BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF ZIA NATURAL GAS COMPANY'S APPLICATION FOR REVISION OF ITS RATES, RULES, AND FORMS UNDER ADVICE NOTICE NO. 57,	)	
	)	**CASE NO. 18-_____-UT**
ZIA NATURAL GAS COMPANY,	)	
APPLICANT.	)	

PREPARED DIRECT TESTIMONY

OF

THOMAS J. SULLIVAN

On Behalf of
Zia Natural Gas Company

Issues:
Base Year and Test Year Billing Determinants and Revenues
Weather Normalization Adjustment
Peak Day Analysis
Cost of Capital
Test Year Revenue Requirement
Class Cost of Service
Rate Design

January 26, 2018

NMPRC CASE NO. 18-_____-UT
DIRECT TESTIMONY OF THOMAS J. SULLIVAN

I. WITNESS INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. Thomas J. Sullivan, 15898 Millville Road, Richmond, Missouri 64085.

Q. WHAT IS YOUR OCCUPATION?

A. I am President and owner of Navillus Utility Consulting LLC.

Q. HOW LONG HAVE YOU BEEN WITH NAVILLUS UTILITY CONSULTING?

A. I started the company in June 2011. Prior to that date, I worked for Black & Veatch Corporation. I worked for Black & Veatch for over 31 years as an engineer, project engineer, project manager, vice president, and director.

Q. WHAT IS YOUR EDUCATIONAL BACKGROUND?

A. I earned a Bachelor of Science Degree in Civil Engineering from the University of Missouri - Rolla in 1980, summa cum laude, and a Master of Business Administration degree from the University of Missouri - Kansas City in 1985.

Q. ARE YOU A REGISTERED PROFESSIONAL ENGINEER?

A. Yes, I am a registered Professional Engineer in the State of Missouri.

Q. TO WHAT PROFESSIONAL ORGANIZATIONS DO YOU BELONG?

A. I am a member of the American Society of Civil Engineers.

Q. WHAT IS YOUR PROFESSIONAL EXPERIENCE?

A. I have been responsible for the preparation and presentation of numerous studies for gas, electric, water, and wastewater utilities. My clients served include investor-

owned utilities, publicly-owned utilities, and their customers. The professional studies that I have prepared involve valuation and depreciation, cost of service, cost allocation, rate design, cost of capital, supply analysis, load forecasting, economic and financial feasibility, cost recovery mechanisms, and other engineering and economic matters.

Q. HAVE YOU PREVIOUSLY APPEARED AS AN EXPERT WITNESS?

A. Yes, I have. In Exhibit TJS-1, I list cases where I have filed expert witness testimony. As noted on that Exhibit, I have appeared before the New Mexico Public Regulation Commission ("Commission") as an expert witness for Zia Natural Gas Company in Case No. 08-00036-UT.

Q. FOR WHOM ARE YOU TESTIFYING IN THIS PROCEEDING?

A. I am testifying on behalf of Zia Natural Gas Company ("Zia" or "Company").

Q. WHAT IS THE NATURE OF YOUR RESPONSIBILITIES IN THIS ENGAGEMENT?

A. The Company asked me to:

1. Prepare the Company's Base Year and Test Year billing determinants and revenues.
2. Prepare the Company's proposed weather normalization adjustment.
3. Prepare the Company's proposed cost of capital.
4. Prepare the peak day analysis used to determine class peak day responsibility for use in the class cost of service study.

5. Determine the Company's Base and Test Year revenue requirements.
6. Prepare class cost of service studies based on the Company's Base and Test Year revenue requirements.
7. Design rates which will produce revenues equal to the Company's Test Year revenue requirement.

After this initial introductory section, my direct testimony is divided into sections that parallel these responsibilities.

Q. DO YOU SPONSOR ANY EXHIBITS?

A. Yes, in addition to Exhibit TJS-1 previously discussed, I sponsor the following exhibits:

Exhibit TJS-2 – Zia Natural Gas – New Mexico Service Area

Exhibit TJS-3 – Historical Heating Degree-Days and Calculation of Normal Heating Degree-Days

Exhibit TJS-4 – Summary of Statistical Results from Heating Degree-Day Regression Analysis

Exhibit TJS-5 – Heating Adjustment

Exhibit TJS-6 – Test Year Volumes and Number of Customers

Exhibit TJS-7 – Federal Reserve Balance Sheet

Exhibit TJS-8 – Yield on 20-year and 30-year Treasury Bonds

Exhibit TJS-9 - Determination of Class Load Factor

Q. WHERE EXHIBITS TJS-1 THROUGH TJS-9 PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION AND CONTROL?

A. Yes.

Q. ARE EXHIBITS TJS-1 THROUGH TJS-9 TRUE AND CORRECT TO THE BEST OF YOUR KNOWLEDGE AND BELIEF?

A. Yes.

Q. DO YOU SPONSOR ANY SCHEDULES?

A. Yes, I sponsor the following schedules:

Schedule A-1 – Summary of Overall Cost of Service and Claimed Revenue Deficiency

Schedule A-2.1 – Summary of Revenue Increase or Decrease of the Proposed Rates by Rate Class

Schedule A-3.1 – Summary of Cost of Service Adjustment by Functional Classification

Schedule A-4.1 – Summary of Rate Base

Schedule A-5.1 – Summary of Total Capitalization and the Weighted Average Cost of Capital

Schedule G-1 – Capitalization, Cost of Capital and Overall Rate of Return

Schedule G-10 – Detailed analyses supporting capitalization and cost of capital

Schedule K-1 – Gas Operating Revenue, Sales Volumes, and Customers

Class Cost of Service Study and Supporting Schedules

Schedule L – Cost of Service Study

Schedule M – Allocated Unit Cost of Service by Customer Class

Schedule N – Class Allocation Bases

Schedule O – Rate of Return Under Current and Proposed Rates by Rate Class

Schedule P – Proof of Revenue Analysis (Rate Design)

Schedule Q-1 – Peak Demand Information

Schedule Q-5 – Customer Information

Schedule Q-6 – Weather Data

Q. WHERE THESE SCHEDULES PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION AND CONTROL?

A. Yes.

Q. ARE THESE SCHEDULES TRUE AND CORRECT TO THE BEST OF YOUR KNOWLEDGE AND BELIEF?

A. Yes.

II. BASE AND TEST YEAR BILLING DETERMINANTS AND REVENUES

Q. FOR PURPOSES OF YOUR TESTIMONY AND EXHIBITS, HOW DO YOU DEFINE BASE YEAR AND TEST YEAR?

A. The Base Year analyses in this case reflect per books rate base and per books revenue requirements. The Test Year analyses reflect the Company's proposed pro forma adjustments to rate base and revenue requirements. Both the Base Year and Test Year are based on the twelve months ended August 31, 2017. As will be discussed later in my testimony, I consider the reclassification of customers, the weather normalization adjustment, and revenue synchronization adjustment to be Base Year adjustments consistent with their treatment in the Company's last rate case. As such the Company is proposing no Test Year adjustments to billing determinants (sales volumes and number of customers) or sales revenues.

Q. PLEASE EXPLAIN WHAT YOU MEAN BY BASE YEAR AND TEST YEAR BILLING DETERMINANTS AND REVENUES.

A. Per Books billing determinants and revenues are based on the 12 month period ended August 31, 2017. The Company is proposing the following adjustments to Per Books billing determinants and revenues to determine Base and Test Year revenues and billing determinants:

1. Establish an Irrigation customer class
2. Establish an Industrial customer class

3. Synchronize revenues to reflect existing rates times Per Books billing units (number of customers and volumes)

4. Adjust volumes, revenues and gas cost to reflect normal weather.

Q. PLEASE EXPLAIN HOW THE IRRIGATION CUSTOMER CLASS WAS DETERMINED.

A. Irrigation customers are defined as Small and Large Commercial customers whose primary natural gas use is for gas-fired engine driven irrigation pumps, thus these customers' usage characteristics are similar. As shown in Schedule K-1, during the test year, the Company has identified 481 Small Commercial and 6 Large Commercial irrigation customers. For the Base and Test Years, these customers have been transferred from their respective Small and Large Commercial classes to a new proposed Irrigation customer class. As discussed later in my testimony, this Irrigation class is treated separately in the class cost of service study and a separate Irrigation rate is being proposed in this case.

Q. PLEASE EXPLAIN HOW THE INDUSTRIAL CUSTOMER CLASS WAS DETERMINED.

A. Industrial customers are defined as Large Commercial and Special Contract customers who use natural gas primarily in facilities and equipment that produce, process or assemble goods, including oil processing and products extraction and food processing, and whose annual usage exceeds 12,000 mscf, thus these customers' usage characteristics are similar. As shown in Schedule K-1, during the test year, the

Company has identified 6 Large Commercial and 3 Special Contract customers who meet these criteria. For the Base and Test Years, these customers have been transferred from their respective Large Commercial and Special Contract classes to a new proposed Industrial customer class. As discussed later in my testimony, this Industrial class is treated separately in the class cost of service study and a separate Industrial rate is being proposed in this case.

Q. PLEASE EXPLAIN HOW THE BASE AND TEST YEAR REVENUES UNDER EXISTING RATES ARE DETERMINED FOR THE PROPOSED CUSTOMER CLASSES.

A. As shown in Schedule K-1, the revenues under existing rates for the irrigation and industrial customers are based on the current rates they are charged. For the Irrigation class, revenues for the customers transferred from the Small Commercial class are based on the Small Commercial rate and for the Large Commercial customers, the Large Commercial rate. As discussed later in my testimony, revenues under proposed rates are based on the proposed Irrigation rate. For the Industrial class, revenues from customers transferred from the Large Commercial class are based on the Large Commercial rate, and for the Special Contract customers, the current negotiated rate. For the Base and Test Year, the transferring of these customers has no impact on the overall billing determinants or revenues under existing rates.

Q. IS THE COMPANY PROPOSING NEW RATE SCHEDULES FOR THE PROPOSED IRRIGATION AND INDUSTRIAL CUSTOMER CLASSES?

A. Yes. The Irrigation and Industrial customer classes are treated as separate and distinct customer classes in the class cost of service study discussed later in my direct testimony. Also, the Company is proposing separate and distinct Irrigation and Industrial rates as discussed later in my direct testimony.

Q. WHAT IS THE DIFFERENCE BETWEEN PER BOOKS REVENUES AND EXISTING RATES TIMES PER BOOKS BILLING UNITS?

A. Per books revenues are the actual revenues billed. Per Books billing units times existing rates (Synchronized Per Books revenues) are equal to the revenues derived from applying existing rates to Per Books customers billed and volumes billed (Base Year volumes unadjusted before the weather normalization adjustment). Per books revenues may include items such as corrected bills or billing errors. Usually the difference between Synchronized Per Books revenues and Per Books revenues is small unless there has been a rate change during the Base Year (when the difference would best be characterized as a revenue annualization adjustment). Even if there is not a rate change during the Base Year, adjusting Per Books revenues to synchronize them with billing units provides a more precise means to measure the additional revenues derived from any increase (or decrease) in rates.

Q. HOW MUCH DO PER BOOKS REVENUES DIFFER FROM PER BOOKS BILLING UNITS TIMES THE EXISTING RATES?

A. As shown on Schedule K-1, the total difference (excluding the weather normalization adjustment I discuss later in my testimony) is a negative $33,368 which is all margin

revenues (base charge, distribution service charge, and transmission service charge). For purposes of Base and Test Year revenues (and the weather normalization adjustment discussed in the next section of my testimony), gas cost is based on the average unit cost during the Base Year of $3.9531 per mscf applied to all customer classes. This treatment synchronizes gas cost revenues and cost of gas, and thus eliminates any impact of cost of gas on my determination of revenues, revenue requirements, cost of service, revenue deficiency, and rate design.

In Schedule K, I consider the synchronization and weather normalization adjustments as Base Year adjustments to per books volumes, cost of gas, and revenues. As such, I am proposing no Test Year adjustments to volumes, cost of gas, and revenues. I discuss the Weather Normalization Adjustment in the next section of my testimony.

III. WEATHER NORMALIZATION ADJUSTMENT

Q. PLEASE EXPLAIN THE CONCEPT OF WEATHER NORMALIZATION AND WHY IT IS IMPORTANT IN ESTABLISHING FAIR AND REASONABLE RATES FOR NATURAL GAS SERVICE.

A. Because proposed rates are based on gas usage, gas usage should be adjusted to reflect usage (volumes) that would have been expected in an otherwise "normal" (typical) year. If rates are based upon usage levels that are inflated due to colder than normal conditions, the rates may be set too low and may not recover costs during periods of normal conditions. Alternately, if rates are based on usage levels that are understated due to warmer than normal condition (as was the case during the Test Year), the rates may be set too high and over recover during periods of normal conditions. The most reasonable basis on which to set rates is on normal conditions. Over the long term, this eliminates a bias which may be introduced by using usage levels to establish rates that are higher or lower than what would normally be expected. Thus, in establishing rates, it is usually necessary to apply an adjustment to actual Base Year volumes to recognize what usage would have been if weather conditions were normal.

Q. WERE WEATHER CONDITIONS NORMAL DURING THE BASE YEAR IN THE COMPANY'S SERVICE TERRITORY?

A. No. The Company's service territory experienced significantly warmer weather than normal during the Base Year ended August 31, 2017. Based on a comparison of actual heating degree-days ("HDDs") to normal HDDs, conditions during the Base

Year were warmer than normal. As discussed later in my direct testimony, I am recommending that a 10-year average of actual HDD's be used for normal HDDs for each of the five weather stations I am using.

Q. PLEASE DEFINE WHAT YOU MEAN BY A HEATING DEGREE-DAY.

A. A heating degree-day is defined as 65 degrees less average daily temperature where average daily temperature equals the average of the high and low temperatures on each day. Sixty-five degrees is typically used as the base temperature. If the average daily temperature exceeds 65 degrees, the HDD for that day is set equal to zero. The sum of the daily HDDs for a particular month is the monthly HDDs.

Q. PLEASE SUMMARIZE THE WEATHER CONDITIONS DURING THE BASE AND TEST YEAR FOR THE WEATHER STATIONS YOU USED IN YOUR ANALYSES.

A. The data is shown in the following table:

Weather Station	Actual HDDs for 12 Months Ended 8/2017	10- Year Normal HDDs	% Warmer Than Normal
Hobbs	2,200	2,786	21.0
Ruidoso	4,045	4,724	14.4
Cimarron	4,811	5,490	12.4
Las Cruces (NMSU)	2,108	2,621	19.6
Las Vegas	4,983	5,603	11.1

Q. PLEASE OUTLINE YOUR DIRECT TESTIMONY CONCERNING WEATHER NORMALIZATION.

A. I will:

1) Describe the methodology I use to determine the relationship between gas usage and weather;

2) Describe the weather stations and weather data I use;

3) Describe the analyses I use to adjust temperature or heat sensitive usage to reflect normal weather conditions; and

4) Describe the results of the heating adjustment analyses.

Q. BEFORE DISCUSSING THE SPECIFIC ADJUSTMENTS YOU ARE PROPOSING, PLEASE SUMMARIZE THE METHODOLOGY YOU USE TO DETERMINE THE RELATIONSHIP BETWEEN USAGE AND WEATHER.

A. I use multiple linear regression analysis to define the relationship between volumes and variables that represent weather conditions. Multiple linear regression is a statistical approach commonly used to predict the value of a dependent variable (use per customer) using multiple independent variables (including current month HDDs and previous month HDDs). In this regard, the goal is to explain the dependent variable with reasonable accuracy using as few independent variables as possible.

Multiple regression yields an equation of the form:

$$Y = B + A_1X_1 + A_2X_2 + ... + A_KX_K$$

Where

Y is the dependent variable

$X_1...X_K$ are the independent variables

B is the y-intercept (or constant)

$A_1...A_K$ are the regression coefficients

With respect to my use of multiple linear regression as a tool in developing adjustments to reflect normal weather conditions, the dependent variable (Y) is monthly use per customer, and I calculate it by dividing monthly volumes by monthly number of customers for each class and location. I use monthly use per customer as the dependent variable instead of total monthly volumes because use per customer reduces the effect of growth or decline in total volumes due to changes in numbers of customers (particularly on a seasonal basis). Independent variables ($X_1...X_K$) are typically weather variables such as HDDs. The intercept (B) is a monthly constant. The constant represents use that is not affected by the independent variables. This non-weather sensitive use is generally referred to as base use (and includes usage such as water heating, cooking and clothes drying, which are not weather dependent). The coefficients ($A_1...A_K$) are developed from the regression analysis based on the best fit (least squares).

