	
2	ADAIR	68.8	13.09	10	14	12,573	25,896	12.5	R,E	I	0.55929	110.44	127.22	1	
3	AIKEN RURAL	67	12.5	2.5	2.5	4,608	13,940	12.5	R,E	I	0.55929	40.48	68.48	1	
4	ALLMON	67	12.5	7.5	9.38	10,895	43,006	12.5	R,L	I	0.55929	95.70	211.28	1	
5	ALLRED	115	12.5	12	20	19,630	57,040	12.5	R,L	E	0.55929	34.49	56.05	2	80
6	AM-FRAC	115	2.4	5.6	7	5,677	24,595	2.4	R,L	I	0.55929	49.87	120.83	0	
7	AMHERST	67	2.4	3.75	4.687	7,840	28,640	2.4	R,L	I	0.55929	68.87	140.70	2	
8	ARROWHEAD	115	13.2	15	25	12,450	55,570	13.2	R,L	I	0.55929	109.36	273.00	2	
9	ARTESIA COUNTRY CLUB	67	12.5	7.5	9.38	12,000	40,000	12.5	R,E	I	0.55929	105.41	196.51	2	
10	ARTESIA S RURAL	69	13.2	11.2	14	8,663	46,721	13.2	R,L	I	0.55929	76.10	229.53	2	
11	ARTESIA TOWN	66	4.16	5	5	10,526	32,485	4.16	R,E	I	0.55929	92.46	159.59	3	
12	ARTESIA WEST 13th St.	67	4.16	7.5	11.26	9,800	55,797	4.16	R,L	I	0.55929	86.08	274.12	2	
13	BAILEY PUMP	67	12.5	5	5.6	11,000	35,000	12.5	R,E	I	0.55929	96.62	171.95	1	
14	BAINER	66	4.16	5	5	10,526	32,485	4.16	R,E	I	0.55929	92.46	159.59	1	
15	BARWISE	68.8	13.09	3.75	4.2	7,760	27,560	12.5	R,L	I	0.55929	68.16	135.40	2	
16	BATTLE AXE T1	115	22.86	30	50	19,900	89,300	22	R,L	I	0.55929	174.80	438.71	3	
17	BATTLE AXE T2	115	22.86	30	50	19,600	88,400	22	R,L	I	0.55929	172.17	434.29	3	
18	BENNETT	115	13.2	16.8	28	11,770	55,780	12.5	R,L	I	0.55929	103.39	274.04	3	
19	BENSING	118	13.2	17.5	29.5	11,700	67,500	12.5	R,L	I	0.55929	102.77	331.61	3	
20	BOARDMAN	69	13.2	12	20	9,410	45,960	12.5	R,L	E	0.55929	67.78	185.15	2	18
21	BOOKER 4.16 KV	69	4.2	3.75	3.75	7,900	24,500	4.16	R,E	I	0.55929	69.39	120.36	3	
22	BOWERS	67	13.8	7.5	9.375	19,800	56,515	13.2	R,L	I	0.55929	173.92	277.65	3	
23	BRASHER	115	13.2	15	25	13,500	57,700	13.2	R,L	I	0.55929	118.58	283.47	3	
24	BRISCOE	66	22	3	3.92	5,697	15,131	22	R,E	I	0.55929	50.04	74.33	2	
25	BROWNFIELD SWITCH STATION	67	22.9	5	5	13,410	31,360	22	R,L	I	0.55929	117.79	154.07	1	
26	BUCKEYE	115	12.5	7.5	10.5	20,620	74,550	12.5	R,L	I	0.55929	181.13	366.25	3	
27	BUFFALO	69	13.2	5	6.25	4,595	22,296	13.2	R,L	I	0.55929	40.36	109.54	2	
28	BURNETT	69	13.2	11.2	14	8,110	45,840	13.2	R,L	I	0.55929	71.24	225.20	2	
29	BUSH	115	13.8	15	25	24,880	60,701	13.2	R,L	I	0.55929	218.55	298.21	3	
30	BYRD	115	4.2	13.5	22.4	10,602	52,896	4.16	R,L	I	0.55929	93.13	259.87	0	
31	CAMEX	67	2.4	5	7	13,000	30,000	2.4	R,L	I	0.55929	114.19	147.38	3	
32	CAMEX 115	118	13.2	16.8	28	12,650	71,450	13.2	R,L	E	0.55929	0.00	0.00	2	100
33	CAMPBELL STREET	115	12.5	15	25	18,192	65,727	12.5	R,L	I	0.55929	159.80	322.90	2	
34	CANADIAN	67	2.4	10	10	15,350	55,490	2.4	R,L	I	0.55929	134.83	272.61	4	
35	CANYON EAST	115	13.2	15	25	12,700	58,300	13.2	R,L	I	0.55929	111.56	286.42	2	
36	CANYON WEST	115	13.2	15	25	13,340	50,960	13.2	R,L	I	0.55929	117.18	250.36	3	
37	CAPITAN	69	13.2	15	25	10,610	57,270	13.2	R,L	I	0.55929	93.20	281.36	3	
38	CARLISLE	115	22.86	33.3	36.6	12,592	58,368	22	R,E	I	0.55929	110.61	286.75	3	
39	CARLSBAD WATER	67	12.5	3.75	3.75	6,912	20,909	12.5	R,E	I	0.55929	60.72	102.72	2	
40	CARSON CO	115	13.8	10	12.5	16,667	56,431	13.2	R,L	I	0.55929	146.40	277.23	2	
41	CEDAR LAKE EAST	66	12.5	2	2	4,000	25,000	12.5	R,E	E	0.55929	0.00	0.00	1	100
42	CENTRE ST	67	13.8	12	22.4	20,560	43,351	13.2	R,L	I	0.55929	180.60	212.97	2	
43	CHANNING T1	230	34.5	16.8	28	17,700	63,100	33	R,L	I	0.55929	155.48	310.00	2	
44	CHANNING T2	230	34.5	16.8	28	17,700	63,100	33	R,L	I	0.55929	155.48	310.00	1	
45	CHERRY	115	13.2	15	25	18,449	67,706	13.2	R,L	I	0.55929	162.06	332.63	2	
46	CHINA DRAW T1	115	12.47	16.8	28	11,700	67,200	12.5	R,L	I	0.55929	102.77	330.14	2	
47	CHINA DRAW T2	115	12.47	16.8	28	11,200	65,800	12.5	R,L	I	0.55929	98.38	323.26	2	
48	CLIFFSIDE	68.8	4.36	7.5	10.5	12,678	44,698	4.16	R,L	I	0.55929	111.36	219.59	0	
49	COBLE	67	12.5	10	11	16,500	55,000	12.5	R,E	E	0.55929	82.61	154.02	2	43
50	COBURN CREEK	118	13.2	16.8	28	11,700	69,000	13.2	R,L	I	0.55929	102.77	338.98	2	
51	CONWAY	115	13.8	12	20	21,840	48,390	13.2	R,L	I	0.55929	191.84	237.73	2	
52	COOPER RANCH	115	13.2	12	22.4	17,615	56,447	12.5	R,E	I	0.55929	154.73	277.31	2	
53	CORTEZ	115	4.2	5	6.25	10,530	27,280	4.16	R,L	I	0.55929	92.50	134.02	0	
54	COTTONWOOD #1	66	12.5	1.5	1.88	3,158	9,745	12.5	R,E	I	0.55929	27.74	47.88	2	
55	COULTER	115	13.8	15	25	25,000	75,000	13.2	R,L	I	0.55929	219.60	368.46	3	
56	COUNTY LINE	69	12.47	18.75	25	36,600	89,810	12.5	R,L	E	0.55929	80.37	110.30	1	75
57	CRMWA #1	115	4.16	7.5	9.37	20,493	50,307	4.16	R,L	I	0.55929	180.01	247.15	0	
58	CRMWA #2	115	4.16	5	6.25	16,255	36,145	4.16	R,L	I	0.55929	142.78	177.57	0	
59	CRMWA #3	115	4.16	5	6.25	14,481	35,758	4.16	R,L	I	0.55929	127.20	175.67	0	
60	CRMWA #4	115	4.16	5	6.25	15,785	35,824	4.16	R,L	I	0.55929	138.66	176.00	0	
61	CRMWA 21 (Adobe Creek) 13	67	13.2	10	14	23,000	80,000	13.2	R,E	I	0.55929	202.03	393.02	1	
62	CRMWA 21 (Adobe Creek) 4	67	4.2	7.5	8.4	10,000	32,000	4.16	R,E	I	0.55929	87.84	157.21	1	
63	CRMWA 22	69	4.2	3.75	4.687	7,900	24,500	4.16	R,E	I	0.55929	69.39	120.36	0	
64	CRMWA 23	67	13.8	15	28	24,060	66,861	13.2	R,L	I	0.55929	211.34	328.47	0	
65	CROUSE HINDS	115	13.8	12	20	19,600	63,100	13.2	R,L	I	0.55929	172.17	310.00	0	
66	CURRY CO	67	24	12	20	18,465	52,230	22	R,L	I	0.55929	162.20	256.60	4	
67	DALHART 12.5 KV	67	12.5	12	22.4	15,855	50,503	12.5	R,L	I	0.55929	139.27	248.11	2	
68	DALHART 2.4 KV	67	2.4	3.75	4.68	11,960	38,450	2.4	R,E	I	0.55929	105.06	188.90	4	
69	DALHART 35 KV	67	34.5	7.5	7.5	17,590	42,475	33	R,L	I	0.55929	154.51	208.67	2	
70	DAMRON	69	13.2	7.5	10	17,250	55,850	13.2	R,L	I	0.55929	151.52	274.38	1	
71	DAWN	115	13.2	7.5	9.375	7,870	23,170	13.2	R,L	I	0.55929	69.13	113.83	2	
72	DEAFSMITH	115	13.8	12	20	19,600	63,100	13.2	R,E	E	0.55929	0.00	0.00	1	100
73	DEXTER 34.5 KV	69	34.5	5.6	7	7,047	32,076	33	R,L	I	0.55929	61.90	157.58	1	
74	DEXTER 4.16 KV	66	4.2	3.75	3.75	7,894	24,364	4.16	R,E	I	0.55929	69.34	119.69	2	
75	DIEKEMPER	66	4.2	1.5	1.5	2,105	6,497	4.16	R,E	I	0.55929	18.49	31.92	1	
76	DIMMITT E	67	13.8	15	25	21,980	69,170	12.5	R,L	I	0.55929	193.07	339.82	2	
77	DIMMITT S	67	12.5	10	12.5	9,216	27,879	12.5	R,E	I	0.55929	80.96	136.97	2	
78	DOLLARHIDE	115	13.2	12	22.4	11,100	46,800	12.5	R,E	I	0.55929	97.50	229.92	3	
79	DOSS 12.5 KV	69	12.5	16.8	28	9,851	71,031	12.5	R,L	I	0.55929	86.53	348.96	3	
80	DOSS 22 KV	67	24.9	12	20	18,330	62,470	22	R,L	I	0.55929	161.01	306.90	2	
81	DRINKARD	115	13.2	12	22.4	11,190	38,840	13.2	R,L	I	0.55929	98.29	190.81	3	
82	DUMAS 19TH 12.5 KV	115	12.5	12	20	19,400	63,400	12.5	R,L	I	0.55929	170.41	311.47	3	
83	DUMAS 19TH 35 KV	115	34.5	12	20	20,700	51,675	33	R,L	I	0.55929	181.83	253.87	2	
84	DUVAL #3	67	4.2	5	7	10,526	32,485	4.16	R,L	I	0.55929	92.46	159.59	1	
85	EAST CLOVIS	118	13.2	16.8	28	8,768	67,351	12.5	R,L	I	0.55929	77.02	330.88	3	
86	EAST DENVER CITY	67	12.5	10	12.5	16,500	55,000	12.5	R,E	I	0.55929	144.94	270.20	3	
87	EAST LEVELLAND	69	13.2	12	22.4	9,400	42,300	12.5	R,E	I	0.55929	82.57	207.81	2	
88	EAST PLAINVIEW	68.8	13.09	15	16.8	19,370	71,767	12.5	R,L	I	0.55929	170.15	352.58	3	
89	EAST PLANT	115	13.2	15	28	11,415	59,261	13.2	R,L	I	0.55929	100.27	291.14	4	
90	EAST SANGER	115	12.5	12	20	19,859	64,143	12.5	R,L	I	0.55929	174.44	315.12	2	
91	ELWOOD	67	12.5	10	12.5	16,500	55,000	12.5	R,E	I	0.55929	144.94	270.20	1	
92	ESTACADO #1	115	13.2	15	28	11,680	52,670	13.2	R,L	I	0.55929	102.60	258.76	3	
93	ESTACADO #2	115	13.2	15	28	15,000	55,700	13.2	R,L	I	0.55929	131.76	273.64	3	
94	ETTER RURAL E.	115	34.5	12	20	23,520	49,700	33	R,L	E	0.55929	142.55	168.47	2	31
95	ETTER RURAL W	115	34.5	15	25	15,250	64,030	33	R,L	E	0.55929	92.43	217.05	1	31
96	EUNICE	115	13.2	15	25	11,750	52,460	12.5	R,L	I	0.55929	103.21	257.73	4	
97	EXELL	115	12.5	10	12.5	29,500	65,000	12.5	R,E	I	0.55929	259.13	319.33	2	
98	FAIN	115	12.5	7.5	9.375	11,480	45,380	12.5	R,L	I	0.55929	100.84	222.94	1	
99	FARMERS	115	13.2	15	25	18,239	65,335	13.2	R,L	I	0.55929	160.21	320.98	3	
100	FARWELL	67	2.4	2.5	2.5	6,334	19,792	2.4	R,E	I	0.55929	55.64	97.23	2	