I calculate several statistics in connection with my regression analyses to assist in the evaluation of the significance (degree to which the independent variables explain the dependent variable) of the various variables in explaining use per customer. In this regard, I primarily focus on the coefficient of determination (R-squared), F statistic, the t-statistic of the coefficients, and the significance of F, which are commonly used to measure how well the independent variables (HDDs, for

example) explain the dependent variable (usage).

Q. WHAT DATA DO YOU USE IN PERFORMING THE MULTIPLE LINEAR REGRESSION ANALYSIS DESCRIBED ABOVE?

A. I base my analysis on actual monthly use per customer (dependent variable) and actual monthly HDDs. In simple terms, my regression analysis produces coefficients that I use to determine use per customer per HDD.

Q. WHAT USAGE ARE YOU PROPOSING TO ADJUST?

A. I am proposing to adjust volumes for those groups of customers where it can be demonstrated that their usage is sensitive to changes in winter temperature conditions. These groups of customers use natural gas primarily for space heating. The variation in monthly HDDs typically explains most of the variation in volumes used by customers who use gas in space heating applications. The customer groups I am proposing to adjust are the Company's Residential, Small Commercial, Large Commercial, and Sale for Resale (City of Las Vegas) customer groups.

Q. WHAT VARIABLES DO YOU DETERMINE BEST EXPLAIN THE VARIATION IN HEAT SENSITIVE SALES AND WHAT IS THE BASIS FOR YOUR RECOMMENDATION REGARDING THESE VARIABLES?

A. The correlation between HDDs and sales to space heating customers is quite high. In others words, the colder the weather, the greater the space heating requirements. HDDs are typically used as a basis to predict a customer's natural gas space heating requirement. The results of my analyses in this case confirm this fact.

In my regression analyses, I considered current and previous month's HDDs, and a trend factor as independent variables. Because volumes are based on the reading of a customer's meter which may lag the customer's actual usage and the reading of meters in many cases is done on a cycle that does not correspond to a calendar month, HDDs for the previous month are considered as a variable. The trend factors recognize any long run change in use per customer that is not attributable to changes in weather conditions (due to factors such as conservation or changes in typical home size).

Q. PLEASE DESCRIBE THE WEATHER DATA YOU UTILIZE FOR YOUR ANALYSIS.

A. I use monthly actual heating degree-day data for the following five New Mexico weather stations: Hobbs, Ruidoso, Cimarron, Las Cruces (New Mexico State University) and Las Vegas. The primary consideration in my selection of these weather stations is to select weather stations that are in close geographic proximity to the Company's load centers (the towns the Company serves). Exhibit TJS-2 is a map of Zia's New Mexico service territory showing the principle towns served. My intent is to group the towns around these weather stations where I would expect weather conditions (HDDs) to be similar based on geographic proximity. The actual weather data I use includes data published by the National Oceanic and Atmospheric Administration ("NOAA") and data compiled by the Company. The table below summarizes the Company's five Districts, the principle towns or counties served in

each district, and the weather station that I assigned to each District.

	Towns Served	**Weather Station**
District 210	Hobbs Jal	Hobbs
District 220	Lincoln County	Ruidoso
District 230	Maxwell Springer	Cimarron
District 230	City of Las Vegas	Las Vegas
District 250	Dona Ana County	Las Cruces (NMSU)

Q. ARE THESE THE SAME WEATHER STATIONS USED BY THE COMPANY IN ITS LAST RATE CASE IN 2007?

A. No. The only weather station I am using in this case that I would consider the same is the NOAA weather station I am using for Las Vegas. In the last rate case, Case No. 08-00036-UT, I also used NOAA weather stations for Hobbs, Ruidoso, and Maxwell. For reasons I will discuss below, I do not believe that the NOAA weather data for these stations is adequate for the Company's weather normalization analyses. Finally, since the last rate case, the Company acquired facilities from Rio Grande Natural Gas Association in the area around Las Cruces. I am using the NOAA weather station at New Mexico State University in Las Cruces for these customers.

Q. PLEASE DISCUSS THE ISSUES YOU ENCOUNTERED WITH THE HOBBS, RUIDOSO, AND MAXWELL NOAA WEATHER STATIONS.

A. Over the 30 plus years that I have been performing weather normalization analyses, I have primarily relied upon weather data, specifically heating degree-day data, published by the NOAA. However, over the past decade or so, I have begun to notice that the quality and completeness of this data has deteriorated, especially in more rural or less populated areas, such as those served by the Company in New Mexico. The problem was particularly acute for the Ruidoso, Hobbs, and Maxwell NOAA stations.

For the NOAA Ruidoso station, the following monthly HDD data was missing from the NOAA database and not available over the last 10 years (generally the period since the Company's last rate case): February and June 2011, June and July 2012, September 2012 through July 2013, January 2014, and March 2014 through June 2016. This represents 56 months (nearly ½) missing out of the last 120 months.

For the NOAA Hobbs station, the following monthly HDD data was missing from the NOAA database and not available over the last 10 years: September, and November 2007; January, April, May and July 2008; September 2008 through February 2009; March through June 2010; March, April, and June 2012; March, May, and November 2013; May through August, and October 2014; and July 2015. This represents 28 (almost 1/4) months missing out of 120 months.

For the NOAA Maxwell station, the following monthly HDD data was missing and not available from the NOAA database over the last 10 years: January 2008 through May 2010, March through October 2011, August 2015 through February 2016, and Ma7 2016. This represents 45 months (over 1/3) missing out of

120 months.

The missing data for these three stations creates two problems. First, the lack of actual monthly data would create significant gaps in the analysis of the relationship between actual HDD's and usage. Second, the lack of data makes it nearly impossible to determine what normal or average conditions were over this time period using this data.

Q. WHAT SOLUTION DID YOU DETERMINE FOR THE MISSING NOAA DATA?

A. Fortunately, the Company maintains weather stations in Hobbs and Ruidoso. For Hobbs, the Company weather station was missing 3 months over the last 10 years. For Ruidoso, the Company weather station at its current location did not go into service until October 2008. For the missing months, I was able to use NOAA data and the relationship between the NOAA data and Company data at those locations to fill in the data.

For the Maxwell area, the NOAA Cimarron weather station has fairly complete data, is within the Company's service territory, and is geographically similar to Maxwell. Over the 10-year period studied, the Cimarron station was missing 9 months of data. For most of the missing months, I used NOAA estimates from its published New Mexico Local Climatological Data for Cimarron: for a few I used relationships between Las Vegas and Cimarron to fill in missing months.

Q. WHAT IS THE SOURCE OF THE DATA YOU USED FOR NORMAL HDDS?

A. I use the same actual HDD data that I use to determine the relationship between usage and HDDs to also determine the monthly normal HDDs. For all five weather stations, I recommend using the 10-year average monthly HDDs for normal HDDs. The calculation of the 10-year average for each of the 5 weather stations is shown in Exhibit TJS-3.

Q. WHY IS A TEN-YEAR AVERAGE APPROPRIATE?

A. I believe that the 10-year is appropriate for several reasons. First, in the Commission's Order in the Company's last case in Case No. 08-00036-UT, the Commission adopted the Recommended Decision of the Hearing Examiner in which the Hearing Examiner recommended the use of a 30-year average for Hobbs and 10-year averages for Ruidoso, Maxwell, and Las Vegas. Second, it has been approximately 10 years since the Company's last rate case. Therefore, the current rates have been in place for approximately 10 years. Third, due to the data limitations discussed earlier, I believe that the database I am using for the last 10 years is reasonably complete and reliable. Fourth, the use of a 10-year period is a reasonable balance between using current data and using a long enough time period to capture variations in weather (both colder and warmer winters).

Q. WHAT VOLUME AND CUSTOMER DATA DO YOU USE?

A. My source for monthly volume (usage) and customer data is the Company's detailed billing data records. The volumes I use are reported in mscf (thousand standard cubic

feet) which means that all the volumes are adjusted to standard pressure. The Company's detailed billing data is aggregated by District and by customer class (Residential, Small Commercial, Large Commercial, and Sale for Resale).

I rely upon billing data for the period September 2007 through August 2017. My goal is to use a sufficiently long period of time such that the average heating-degree days over that period are approximately equal to normal and capture any underlying change in usage characteristics (due to such factors as conservation). I ran separate regression analyses on each of the three customer groups for each of the 4 weather stations and the City of Las Vegas.

Q. WHY IS IT NECESSARY TO PERFORM YOUR ANALYSES OVER A PERIOD OF TIME THAT EXHIBITS NORMAL WEATHER CONDITIONS?

A. In connection with studies that I have made over the years of the relationship between gas volumes and winter weather conditions, I have observed several anomalies. One of these anomalies is that for a specific customer group, the relationship between sales and HDDs can appear to change substantially from year to year. In studying this question, I found that significant changes in the relationship generally correspond to years where weather conditions are more abnormal. Therefore, it is important that I examine conditions over a long enough period to ensure that any weather adjustment I make reflects truly normal usage characteristics. For example, using only the test year of data for my analysis violates this principle because the weather during the test year (in this case) was significantly warmer than normal. It is unreasonable to assume that

usage characteristics during one year which was significantly warmer than normal would be representative of normal usage characteristics.

Q. PLEASE DESCRIBE YOUR WEATHER NORMALIZATION REGRESSION RESULTS.

A. In order to identify changes in usage patterns over the ten year period for which I have sales data, I performed regression analyses in decreasing blocks of time (2007-2017, 2008-2017, 2009-2017, etc.) for each Residential, Small Commercial, and Large Commercial customer group and the City of Las Vegas. I evaluated the results of each of these time periods using five criteria to determine which period should be used to define usage characteristics. These five criteria are:

1. Consistency of predicted normal use per customer;
2. Average annual HDDs for the period evaluated being near normal;
3. R squared – values in the high 90 percent range are common for the Residential and Small Commercial customer groups;
3. The standard error (or t-statistic) for each coefficient;
4. F statistic – higher values equate to higher level of significance;
5. Obvious changes in database as reflected in coefficients and statistics.

In performing my analyses, I did not find the trend coefficient to be significant. Also, I found that using the prior month's heating degree-days was not significant, particularly for analyses of 9 years or less. In my discussions with the

Company, I learned that automated meter reading ("AMR") was installed about 9 years ago and from that point to the present, meters have been read on a calendar month basis. Therefore, for the Hobbs, Ruidoso, and Maxwell (Cimarron) districts, the best results were generally found by using the last 9 years. For Las Vegas, the 10-year analysis using the current month's HDDs produced the best results. Since the Company acquired the Dona Ana system in 2011 (last 6 years), only data from that point was available.

Exhibit TJS-4 summarizes the results of the regression analysis I use for each customer group and weather station that best meets these criteria. Based on these regression analyses, I find that it is reasonable to adjust all the Residential, Small Commercial, and Large Commercial customer groups, as well Las Vegas (wholesale customer).

Q. HOW DID YOU DETERMINE THE HEATING VOLUME ADJUSTMENT APPLICABLE TO ZIA'S RESIDENTIAL, SMALL COMMERCIAL AND LARGE COMMERCIAL CUSTOMER GROUPS AND THE CITY OF LAS VEGAS?

A. I summarize this calculation in Exhibit TJS-5. The heating adjustment per customer is the difference between normal and actual HDDs multiplied by its respective HDD coefficients (current and prior months) for each month of the test year. Using coefficients from Exhibit TJS-4 and the 10-year average HDD data shown in Exhibit TJS-3, I determine the heating adjustment per customer (Column (H)).

After I calculate the monthly heating adjustment per customer (mscf/customer), I multiply each of these figures by the respective number of customers for each month of the test year to determine the total volumetric adjustment. As I show in Column (J) of Exhibit TJS-5, my heating adjustment represents an increase in sales of 234,666 mscf for the Residential class, 37,132 mscf for the Commercial class, 56,542 mscf for the Large Commercial class, and 55,104 mscf for the City of Las Vegas for a total recommended heating adjustment of 383,443 mscf. These adjustments result in an increase in volumes which is consistent with actual conditions being warmer than normal during the base year. Also, as shown in Exhibit TJS-5, the Residential class includes the small number of customers the Company serves in Texas off of the Hobbs system.

Q. HOW DID YOU DETERMINE THE WEATHER NORMALIZATION REVENUE ADJUSTMENTS?

A. For each location, I determine the margin (distribution and transmission) adjustment by multiplying the margin rate (excluding gas cost) times the volumetric adjustment. I show the margin adjustments in Columns (L) and (N) of Exhibit TJS-5 and I calculate them by multiplying Column (J) by Column (K) and Column (J) and Column (M), respectively. I show the cost of gas adjustment in Column (P) and I calculate it by multiplying Column (J) by the cost of gas in Column (O). The cost of gas I use is the Company's calculated average Base Year cost of gas. The total revenue adjustment is the sum of Column (L), (N) and (P).

For the Residential class, the total margin adjustment (transmission and distribution charges) is $719,954, the cost of gas adjustment is $927,654 and the total revenue adjustment is $1,647,608. For the Small Commercial class, the total margin adjustment is $113,922, the cost of gas adjustment is $146,787 and the total revenue adjustment is $260,708. For the Large Commercial class, the total margin adjustment is $173,471, the cost of gas adjustment is $223,516 and the total revenue adjustment is $396,987. For the City of Las Vegas, the total margin adjustment is $17,082, the cost of gas adjustment is $217,829 and the total revenue adjustment is $234,911. The Total Company margin adjustment is $1,024,429, the cost of gas adjustment is $1,515,786 and the total revenue adjustment is $2,540,215.

All of these adjustments result in an increase in base year revenues, which is consistent with actual conditions being warmer than normal during the base year. Exhibit TJS-6 summarizes the volumetric and use per customer adjustment by customer class and location. Exhibit TJS-6 also summarizes the Base and Test year volumes and customers for the Irrigation, Industrial, and Transportation customers.

Q. DO YOU PROPOSE ANY OTHER ADJUSTMENTS TO BASE YEAR UNITS OF SERVICE, COST OF GAS AND REVENUES?

A. No, I do not.

Q. DOES THIS CONCLUDE YOUR PREPARED DIRECT TESTIMONY REGARDING YOUR PROPOSED WEATHER NORMALIZATION

ADJUSTMENT AND BASE AND TEST YEAR BILLING DETERMINANTS AND REVENUES?

A. Yes, it does.

IV. COST OF CAPITAL

Q. PLEASE SUMMARIZE THE COST OF CAPITAL YOU ARE RECOMENDING FOR ZIA NATURAL GAS COMPANY.

A. The cost of capital I am recommending for Zia is shown in Schedule G-1 of the Company's filing. In that Schedule I am recommending a capital structure consisting of 54.60 percent equity and 45.40 percent debt. I am recommending a cost of debt of 6.17 percent and a cost of equity (return on equity) of 12.05 percent. The overall cost of capital I am recommending is the weighted average cost of capital of 9.38 percent. Further, I am recommending that this weighted average cost of capital be the Company's return on rate base used to determine the Company's overall revenue requirement.

Q. PLEASE OUTLINE YOUR TESTIMONY REGARDING ZIA NATURAL GAS COMPANY'S COST OF CAPITAL.

A. I will first discuss some background information and issues regarding Zia Natural Gas Company. I will then discuss the methodologies used to determine the appropriate capital structure, cost of equity and cost of debt for Zia. I will then discuss the determination of the appropriate capital structure, cost of equity, cost of debt, and weighted average cost of capital (return on rate base) for Zia.

Background

Q. IS THERE SOME BACKGROUND INFORMATION YOU WOULD LIKE TO DISCUSS REGARDING ZIA NATURAL GAS COMPANY PRIOR TO

DISCUSSING YOUR RECOMMENDED COST OF CAPITAL?

A. Yes. Zia Natural Gas Company is an operating division of Natural Gas Processing Co. ("NGP") which is a privately held S corporation. Further, NGP is financed 100 percent with the owner's equity and as such has no outstanding debt. Natural Gas Processing consists of two principal operating divisions: Wyoming Gas Company and Zia Natural Gas Company. Wyoming Gas and Zia Natural Gas are natural gas distribution companies providing service in Wyoming and New Mexico, respectively.

Q. DOES NATURAL GAS PROCESSING'S STRUCTURE PRESENT CHALLENGES TO DETERMINING A COST OF CAPITAL FOR ZIA NATURAL GAS?

A. Yes. Since Zia is an operating division of Natural Gas Processing Co, which has a capital structure that is 100 percent equity and all of this equity is privately held, there is no public information available specific to Zia or Natural Gas Processing to determine the appropriate cost of capital. Further, in the past the Commission has determined that a capital structure should be imputed for Zia based on a more typical natural gas distribution company.

Q. HOW WAS ZIA NATURAL GAS COMPANY'S COST OF CAPITAL DETERMINED IN THE COMPANY'S LAST RATE CASE?

A. In Zia Natural Gas Company's last rate case in Case No. 08-00036-UT, the following capital structure and cost of capital was approved by the Commission:

Component	Percentage	Cost	Weighted Cost
Debt	47.5%	6.10%	2.90%
Equity	52.5%	10.27%	5.39%
Weighted Average Cost of Capital			8.29%

The above capital structure and cost of debt were imputed as discussed above.

Q. WHAT SIGNIFICANT EVENTS HAVE OCCURRED IN THE FINANCIAL MARKETS SINCE ZIA NATURAL GAS COMPANY'S LAST RATE CASE?

A. Since the Company filed its last case in 2008, financial markets have gone through a significant amount of upheaval. The country was in recession for 2008 and 2009 and the Federal Reserve essentially kept short term interest rates at or near 0 percent up until late 2016. Since then, the Federal Reserve has raised short-term interest rates five times to a current level of approximately 1.50 percent. As will be discussed later in my testimony, such low short-term interest rates (and their impact on long-term rates and dividend yields) should not be considered normal. Further, Zia Natural Gas Company's capital structure and cost of capital should not be biased for potentially several years in the future by these abnormal circumstances. The Company files rate cases very infrequently (almost 10 years since its last rate filing and about the same time for the case prior to that) and therefore, the development of Zia's cost of capital should take into consideration that the rates approved in this matter are likely to be in place for several years.

Cost of Capital - Methodologies

Q. WHAT IS THE STANDARD UPON WHICH YOUR RECOMMENDED COST

OF CAPITAL IS BASED?

A. My recommended cost of capital is based on providing a return to the Company comparable to returns earned by other natural gas distribution companies, recognizing to the extent practical the risks and costs associated with the Company's New Mexico operations. The cost of capital is one consideration in the Commission's determination of just and reasonable rates.

Q. HOW HAVE YOU DEFINED WHAT IS A COMPARABLE NATURAL GAS DISTRIBUTION COMPANY?

A. Throughout my analysis, the comparable company analyses are based on the eleven utilities contained in the Value Line Investment Survey Natural Gas Distribution Utility Industry. Rather than impart some arbitrary standard on what utilities to use, I am relying upon the universe used by Value Line Investment Survey. The Natural Gas Distribution Utility Industry contains a universe of publicly traded natural gas distribution utilities for which a significant history of public information is available.

In Schedule G-10A, I summarize these comparable companies along with some relevant financial and operating data.

Q. IN YOUR VIEW, ARE THERE ISSUES WITH THESE COMPARABLE COMPANIES?

A. Yes. First, and most importantly, all of these utilities are significantly larger than Zia Natural Gas Company (and Natural Gas Processing). As will be discussed later in my testimony, size does matter when determining risk and the cost of doing business.

Second, all of these utilities either have an infrastructure rider or some form of revenue decoupling mechanism, most have both. One of the results of these mechanisms is to reduce the variability in the utility's revenue stream and hence the variability in their earnings. Third, the universe of natural gas distribution companies followed by Value Line has changed and is generally shrinking due to consolidation in the industry. Piedmont Natural Gas Company and AGL Resources were both in the Value Line industry group last year but have been removed due to mergers, and One Gas has been added since sufficient historical data has been compiled since the company was created in 2014. WGL (Washington Gas Light) Holdings is being acquired and will likely then be dropped from the Value Line industry group. As the universe of publicly traded natural gas utilities declines, this will become an issue when analyzing companies such as Zia Natural Gas Company that are essentially pure natural gas distribution utilities. A database of publically available financial information for small pure natural gas distribution utilities (comparable to Zia) does not exist.

In my view, none of these issues is sufficient to remove any of these utilities from my analyses. None of these utilities is truly comparable to Zia Natural Gas Company. The differences between these companies and Zia can be identified and analyses adjusted to reflect these differences as will be discussed later in my testimony.

Q. WHAT METHODOLOGIES DO YOU USE TO DETERMINE THE COST OF

EQUITY FOR ZIA NATURAL GAS COMPANY?

A. The two commonly used approaches for determining the cost of equity are the Discounted Cash Flow ("DCF") model and the Capital Asset Pricing Model ("CAPM"). The cost of equity in the DCF model is equal to the expected dividend over the next 12 months divided by the current stock price plus the expected annual growth rate. The cost of equity in CAPM is equal to the risk free rate plus a premium for the relative risk of the asset. I will discuss the details of these calculations later in my testimony. Both of these methods have been commonly used in rate cases before this Commission. The comparable companies discussed above constitute the sample upon which I base the calculations used in both of DCF model and CAPM.

Q. WHAT METHODOLOGIES DO YOU USE TO DETERMINE THE CAPITAL STRUCTURE FOR ZIA NATURAL GAS COMPANY?

A. As previously discussed, Natural Gas Processing, Co.'s capital structure is 100 percent equity. It would not be reasonable to determine the overall cost of capital based entirely on the return on equity if that return on equity is based on analysis of comparable companies or the marketplace for similar companies where a 100 percent equity capital structure is not typical. Furthermore, a 100 percent equity capital structure may not result in the lowest overall cost of capital. Rather than attempting to determine what combination of capital structures and costs of capital components produces the lowest overall cost of capital, I am primarily relying upon the typical or average capital structure of the comparable companies discussed above. In the

Company's last rate case, Case No. 08-00036-UT, analysis of the comparable companies was the primary consideration to impute the levels of debt and equity (i.e. capitalization) for Zia Natural Gas Company.

Capital Structure

Q. PLEASE DISCUSS ANALYSES THAT UNDERLY YOUR RECOMMENDED CAPITAL STRUCTURE FOR ZIA NATURAL GAS COMPANY.

A. The analyses underlying the capital structure I am recommending for Zia Natural Gas Company is shown in Schedule G-10B. In the table I show the current and projected debt and equity ratios for the comparable company sample I discussed earlier. The current and projected ratios are those reported in the most current company reports in the Value Line Investment Survey.

This analysis shows a slightly higher equity ratio for the 2020-2022 period than the current period. This is probably to be expected since companies are likely taking advantage of the current historically low interest rates to issue debt while the cost of debt is abnormally low. As I discuss later in my testimony, the current interest rate environment is abnormal and the Federal Reserve has just begun to normalize interest rates after being artificially suppressed by the Federal Reserve. Therefore, I did not give any consideration to the current capital structures.

Q. WHAT CAPITAL STRUCTURE ARE YOU RECOMMENDING FOR ZIA NATUAL GAS COMPANY?

A. I am recommending an equity ratio of 54.60 percent and a debt ratio of 45.40 percent

based on the analysis contained in Schedule G-10B. It must be noted that capital structure and cost of capital are not mutually exclusive. As will be discussed more fully in my cost of equity discussion later, Zia Natural Gas Company is higher risk than the comparable companies included in my analysis of capital structure (and cost of equity). This higher risk could be reflected in a more conservative (higher equity ratio) capital structure. As discussed earlier, the cost of equity models I am using have provisions to explicitly quantify this higher risk. Therefore, my analysis will focus on quantifying this risk in the cost of debt and equity rather than the capital structure.

Cost of Equity

Q. PLEASE DESCRIBE YOUR APPROACH TO DETERMINING THE COST OF EQUITY FOR ZIA NATURAL GAS COMPANY.

A. As I discussed earlier in my testimony, I have primarily relied upon two commonly used approaches for determining the cost of equity: the DCF model and CAPM. While both of these analyses rely upon data available for "comparable" utilities, it is critical that these analyses recognize that there are limitations with this comparability that must be recognized within these models. There are several factors that make Zia Natural Gas Company riskier than the comparable company sample. While the traditional mathematics within the DCF model do not allow for the explicit measurement of risk, there are ways to recognize higher risk based on the variability of the samples within the DCF model. Unlike the DCF model, the CAPM model

explicitly reflects risk in its calculation and can explicitly reflect variation in risk between the sample companies, and between the sample companies and Zia Natural Gas Company. I also consider the return on equity projected by Value Line for the comparable companies.

Q. PLEASE DISCUSS SPECIFIC DIFFERENCES BETWEEN ZIA NATURAL GAS COMPANY AND THE COMPARABLE COMPANIES THAT MAKE ZIA RISKIER THAN THE COMPARABLE COMPANY SAMPLE.

A. As discussed earlier in my testimony, there are four significant differences between Zia Natural Gas Company and the comparable company sample that make Zia more risky.

First, Natural Gas Processing, the parent company of Zia Natural Gas Company, is a much smaller company than the comparable company sample. While market capitalization data is not available for NGP, owner's equity, net utility plant and customers served are available. NGP's equity equaled approximately $66 million, net utility plant (Zia Natural Gas and Wyoming Gas) totaled approximately $61 million and the average number of customers served totaled approximately 44,800 for the year ended August 31, 2017. As summarized in Schedule G-10A, the market capitalization of the comparable companies' averages approximately $4.8 billion, the net plant also about $4.9 billion, and the number of customers averages over 1.5 million. I will discuss the actual quantification of how this size difference impacts cost of equity in my discussion of the CAPM later in my testimony.

Second, the relatively small size of Zia Natural Gas Company impacts the frequency with which the Company files rate cases. Larger companies have larger staffs, including staff whose primary responsibilities include regulatory filings, thus they generally file rate cases more frequently. The larger companies can more easily justify the cost and effort of filing rate cases for smaller percentage increases and small impacts on their rate of return. Smaller utilities like Zia do not have staffs who primarily work on regulatory filings. All of the company witnesses in this case have significant responsibilities outside of regulatory filings. Further, smaller utilities like Zia are more dependent upon outside resources to assist them with rate case filings. Therefore, the overall impact of this is to increase the effect of regulatory lag on smaller utilities like Zia Natural Gas Company.

Third, as shown in Schedule G-10A, all of the comparable companies have infrastructure riders in at least some of the jurisdictions in which they operate. While there is variation in how these riders are used, at their core, these riders allow utilities to recover the costs associated with capital investment between rate cases. These riders have the direct impact of mitigating the earnings erosion that can result from capital investments made between the filing of rate cases. Neither Zia Natural Gas nor Wyoming Gas has any infrastructure riders.

Fourth, as shown in Schedule G-10A, all but two of the comparable companies have some form of revenue decoupling mechanism and/or weather normalization adjustment rider. Revenue decoupling mechanisms are designed to

offset some of the revenue (and earnings) erosion between rate cases that results from using volumetric rate design to recover primarily fixed distribution costs while volumes decline over time due primarily to conservation and/or increased equipment efficiencies. Weather normalization adjustment riders are designed to substantially mitigate the variation in margin revenues due to warmer or colder than normal weather. Both types of riders directly reduce the variability and volatility of margin revenues (and earnings). Neither Zia Natural Gas nor Wyoming Gas has revenue decoupling or weather normalization riders.

Q. HOW HAS ZIA NATURAL GAS COMPANY'S ACTUAL RATES OF RETURN COMPARED TO ITS AUTHORIZED RATE OF RETURN SINCE THE COMPANY'S LAST RATE CASE?

A. In Schedule G-10C, I summarize Zia Natural Gas Company's actual rates of return on rate base and equity for each calendar year since the Company's last rate case in 2008. As shown in this table, the Company's rate of return on rate base has averaged 1.08 percent lower than its authorized return and has shown significant volatility from a low of 5.52 percent to a high of 9.46 percent. The rate of return on equity has averaged 2.07 percent lower than the authorized return on equity and has ranged from a low 5 percent to a high of 12.50 percent. This high volatility can primarily be directly attributed to weather variation and the vast majority of Zia Natural Gas Company's sales being weather dependent. Further, this higher volatility translates into higher risk.

CAPM

Q. PLEASE DESCRIBE THE CAPITAL ASSET PRICING MODEL YOU USE TO DETERMINE COST OF EQUITY?

A. I am using the CAPM and Modified CAPM as described in *Duff & Phelps 2017 Valuation Handbook – Guide to Cost of Capital* ("D&P Handbook"). The Modified CAPM formula is as follows:

$$k_e = R_f + \beta \times (RP_m) + RP_s$$

Where,

k_e = Cost of equity capital

R_f = Risk-free rate

β = Beta

RP_m = Equity risk premium

RP_s = Size premium

The CAPM formula is similar to the Modified CAPM formula with the exception that the CAPM formula does not include the size premium (RP_s).

In addition, I also considered the Build-up method as also described in the D&P Handbook. The Build-up method is a variant of the CAPM described above that explicitly recognizes the relative risk of an industry and the size of the company and can be applied directly to Natural Gas Processing (Zia Natural Gas Company) rather than be applied indirectly through comparable companies. The formula is as follows:

$$k_e = R_f + RP_m + RP_i + RP_s$$

where,

k_e = Cost of equity capital

R_f = Risk-free rate

RP_m = Equity risk premium

RP_i = Industry risk premium

RP_s = Size premium

In my analysis I give primary consideration to the Modified CAPM and Build-up methods because these models explicitly recognize size, and as I have previously discussed, it is important in the case of Zia Natural Gas Company to explicitly recognize the higher risk associated with the smaller company.

Q. HOW DOES THE D&P HANDBOOK CHARACTERIZE SIZE?

A. According to the D&P Handbook:

> "The size effect is based on the empirical observation that companies of smaller size are associated with greater risk and therefore, have greater cost of capital. The "size" of a company is one of the most important risk elements to consider when developing cost of equity capital estimates for use in valuing a business simply because size has been shown to be a predictor of equity returns. In other words, there is a significant (negative) relationship between size and historical equity returns – as size decreases, returns tend to increase, and vice versa."[1]

The D&P Handbook quantifies this size effect (RP_s) using the CRSP (Center for Research in Security Prices) Deciles Size Premia which I discuss more fully below.

[1] Page 4-1, *Duff & Phelps 2017 Valuation Handbook – Guide to Cost of Capital*

Q. PLEASE DESCRIBE THE DATA USED IN YOUR DETERMINATION OF THE COST OF EQUITY CAPITAL USING THE CAPM FOR ZIA NATURAL GAS COMPANY.

A. Schedule G-10D summarizes my calculations. The comparable companies used in this analysis are the same as the companies I used in my determination of capital structure. The data inputs into this analysis are the individual companies' Beta (β) (Column C), the risk free rate (R_f) (Column D), the equity risk premium (RP_m) (Column E), market capitalization (Columns H and I), the CRSP Decile, the size premium (RP_s), and the industry risk premium (RP_i). The Betas are from the most current Value Line Investment Survey report for each company. The market capitalization for each company is from the most current Value Line Investment Survey report for each company and the amount reported in Yahoo Finance (internet site) at market close on December 29, 2017. The remaining inputs are from the D&P Handbook (2017).

Q. PLEASE EXPLAIN THE BETA USED IN YOUR DETERMINATION OF THE COST OF EQUITY CAPITAL USING THE CAPM FOR ZIA NATURAL GAS COMPANY.

A. The company specific data used in the CAPM formula is the company's specific Beta. Beta is a measure of the company's risk as measured by the correlation of the company's stock price relative to the market. The market by definition has a Beta of 1.00. A Beta of less than one implies a lower risk than the average market stock. The

Betas for each company are shown in Column C of Schedule G-10D.

Q. PLEASE EXPLAIN THE RISK FREE RATE USED IN YOUR DETERMINATION OF THE COST OF EQUITY CAPITAL USING THE CAPM FOR ZIA NATURAL GAS COMPANY.