Appendix I
Distribution Substation Transformer Loss

Line No.	1	Voltage High Side, kV 2	Low Side, kV 3	Ratings Nominal MVA 4	Max MVA 5	No Load Losses WATTS 6	Full Load Losses WATTS 7	Low Side Class 8	Verify Flag R,L,E 9	Exclude Flag 10	Primary Load Factor 11	No Load Losses MWH 12	Full Load Losses MWH 13	Number of Feeder Circuits 14	Percent Transf. Excluded 15
101	FIESTA	115	13.2	15	28	15,523	65,978	12.5	R,L	I	0.55929	136.35	324.14	3	
102	FLANNAGAN	69	13.2	11.2	14	10,800	37,984	12.5	R,L	E	0.55929	52.18	102.63	1	45
103	FRIONA RURAL	115	22.9	12	20	21,350	49,200	22	R,L	I	0.55929	187.54	241.71	2	
104	FRITCH	115	13.2	7.5	9.38	13,825	41,819	13.2	R,E	I	0.55929	121.44	205.45	2	
105	GARZA N	72	25	11.2	14	6,497	45,517	22	R,L	I	0.55929	57.07	223.62	1	
106	GARZA S	72	25	11.2	14	9,304	47,534	22	R,L	I	0.55929	81.73	233.53	1	
107	GOODPASTURE	69	12.5	2	2	6,300	18,000	12.5	R,E	I	0.55929	55.34	88.43	1	
108	GREYHOUND	118	13.2	17.5	29.5	1,170	67,500		R,L	I	0.55929	10.28	331.61	1	
109	HALE CENTER	67	12.5	5	5	10,000	35,000	12.5	R,E	I	0.55929	87.84	171.95	2	
110	HAPPY CITY	66	12.5	6	7	11,100	36,880	12.5	R,L	I	0.55929	97.50	181.18	2	
111	HART INDUSTRIAL	67	12.5	5	6.25	12,425	31,575	12.5	R,L	I	0.55929	109.14	155.12	2	
112	HASTINGS	67	13.2	15	25	27,190	77,050	13.2	R,L	I	0.55929	238.84	378.53	4	
113	HENDRICKS	66	22	10	13.33	16,500	50,000	22	R,L	I	0.55929	144.94	245.64	3	
114	HEREFORD	118	13.2	16.8	28	16,000	82,000	13.2	R,E	I	0.55929	140.54	402.85	2	
115	HERRING	115	34.5	12	20	25,140	51,450	33	R,L	I	0.55929	220.83	252.76	2	
116	HIGHLAND PARK	115	13.8	25	41.6	30,680	101,010	13.2	R,E	E	0.55929	134.75	248.12	2	50
117	HILLSIDE	118	13.2	16.8	28	8,807	67,624	13.2	R,L	I	0.55929	77.36	332.22	3	
118	HOBGOOD	69	4.2	0.23	0.23	1,096	3,150	4.16	R,E	I	0.55929	9.63	15.48	1	
119	HOPI	69	13.2	16.8	28	9,927	70,540	12.5	R,L	I	0.55929	87.20	346.55	3	
120	HOWARD	118	13.2	11.2	14	7,531	41,570	13.2	R,L	I	0.55929	66.15	204.23	2	
121	IMC #3 Strata	69	12.5	5	6.25	12,000	48,000	12.5	R,L	I	0.55929	105.41	235.81	2	
122	IMC #4	69	13.2	5	5	7,789	20,101	13.2	R,L	I	0.55929	68.42	98.75	0	
123	INDUSTRIAL	67	13.8	12	20	19,700	57,300	13.2	R,L	I	0.55929	173.04	281.50	3	
124	IRICK	66	12.5	6	7.26	11,450	36,845	12.5	R,L	I	0.55929	100.58	181.01	2	
125	JAL	115	13.8	12	20	18,800	63,000	12.5	R,L	I	0.55929	165.14	309.51	3	
126	JAYBEE	69	12.5	2.5	3.125	4,608	13,940	12.5	R,E	I	0.55929	40.48	68.48	1	
127	KINGSMILL	69	13.2	16.8	28	16,300	67,300	13.2	R,L	I	0.55929	143.18	330.63	5	
128	KINNEY	69	2.4	1	1.5	3,800	11,875	2.4	R,E	I	0.55929	33.38	58.34	0	
129	KISER	118	13.2	16.8	28	16,000	82,000	12.5	R,L	I	0.55929	140.54	402.85	2	
130	KITE	67	13.2	12	20	17,800	55,630	13.2	R,L	I	0.55929	156.36	273.30	3	
131	KRESS RURAL	69	12.5	6	6	10,515	10,922	12.5	R,L	I	0.55929	92.36	53.66	3	
132	LAKE MEREDITH	118	13.2	11.2	14	8,004	40,923	13.2	R,L	I	0.55929	70.31	201.05	3	
133	LARIAT	67	12.5	7.5	9.375	10,895	43,006	12.5	R,E	I	0.55929	95.70	211.28	1	
134	LAWRENCE PK E #1	67	13.8	15	25	23,899	60,360	13.2	R,L	I	0.55929	209.93	296.54	3	
135	LAWRENCE PK W #2	67	13.8	15	25	24,200	71,126	13.2	R,L	I	0.55929	212.57	349.43	3	
136	LEA NATIONAL	115	13.2	11.2	14	7,806	43,297	13.2	R,L	I	0.55929	68.57	212.71	2	
137	LEA ROAD	115	12.5	10	12.5	17,615	56,447	12.5	R,L	E	0.55929	49.51	88.74	2	68
138	LEHMAN	115	12.5	12	20	19,400	63,000	12.5	R,L	I	0.55929	170.41	309.51	2	
139	LEVELLAND (EAST XFMR)	66	2.4	1.5	1.5	3,800	11,875	2.4	R,E	I	0.55929	33.38	58.34	2	
140	LEVELLAND CITY	69	13.2	12	22.4	9,800	49,600	12.5	R,L	I	0.55929	86.08	243.67	2	
141	LIPSCOMB 12.5 KV	118	13.2	5.6	7	2,161	6,482	13.2	R,L	I	0.55929	18.98	31.84	2	
142	LIPSCOMB 35 KV	118	36.2	16.8	28	13,516	62,374	33	R,L	I	0.55929	118.72	306.43	1	
143	LITTLEFIELD CITY	67	4.2	5	6.25	10,000	30,000	4.16	R,E	I	0.55929	87.84	147.38	4	
144	LITTLEFIELD SOUTH	67	12.5	7.5	9.375	10,000	35,000	12.5	R,E	I	0.55929	87.84	171.95	2	
145	LIVINGSTON RIDGE	69	13.2	11.2	14	6,396	44,866	12.5	R,L	I	0.55929	56.18	220.42	3	
146	LOCKNEY RURAL	69	12.5	2.5	2.5	4,608	13,940	12.5	R,E	I	0.55929	40.48	68.48	2	
147	LOCKNEY RURAL 23	69	22.86	10	10	12,004	35,123	22	R,L	I	0.55929	105.44	172.55	2	
148	LYNN	69	22.9	10	10	12,233	37,682	22	R,L	I	0.55929	107.45	185.12	3	