A. The risk free rate is the rate the marketplace regards as having no risk of default. The yield on long term United States Treasury bonds is typically used for the risk free rate. However, since the current financial market in the recent past has not been normal, and the rates that will be determined in this case will likely be in effect for several years, to simply use the current yield on long term Treasury bonds would not be appropriate or reasonable. Therefore, the risk free rate I use is based on consideration of several factors. First, I consider the longer run goals of the Federal Open Market Committee ("FOMC"). The policies of the FOMC have directly created the current interest rate environment. Second, I consider the long term real interest rate – the interest rate adjusted for inflation. Third, I consider the long term interest rate considered normal in the D&P Handbook.

Q. PLEASE DISCUSS WHY YOU BELIEVE THE CURRENT MARKET CONDITIONS ARE NOT NORMAL.

A. The Federal Reserve had been holding short term rates at nearly 0 percent for several years until it started to slowly raise short term rates in late 2016 to the current level near 1.5 percent over the last year. They largely accomplished this through purchasing treasury securities in the open market through a process known as

quantitative easing ("QE"). This process involved the Federal Reserve artificially increasing the demand for Treasury securities (and Treasury backed securities) which drives up the prices for these securities and thus lowers the yield. As shown in Exhibit TJS-7, at the time of the 2008-09 recession began, the Federal Reserve held approximately $800 billion in securities. This number grew to approximately $4.5 trillion by 2015 when QE ended. Also Exhibit TJS-8 shows the yields on 20-year and 30-year Treasury bonds over approximately the same time period. Coincidently, both of these periods generally cover the time frame since the Company's last rate case. Clearly, the Federal Reserve's policy has had the effect of driving long term interest rates lower. As also shown in Exhibit TJS-8, this period has also seen significant volatility in the yield on 20-year and 30-year Treasury bonds, ranging between approximately 2 and 5 percent.

As stated previously, the rate of return that the Commission will establish in this case will likely be in effect for several years. It is clearly unreasonable to use the yield on a 20 or 30-year Treasury bonds from a single date during a period when the yields on these bonds have varied substantially, and when interest rates have been pushed lower by what were essentially emergency measures by the Federal Reserve.

Finally, the Federal Reserve has indicated that it plans to raise interest rates three more times in 2018 and begin to unwind the treasury securities it owns (which will also put upward pressure on interest rates). It would be unreasonable to base Zia Natural Gas Company's rate of return on the period of time where the Federal

Reserve's policy is shifting in front of our eyes from historically accommodative to a more normal period.

Q. HAS DUFF AND PHELPS EXPRESSSED A SIMILAR OPINION IN ITS 2017 VALUATION HANDBOOK?

A. Yes. According to D&P:

> "Beginning with the global financial crisis of 2008 (the "Financial Crisis"), analysts have had to reexamine whether the "spot" rate is still a reliable building block upon which to base their cost of equity capital estimates. The Financial Crisis challenged long-accepted practices and highlighted potential problems of simply continuing to use the spot yield-to-maturity of a safe government security as the risk-free rate, without any further adjustments.
>
> During periods in which risk-free rates appear to be abnormally low due to flight to quality of massive central bank monetary interventions, valuation analysts may want to consider normalizing the risk free rate. By "normalization" we mean estimating a risk-free rate that more likely reflects the sustainable average return of long-term U.S. Treasuries."[2]

Q. PLEASE SUMMARIZE THE LONGER RUN GOAL OF THE FOMC THAT IS RELEVANT TO YOUR DETERMINATION OF AN APPROPRIATE RISK FREE RATE.

A. As stated in its December 13, 2017 FOMC meeting press release: "Statement on Longer-Run Goals and Monetary Policy Strategy":

> "The Committee reaffirms its judgment that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate."

In its December 13, 2017 press release, the FOMC reiterated their 2 percent inflation

goal.

Q. HAS THE FOMC INDICATED THE STEPS IT PLANS TO TAKE TO RETURN BACK TO A MORE NORMAL POLICY?

A. Yes. At its June 2017 meeting, the FOMC stated the following:

> "At the June 2017 FOMC meeting, all participants agreed to further augment the Committee's Policy Normalization Principles and Plans by providing the following additional details regarding the approach the FOMC intends to use to reduce the Federal Reserve's holdings of Treasury and agency securities once normalization of the level of the federal funds rate is well under way."[3]

In its December 13, 2017 press release, the FOMC provided additional details regarding how it intends to reduce the holding in its balance sheet. In addition, the Federal Reserve has raised short term interest rates five times in the last year – first in December 2016 and most recently in December 2017- to a level of 1-1/4 to 1-1/2 percent.

Q. PLEASE EXPLAIN HOW YOU CONSIDERED ALL THESE FACTORS IN THE RISK FREE RATE YOU ARE USING.

A. The risk free rate (R_f) can be expressed in terms of the real interest rate plus the expected rate of inflation. In the context of the 1926-2016 time period I use for the equity risk premium of 6.94 percent (discussed below in my direct testimony), inflation averaged 3.0 percent over that same time period, and the income return on long term government bonds averaged 5.0 percent.[4] This equates to a 2 percent real interest rate. As discussed earlier in my direct testimony, the current Federal Reserve

[2] Page 3-2, *Duff & Phelps 2017 Valuation Handbook – Guide to Cost of Capital*
[3] "FOMC Communications related to Policy Normalization" – www.federalreserve.gov/monetarypolicy/policy-normalization.htm
[4] Exhibit 2.3 of the 2017 Duff and Phelps Valuation Handbook.

target inflation rate is 2.0 percent. Combining a 2 percent long term real interest rate with a Federal Reserve target inflation rate of 2 percent, yields a nominal risk free rate (R_f) of 4.0 percent. I also looked at the real interest rates published by the U. S. Treasury since 2000. Over this time period, the real interest rate on Treasury securities with a maturity of 10 years or more has averaged 1.86 percent. This includes the last six years where real interest rates have averaged less than 1 percent. In addition, the D&P Handbook shows a recommended normalized 20-year risk free rate of 3.50 percent. Taking into consideration all of this information, I recommend using a 3.75 percent interest rate for my risk free rate as a reasonable estimate of the long term expectations.

Q. PLEASE EXPLAIN THE EQUITY RISK PREMIUM USED IN YOUR DETERMINATION OF THE COST OF EQUITY CAPITAL USING THE CAPM FOR ZIA NATURAL GAS COMPANY.

A. The equity risk premium (RP_m) I use is the Realized Risk Premiums for the period 1926-2016 as reported in the D&P Handbook. Based on the 2016 D&P Handbook, the current equity risk premium is 6.94 percent. The use of this long term index provides stability to the analysis and is not unduly influenced by short-term market changes. The equity risk premium is shown in Column E of Schedule G-10D.

Q. PLEASE EXPLAIN THE CRSP DECILES USED IN YOUR DETERMINATION OF THE COST OF EQUITY CAPITAL USING THE CAPM?

A. The CRSP deciles are percentiles broken down in 10 percent increments with the 1st decile being the largest companies in the CRSP database and the 10th decile being the smallest companies based on market capitalization. The smallest and largest capitalizations are defined in Appendix 3 of the D&P Handbook. Based on these criteria, the decile for each of the comparable companies is shown in Column J of Schedule G-10D. Column K shows the corresponding size premia adjustment for each comparable company based on its decile as reported in in Appendix B of the D&P Handbook.

Q. PLEASE EXPLAIN THE CALCULATIONS IN SCHEDULE G-10D.

A. Column G in Schedule G-10D shows the calculation of the cost of equity using the CAPM formula (without size premia adjustment) and Column L shows the calculation of the cost of equity using the Modified CAPM formula (with size premia adjustment). Schedule G-10D also shows averages and standard deviations of the sample group.

I have also shown the calculation of the Modified CAPM cost of equity for Zia Natural Gas Company (Natural Gas Processing) assuming that Zia Natural Gas Company has a Beta equal to the average of the comparable companies (Line 17 of Schedule G-10D). I have estimated Natural Gas Processing (Zia Natural Gas Company's parent company) as having a market capitalization of approximately $66 million. This puts Zia Natural Gas Company in the 10th decile. I have further shown the calculation of the cost of equity for Zia Natural Gas Company using the Build-up

formula (Line 17 of Schedule G-10D). The Build-up method uses an industry risk premium in lieu of Beta. According to the D&P Handbook, the industry risk premium for the Natural Gas Distribution industry is a negative 5.73 percent.

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR CAPM ANALYSIS.

A. For the comparable company analysis, I have determined a cost of equity of 10.94 percent. This is based upon using the highest 10 percent of the range of comparable companies to reflect the higher risk for Zia Natural Gas Company. Based on the CRSP deciles, Natural Gas Processing would fall in the 10^{th} decile, i.e. the 10 percent smallest companies with the highest risk. One way to look at the 10 percent of companies with the highest risk is that is that these companies fall 1.28 standard deviations above the average. Therefore, the highest 10 percent of the comparable company analysis equals 10.09 percent plus 1.28 times the 0.67 percent standard deviation, or 10.94 percent. Another way to look at this would be that in a sample of 11 companies you would expect one company's rate of return to exceed this amount and that is the case.

Based on the Zia Natural Gas Company Modified CAPM calculation, the Zia Natural Gas Company cost of equity is 14.55 percent and based on the Build-up method, the cost of equity is 10.55 percent. For purposes of determining my recommended cost of equity for Zia Natural Gas Company, I average the three results (10.94, 14.55, and 10.55) to arrive at a CAPM cost of equity of 12.01 percent.

DCF

Q. PLEASE DESCRIBE THE DISCOUNTED CASH FLOW MODEL YOU USE TO DETERMINE COST OF EQUITY.

A. The DCF model I use is as follows:

$$k_e = d_1/P_0 + g$$

where,

k_e = Cost of equity capital

d_1 = Expected dividends per share over the next year

P_0 = Current stock price

g = Expected growth rate in dividends per share

Q. PLEASE DESCRIBE THE DATA USED IN YOUR DETERMINATION OF THE COST OF EQUITY CAPITAL USING THE DCF FOR WYOMING GAS.

A. Schedule G-10E summarizes my calculations. The comparable companies used in this analysis are the same as the companies I used in my determination of capital structure and determination of cost of equity using the CAPM. The data inputs into this analysis are the individual companies' current stock price (Column C), expected dividends for 2018 (Column D), and projected annual growth rates in dividends and earnings (Columns E and F), respectively. The current stock price is based on the closing prices for December 29, 2017, and all of the other data are from the most current Value Line Investment Survey report for each company.

Q. PLEASE EXPLAIN THE CALCULATIONS IN SCHEDULE G-10E.

A. Column G in Schedule G-10E contains the calculation of the dividend yield portion of the DCF Model (d_1/P_0). I calculate the dividend yield by taking the 2018 projected dividends and divide that by the current stock price. In Columns H and I, I calculate the DCF cost of equity using the projected growth in dividends and projected growth in earnings, respectively. While I show the calculation for both dividends and earnings, I have only considered growth in earnings in my recommendation. In the long run, growth in earnings provides the underlying basis to support increases in dividends.

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR DCF ANALYSIS.

A. For the comparable company DCF analysis, I have determined a cost of equity of 11.91 percent. As discussed earlier in my CAPM discussion, Zia Natural Gas Company falls in the 10^{th} decile (i.e. the 10 percent smallest companies) that is comparable to 1.28 standard deviations above the average. Therefore, the highest 10 percent of the comparable company analysis equals 8.83 percent plus 1.28 times the 2.40 percent standard deviation, or 11.91 percent.

Q. IN CONNECTION WITH YOUR DCF ANALYSIS DID YOU CONSIDER ANY OTHER INFORMATION?

A. Yes. I also considered the Value Line projection of return on equity for the comparable companies. The DCF methodology relies upon the use of the dividend yield expressed as the expected dividends over the next 12 months divided by the current stock price. However, current dividend yields are impacted by the recent

Federal Reserve policies. As the Federal Reserve lowered long term interest rates, the yields on dividend paying common stocks also decline since yields are determined in a competitive marketplace. Therefore, Value Line's longer term expectations for return on equity for natural gas distribution companies gives consideration to a period when interest rates would be expected to return to something more normal. Value Line's projections shown in Column J of Schedule G-10E are for the period 2020-2022, the same period used in the Value Line projections of dividends and earnings growth. Based on this analysis, I have determined a cost of equity of 12.28 percent. The highest 10 percent of the comparable company analysis equals 10.68 percent plus 1.28 times the 1.25 percent standard deviation, or 12.28 percent.

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR DCF AND ROE ANALYSES.

A. For the comparable company DCF and projected ROE analyses, I have averaged the two analyses and determined a cost of equity of 12.10 percent.

Recommended Cost of Equity for Zia Natural Gas

Q. WHAT IS YOUR RECOMMENDED COST OF EQUITY FOR ZIA NATURAL GAS COMPANY?

A. My recommended cost of equity for Wyoming Gas is 12.05 percent. This figure represents the average of the CAPM analysis (12.01 percent) and the DCF/ROE analysis (12.10 percent). This recommendation explicitly recognizes and quantifies the higher risk associated with Zia Natural Gas Company relative to the comparable

companies used in the analyses. Using average of "comparable" companies is not reasonable because such averages include no recognition of the higher risk of Zia Natural Gas Company. Further, simply adjusting the comparable companies for their risk relative to the market does nothing to recognize Zia Natural Gas Company's higher risk relative to the sample of comparable companies. Using the high end of the range of comparable companies and using analyses where Zia Natural Gas Company's higher risk can be explicitly calculated provides a reasonable measure of the Company's higher risk.

Cost of Debt

Q. WHAT IS THE BASIS FOR YOUR RECOMMENDED COST OF DEBT FOR ZIA NATURAL GAS COMPANY?

A. As discussed earlier in my direct testimony, Zia and Natural Gas Processing have zero debt and therefore, there is no actual embedded cost of debt that can be used in the determination of the cost of debt portion of Zia's imputed capital structure. Consistent with the development of the cost of equity using the CAPM methodology, I am recommending that the cost of debt be based on consideration of a longer term perspective on interest rates. Therefore, I primarily rely upon two considerations:

1. The long-term total return on Corporate Bonds as determined in the D&P Handbook.
2. The implicit risk premium underlying Zia Natural Gas Company's currently approved cost of debt.

I summarize these considerations in Schedule G-10F.

Q. DID YOU CONSIDER THE CURRENT YIELD ON CORPORATE BONDS AND TREASURY SECURITIES IN YOUR DETERMINATION OF THE APPROPRIATE COST OF DEBT FOR ZIA NATURAL GAS COMPANY?

A. No. As discussed earlier in my testimony regarding cost of equity, the current market conditions are not normal and it would not be reasonable to use current market rates to set a long term cost of capital for Zia Natural Gas. Further, it would be inconsistent to use a risk free rate based on normal conditions to determine the appropriate cost of equity and use current market rates (which by definition are not normal) to determine the appropriate cost of debt.

Q. WHAT IS THE LONG TERM TOTAL RETURN ON DEBT AS DETERMINED IN THE D&P HANDBOOK?

A. As shown in Schedule G-10F (Line 7), the average return for the period 1926-2016 is 6.3 percent (Page 2-4 of the 2017 D&P Handbook). This time period is the same time period used to determine the equity risk premium (RP_m) in the CAPM discussed earlier in my direct testimony.

Q. WHAT IS THE IMPLICIT RISK PREMIUM UNDERLYING ZIA NATURAL GAS COMPANY'S CURRENTLY APPROVED COST OF DEBT?

A. The cost of debt included in the calculation of Zia Natural Gas Company's allowed rate of return is 6.10 percent. The order in Zia Natural Gas Company's last rate case was dated November 25, 2008. On that date, the yield on 20-year treasury securities

was 3.85 percent and the yield on 30-year treasury securities was slightly lower at 3.63 percent. Therefore, the risk premium implied in the approved cost of debt is 2.25 to 2.47 percent above the risk free rate at that time (see Schedule G-10F, Lines 5 and 6).

Q. IF THE SAME RISK PREMIUM IS APPLIED TO THE CURRENT RISK FREE RATE, WHAT IS THE RESULTING COST OF DEBT?

A. As discussed earlier in my direct testimony, the risk free rate I am using in my analysis is 3.75 percent If the 2.25 to 2.47 percent range of risk premium is added to the risk free rate, the resulting cost of debt is 6.00 to 6.22 percent, as shown on Line 9 and 10 of Schedule G-10F.

Q. WHAT IS THE COST OF DEBT YOU ARE RECOMMENDING TO USE IN THE DETERMINATION OF ZIA NATURAL GAS COMPANY'S COST OF CAPITAL?