149	LYONS	67	13.8	12	20	21,550	52,560	13.2	R,L	I	0.55929	189.30	258.22	2	
150	MALJAMAR	115	12.5	10	12.5	17,450	58,016	12.5	R,L	E	0.55929	65.91	122.56	0	57
151	MALJAMAR #2	115	4.2	7	12.4	6,316	29,319	4.16	R,L	I	0.55929	55.48	144.04	0	
152	MALLET	67	13.8	5	5	10,641	39,077	12.5	R,L	I	0.55929	93.47	191.98	2	
153	MANHATTAN	115	13.8	15	25	24,640	63,513	13.2	R,L	I	0.55929	216.44	312.03	3	
154	McCLELLAN (GROOM PUMP STATION)	115	13.2	5	5	9,216	27,879	13.2	R,E	I	0.55929	80.96	136.97	1	
155	MCCULLOGH	67	13.2	15	25	23,044	65,351	13.2	R,L	I	0.55929	202.42	321.06	3	
156	MCLEAN RURAL	115	13.2	7.5	9.375	17,700	58,000	13.2	R,L	E	0.55929	66.86	122.53	2	57
157	MID AM #3 -in Swisher area	67	2.4	5	5.6	14,150	42,000	2.4	R,E	I	0.55929	124.29	206.34	0	
158	MID-AM #2	67	2.4	3.75	3.75	8,800	23,950	2.4	R,L	I	0.55929	77.30	117.66	0	
159	MIDDLETON	67	12.5	10	12.5	14,400	54,818	12.5	R,L	I	0.55929	126.49	269.31	2	
160	MILLEN	115	12.5	12	20	19,889	63,525	12.5	R,L	I	0.55929	174.70	312.09	3	
161	MISS CHEM #2	67	12.5	3.75	4.69	7,851	27,329	12.5	R,E	I	0.55929	68.96	134.26	0	
162	MONROE	66	22	10	13.3	20,680	47,900	22	R,E	I	0.55929	181.65	235.32	1	
163	MONUMENT	118	13.2	16.8	28	10,781	65,108	12.5	R,L	I	0.55929	94.70	319.86	3	
164	MOORE CO	115	13.2	15	28	12,650	52,720	13.2	R,L	I	0.55929	111.12	259.00	3	
165	MORTON	67	2.4	5	6.25	10,526	32,485	2.4	R,E	I	0.55929	92.46	159.59	2	
166	MOSS	67	24.9	10	10	17,985	47,480	22	R,L	I	0.55929	157.98	233.26	2	
167	MULESHOE CITY	67	2.4	3.75	3.75	9,501	29,687	2.4	R,E	I	0.55929	83.45	145.85	2	
168	MULESHOE VALLEY	118	13.2	11.2	14	11,250	54,950	12.5	R,L	I	0.55929	98.82	269.96	1	
169	MULESHOE WATERIELD @ Bailey Co	66	12.5	1.5	1.5	2,765	8,364	12.5	R,L	I	0.55929	24.29	41.09	1	
170	MURPHY	115	22.86	20	33	12,592	58,368	22	R,E	I	0.55929	110.61	286.75	3	
171	N CLOVIS	118	13.2	16.8	28	11,544	61,309	13.2	R,L	I	0.55929	101.40	301.20	2	
172	N E HOBBS	115	13.2	15	28	11,232	59,268	12.5	R,L	I	0.55929	98.66	291.17	4	
173	N HOBBS #1	115	12.5	12	20	21,320	41,510	12.5	R,E	I	0.55929	187.27	203.93	3	
174	N HOBBS #2	115	12.5	12	20	20,830	57,290	12.5	R,L	I	0.55929	182.97	281.45	2	
175	N PLAINVIEW	67	12.5	10	10	16,500	55,000	12.5	R,E	I	0.55929	144.94	270.20	2	
176	NAVAJO MALAGA	66	4.16	3	3	6,316	19,491	4.16	R,E	I	0.55929	55.48	95.75	0	
177	NM POTASH	69	13.8	7.5	10.5	16,680	44,960	12.5	R,E	I	0.55929	146.52	220.88	0	
178	NORRIS ST	115	13.2	12	20	13,396	37,753	12.5	R,L	I	0.55929	117.67	185.47	2	
179	NORTH CANAL	115	13.2	15	25	15,291	56,220	12.5	R,L	I	0.55929	134.32	276.20	3	
180	NORTH LOVING	118	13.2	16.8	28	11,300	66,100	12.5	R,L	I	0.55929	99.26	324.74	2	
181	OCHOA	118	13.2	16.8	28	10,000	69,000	12.5	R,L	I	0.55929	87.84	338.98	2	
182	OCOTILLO	118	13.2	16.8	28	9,851	64,252	12.5	R,L	I	0.55929	86.53	315.66	3	
183	OLTON	67	12.5	7.5	7.5	13,825	41,819	12.5	R,E	I	0.55929	121.44	205.45	2	
184	OSAGE	118	13.2	16.8	28	11,789	60,542	12.5	R,L	I	0.55929	103.55	297.43	4	
185	OZARK MAHONING #2	67	2.4	5	5.6	9,501	29,687	2.4	R,L	E	0.55929	0.00	0.00	0	100
186	PACIFIC	115	12.5	12	20	19,300	65,500	12.5	R,L	E	0.55929	108.50	205.94	2	36
187	PALO DURO	115	13.2	7.5	10.5	8,520	23,570	13.2	R,L	I	0.55929	74.84	115.79	1	
188	PARMER CO	115	22	7.5	7.5	17,800	40,490	22	R,E	I	0.55929	156.36	198.92	2	
189	PCA #2	67	13.2	16	22.4	13,825	95,121	13.2	R,L	I	0.55929	121.44	467.31	2	
190	PEARL	115	12.5	5	6.25	9,216	27,879	12.5	R,E	I	0.55929	80.96	136.97	3	
191	PERIMETER	118	13.2	16.8	28	10,330	65,333	13.2	R,L	E	0.55929	0.00	0.00	0	100
192	PERRYTON N	115	12.5	7.5	11.72	9,800	36,700	12.5	R,L	I	0.55929	86.08	180.30	2	
193	PERRYTON S	115	12.5	7.5	10.5	15,500	58,000	12.5	R,L	I	0.55929	136.15	284.94	2	
194	PHILLIP PUMP	69	2.4	2.5	2.8	5,109	21,081	2.4	R,L	I	0.55929	44.88	103.57	0	
195	PHILLIPS PUMP 2	69	2.4	2.5	2.8	4,837	21,307	2.4	R,L	I	0.55929	42.49	104.68	0	
196	PIERCE	115	13.8	15	25	23,053	68,991	13.2	R,L	I	0.55929	202.50	338.94	3	
197	PLAINVIEW CITY E Transformer	65	2.4	7.5	7.5	9,501	29,687	2.4	R,E	I	0.55929	83.45	145.85	2	
198	PLAINVIEW CITY W Transformer	66	2.4	3.75	3.75	9,501	29,687	2.4	R,E	I	0.55929	83.45	145.85	2	
199	PLANT X RURAL	115	12.5	5	5	11,720	28,660	12.5	R,L	I	0.55929	102.95	140.80	2	
200	PORTALES #1	67	4.2	7.5	9.375	12,000	48,000	4.16	R,E	I	0.55929	105.41	235.81	3	