A. Based on consideration of the long-term cost of debt according to the D&P Handbook of 6.3 percent and the risk adjusted cost of debt of 6.00 percent to 6.22 percent, I am recommending a cost of debt for Zia Natural Gas Company of 6.17 percent as shown on Line 11 of Schedule G-10F.

Cost of Capital

Q. BASED ON YOUR RECOMMENDED CAPITAL STRUCTURE, COST OF EQUITY AND COST OF DEBT, WHAT IS THE OVERALL WEIGHTED COST OF CAPITAL YOU ARE RECOMMENDING FOR ZIA NATURAL

GAS COMPANY?

A. I am recommending a weighted cost of capital of 9.36 percent as shown in the following table (and Schedule G-1):

Component	Percent	Cost	Weighted Cost
Debt	45.40%	6.17%	2.80%
Equity	54.60%	12.05%	6.58%
Total	100.00%		9.38%

Q. DOES THIS CONCLUDE YOUR TESTIMONY REGARDING YOUR RECOMMNEDED COST OF CAPITAL FOR ZIA NATURAL GAS COMPANY?

A. Yes, it does.

V. PEAK DAY AND CLASS LOAD FACTOR ANALYSIS

Q. FOR WHAT PURPOSE DO YOU DEVELOP CLASS LOAD FACTORS?

A. I use class load factors to determine the class peak day requirements in the development of the demand allocation factors I use in my class cost of service study. Since the Company does not directly collect data regarding the peak day usage of each customer or each customer class, the development of class load factors provides a means to estimate the peak demand of each customer class.

Q. PLEASE DEFINE WHAT YOU MEAN BY LOAD FACTOR.

A. Load factor is the ratio of the customer class's average daily demand to the customer class's peak day demand. Average daily demand is equal to annual sales divided by 365 days. If the average daily demand is known then the class's peak day requirements can be determined by dividing the class's average daily demand by load factor. Load factor provides a relative measure of how efficiently a customer class utilizes the capacity of the system.

Q. HOW DO YOU DETERMINE THE LOAD FACTOR FOR EACH OF THE PROPOSED CUSTOMER CLASSES?

A. For the classes for which I prepared a weather normalization adjustment (Residential, Small Commercial, Large Commercial, and Wholesale), I use the results of the same regression analyses used to determine the weather normalization adjustment to determine the class load factors. For the Irrigation and Industrial customer classes, I base the load factors on analysis of the classes' monthly usage.

Q. PLEASE EXPLAIN HOW YOU DETERMINED THE CLASS LOAD FACTORS FOR THE RESIDENTIAL, SMALL COMMERICAL, LARGE COMMERCIAL AND WHOLESALE CLASSES.

A. The calculation of load factor for each of these classes is shown in Exhibit TJS-9. The base use and heat factors (Columns [B] and [C], respectively) are the same factors used in the weather normalization adjustment as shown in Exhibit TJS-4 and Exhibit TJS-5. The base use factor is the usage not correlated with HDDs and the units on these factors is mscf per customer per month. The heat factor is the usage correlated with HDDs and the units on these factors is mscf per HDD per customer. The normal peak day HDDs (Column [D]) and normal annual HDDs (Column [E]) are developed in Exhibit TJS-3.

Utilizing the regression coefficients and the HDDs, the normal average daily and normal peak day usage per customer can be estimated. The normal peak day usage per customer is equal to the base usage divided by the average number of days in a month plus the peak day HDDs times the heat factor. The normal average daily usage per customer is equal to the base usage times 12 months plus the normal annual HDDs times the heat factor, all divided by 365 days. The load factor for the class is then equal to the average daily use per customer divided by the peak day usage per customer. This calculation is shown in Column [F] of Exhibit TJS-9.

Q. HOW DID YOU DETERMINE THE CLASS LOAD FACTORS FOR THE IRRIGATION CLASS?

A. Irrigation customers use natural gas to operate natural gas fired engine driven pumps that pump groundwater to irrigate crops. Since Zia Natural Gas Company's system peaks during the winter time usually on the coldest day, one would not expect irrigation pumps to be operating on such days since the coldest day is typically going to have freezing temperatures. Further, based on review of the monthly sales volumes to irrigation customers, irrigation load primarily occurs during the months of March through October, not coincident with the period of time during which the winter peak will occur. For these reasons, I set the class load factor for the irrigation class equal to zero. In other words, I do not expect that these customers are using natural gas at the time of the system peak day.

Q. HOW DID YOU DETERMINE THE CLASS LOAD FACTORS FOR THE INDUSTRIAL CLASS?

A. Based on review of the monthly sales volumes to the industrial customers, their usage does not vary significantly from month to month nor does it vary significantly from summer to winter. While there is some seasonality to the usage that seasonality is not based on winter temperatures. It is primarily based on the seasonality of the industrial processes. The primary industries of the Company's industrial customers are food and oil processing. The seasonality in industrial use is primarily caused by the food processing customers who primarily use natural gas for chili drying which occurs in the late summer and fall.

Over the five year period 2012 through 2017, the average daily use per industrial customer was 5.8 mscf while the average daily use per industrial customer during January and December over the same time period was 6.8 mscf. The 85 percent load factor I use for the industrial customer class is based on the ratio of the average annual daily use to the average December and January use.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY REGARDING PEAK DAY AND CLASS LOAD FACTORS?

A. Yes, it does.

VI. REVENUE REQUIREMENTS AND CLASS COST OF SERVICE STUDY

Q. HAVE YOU MADE CHANGES TO THE CLASS COST OF SERVICE STUDY YOU PREPARED IN THIS CASE RELATIVE TO THE ONE YOU PREPARED IN THE COMPANY'S LAST CASE?

A. Yes. I made two significant changes to the class cost of service study I prepared for this case compared to the one I sponsored in the Company's last case in Case No. 08-00036-UT. These changes primarily relate to the Company's acquisition of the Dona Ana system from Rio Grande Natural Gas Association in 2011. In its Order Adopting Recommended Decision in Case No. 10-00272-UT, the Commission ordered the following:

> "Zia shall be allowed to apply to customers of the Dona Ana system on a temporary basis the rates Zia currently charges to customers in its other New Mexico operating districts, as those rates were approved in Case No. 08-00036-UT. Zia shall propose in Zia's next rate case valuations for the assets it is acquiring in this case and address the reasonableness of a positive or negative acquisition adjustment to properly value the assets for Zia's rate base. Zia shall also address in its next rate case through a cost of service study whether any of its New Mexico districts and customer classes subsidize other New Mexico districts and customer classes. Zia shall address the reasonableness of charging a uniform rate for service among Zia's operating districts versus the potential establishment of geographically based rate zone and the reasonableness of its rate design for the various customer classes in the areas being acquired in this proceeding."

The primary issue that the Commission ordered the Company to address in this case is whether charging the customers in the acquired system (the Dona Ana system) the system-wide rate in effect at the time was reasonable. Further, the Commission is asking the Company to address whether charging the Dona Ana

system the same rate as the rest of the system creates a subsidy (i.e. the legacy Zia system is subsidizing Dona Ana customers or the Dona Ana system is subsidizing the legacy Zia system). Further, the Order in Case No. 10-00272-UT also discussed the irrigation and industrial customers that were being acquired with the Dona Ana system, and the appropriate rates to charge these customers.

The other issue raised in the citation above relates to the value of the acquired assets and that issue is addressed in the Direct Testimony of Ms. Leslie Graham.

Q. PLEASE DISCUSS THE CHANGES YOU MADE TO THE CLASS COST OF SERVICE STUDY YOU PREPARED IN THIS CASE TO MEET THESE REQUIREMENTS.

A. As previously discussed in my testimony, the Company is proposing two new rates, one for irrigation customers and the second for industrial customers. As discussed earlier, the customers, volumes, and revenues associated with these customer classes have been segregated from the existing Small and Large Commercial and Special Contract customer classes. In the class cost of service study I prepared for this case, I have created two new customer classes so that the cost to serve these customer classes can be determined and separate rates proposed, if appropriate.

The second change made to the class cost of service study is to segregate the Dona Ana customers from the legacy Zia system so that that cost to serve the Dona Ana and legacy system customers can be determined separately to assess whether system-wide rates are reasonable, as requested in the Commission's Order.

Q. PLEASE DESCRIBE THE CLASS COST OF SERVICE STUDY YOU SPONSOR IN THIS MATTER.

A. I sponsor two class cost of service studies, one based on the Base Year and one on the Test Year revenue requirements. The Base Year class cost of service study is based upon Zia's operations for the twelve-month period ended August 31, 2017, and the Test Year class cost of service is based on Zia's operations for the twelve-month period ended August 31, 2017 reflecting the Company's proposed test year adjustments to rate base and expenses. Other than the billing unit and revenue adjustments discussed earlier in my direct testimony, Base Year and Test Year figures (rate base and revenue requirements) were provided by and are sponsored by Company personnel. I summarize the Base Year and Test Year revenue requirements and rate base in Schedules A-1, A-3, and A-4. Schedule A-5 summarizes the rate of return I use in my class cost of service study, and is essentially the same as Schedule G-1 discussed earlier in my testimony.

The class cost of service studies I sponsor are contained in Schedules L, M, N, and O. My discussion of specific numbers or results in the testimony that follows is based on the Test Year analyses unless otherwise specified.

Q. PLEASE DESCRIBE SCHEDULE L.

A. Schedule L-1 summarizes Base Year and Test Year rate base. Plant in service is summarized by FERC account, accumulated depreciation by FERC Account, and other rate base items by type. Schedule L-2 shows the functional classification of rate

base, Schedule L-2(a) for the Base Year and Schedule L-2(b) for the Test Year. Schedule L-4 shows the allocation of functionally classified rate base to customer classes, Schedule L-4(a) for the Base Year and Schedule L-4(b) for the Test Year.

Schedule L-5 summarizes the Base Year and Test Year revenue requirement (Total Company Cost of Service). Schedule L-6 shows the functional classification of Cost of Service, Schedule L-6(a) for the Base Year and Schedule L-6(b) for the Test Year. Schedule L-8 shows the allocation of functionally classified cost of service to customer classes, Schedule L-8(a) for the Base Year, and Schedule L-8(b) for the Test Year.

Base Year and Test Year revenues by class and type are summarized in Schedule A-2.1 with additional detail in Schedule K.

Q. PLEASE EXPLAIN THE COST FUNCTIONS YOU SHOW IN SCHEDULE L.

A. I classify costs in Schedule L into ten functions: Commodity; Transmission - Demand and Commodity; Distribution - Demand and Customer; Services (service lines); Meters and Regulators; Customer Accounting, Direct – Las Vegas, and Direct - Other. The Transmission, Distribution, and Services functions are further segregated between the Dona Ana and Other Zia (the legacy system) systems.

Since Gas Supply costs are collected through a separate Purchased Gas Adjustment Clause ("PGAC"), I do not include these costs in the cost of service study. Therefore, my class cost of service study only includes margin (cost of service or revenues excluding cost of gas) related costs and revenues.

The Commodity function is used to allocate regulatory commission expenses, primarily rate case expenses.

The Transmission function includes costs associated with the Company's transmission assets as well as the high capacity steel distribution mains in the Dona Ana system (where no mains are specifically booked as transmission). I assign 50 percent of the cost assigned to the transmission function as Demand related and 50 percent as Commodity related. This treatment strikes a balance between the peak day and annual requirements that these facilities meet. Included in the transmission mains investment (Account 367) is the cost of approximately 12 miles of main that directly serves Las Vegas. I directly assign the book cost of this main to Las Vegas.

Based on a detailed study of mains investment, I have classified 46.40 percent of Distribution related costs as Demand related and 53.60 percent as Customer related.

I classify costs associated with the service lines as Services related costs.

I classify costs associated with meters and regulators as Meters and Regulators related costs. Also, the Company books costs associated with cathodic protection to the same department as Meters and Regulators. The meter and regulator associated with service to Las Vegas is booked to Account 369 – Measuring and Regulating Station Equipment and I directly assign the booked cost of that meter and regulator to Las Vegas.

I classify customer service costs as Customer Accounting related.

The Direct - Other assigned classification includes revenues associated with interest on unpaid bills, read-in meter fees, returned check charges, and margin revenue from Texas customers.

Q. PLEASE EXPLAIN HOW YOU ASSIGN COSTS TO THE COST FUNCTION YOU USE.

A. In the L-2 and L-6 Schedules, I reference how the costs are assigned to function in Column (V). If a cost is directly assigned to a cost function, I indicate to which function the costs are assigned. If a cost is allocated to function based on how other costs are assigned or allocated to function, I indicate upon which basis that cost is allocated to functions.

Q. HOW DO YOU TREAT OTHER OPERATING REVENUES IN YOUR CLASS COST OF SERVICE STUDY?

A. In my class cost of service study, I credit other operating revenues to cost of service. The other operating revenues I credit to cost of service include: interest on unpaid bills, read-in meter fees, connection and reconnection charges, returned check charges, rents, merchandising, non-tariff revenues, gain/loss on assets, other gas revenues, margin revenue from Texas customers, and margin revenue from transportation customers. I directly assign interest on unpaid bills, read-in meter fees, and returned check charges to the Residential class because this is the class that generally produces these types of revenues. Connection and reconnection charges and non-tariff revenues I assign to the Customer Accounting function. I assign rents

based on Total Plant investment. I assign merchandising and other gas revenues based on supervised O&M. I assign margin revenues from transportation customers on the basis of net plant. I assign interest expense on customer deposits directly to the Residential class.

Q. PLEASE DISCUSS YOUR TREATMENT OF REVENUES FROM TEXAS CUSTOMERS.

A. The Company serves 28 Residential customers in Texas off its Hobbs system in southeast New Mexico. The Texas Railroad Commission has accepted New Mexico as having regulatory authority over these customers. They are charged the same rates as New Mexico less state income taxes. Therefore, there is really no cost allocation issue related to these customers, and the most straightforward treatment is to simply credit the margin revenues that the Company receives from these customers to the cost of service of New Mexico residential customers. The total margin revenues (weather normalized) associated with these 28 customers is $7,608. Because the class is so small, I elected to use the revenue credit approach in order to simplify my analysis. Additionally, I reduce the amount of the overall increase attributable to New Mexico customers by the amount that would be derived by charging the Texas customers the rates I am proposing for New Mexico Residential customers.

Q. PLEASE DISCUSS WHERE YOU ALLOCATE FUNCTIONALLY CLASSIFIED COST TO CUSTOMER CLASSES.

A. In Schedules L-4 (rate base) and L-8 (revenue requirement or cost of service), I allocate rate base and cost of service, respectively, to customer classes.

Q. HOW DO YOU DEFINE CUSTOMER CLASSES IN YOUR COST OF SERVICE STUDY?

A. Consistent with my earlier discussion, I define my customer classes based on the current service classifications used by the Company and I include the classes for the proposed new rates, and I segregate customers between the Dona Ana and Other Zia systems. I therefore have five customer classes split between Dona Ana and Other Zia: Residential, Small Commercial, Large Commercial, Irrigation, and Industrial; and a customer class for Wholesale – Las Vegas.

Q. PLEASE DISCUSS THE PRINCIPAL ALLOCATION BASES YOU USE IN YOUR CLASS COST OF SERVICE STUDY.

A. The principal allocation factors used in Schedules L-4 and L-8 to allocate functionally classified costs to customer classes are shown in Schedule N, Schedule N-1(a) being for the Base Year and Schedule N-1(b) for the Test Year. Since I am not proposing any test year adjustments to customers or volumes, there is no difference between the base and test year allocations.

Firm winter peak demand represents estimated class peak day requirements. The peak day requirements for the classes are estimated based on the load factor analyses discussed earlier in my testimony and summarized in Exhibit TJS-9.

Winter period throughput (volumes) represents throughput for each class during the months of November through March. The firm winter period sales allocation basis represents the same figure since the Company does not provide interruptible service. The commodity allocation basis represents annual throughput (volumes) for each class.

I develop the distribution-customer, services, meters and regulators, and customer accounting allocation bases by weighting average number of customers. I weight the number of customers by factors that represent the relative cost or investment associated with service to each class.

I do not allocate distribution related costs to the Wholesale – Las Vegas class because this customer is served directly off of the transmission system and the cost of the meter and regulator are directly assigned as previously discussed.