Appendix I
Distribution Substation Transformer Loss

Line No.	1	Voltage High Side, kV 2	Low Side, kV 3	Ratings Nominal MVA 4	Max MVA 5	No Load Losses WATTS 6	Full Load Losses WATTS 7	Low Side Class 8	Verify Flag R,L,E 9	Exclude Flag 10	Primary Load Factor 11	No Load Losses MWH 12	Full Load Losses MWH 13	Number of Feeder Circuits 14	Percent Transf. Excluded 15
201	PORTALES #2 A	67	12.47	10	14	6,316	19,491	4.16	R,L	I	0.55929	55.48	95.75	1	
202	PORTALES #2 B	67	4.2	5	5	8,777	40,107	4.16	R,L	I	0.55929	77.10	197.04	2	
203	PORTALES SOUTH	67	4.16	7.5	9.375	12,000	44,565	4.16	R,L	I	0.55929	105.41	218.94	2	
204	PORTALES WATER FIELD	115	12.5	10	14	11,700	33,600	13.2	R,L	I	0.55929	102.77	165.07	2	
205	POST CITY (Garza #3)	67	4.2	5	5	10,304	34,922	4.16	R,L	I	0.55929	90.51	171.56	2	
206	POTASH JUNCTION	67	12.5	10	12.5	14,470	58,190	12.5	R,L	I	0.55929	127.10	285.88	1	
207	PRENTICE W	115	13.2	15	28	12,281	52,074	13.2	R,L	E	0.55929	7.55	17.91	1	93
208	PRICE	118	13.2	17.5	29.5	11,700	67,500	12.5	R,L	I	0.55929	102.77	331.61	3	
209	PRINGLE INT	115	34.5	16.8	28	13,106	68,952	33	R,L	I	0.55929	115.12	338.75	1	
210	PUCKETT WEST	115	13.2	15	25	15,460	58,647	13.2	R,L	I	0.55929	135.80	288.12	3	
211	PULLMAN	115	13.2	15	25	11,990	52,620	13.2	R,L	I	0.55929	105.32	258.51	3	
212	RIAC EAST	67	4.2	5	5.25	10,526	32,485	4.16	R,L	I	0.55929	92.46	159.59	3	
213	RIAC WEST	69	4.2	7.5	9.375	11,800	44,605	4.16	R,L	I	0.55929	103.65	219.14	2	
214	RILEY	67	12.5	3.75	5	6,912	20,909	12.5	R,E	I	0.55929	60.72	102.72	2	
215	RIVERVIEW	115	13.2	15	25	16,074	56,237	13.2	R,L	I	0.55929	141.19	276.28	3	
216	ROBERTS CO	67	4.16	5	6.25	6,851	19,040	13.2	R,E	I	0.55929	60.18	93.54	2	
217	ROSWELL CITY N	115	12.5	15	25	17,636	65,206	12.5	R,E	I	0.55929	154.91	320.34	2	
218	ROSWELL CITY S	115	12.5	15	25	17,600	65,000	12.5	R,E	I	0.55929	154.60	319.33	2	
219	ROXANA	69	13.8	10	14	10,742	23,613	13.2	R,E	I	0.55929	94.36	116.01	2	
220	RUSSELL SUB E TRANSFORMER	115	12.5	12	20	20,200	63,100	12.5	R,L	E	0.55929	63.88	111.60	1	64
221	RUSSELL SUB W TRANSFORMER	115	13.2	15	28	12,369	51,686	13.2	R,L	E	0.55929	39.11	91.41	2	64
222	S FLOYDADA	66	22	5	5	10,100	32,392	22	R,L	I	0.55929	88.72	159.14	2	
223	S HOBBS E	115	13.2	12	20	14,677	40,275	12.5	R,L	I	0.55929	128.92	197.86	2	
224	S HOBBS W	115	12.5	12	20	18,500	57,000	12.5	R,L	E	0.55929	35.75	61.61	2	78
225	S PLAINVIEW	67	12.5	10	14	16,500	55,000	12.5	R,E	I	0.55929	144.94	270.20	3	
226	SAGE BRUSH	115	22.86	30	50	20,600	91,000	22	R,L	I	0.55929	180.95	447.06	3	
227	SAMSON	115	13.2	12	20	18,820	46,500	12.5	R,L	I	0.55929	165.31	228.45	2	
228	SAND DUNES	67	12.5	7.5	8.4	9,500	30,000	12.5	R,L	I	0.55929	83.45	147.38	3	
229	SEMINOLE INTG	115	22.86	16.8	28	12,592	58,368	22	R,L	I	0.55929	110.61	286.75	2	
230	SHAMROCK PUMP	66	2.4	1	1	2,534	7,917	2.4	R,E	I	0.55929	22.25	38.89	0	
231	SHELL C3	115	4.16	10	14	12,852	31,876	4.16	R,L	E	0.55929	80.15	111.19	0	29
232	SHERMAN CO	115	34.5	12	12	27,100	53,900	33	R,L	I	0.55929	238.05	264.80	3	
233	SLATON	69	22.9	10	10	13,067	35,044	22	R,L	I	0.55929	114.78	172.16	2	
234	SLATON CITY	67	4.2	3.75	3.75	7,894	24,364	4.16	R,E	I	0.55929	69.34	119.69	2	
235	SLAUGHTER	67	2.4	3.75	4.2	6,960	22,330	2.4	R,L	I	0.55929	61.14	109.70	1	
236	SMITH	67	4.2	3.75	3.75	7,894	24,364	4.16	R,E	I	0.55929	69.34	119.69	2	
237	SONCY	67	13.8	20	20	24,981	94,630	13.2	R,L	I	0.55929	219.43	464.90	4	
238	SOUTH GEORGIA EAST	115	13.8	15	25	21,120	56,040	13.2	R,L	I	0.55929	185.52	275.31	3	
239	SOUTH GEORGIA WEST	118	13.2	16.8	28	9,052	75,940	13.2	R,L	I	0.55929	79.51	373.08	3	
240	SOUTH LOVING	69	13.2	11.2	17.5	7,835	43,091	13.2	R,L	I	0.55929	68.82	211.70	3	
241	SOUTHEAST	115	13.2	15	25	18,480	50,440	13.2	R,L	I	0.55929	162.33	247.80	2	
242	SOUTHLAND	69	2.4	1.5	1.5	3,158	9,745	2.4	R,E	I	0.55929	27.74	47.88	1	
243	SPEARMAN INTERCHANGE	67	34.4	10	10	14,320	61,030	33	R,L	I	0.55929	125.79	299.83	1	
244	SPEARMAN SUB EAST XFMR	115	4.16	7.5	10.5	12,416	40,872	4.16	R,L	I	0.55929	109.06	200.80	2	
245	SPEARMAN SUB WEST XFMR	115	4.16	7.5	10.5	13,440	41,855	4.16	R,L	I	0.55929	118.06	205.63	2	
246	SPRING DRAW	118	13.2	16.8	28	11,713	67,783	13.2	R,L	I	0.55929	102.89	333.00	3	
247	SPRINGCREEK	67	13.2	7.5	9.375	15,760	41,150	13.2	R,E	I	0.55929	138.44	202.16	2	
248	SPRINGLAKE	67	13.2	7.5	7.5	11,060	52,193	13.2	R,L	I	0.55929	97.15	256.41	2	
249	SUDAN RURAL	66	12.5	2.5	2.5	4,608	13,940	12.5	R,E	I	0.55929	40.48	68.48	2	
250	SUNSET T1	115	13.2	15	28	15,300	46,900	13.2	R,L	I	0.55929	134.40	230.41	3	
251	SUNSET T2	118	13.2	16.8	28	14,300	63,300	13.2	R,L	I	0.55929	125.61	310.98	2	
252	TEAGUE	115	12.5	10	14	13,610	30,300	12.5	R,E	I	0.55929	119.55	148.86	2	
253	TENNECO	69	13.2	15	25	11,170	57,590	13.2	R,L	I	0.55929	98.12	282.93	1	
254	TEXACO	67	12.5	12	20	20,146	52,610	12.5	R,L	E	0.55929	21.24	31.02	2	88
255	TEXAS FARMS	115	13.2	7.5	9.375	7,670	23,270	13.2	R,L	I	0.55929	67.37	114.32	1	
256	TMC	67	4.2	10	12.5	15,600	54,420	4.16	R,L	I	0.55929	137.03	267.35	0	
257	TOKIO	67	12.5	5	6.25	9,216	27,879	12.5	R,E	I	0.55929	80.96	136.97	1	
258	TRANSPETCO	67	4.2	7.5	7.5	11,657	37,611	4.16	R,L	I	0.55929	102.40	184.78	2	
259	TUCO	67	12.5	10	13.3	16,050	58,110	12.5	R,L	I	0.55929	140.98	285.48	2	
260	TWEEDY	115	13.2	12	20	10,260	33,790	13.2	R,L	E	0.55929	19.83	36.52	2	78
261	UNITED SALT	69	12.4	0.75	0.75	1,382	4,182	12.5	R,E	I	0.55929	12.14	20.54	1	
262	URTON	115	12.5	12	12	21,940	63,559	12.5	R,L	I	0.55929	192.72	312.25	2	
263	VAN BUREN #1	67	13.2	15	25	29,725	70,460	13.2	R,L	I	0.55929	261.10	346.16	3	
264	VAN BUREN #2	67	13.8	15	25	23,760	62,700	13.2	R,L	I	0.55929	208.71	308.03	3	
265	VEGA	69	13.2	11.2	14	10,575	43,151	13.2	R,L	I	0.55929	92.89	211.99	2	
266	VICKERS	69	23.9	10	14	23,600	50,236	22	R,L	I	0.55929	207.30	246.80	1	
267	W ANTON	66	22	6	6	11,394	30,261	22	R,E	I	0.55929	100.09	148.67	1	
268	W BENDER	115	13.2	12	22.4	11,190	38,840	13.2	R,L	I	0.55929	98.29	190.81	2	
269	W BORGER	115	13.2	15	25	14,838	55,493	13.2	R,L	I	0.55929	130.34	272.63	3	
270	W CLOVIS 13.2 KV	115	13.2	15	25	12,160	55,680	13.2	R,L	I	0.55929	106.81	273.54	2	
271	W CLOVIS 23 KV	67	24	12	22.4	10,800	47,800	22	R,L	I	0.55929	94.87	234.83	1	
272	W LITTLEFIELD	69	12.5	1.5	1.5	2,765	8,364	12.5	R,E	I	0.55929	24.29	41.09	1	
273	W MULESHOE	69	13.2	11.2	1400	9,800	66,850	12.5	R,L	I	0.55929	86.08	328.42	2	
274	W PLAINVIEW	67	12.5	12.5	20	16,500	55,000	12.5	R,E	I	0.55929	144.94	270.20	4	
275	WADE	118	13.2	5.6	7	2,088	6,265	12.5	R,E	I	0.55929	18.34	30.78	1	
276	WARD	115	12.5	4	4	13,610	30,300	12.5	R,L	I	0.55929	119.55	148.86	1	
277	WASSON	67	2.4	2	2	5,160	15,661	2.4	R,L	I	0.55929	45.33	76.94	0	
278	WATERFIELD	67	13.8	10	12.5	13,670	68,760	13.2	R,L	I	0.55929	120.08	337.80	3	
279	WEATHERLY	67	13.8	10	11.2	15,760	41,150	13.2	R,E	I	0.55929	138.44	202.16	2	
280	WELLMAN	67	12.5	5	6.25	5,000	15,000	12.5	R,E	I	0.55929	43.92	73.69	1	
281	WESTRIDGE	69	13.2	12	20	9,020	45,460	13.2	R,L	I	0.55929	79.23	223.34	2	
282	WHERRY HOUSING	67	12.5	3	3.65	5,530	16,728	12.5	R,E	I	0.55929	48.57	82.18	2	
283	WHITAKER	115	13.8	15	25	22,520	72,200	13.2	R,L	I	0.55929	197.82	354.70	3	
284	WHITE CITY	67	12.5	2.5	2.5	4,608	13,940	12.5	R,E	I	0.55929	40.48	68.48	2	
285	WHITEFACE	67	12.5	10	10	14,695	57,235	12.5	R,L	I	0.55929	129.08	281.18	2	
286	WHITEHEAD AMOCO	67	2.4	3.75	4.69	7,120	27,771	2.4	R,E	I	0.55929	62.54	136.43	1	
287	WHITHARRAL	67	4.16	2.5	3.125	6,560	16,503	4.16	R,L	I	0.55929	57.62	81.08	1	
288	WHITTEN	115	12.5	10	12.5	21,360	64,570	12.5	R,L	I	0.55929	187.63	317.22	2	
289	WILDORADO	67	12.5	10	10	15,984	59,797	13.2	R,L	I	0.55929	140.40	293.77	2	
290	WILLS OIL	67	12.5	1.5	1.5	2,730	7,800	12.5	R,E	I	0.55929	23.98	38.32	1	
291	WOOD DRAW	118	13.2	16.8	28	8,989	67,373	13.2	R,L	I	0.55929	78.96	330.99	3	
292	YANCY	67	4.16	2	2	5,160	15,536	4.16	R,L	I	0.55929	45.33	76.33	0	
293	YELLOW HOUSE	66	12.5	3.75	5	10,992	32,937	12.5	R,E	I	0.55929	96.55	161.81	1	
294	ZAVALLA	67	12.5	10	12.5	18,680	51,100	12.5	R,L	I	0.55929	164.09	251.04	2	
295	ZIA	115	13.2	10	14	22,080	39,216	12.5	R,E	I	0.55929	193.95	192.66	1	
296	ZODIAC	67	4.16	10	11.2	19,282	64,592	4.16	R,L	I	0.55929	169.37	317.33	2	
297															
298						**No Load Losses MW**	**Full Load Losses MW**	**Total Losses MW**				**No Load Losses MWH**	**Load Losses MWH**	**Total Losses MWH**	
299															
300															
301															
302	**Total nominal ratings**			**3,043.580**	**MVA**	**3.65**	**12.87**	**16.52**				**32,101**	**63,229**	**95,330**	
303	**Sum of demands at Primary and below from "H"**			**2,253.641**	**MW**										
304	**System at peak Hr Primary Generation**			**47.291**	**MW**										
305	**Sum of demands adjusted for Primary Generation**			**2,206.351**	**MW**										
306															
307	**Hours in Period**			**8784**											
308															