Q. HOW DO YOU ALLOCATE FUNCTIONALLY CLASSIFIED COSTS TO CUSTOMER CLASSES?

A. I allocate Transmission and Distribution Demand related costs to classes using an approach that results in 50 percent of the costs being allocated on the basis of winter period throughput and 50 percent of the costs being allocated on the basis of peak day deliveries.

I allocate Commodity and Transmission Commodity related costs to classes based on annual throughput (volumes).

I allocate Distribution Customer, Services, Meters and Regulators, and Customer Accounting related costs to classes on the basis of weighted number of customers. Weighting factors are used for each functional classification in order to recognize the relative difference in costs of these functions in serving the various customer classes.

As previously discussed, I directly assign certain other revenues, margin revenues derived from Texas customers as shown on Lines 25 through 28 of Schedule L-8, and direct costs associated with service to Las Vegas as shown on Line 23 of Schedules L-4 and L-8.

Q. PLEASE DISCUSS SCHEDULE M.

A. In Schedule M, Schedule M-1(a) for the Base Year and Schedule M-1(b) for the Test Year, I show the calculation of class unit cost of service by stating the class cost of service shown in Schedule L-8 (a and b) in terms of a unit cost. For example, I divide Distribution-Customer related class cost of service from Schedule L-8 by class number of customers (from Schedule N) and then divide by 12 to state the cost of service in term of dollars per month.

Q. PLEASE DISCUSS SCHEDULE O.

A. In Schedule O, Schedule O-1(a) for the Base Year and Schedule O-1(b) for the Test Year, I show class rates of return under current rates and proposed rates (Schedule O-1(b) only).

Q. WHAT ARE THE PRINCIPAL FINDINGS OF YOUR STUDY?

A. As shown in Schedule O-1(b), the overall rate of return on Zia's gas utility operations under current rates amounts to 5.75 percent based on a rate base of $46,913,872. I summarize class rates of return under current rates by customer class in the table below.

Customer Class	**Rate of Return Under Existing Rates**
Residential	3.96%
Small Commercial	11.70%
Large Commercial	13.55%
Irrigation	11.14%
Industrial	20.20%
Wholesale	-4.54%

In addition, the rate of return under current rates for the Dona Ana system is 2.23 percent, and for the Other Zia system, the rate of return is 8.30 percent.

As indicated by the rates of return under current rates, current rate revenues associated with Zia's service to New Mexico customers are insufficient to cover cost, including an opportunity for the Company to earn a reasonable return on its investment devoted to public service. In order for the Company to earn the 9.38 percent rate of return requested by the Company, current rate revenues must be increased by $2.6 million.

Q DOES THIS CONCLUDE YOUR DIRECT TESTIMONY REGARDING REVENUE REQUIREMENTS AND THE CLASS COST OF SERVICE STUDY?

A. Yes, it does.

VII. PROPOSED RATE DESIGN

Q. WHAT GUIDELINES DID YOU FOLLOW IN THE DESIGN OF YOUR PROPOSED RATES?

A. I used the following guidelines to design proposed rates:

1. The overall rate increase should be approximately $2.6 million. The amount of this $2.6 million applicable to New Mexico retail customers should be reduced by the amount of the increase applicable to Texas customers.
2. Customer charges should more directly reflect the fixed nature of non-gas costs as well as direct customer related costs.
3. All customers should be paying a system-wide transmission charge.
4. Customer charges and distribution charges should be established on a system-wide basis.
5. Maintain existing relative rate relationships between Residential, Small Commercial, and Large Commercial rates.
6. Develop new rates for Irrigation and Industrial classes.
7. Assume that same rates are charged to Texas Residential customers as proposed for the New Mexico Residential customers. The actual rates that will be charged to Texas customers will be adjusted to remove state income taxes.
8. Since there are disparate class rates of return within the class cost of service study showing that rates for some classes should receive an overall decrease, design rates such that no class receives an overall decrease in rates.
9. Consistent with the above goals, rates should be designed as near to class cost of service as practical.

Q. PLEASE GENERALLY DISCUSS THE COMPANY'S CURRENT RATE STRUCTURE.

A. Currently Zia has the following four rate schedules:

1. Residential
2. Small Commercial
3. Large Commercial
4. Wholesale

In addition, Zia currently serves three customers under special contracts.

The Residential, Small Commercial, and Large Commercial rates are system-wide rates where the customer charges are different between the three rates but the transmission and distribution charges are the same. The Wholesale rate has a customer and transmission charge. The three special contract customers are currently charged a customer and distribution charge.

Q. HOW LONG HAS ZIA HAD SYSTEM-WIDE RATES FOR ITS RESIDENTIAL, SMALL COMMERCIAL AND LARGE COMMERCIAL RATES?

A. As discussed earlier in my testimony, in its Order Adopting Recommended Decision in Case No. 10-00272-UT, the Commission ordered that the system-wide rates established in the Company's last rate case in Case No. 08-00036-UT be applied to the Dona Ana system on a temporary basis. These rates have been in effect since April 2011.

In Case No. 08-00036-UT ("2008 Rate Case"), the Company proposed and the Commission approved system-wide rates. At the time of the Company's filing in Case No. 08-00036-UT, the Company essentially had system-wide rates with one exception. Prior to Case No. 08-00036-UT, the customers served in the Maxwell district (District

230) had a lower transmission charge than the rest of the system. This differential was eliminated as a result of Case No. 08-00036-UT.

In Case No. 2745 ("1996 Rate Case"), which was the Company's rate case prior to the 2008 Rate Case, the Company proposed system-wide rates. At the time of the Company's filing in that case, the Company had separate rates for its Ruidoso and Hobbs districts. The Staff supported the Company's recommendation and the Hearing Examiner recommended that the Staff's and Company's recommendations be adopted and the Commission approved this recommendation for system-wide rates.

Q. DOES YOUR CLASS COST OF SERVICE STUDY INDICATE THAT THERE ARE DIFFERENCES IN THE COST OF SERVICE BETWEEN DONA ANA AND THE REMAINING ZIA SYSTEM?

A. Yes. As I indicated earlier in my testimony, the rate of return under existing rate for the Dona Ana system is 2.23 percent and the rate of return for the rest of the system (excluding Las Vegas) is 8.30 percent. If I include Las Vegas, the rate of return on the legacy Zia system is 7.81 percent. Further, similar differences exist between the classes in the Dona Ana system compared to the same classes in the legacy Zia system. For example, the rate of return under existing rates for the Dona Ana Residential customers is 0.55 percent versus 6.19 percent for the Residential customers in the remainder of the system.

Q. WOULD YOUR CLASS COST OF SERVICE STUDY INDICATE THAT THERE SHOULD BE DIFFERENT RATES FOR THE DONA ANA SYSTEM THAN THE REMAINDER OF THE SYSTEM IF THE CLASS COST OF SERVICE STUDY WAS THE SOLE CONSIDERATION?

A. Yes. As shown in Schedule M-1b (specifically Line 17) there are significantly differences in the distribution related cost of service between Dona Ana and the remainder of the system. However, the class cost of service study should not be the sole consideration.

Q. WHY SHOULD YOUR CLASS COST OF SERVICE STUDY NOT BE THE SOLE CONSIDERATION?

A. First, there are several other factors that must be considered when designing rates other than the class cost of service study. Second, the class cost of service should be viewed as a snapshot taken at a specific point in time. The primary driver in a class cost of service study is the investment in transmission and distribution plant and how the costs of these facilities are allocated. As indicated above, the primary difference between the Dona Ana and legacy Zia system is related to distribution plant (i.e. distribution mains).

Since 2011, the Company has invested approximately $5 million in distribution mains in the Dona Ana district. This represents approximately 30 percent of the total rate base of approximately $17 million for the Dona Ana district in Schedule O-1. This factor is the primary reason why the distribution cost of service in Dona Ana is higher than the rest of the system. There are two reasons why this recent investment should not be the primary consideration in the design of Zia's rates. First, the class cost of service study is based on using embedded cost. For plant in service, this embedded cost is based on the original cost of the facilities. Second, when one area is compared to another there can be significant differences in the age of the facilities and this difference in age has two impacts. First, the older facilities have a lower original cost. The relatively large investment in the Dona Ana system is using very recent cost. The investment in the rest

of the system is using costs that go back as far as the 1960's. There have been very substantial changes in the cost of distribution mains over this period of time. Second, older facilities generally have higher operation and maintenance requirements and will ultimately have to be replaced sooner than the new facilities (in other words they have a shorter remaining life). In effect, much of the differences in cost are due to the effects of time, not any inherent difference in the cost to serve, and these time effects are transient. While significant recent investment was made in Dona Ana, investment in that area should decline significantly and will likely increase at some point in the older areas of the system, thus shifting the dynamics of the cost allocation towards a different area.

Q. PLEASE DISCUSS FURTHER HOW TIME IMPACTS THE COST OF THE FACILITIES.

A. The Company's total investment in distribution mains (FERC Account 376) is approximately $40 million. As indicated earlier this amount is the total of the original cost of all the mains currently in service since the 1960's. If this cost was expressed in term of current cost (trended original cost), that cost would be over $90 million. The following table shows the Handy-Whitman ("H-W") cost indices for Plastic Distribution Mains -Account 376 for the Plateau region since the 1960's:

Year	H-W Index
1965	74
1970	87
1975	130
1980	193

1985	235
1990	281
1995	305
2000	334
2005	391
2010	457
2015	503

As shown in this table, there are substantial differences in cost depending on the decade in which the facilities were installed.

Q. PLEASE DISCUSS HOW AGE IMPACTS THE OPERATION AND MAINTENANCE COSTS AND HOW THESE COSTS ARE TREATED IN THE CLASS COST OF SERVICE STUDY.

A. As indicated above, older facilities will generally require a higher level of operation and maintenance than new facilities. In the class cost of service study, operation and maintenance expenses are generally allocated on the basis of plant investment. When you segregate customer classes by district and difference in the relative age of the facilities between these districts is relatively high, the cost of service study actually has the inverse effect when allocating operation and maintenance expenses. In other words, a higher level of operation and maintenance expenses are allocated to the newer facilities because their original cost is much higher due to the effect of time discussed above.

Q. WHAT ARE SOME OF THE FACTORS IN ADDITION TO THE CLASS COST OF SERVICE STUDY THAT SHOULD BE CONSIDERED WHEN DESIGNING RATES?

A. There are several factors that should be considered in addition to the class cost of service study when designing rates, including the following:

1. The historical relationship between rates
2. Long-term stability in the rates and the relationships between rates
3. Rates should reflect differences in the nature or level of service
4. Benefits realized by existing customers by expanding the system
5. Ease of administration and ease of understanding
6. Fixed versus variable costs and fixed versus variable rate components
7. Seasonal and long-term usage trends
8. Market forces such as the cost of competing fuels or energy sources

Q. PLEASE DISCUSS HOW THE HISTORICAL RATE RELATIONSHIPS IN THE DESIGN OF ZIA'S RESIDENTIAL, SMALL COMMERCIAL, AND LARGE COMMERCIAL RATES REINFORCE THE FIRST FIVE FACTORS LISTED ABOVE.

A. As previously discussed there are two principal historical relationships that exist in Zia's current rates which I recommend be retained. First, Zia's non-gas cost rates are set on a system-wide basis. Second, the Residential, Small Commercial, and Large Commercial volumetric rates are equal, with differences reflected in the customer charges. This structure has been in place for approximately 20 years. At the time of the Company's

acquisition of the RGNGA system six years ago, it was decided that this structure should be maintained and then reviewed in this rate case as it pertains to the Dona Ana system.

While at any given point in time a class cost of service study might indicate differences in cost between these classes or even between the four geographic areas in which the Company provides services, these differences are primarily driven by the age of the distribution systems and the time at which these systems will be renewed. The most recent region that experienced renewals was the Dona Ana system. As investment is made in specific locations, a class cost of service study would inevitably show that the cost is higher in those locations primarily due to the fact that rates are based on embedded (or historical) cost and costs generally increase significantly over time. These timing differences do not result in any real difference in the service to the customer. Even if all of the investment in all four regions was of a similar age, the cost of service study would still show slight differences in cost primarily due to the relatively small differences in the usage characteristics (size and load factor) of the customers in the different districts. The service being provided in each of the Company's districts is essentially the same type of service using comparable facilities.

As it pertains to the acquisition of the Dona Ana system, it is important to also take into account that this acquisition benefited the existing Zia customers for two important reasons. First, this acquisition significantly increased the customer base of the Company with a relatively smaller increase in the general and administrative costs. In the Company's last rate case, Case No. 08-00036-UT, the home office expenses allocated to Zia were $1.53 million and the Company served approximately 24,000 customers. Thus, the cost per customer in 2008 was approximately $64 per customer per year. In the

current case, the home office expenses allocated to Zia are $2.3 million for approximately 38,000 customers or $61 per customer per year. This represents a five percent decline over a period where prices have generally increased by 17 percent (CPI of 211.1 at the time of the Company's 2008 filing versus November 2017's figure of 246.7). The second benefit is that the Dona Ana system is growing at a rate substantially higher than the rest of the system, and this growth will further contribute to spreading out administrative costs over an increasing customer base.

Finally from the perspective of ease of administration and ease of understanding by the customers, the existing structure is less complex than would be establishing a set of rates that are differentiated by location.

Q. PLEASE DISCUSS HOW FIXED AND VARIABLE COSTS AND TRENDS IN USAGE CHARACTERISTICS CREATE A CONFLICT WITH TRADTIONAL RATE DESIGN.

A. Virtually all of the non-gas costs in the Company's revenue requirements are fixed and cost do not vary directly with the quantity of gas delivered in any particular year. Yet, under existing rates, approximately 63 percent of the revenues are recovered through the variable volumetric components of the rates. A significant portion of these volumes also vary directly with winter heating requirements that are weather dependent. A less significant factor, but also important, is that natural gas usage, especially for residential and small commercial customers has been in a long term decline. This decline is primarily attributable to improvements in the basic equipment (primarily heating equipment) used by customers. Further, energy efficiency programs, such as those currently in place for Zia, are specifically designed to further increase the efficiency of

natural gas usage (i.e. reduce usage). While these reductions in usage over time result in a decrease in the gas commodity used with the corresponding reduction in purchased gas cost, these reductions reduce the revenue collected from volumetric non-gas rates but do not reduce the fixed costs of operating and maintaining the gas distribution system.

Q. HOW CAN THE EFFECTS OF WEATHER AND DECLINING USE BE REFLECTED IN THE DESIGN OF RATES?

A. There are generally two, not necessarily mutually exclusive, ways in which the impact of weather and declining use can be mitigated through rate design. The first approach is to use revenue decoupling mechanisms that are designed to decouple revenue recovery from volumetric rate design. The common approach to mitigate the impact of weather is through a weather normalization adjustment ("WNA") mechanism that adjusts the volumetric margin revenues (up or down) based on the differences between actual and normal weather conditions. There are several decoupling methods that are used to reflect the declining usage. Both weather normalization and revenue decoupling mechanisms usually require active management and implementation of the riders by the utility and also regular filings and review by regulators. As an alternative or supplement to revenue decoupling mechanisms, the base rates can be designed to recover more (and in some cases all) of the fixed costs through the fixed rate components (in Zia's case, the customer charges).

Q. WHICH OF THE TWO APPROACHES ARE YOU RECOMMENDING IN THIS CASE?

A. I am recommending that more of the fixed cost be recovered through the fixed rate component. At this time, the Company is not interested in the additional administrative and/or filing requirements of implementing a WNA or other decoupling mechanism.

Q. PLEASE DISCUSS THE COMPANY'S PROPOSED IRRIGATION RATE.

A. As discussed earlier in my testimony, the Company is proposing the implementation of a separate rate for irrigation customers. This rate will be available to customers who use natural gas for irrigation pumping. As shown in Schedule K-1, this Irrigation class consists of 481 customers who are currently served under the Small Commercial rate and 6 customers served under the Large Commercial rate. The vast majority of these customers are served in the Dona Ana district (479) that was acquired from RGNGA in 2011. As discussed later in my testimony, the rate structure for this rate will have a customer charge, transmission charge, and distribution charge. As shown in the class cost of service study, the usage and cost characteristics of this class are significantly different from the existing Small and Large Commercial customers. The load is primarily off-peak and the customers on average are about twice the size of a typical Small Commercial customer.