Appendix I
Distribution Substation Transformer Loss

Line No.	1	Voltage High Side, kV 2	Low Side, kV 3	Ratings Nominal MVA 4	Max MVA 5	No Load Losses WATTS 6	Full Load Losses WATTS 7	Low Side Class 8	Verify Flag R,L,E 9	Exclude Flag 10	Primary Load Factor 11	No Load Losses MWH 12	Full Load Losses MWH 13	Number of Feeder Circuits 14	Percent Transf. Excluded 15
309															
310															
311															
312	**Summary Information**														
313	**KV Level**	**33**	**22**	**13.2**	**12.5**	**4.16**	**2.4**	**Total**							
314	Total Nominal MVA by Voltage	153.30	327.00	1,151.70	1,091.75	218.48	83.85	3,026.08		MVA					
315	Load by Voltage	111.77	238.42	839.72	796.01	159.30	61.14	2,206.35		MW Load					
316	Load on transformers without feeders	0.00	0.00	23.69	8.33	54.98	17.29	104.29		MW Load At the transformer					
317	Total Feeders	19.00	50.00	205.00	224.00	47.00	28.00	573.00		Number of Feeders					
318	**Feeders excluding partial feeders**	**18.07**	**50.00**	**196.09**	**212.94**	**47.00**	**28.00**	**552.10**		All feeders less % of transformer not included					
319	**Load on Feeders**	**111.77**	**238.42**	**816.02**	**787.68**	**104.32**	**43.85**	**2,102.06**		MW Load on feeders					

Appendix J
Distribution Primary Loss

Line No.					
	Demand at Primary Level				
1	Level 4 - Primary Distribution	450,871	Kw	498,161	Demand at Level 4 from App. H
2	Level 5 - Sec. Distribution Transformers	640,746	Kw	47,291	Subtract Dist Connected Gen at Pk Hour
3	Level 6 - Sec. Distribution Lines	1,114,734	Kw	450,871	Injected into Level 4 from Level 3
4	**Total Demand**	**2,206,351**	**Kw**		
5					
6					
7	**Energy at Primary Level**				
8	Level 4 - Primary Distribution	3,265,508,888	Kwh	3,704,794,414	Energy at Level 4 from App. H
9	Level 5 - Sec. Distribution Transformers	3,205,486,688	Kwh	439,285,526	Subtract Dist Connected Gen
10	Level 6 - Sec. Distribution Lines	4,161,409,160	Kwh	3,265,508,888	Injected into Level 4 from Level 3
11	**Total Energy**	**10,632,404,736**	**Kwh**		

Demand Losses

Low Side Voltage	Load MW	No. of Feeders	@ CP MW Per Feeder	Current Amps	Typical Conductor	Ohms/Mile	Avg. Feeder Length, Miles	Resistance, Ohms	Power Loss per Feeder, Watts	Total Feeder Loss, KW
33.00	111.8	18.07	6.19	108.22	1/0	1.12	21.17	23.71	833,093.97	15,054.01
22.00	238.4	50.00	4.77	125.14	1/0	1.12	14.76	16.53	776,658.07	38,832.90
13.20	816.0	196.09	4.16	182.02	336	0.306	10.69	3.27	325,140.48	63,756.80
12.50	787.7	212.94	3.70	170.86	336	0.306	8.28	2.53	221,891.15	47,249.50
4.16	104.3	47.00	2.22	308.05	336	0.306	3.84	1.18	334,507.80	15,721.87
2.40	43.8	28.00	1.57	376.72	4/0	0.592	3.45	2.04	869,548.95	24,347.37
	2102.1	552.10							**3,360,840.42**	**204,962.45**

Total Primary Loss(MW) **204.96**

Energy Losses

Total Sales	10,632,404,736	KWH
Load Factor - Based on Total Primary Demand and Energy Above	0.5486	
Loss Factor	0.3753	
Primary Energy Losses	**675,624**	**MWH**

Appendix K
Distribution Line Transformer Loss

Demand Losses

Commercial customers may come only off the transformer or larger service drops.

			Adjusted Meters			
Residential	301,809	meters	331,812	97,184	trans.	3.41427 mtr/trans.
Commercial	79,198	meters	49,195	45,116	trans.	1.09041 mtr/trans.
3 Ph Commercial	49,195	meters				

Residential and small commercial	1,114,734	KW	4,161,409,160	KWH (Level 6)
Commercial Load	640,746	KW	3,205,486,688	KWH (Level 5)
Total Load	**1,755,480**	**KW**	**7,366,895,848**	**KWH**

Load/Residential Customer	3.36	KW	Load/transformer	11.47 KW
Load/Commercial Customer	13.02	KW	Load/transformer	14.20 KW

Typical Transformer Losses	76	NL watts	323	FL watts	25	KVA Transformer
	207	NL watts	892	FL watts	100	KVA Transformer

Residential Transformer Losses(Watts)	189.33	
Commercial Transformer Losses(Watts)	304.28	

	Residential	Commercial
No Load Losses(KW)	7,385.98	9,339.01
Load Losses(KW)	18,399.57	13,728.12
Total Losses(KW)	25,785.55	23,067.13
Total Line Transformer Losses (KW)		**48,853**

Energy Losses

Total Sales	7,366,895,848	KWH
Load Factor - Based on Total Secondary Demand and Energy Above	0.4777	
Loss Factor	0.3031	
Total Dist. Line Transformer Losses	**130,063**	**MWH**

Appendix L
Secondary and Service Loss

Secondary Demand Losses

Line No.				
	Demand Served at Secondary Level			
1	Level 5 - Sec. Distribution Transformers	640,746	KW	
2	Level 6 - Sec. Distribution Lines	1,114,734	KW	
3	**Total Demand**	**1,755,480**	**KW**	
4				
5	**Energy Served at Secondary Level**			
6	Level 5 - Sec. Distribution Transformers	3,205,486,688	KWH	
7	Level 6 - Sec. Distribution Lines	4,161,409,160	KWH	
8	**Total Energy**	**7,366,895,848**	**KWH**	
9				
10				
11	Secondary Conductor - 60 ' of 1/0 Conductor			
12				
13	Resistance 0.0127 ohms			
14				
15	Load /Residential Customer	3.36	KW	(From Appendix K)
16				
17	Load /Commercial Customer	13.02	KW	(From Appendix K)
18				
19				
20	Losses for secondary run	14.00	amps	4.98 watts loss
21				
22				
23	Number of Residential Customers Served at Secondary			234,628 Customers
24	Assumes that 1 meter was served at transformer			
25				
26	**Total Secondary Loss**			**1,168 KW**
27				
28				
29				
30				
31				