Q. PLEASE DISCUSS THE COMPANY'S PROPOSED INDUSTRIAL RATE.

A. The Company is proposing a separate Industrial rate. This rate will be available to customers who use more than 12,000 mscf per year and who use natural gas primarily for producing, processing, or assembling goods, including oil and gas extraction and food processing. As shown in Schedule K-1, this Industrial class includes six Large Commercial customers and three customers currently served under special contracts. Three of the current Large Commercial customers are served in the Hobbs district and the

three remaining customers in the Dona Ana district. As discussed later in my testimony, the rate structure for this rate will have a customer charge, transmission charge, and distribution charge. As shown in the class cost of service study, the usage and cost characteristics of this class are significantly different from the existing Large Commercial customers. The load is very consistent throughout the year and the customers on average are 20-30 times the size of a typical Large Commercial customer.

Q. WHAT ARE YOUR SPECIFIC CUSTOMER CHARGE RATE DESIGN RECOMMENDATIONS?

A. I propose the following customer charge changes:

1. Increase the Residential customer charges from $10.96 to $16.00 per month.
2. Increase the Small Commercial customer charge from $15.15 to $22.50 per month.
3. Increase the Large Commercial customer charge from $40.53 to $60.00 per month.
4. Increase the City of Las Vegas customer charge from $300.00 to $4,885 per month.
5. Set the proposed Irrigation rate customer charge at $40 per month.
6. Set the proposed Industrial rate customer charge at $215 per month.

Q. WHAT ARE YOUR SPECIFIC TRANSMISSION CHARGE RATE DESIGN RECOMMENDATIONS?

A. I am recommending a system-wide transmission charge of $0.6320 per mscf applicable to all customers. This is equivalent to the current transmission charge; therefore most customers will not experience a change in this component of the rate. However, the

current special contract customers do not currently pay a transmission charge and the Wholesale transmission charge is currently substantially less than the transmission charge for the remaining existing rates.

Q. WHAT ARE YOUR SPECIFIC DISTRIBUTION CHARGE RATE DESIGN RECOMMENDATIONS?

A. I am recommending the following distribution charge changes:

1. Decrease the distribution charge for all Residential, Small Commercial, and Large Commercial customers from $2.436 per mscf to $2.411 per mscf.
2. Set the distribution charge for the Irrigation customers at $1.000 per mscf.
3. Set the distribution charge for the Industrial customers at $1.600 per mscf.

Q. HAVE YOU PREPARED ANY SCHEDULES SUMMARIZING YOUR PROPOSED RATES?

A. Yes. Schedule P-2 summarizes the existing and proposed rates and Test Year revenues under existing and proposed rates. Lines 1 through 14 show Test Year revenues under existing rates, Lines 15 though 28 show Test Year revenues under proposed rates, and Lines 29 through 44 compare Test Year revenues under existing and proposed rates.

Q. HOW DID YOU DETERMINE THE CUSTOMER CHARGES FOR EACH CUSTOMER CLASS?

A. I am proposing customer charges that move closer to the customer related costs indicated in my cost of service study and also produce a higher level of overall fixed charge recovery as previously discussed in my testimony. The table below summarizes the indicated customer related costs shown in Schedule M-1(b), Line 12 and the existing and proposed Customer Charges.

Customer Class	Existing Customer Charge	Customer Related Costs (1)	Proposed Customer Charge
	$/month	$/month	$/month
Residential	10.96	22.16	16.00
Small Commercial	15.15	25.08	22.50
Large Commercial	40.53	103.04	60.00
Irrigation	15.15-40.53	50.38	40.00
Industrial	40.00 -40.53	217.41	215.00
Wholesale	300.00	748.59	4,885.00
(1) Combined Class			

The proposed increases to the Residential, Small Commercial, and Large Commercial are approximately equal on a percentage basis. The proposed Irrigation customer charge is approximately half-way between the proposed Small and Large Commercial customer charges and gives recognition to the fact that most of the Irrigation customers are currently paying the Small Commercial customer charge, even though the cost of service study would justify a higher charge. I set the Industrial customer charge at approximately the customer related costs.

Finally, I set the Wholesale customer charge above the customer related costs for two reasons. First, there is a 12 mile dedicated transmission line that serves this customer that is essentially a lateral line (essentially a large service line) and a transmission meter and regulator that are not included in customer related costs (the $776.21), but these costs are comparable to a service line and meter for the other customer that is included in those classes' customer related costs. The cost of service associated with this lateral and meter is $53,515 or approximately $4,460 per month. Therefore, the total customer related cost for this customer is $5,236 per month. In developing the proposed customer charge, I took into account this actual cost and the overall cost to serve to serve this customer.

Q. HOW DID YOU DETERMINE THE TRANSMISSION CHARGE?

A. The transmission charge I am proposing is equal to the existing transmission charge of $0.6320 per mscf, which is approximately equal to the overall transmission cost of service of $0.6072 per mscf. There are currently four customers who are not paying the system-wide transmission charge that all the other customers are currently paying. The three special contract customers currently pay a consolidated rate that does not have a separate transmission charge, and the Wholesale transmission rate is currently $0.3100 per mscf. I am recommending that all customer pay the same transmission rate and any remaining differences in the cost of service be reflected in the distribution charges.

Q. HOW DID YOU DETERMINE THE DISTRIBUTION CHARGES?

A. I set the Distribution Charge for the Irrigation and Industrial customer classes at the rate necessary for the overall revenue change for these classes to be approximately zero. The class cost of service study indicates that these classes should receive an overall rate decrease. However, due to the magnitude of the overall increase and the additional impact on primarily the residential customers, I am recommending that no class of customers receive an overall decrease. However, since there is such a large difference between the rates currently paid by the Industrial customers served under the Large Commercial rate and those customers served under the special contracts, there will be individual customers whose rates will increase or decrease within this class.

I then set the Residential, Small Commercial, and Large Commercial distribution charge at the level that is required to collect the remainder of the overall Company revenue requirement less the amount of incremental revenues that the Company will

realize from the Texas Residential customers. This results in a small decrease in the current distribution charge from $2.436 per mscf to $2.411 per mscf.

. **Q. HOW MUCH OF THE OVERALL MARGIN REVENUES ARE BEING COLLECTED THROUGH THE FIXED CUSTOMER CHARGES UNDER YOUR RECOMMENDED RATES?**

A. Approximately 47 percent under the proposed rates as compared to the approximately 37 percent under the existing rates.

Q. PLEASE DISCUSS THE IMPACT OF YOUR PROPOSED RATES BY RATE SCHEDULE.

A. The percentage increases or decreases by rate schedule are shown on Lines 29 through 44 of Schedule P-2 and also in Column [O] of Schedule A-2.1. The increase to customers served under the Residential rate schedule under proposed rates is approximately 12 percent of current revenues. The increase to customers served under the Small Commercial rate schedule under proposed rates is approximately 7.4 percent of current revenues. The proposed increase to customers served under the Large Commercial rate schedule under proposed rates is approximately 3.1 percent. The percentage increases to the Irrigation and Industrial customers are approximately 0. The percentage increase to the Wholesale customer is approximately 9 percent. These percentage increases compare to an overall total increase of 9.2 percent.

Q. HOW DO YOUR PROPOSED RATES COMPARE TO COST OF SERVICE?

A. As I stated earlier in my testimony, there are disparate class rates of return within the class cost of service study showing that rates for some classes should receive an overall decrease. In order to mitigate the impact of fully implementing the results of the class

cost of service study on the Residential customer class, I am recommending that rates be designed such that no class receives an overall decrease in rates. Otherwise, rates should be designed as near to class cost of service as practical. With these goals in mind, the proposed rates have the impact of increasing the rate of return for the Residential class and reducing the disparity of the rates of return relative to the Residential class.

As shown on Line 15 of Schedule O-1(b), the rate of return under proposed rates for the Residential customers is 7.69 percent, for the Small Commercial 15.46 percent, for the Large Commercial 15.36 percent, the Irrigation 11.28 percent, the Industrial 20.19 percent, and the Wholesale 9.38 percent. The rates I am proposing reduce the disparity between classes as shown in the following table:

Relative Rate of Return (Percent of Residential)		
	Existing Rates	**Proposed Rates**
Residential	100	100
Small Commercial	295	201
Large Commercial	342	200
Irrigation	281	147
Industrial	509	263
Wholesale	Negative	122

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY REGARDING RATE DESIGN?

A. Yes, it does.

VIII. CONCLUSION

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. My testimony explains the Company's proposed Base Year and Test Year billing determinants and revenues, the proposed weather normalization adjustment, the proposed cost of capital, the class peak day analysis, the Base Year and Test Year revenue requirements, the class cost of service studies based on the Base Year and Test Year revenue requirements, and rate design.

Q. IN YOUR OPINION, ARE THESE PROPOSALS APPROPRIATE?

A. Yes, based on my analyses, my recommendations are appropriate and should be approved.

Q. DOES THIS CONCLUDE YOUR PREPARED DIRECT TESTIMONY AT THIS TIME?

A. Yes, it does.

Expert Witness Testimony of Thomas J. Sullivan

- *Peoples Natural Gas Company of South Carolina, South Carolina Public Service Commission Docket No. 88-52-G (1988).* Natural gas utility revenue requirements and rate design.
- *Peoples Natural Gas (UtiliCorp United, Inc.), Iowa Utilities Board Docket No. RPU-92-6 (1992).* Natural gas utility class cost of service study and peak day demand requirements.
- *Peoples Natural Gas (UtiliCorp United, Inc.), Kansas Corporation Commission Docket No. 193,787-U (1996).* Natural gas utility class cost of service study, rate design, and peak day demand requirements.
- *Southern Union Gas Company, Railroad Commission of Texas Gas Utilities Docket No. 8878 (1998).* Natural gas utility depreciation rates.
- *Southern Union Gas Company, City of El Paso (1999).* Natural Gas utility depreciation rates.
- *UtiliCorp United, Inc., Kansas Corporation Commission Docket No. 00-UTCG-336-RTS (1999).* Natural gas utility weather normalization, class cost of service, and rate design.
- *Philadelphia Gas Works, Pennsylvania Public Utility Commission Docket No. R-00006042 (2001).* Natural gas utility revenue requirements.
- *Missouri Gas Energy, Missouri Public Service Commission Docket No. GR-2001-292 (2001).* Natural gas utility depreciation rates.
- *Aquila Networks, Iowa Utilities Board Docket No. RPU-02-5 (2002).* Natural gas utility class cost of service study, rate design, and weather normalization adjustment.
- *Aquila Networks, Michigan Gas Utilities, Michigan Public Service Commission Case No. U-13470 (2002).* Natural gas utility class cost of service study, rate design, and weather normalization adjustment.
- *Aquila Networks, Nebraska Public Service Commission Docket No. NG-0001, NG0002, NG0003 (2003).* Natural gas utility weather normalization adjustment.
- *Aquila Networks, Missouri Public Service Commission Docket No. GR-2003 (2003).* Natural gas utility class cost of service study, rate design, annualization adjustment, and weather normalization adjustment.
- *North Carolina Natural Gas, North Carolina Utilities Commission Docket No. G-21-Sub 442 (2003).* Filed intervener testimony on behalf of the municipal customers regarding natural gas cost of service and rates related to intrastate transmission service.
- *Texas Gas Service Company, Division of ONEOK, Railroad Commission of Texas Gas Utilities Docket No. 9465 (2004).* Natural gas utility depreciation rates.

- *Missouri Gas Energy, Missouri Public Service Commission Docket No. GR-2004-0209 (2004).* Natural gas utility depreciation rates.

- *Aquila Networks, Kansas Corporation Commission Docket No. 05-AQLG-367-RTS (2004).* Natural gas utility class cost of service study, rate design, and weather normalization adjustment.

- *Aquila Networks, Iowa Utilities Board Docket No. RPU-05-02 (2005).* Natural gas utility class cost of service study, rate design, grain drying adjustment and weather normalization adjustment.

- *PJM Interconnection, LLC, Federal Energy Regulatory Commission Docket No. ER05-1181 (2005).* Operating cash reserve requirements.

- *Kinder Morgan, Inc., LLC, Wyoming Public Service Commission Docket No. 30022-GR-6-73 (2006).* Natural gas utility weather normalization adjustment, development of load factors, billing cycle adjustment, determination of test year billing units and revenue, and depreciation rates.

- *Missouri Gas Energy, Missouri Public Service Commission Docket No. GR-2006-0422 (2006).* Natural gas utility depreciation rates.

- *Kinder Morgan, Inc., Nebraska Public Service Commission Docket No. NG-0036 (2006).* Natural gas utility weather normalization adjustment, test year billing determinants and revenues under existing rates, customer and usage trends and rate design.

- *Aquila Networks, Kansas Corporation Commission Docket No. 07-AQLG-431-RTS (2006).* Natural gas utility class cost of service study, rate design, irrigation adjustment, and weather normalization adjustment.

- *Aquila Networks, Nebraska Public Service Commission Docket No. NG-0041 (2006).* Natural gas utility jurisdictional and class cost of service study, rate design, and revenue synchronization adjustment.

- *Zia Natural Gas Company, New Mexico Public Regulation Commission Case No. 08-00036-UT (2008).* Natural gas utility billing determinants and revenues, weather normalization adjustment, customer growth adjustment, peak day analysis, revenue requirement, class cost of service study, and rate design.

- *SourceGas Distribution, LLC, The Public Utilities Commission of the State of Colorado Docket No. 08S-0108G (2008).* Natural gas utility weather normalization adjustment, irrigation adjustment, group load factor analysis, therm billing, test year billing determinants and revenues, and trends in customer usage.

- *Black Hills/Iowa Gas Utility Company, LLC (fka Aquila Networks), Iowa Utilities Board Docket No. RPU-08-3 (2008)* Natural gas utility weather normalization adjustment, grain

drying adjustment, revenue synchronization adjustment, class cost of service study, and rate design.

- *Black Hills/Colorado Gas Utility Company, LLC (fka Aquila Networks), The Public Utilities Commission of the State of Colorado Docket No. 08S-430G (2008)* Natural gas utility weather normalization, revenue synchronization adjustment, customer reclassification, thermal billing, test year billing determinants, revenues under existing and proposed rates, class cost of service study, and rate design.

- *Wyoming Gas Company, Wyoming Public Service Commission Docket No 30009-48-GR-8 (2008)* Natural gas utility weather normalization adjustment, test year billing determinants, revenues under existing and proposed rates, rate of return, revenue requirement, class cost of service study, and rate design.

- *Missouri Gas Energy, Missouri Public Service Commission Docket No. GR-2009-0355 (2009).* Natural gas utility depreciation rates.

- *Empire District Gas Company, Missouri Public Service Commission Docket No. GR-2009-0434* (2009). Natural gas utility depreciation rates.

- *SourceGas Distribution, LLC, Nebraska Public Service Commission Docket No. NG-0060 (2009).* Natural gas utility customer and usage trends and adjustments; weather normalization adjustment, customer change adjustment, use per customer adjustment, and inflation adjustment riders; and competitive factors.

- *Black Hills/Nebraska Gas Utility Company, LLC (fka Aquila Networks), Nebraska Public Service Commission Docket No. NG-0061 (2009).* Natural gas utility jurisdictional and class cost of service study, rate design, and revenue synchronization adjustment.

- *SourceGas Distribution, LLC, Wyoming Public Service Commission Docket No. 30022-148-GR -10 (2010).* Natural gas utility customer and usage trends; use per customer adjustment, inflation adjustment, and uncollectible accounts riders.

- *Black Hills/Nebraska Gas Utility Company, LLC (f.n.a. Aquila Networks) Iowa Utilities Board Docket No. RPU-2010-0002 (2010).* Natural gas utility jurisdictional class cost of service study, rate design, weather normalization adjustment, grain dryer adjustment, annualization adjustment, ethanol plant adjustment, and synchronization adjustment.

- *The Empire District Electric Company, Missouri Public Service Commission Docket No ER 2011-0004 (2010).* Electric utility depreciation rates.

- *The Empire District Electric Company, Corporation Commission of Oklahoma Cause No. PUD 201100082 (2011).* Electric utility depreciation rates.

- *SourceGas Distribution, LLC, Nebraska Public Service Commission Docket No. NG-0067-RTS (2011).* Natural gas utility jurisdictional and class cost of service study, rate design, customer and usage trends, number of customer change adjustment, use per customer adjustment, and competitive factors.