Service Demand Loss

32				
33				
34	Resistance Values			
35				
36	Residential Service	0.02028	ohms	
37	65' of #2 Triplex			
38				
39	Commercial Service	0.00636	ohms	
40	30' of #1/0 Quad			
41				
42	Residential	331,812	meters	14.00 amps/mtr
43				
44	Commercial	49,195	meters	31.33 amps/mtr
45				
46				
47	Residential Loss/Meter	7.95	watts	2,637 kw
48				
49	Commercial Loss/meter	18.73	watts	922 kw
50				
51				
52	**Total Service Losses**			**3,559 kw**
53				
54				

Secondary and Service Energy Losses

55			
56			
57			
58	**Total Sales**	7,366,895,848	KWH
59			
60	Load Factor - Based on Total Secondary	0.4777	
61	Demand and Energy Above		
62	Loss Factor	0.3031	
63			
64	**Total Secondary and Service Demand Loss**	**4,726**	**KW**
65			
66	**Total Secondary and Service Energy Loss**	**12,583**	**MWH**

SOUTHWESTERN PUBLIC SERVICE COMPANY
SUMMARY OF LOSS EVALUATION

JAN - DEC 2016

Line No.	System Component	Demand MW	Energy MWH	Adjusted Energy MWH	Percent of Total Losses: Demand Percent	Percent of Total Losses: Energy Percent	Factored KWH	Loss Level	Demand Total Loss KW	Energy Total Loss kWh
13	Transmission Lines							**1**	**0.00**	**0**
14	345 kV	8.26	81,914	80,473	1.88	4.20	80,472,979			
15	230 kV	47.35	364,668	358,252	10.77	18.71	358,252,268	**2**	**138.79**	**913,763,470**
16	115 kV	66.32	357,874	351,579	15.09	18.36	351,578,600			
17	69 kV	19.19	61,909	60,820	4.37	3.18	60,820,099	**3**	**25.61**	**103,252,764**
19	Corona and Insulator Loss							**4**	**221.49**	**757,391,388**
20	345 kV	2.12	18,634	18,307	0.48	0.96	18,306,549			
21	230 kV	2.21	19,382	19,041	0.50	0.99	19,040,983	**5**	**48.85**	**127,775,281**
22	115 kV	1.27	11,116	10,921	0.29	0.57	10,920,881			
23	69 kV	0.30	2,678	2,631	0.07	0.14	2,630,895	**6**	**4.73**	**12,361,948**
25	Autotransformers - Load								**439.46**	**1,914,544,850**
26	345/230 kV	0.80	6,651	6,534	0.18	0.34	6,533,694			
27	230/115 kV	7.40	43,241	42,480	1.68	2.22	42,480,219			
28	115/69 kV	4.36	23,239	22,830	0.99	1.19	22,830,107			
30	Autotransformers - No Load									
31	345/230 kV	0.52	4,741	4,658	0.12	0.24	4,657,903			
32	230/115 kV	2.54	21,905	21,519	0.58	1.12	21,519,395			
33	115/69 kV	1.76	17,276	16,972	0.40	0.89	16,971,664			
35	Distribution Sub. Transformers	16.52	95,330	93,653	3.76	4.89	93,653,226			
37	Distribution									
38	Primary	204.96	675,624	663,738	46.64	34.67	663,738,161			
39	Line Transformers	48.85	130,063	127,775	11.12	6.67	127,775,281			
40	Secondary & Services	4.73	12,583	12,362	1.08	0.65	12,361,948			
42	Total Determined Losses	439.46	1,948,829							
43	Undeterminable Losses		-34,284							
44	Total Losses		1,914,545	1,914,545			1,914,544,850			
	Check Total		1,948,829							

Appendix N

Powerflow Study Loss Results

Appendix N
Powerflow Study Loss Results

```
Case Name: 2016MDWGFinal-16S_7_6003_edited.sav

Case Title 1: "2016 MDWG FINAL WITH 2015 SERIES MMWG FINAL"
Case Title 2: "MDWG 2016S WITH MMWG 2016S"

Bus Range:  522800 - 528799


* * * * * * * * * * L O S S E S   B Y   E L E M E N T   C L A S S * * * * * * * * * *

----------------------------- AUTOTRANSFORMER LOSSES (MW) ------------------------------

[ 345/230 kV ] [ 345/115 kV ] [ 230/115 kV ] [ 230/69 kV ] [ 115/69 kV ] [   TOTAL   ]
 0.80394         0.0            7.399254      0.0           4.360944      12.56414


-------------------- TRANSMISSION LINE LOSSES (MW) ---------------------

[   345 kV   ] [   230 kV   ] [   115 kV   ][   69 kV   ]  [   TOTAL   ]
 8.262287        47.34864       66.32214      19.1898        141.1229


------------------------ CASE TOTALS -------------------------

TOTAL AREA LOSSES:  153.687MW

TOTAL 345kV LINES:  10           TOTAL 345/230kV TRANSFORMERS:  7
TOTAL 230kV LINES:  79           TOTAL 345/115kV TRANSFORMERS:  0
TOTAL 115kV LINES:  391          TOTAL 230/115kV TRANSFORMERS:  53
TOTAL  69kV LINES:  288           TOTAL 230/69kV TRANSFORMERS:  0
                                  TOTAL 115/69kV TRANSFORMERS:  86
```

```
Case Name: 2016MDWGFinal-16G_6_Jan-Feb_3379_edited_07172017.sav

Case Title 1: "2016 MDWG FINAL WITH 2015 SERIES MMWG FINAL"
Case Title 2: "MDWG 2016G WITH MMWG 2016L"

Bus Range:  522800 - 528799


* * * * * * * * * * L O S S E S  B Y  E L E M E N T  C L A S S * * * * * * * * * *

------------------------------ AUTOTRANSFORMER LOSSES (MW) ------------------------------

[ 345/230 kV ] [ 345/115 kV ] [ 230/115 kV ] [ 230/69 kV ] [ 115/69 kV ] [   TOTAL   ]
 0.673998        0.0            4.880167      0.0           2.564221      8.118386


-------------------- TRANSMISSION LINE LOSSES (MW) ---------------------

[   345 kV   ] [   230 kV   ] [   115 kV   ][   69 kV   ]  [   TOTAL   ]
 8.959543        27.26439       29.51939      6.117981       71.86131


------------------------ CASE TOTALS -------------------------

TOTAL AREA LOSSES:  79.97969MW

TOTAL 345kV LINES:  10           TOTAL 345/230kV TRANSFORMERS:  7
TOTAL 230kV LINES:  79           TOTAL 345/115kV TRANSFORMERS:  0
TOTAL 115kV LINES:  387          TOTAL 230/115kV TRANSFORMERS:  53
TOTAL  69kV LINES:  289           TOTAL 230/69kV TRANSFORMERS:  0
                                  TOTAL 115/69kV TRANSFORMERS:  86
```

Appendix N
Powerflow Study Loss Results

```
Case Name: 2016MDWGFinal-16G_6_Mar-May_3323_edited_07172017.sav

Case Title 1: "2016 MDWG FINAL WITH 2015 SERIES MMWG FINAL"
Case Title 2: "MDWG 2016G WITH MMWG 2016L"

Bus Range:  522800 - 528799


* * * * * * * * * * L O S S E S   B Y   E L E M E N T   C L A S S * * * * * * * * * *

----------------------------- AUTOTRANSFORMER LOSSES (MW) ------------------------------

[ 345/230 kV ] [ 345/115 kV ] [ 230/115 kV ] [ 230/69 kV ] [ 115/69 kV ] [   TOTAL   ]
 0.764193        0.0            4.626019      0.0           2.540981      7.931192


-------------------- TRANSMISSION LINE LOSSES (MW) ---------------------

[   345 kV   ] [   230 kV   ] [   115 kV   ][   69 kV   ]  [   TOTAL   ]
 9.852043        48.48065       41.44         6.09039        105.8631


------------------------ CASE TOTALS -------------------------

TOTAL AREA LOSSES:  113.7943MW

TOTAL 345kV LINES:  10            TOTAL 345/230kV TRANSFORMERS:  7
TOTAL 230kV LINES:  79            TOTAL 345/115kV TRANSFORMERS:  0
TOTAL 115kV LINES:  387           TOTAL 230/115kV TRANSFORMERS:  53
TOTAL  69kV LINES:  289            TOTAL 230/69kV TRANSFORMERS:  0
                                   TOTAL 115/69kV TRANSFORMERS:  86
```

```
Case Name: 2016MDWGFinal-16S_6_June-Aug_4432_edited.sav

Case Title 1: "2016 MDWG FINAL WITH 2015 SERIES MMWG FINAL"
Case Title 2: "MDWG 2016S WITH MMWG 2016S"

Bus Range:  522800 - 528799


* * * * * * * * * * L O S S E S   B Y   E L E M E N T   C L A S S * * * * * * * * * *

----------------------------- AUTOTRANSFORMER LOSSES (MW) ------------------------------

[ 345/230 kV ] [ 345/115 kV ] [ 230/115 kV ] [ 230/69 kV ] [ 115/69 kV ] [   TOTAL   ]
 0.853081        0.0            5.503023      0.0           3.201583      9.557688


-------------------- TRANSMISSION LINE LOSSES (MW) ---------------------

[   345 kV   ] [   230 kV   ] [   115 kV   ][   69 kV   ]  [   TOTAL   ]
 7.400779        40.52235       43.1105       10.91577       101.9494


------------------------ CASE TOTALS -------------------------

TOTAL AREA LOSSES:  111.5071MW

TOTAL 345kV LINES:  10           TOTAL 345/230kV TRANSFORMERS:  7
TOTAL 230kV LINES:  79           TOTAL 345/115kV TRANSFORMERS:  0
TOTAL 115kV LINES:  391          TOTAL 230/115kV TRANSFORMERS:  53
TOTAL  69kV LINES:  288           TOTAL 230/69kV TRANSFORMERS:  0
                                  TOTAL 115/69kV TRANSFORMERS:  86
```

Appendix N
Powerflow Study Loss Results

```
Case Name: 2016MDWGFinal-16W_6_Sep-Dec_3386_edited.sav

Case Title 1: "2016 MDWG FINAL WITH 2015 SERIES MMWG FINAL"
Case Title 2: "MDWG 2016W WITH MMWG 2016W"

Bus Range:  522800 - 528799


* * * * * * * * * * L O S S E S   B Y   E L E M E N T   C L A S S * * * * * * * * * *

------------------------------ AUTOTRANSFORMER LOSSES (MW) ------------------------------

[ 345/230 kV ] [ 345/115 kV ] [ 230/115 kV ] [ 230/69 kV ] [ 115/69 kV ] [   TOTAL   ]
 0.733934        0.0            4.827077      0.0           2.383778      7.944789


-------------------- TRANSMISSION LINE LOSSES (MW) ---------------------

[   345 kV   ] [   230 kV   ] [   115 kV   ][   69 kV   ]  [   TOTAL   ]
 10.88771        44.96074       44.78917      5.293581       105.9312


------------------------ CASE TOTALS --------------------------

TOTAL AREA LOSSES:  113.876MW

TOTAL 345kV LINES:  10            TOTAL 345/230kV TRANSFORMERS:  7
TOTAL 230kV LINES:  79            TOTAL 345/115kV TRANSFORMERS:  0
TOTAL 115kV LINES:  397           TOTAL 230/115kV TRANSFORMERS:  55
TOTAL  69kV LINES:  287            TOTAL 230/69kV TRANSFORMERS:  0
                                   TOTAL 115/69kV TRANSFORMERS:  85
```

Appendix O
Energy Loss Factors

SOUTHWESTERN PUBLIC SERVICE COMPANY
ENERGY LOSS FACTOR CALCULATION
12 MONTHS ENDING DECEMBER 2016

Loss Factor Calculation

Total Generation Inputs = 31,758,276,076 kWh

Line No.		Loss Factor to Gross up to Gen	Loss factor to gross up 1 level 1/(1-loss %)	% loss by level	KWH Flow into each level		KWH Loss by Level		KWH Sales by loss level	Loss Check Loss fac X sales
11	Sales at the Generator @ Generation	**1.000000**	1.000000	0.000000%	31,758,276,076		0		8,295,082	8,295,082
14	Sales @ 115, 230 & 345 KV Level 2	**1.029633**	1.029633	2.877997%	31,749,980,994		913,763,470		13,821,244,766	14,230,809,712
17	Sales @ 69 KV Level 3	**1.035919**	1.006105	0.606835%	17,014,972,758		103,252,764		4,942,501,116	5,120,030,814
20	Sales @ Primary (33kv - 2.4kv) Level 4	**1.105898**	1.067553	6.327826%	11,969,218,878		757,391,388		3,704,794,414	4,097,124,733
23	Secondary Sales @ the Transf. Level 5	**1.125047**	1.017315	1.702074%	7,507,033,076		127,775,281		3,205,486,688	3,606,323,182
26	Sales served by secondary lines Level 6	**1.128389**	1.002971	0.296182%	4,173,771,108		12,361,948		4,161,409,160	4,695,688,321
29	Total		1.064152	6.028491%	31,758,276,076	=	1,914,544,850	+	29,843,731,226	31,758,271,843
31								Check using rounded factors		-4,233
34	Composite Factors 5 & 6 to Gen.	**1.126935**	1.019023	1.866746%	7,507,033,076		140,137,228		7,366,895,848	

Loss factor calculation for gross up to a target level equals the product of loss factors for each level up through the target level.

SOUTHWESTERN PUBLIC SERVICE COMPANY
DEMAND LOSS FACTOR CALCULATION
12 MONTHS ENDING DECEMBER 2016

Loss Factor Calculation

Total Generation Inputs = 6,003,000 Kw
System Peak Hr. 6,003,000 Kw

Line No.		Loss Factor to Gross up to Gen	Loss factor to gross up 1 level 1/(1-loss %)	% loss by level	KW Flow into each level		KW Loss by Level		KW Demand by loss level	Loss Check Loss fac X sales
11	Sales at the Generator @ Generation	**1.000000**	1.000000	0.000000%	6,003,000		0		0	0
14	Sales @ 115, 230 & 345 KV Level 2	**1.023667**	1.023667	2.311973%	6,003,000		138,788		2,244,415	2,297,533
17	Sales @ 69 KV Level 3	**1.030961**	1.007126	0.707520%	3,619,798		25,611		1,090,485	1,124,247
20	Sales @ Primary (33kv - 2.4kv) Level 4	**1.131015**	1.097049	8.846390%	2,503,702		221,487		436,754	493,975
23	Secondary Sales @ the Transf. Level 5	**1.161769**	1.027192	2.647180%	1,845,461		48,853		640,746	744,399
26	Sales served by secondary lines Level 6	**1.166539**	1.004106	0.408905%	1,155,862		4,726		1,114,734	1,300,380
29	Total		1.078990	7.320754%	5,966,598	=	439,465	+	5,527,133	5,960,535
31	Composite Factor Levels 5 and 6	**1.164833**	1.029901	2.903288%	1,845,461		53,579		1,755,480	

12 MONTHS ENDING DECEMBER 2016

Rate Class Loss Factors by Loss Level

Line No.		Loss Level	Demand Loss factors	Energy Loss Factors
1				
2				
3				
4	Residential Lighting	6	1.164833	1.126935
5	Residential Space Heating	6	1.164833	1.126935
6	Small General Service	6	1.164833	1.126935
7	General Service - Secondary	5	1.164833	1.126935
8	General Service - Primary	4	1.131015	1.105898
9	Large General Service			
10	Transmission Backbone	2	1.023667	1.029633
11	Sub-Transmission	3	1.030961	1.035919
12	Street Lighting	6	1.164833	1.126935
13	Area Lighting	6	1.164833	1.126935
14	Small Municipal and School	6	1.164833	1.126935
15	Large Municipal	6	1.164833	1.126935
16	Large Municipal - Primary	4	1.131015	1.105898
17	Large Schools	5	1.164833	1.126935
18	Interruptible Service -SAS 4	4	1.131015	1.105898
19	Wholesale - Service -115 kV	2	1.023667	1.029633
20	Wholesale - Service -69 kV	3	1.030961	1.035919

* For Levels 5 & 6, the Composite Factors used in billing applicatons are stated.