- *Interstate Power and Light Company, Iowa Utilities Board Docket No. RPU-2012- 0002 (2012).* Natural gas utility class cost of service study and weather normalization adjustment.

- *The Empire District Electric Company, Missouri Public Service Commission Docket No. ER-2012-0345 (2012).* Electric utility depreciation rates.

- *Rocky Mountain Natural Gas Company LLC, Public Utilities Commission of the State of Colorado Docket No. 13AL-0067G (2013).* Intrastate natural gas pipeline cost of service study and rate design.

- *Rocky Mountain Natural Gas Company LLC, Public Utilities Commission of the State of Colorado Docket No. 13AL-067G (2013).* Safety and System Integrity Rider (SSIR).

- *SourceGas Distribution LLC, Public Utilities Commission of the State of Colorado Docket No. 13AL-143G (2013).* Tariff provisions to incorporate Docket No. 13AL-0067G unbundling and tariff changes.

- *Black Hills/Kansas Gas Utility Company, LLC, Kansas Corporation Commission Docket No. 14-BHCG-502-RTS (2014).* Natural gas utility class cost of service study, rate design, weather normalization adjustment, irrigation adjustment, annualization adjustment, synchronization adjustment, and bypass revenue rider

- *Wyoming Gas Company, Wyoming Public Service Commission Docket No 30009-57-GI-14 (2015)* Testified at hearing to consider Wyoming Gas Company's motion for relief from filing a general rate case.

- *The Empire District Electric Company, Missouri Public Service Commission Docket No. ER-2016-0023 (2015)* Electric utility depreciation rates.

- *The Empire District Electric Company, Oklahoma Corporation Commission Cause No .PUD 201600468 (2016)* Electric utility depreciation rates.

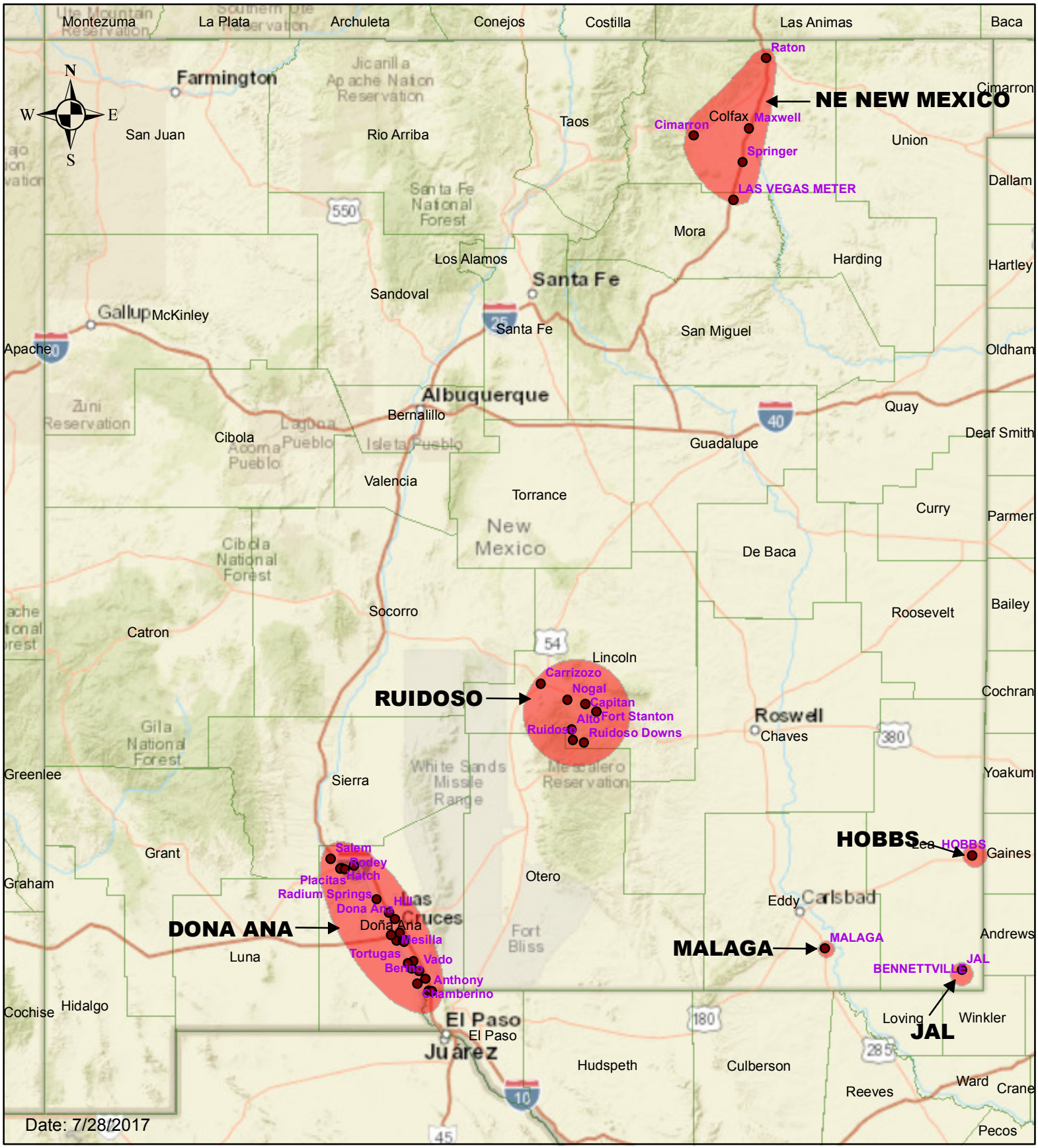
- *Wyoming Gas Company, Wyoming Public Service Commission Docket No 30009-60-GR-16 (2016)* Natural gas utility cost of capital, weather normalization adjustment, test year billing determinants, revenues under existing and proposed rates, revenue requirement, class cost of service study, and rate design.

ZIA NATURAL GAS
NEW MEXICO SERVICE AREA

Exhibit TJS-2

Legend

- CITIES
- ZNGC SERVICE AREAS
- COUNTIES



Zia Natural Gas Company
Historical Heating Degree-Days and
Calculation of Normal Heating Degree- Days

	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
			Actual Heating Degree-Days					
Line No.	Year	Month	Hobbs	Ruidoso	Cimarron (Maxwell)	NMSU (Dona Ana)	Las Vegas	Reference
1	2007	September	0	135	98	0	80	
2		October	91	382	315	85	364	
3		November	402	651	604	319	683	
4		December	645	978	1,058	651	1,051	
5	2008	January	739	1,030	1,092	653	1,112	
6		February	452	717	869	475	837	
7		March	351	697	725	346	788	
8		April	131	427	478	142	542	
9		May	30	251	243	21	321	
10		June	0	17	28	0	34	
11		July	0	35	2	0	15	
12		August	0	17	54	0	47	
13		September	1	195	168	0	159	
14		October	137	340	399	108	413	
15		November	361	608	733	398	699	
16		December	663	811	856	589	982	
17	2009	January	634	793	850	569	904	
18		February	388	633	761	418	747	
19		March	270	573	660	282	702	
20		April	145	436	485	159	550	
21		May	8	121	193	1	194	
22		June	0	19	82	0	68	
23		July	0	0	3	0	10	
24		August	0	3	16	0	16	
25		September	17	153	205	5	193	
26		October	191	414	554	134	552	
27		November	359	589	680	364	660	
28		December	824	986	1,170	735	1,145	

Zia Natural Gas Company
Historical Heating Degree-Days and
Calculation of Normal Heating Degree- Days

Line No.	Year	Month	Actual Heating Degree-Days Hobbs	Ruidoso	Cimarron (Maxwell)	NMSU (Dona Ana)	Las Vegas	Reference
	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
29	2010	January	762	941	1,015	726	985	
30		February	625	827	1,131	528	998	
31		March	379	702	803	439	827	
32		April	125	419	434	104	508	
33		May	46	217	297	52	302	
34		June	0	13	31	0	19	
35		July	0	3	18	0	19	
36		August	0	21	12	0	14	
37		September	0	33	54	0	43	
38		October	52	311	414	55	392	
39		November	423	670	741	430	778	
40		December	572	736	827	548	855	
41	2011	January	715	883	1,035	706	1,002	
42		February	587	845	955	601	999	
43		March	183	467	613	201	593	
44		April	36	265	426	52	429	
45		May	41	224	294	36	289	
46		June	0	0	4	0	8	
47		July	0	0	0	0	0	
48		August	0	0	0	0	0	
49		September	1	70	178	0	146	
50		October	99	350	430	81	425	
51		November	405	638	707	410	715	
52		December	811	1,019	1,178	812	1,170	

Zia Natural Gas Company
Historical Heating Degree-Days and
Calculation of Normal Heating Degree- Days

Line No.	[A] Year	[B] Month	[C] Actual Heating Degree-Days Hobbs	[D] Ruidoso	[E] Cimarron (Maxwell)	[F] NMSU (Dona Ana)	[G] Las Vegas	[H] Reference
53	2012	January	608	773	859	596	857	
54		February	568	794	899	476	891	
55		March	241	551	577	328	632	
56		April	44	288	376	76	400	
57		May	30	168	188	12	202	
58		June	0	0	9	0	4	
59		July	0	3	0	0	0	
60		August	0	1	2	0	2	
61		September	11	105	115	6	123	
62		October	154	289	403	54	396	
63		November	288	553	608	281	620	
64		December	617	830	1,020	634	1,000	
65	2013	January	690	986	1,118	770	1,079	
66		February	511	805	909	553	927	
67		March	304	568	701	279	714	
68		April	173	408	540	97	555	
69		May	59	212	257	27	279	
70		June	0	9	15	0	36	
71		July	0	29	19	0	29	
72		August	0	7	20	0	9	
73		September	0	110	98	4	130	
74		October	131	407	490	119	521	
75		November	459	670	775	401	803	
76		December	726	873	1,014	671	1,042	

Zia Natural Gas Company
Historical Heating Degree-Days and
Calculation of Normal Heating Degree- Days

Line No.	Year	Month	Actual Heating Degree-Days					Reference
			Hobbs	Ruidoso	Cimarron (Maxwell)	NMSU (Dona Ana)	Las Vegas	
	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
77	2014	January	685	831	934	647	955	
78		February	506	615	783	341	748	
79		March	353	613	683	272	717	
80		April	147	419	517	110	551	
81		May	42	218	282	45	311	
82		June	0	0	20	0	36	
83		July	0	0	12	0	8	
84		August	0	16	22	0	30	
85		September	24	95	86	0	109	
86		October	62	282	346	25	367	
87		November	502	670	755	418	801	
88		December	605	832	999	540	984	
89	2015	January	757	913	947	700	963	
90		February	541	668	823	386	796	
91		March	380	556	661	273	668	
92		April	118	421	485	116	502	
93		May	39	274	365	18	386	
94		June	0	3	37	0	35	
95		July	0	2	12	0	11	
96		August	0	0	2	0	8	
97		September	0	9	37	0	30	
98		October	92	319	345	52	363	
99		November	394	628	724	386	722	
100		December	602	829	850	678	952	

Zia Natural Gas Company
Historical Heating Degree-Days and
Calculation of Normal Heating Degree- Days

Line No.	[A] Year	[B] Month	[C] Actual Heating Degree-Days Hobbs	[D] Ruidoso	[E] Cimarron (Maxwell)	[F] NMSU (Dona Ana)	[G] Las Vegas	[H] Reference
101	2016	January	676	941	1,044	708	1,003	
102		February	431	694	750	406	744	
103		March	226	522	665	201	677	
104		April	105	432	506	134	506	
105		May	57	244	332	25	345	
106		June	0	17	24	0	24	
107		July	0	0	0	0	0	
108		August	0	30	46	0	47	
109		September	4	67	103	3	105	
110		October	33	178	245	6	245	
111		November	314	599	599	294	668	
112		December	634	763	1,008	571	922	
113	2017	January	591	813	975	618	975	
114		February	326	573	612	369	660	
115		March	175	439	415	154	530	
116		April	108	373	469	71	502	
117		May	16	220	317	22	317	
118		June	0	14	35	0	29	
119		July	0	0	5	0	2	
120		August	0	6	28	0	28	

Zia Natural Gas Company
Historical Heating Degree-Days and
Calculation of Normal Heating Degree- Days

Line No.	[A] Year	[B] Month	[C] Actual Heating Degree-Days Hobbs	[D] Ruidoso	[E] Cimarron (Maxwell)	[F] NMSU (Dona Ana)	[G] Las Vegas	[H] Reference
121								
122	10-year Average (Normal HDDs)							
123		January	686	890	987	669	984	
124		February	493	717	849	455	835	
125		March	286	569	650	278	685	
126		April	113	389	472	106	505	
127		May	37	215	277	26	295	
128		June	0	9	29	0	29	
129		July	0	7	7	0	9	
130		August	0	10	20	0	20	
131		September	6	97	114	2	112	
132		October	104	327	394	72	404	
133		November	391	628	693	370	715	
134		December	670	866	998	643	1,010	
135		Total	2,786	4,724	5,490	2,621	5,603	
136								
137	Peak Day - HDD		34.3	44.5	49.9	33.45	50.5	Maximum Month Divided by 20
138	Use		35	45	50	35	50	

Zia Natural Gas Company
Summary of Statistical Results from Heating
Degree Day Regression Analysis

Line No.	[A] Description	[B] Weather Station	[C] Analysis Period	[D] Regression Output	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M] Comments
1	**Residential**												
2	District 210 - Hobbs & Jal	Hobbs	9/08 -8/17	SUMMARY OUTPUT									
3													
4				*Regression Statistics*									
5				Multiple R	0.98986019								
6				R Square	0.97982319								
7				Adjusted R Square	0.97963284								
8				Standard Error	0.44086708								
9				Observations	108								
10													
11				ANOVA									
12					*df*	*SS*	*MS*	*F*	*Significance F*				
13				Regression	1	1000.498251	1000.49825	5147.55503	1.1215E-91				
14				Residual	106	20.60256063	0.19436378						
15				Total	107	1021.100812							
16													
17					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
18				Intercept	1.30947177	0.056882209	23.0207614	4.8602E-43	1.19669726	1.42224628	1.19669726	1.42224628	
19				X Variable 1	0.01173721	0.000163593	71.7464635	1.1215E-91	0.01141287	0.01206154	0.01141287	0.01206154	Current Month's HDD
20													
21	District 220 - Ruidoso	Ruidoso	9/08 -8/17	SUMMARY OUTPUT									
22													
23				*Regression Statistics*									
24				Multiple R	0.97713291								
25				R Square	0.95478872								
26				Adjusted R Square	0.9543622								
27				Standard Error	0.72871969								
28				Observations	108								
29													
30				ANOVA									
31					*df*	*SS*	*MS*	*F*	*Significance F*				
32				Regression	1	1188.741211	1188.74121	2238.54748	4.2286E-73				
33				Residual	106	56.28943295	0.53103239						
34				Total	107	1245.030644							
35													
36					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
37				Intercept	0.56471601	0.109762682	5.14488165	1.2363E-06	0.34710082	0.7823312	0.34710082	0.7823312	
38				X Variable 1	0.01029768	0.000217649	47.3132907	4.2286E-73	0.00986617	0.01072919	0.00986617	0.01072919	Current Month's HDD

Zia Natural Gas Company
Summary of Statistical Results from Heating
Degree Day Regression Analysis

Line No.	[A] Description	[B] Weather Station	[C] Analysis Period	[D] Regression Output	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M] Comments
39													
40	District 230 - Maxwell	Cimarron	9/08 -8/17	SUMMARY OUTPUT									
41													
42				*Regression Statistics*									
43				Multiple R	0.97712888								
44				R Square	0.95478085								
45				Adjusted R Square	0.95435426								
46				Standard Error	0.87869133								
47				Observations	108								
48													
49				ANOVA									
50					*df*	*SS*	*MS*	*F*	*Significance F*				
51				Regression	1	1728.064305	1728.0643	2238.13984	4.2678E-73				
52				Residual	106	81.84243579	0.77209845						
53				Total	107	1809.906741							
54													
55					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
56				Intercept	0.66212147	0.135371308	4.89115074	3.5907E-06	0.39373469	0.93050826	0.39373469	0.93050826	
57				X Variable 1	0.01095001	0.000231457	47.3089827	4.2678E-73	0.01049113	0.0114089	0.01049113	0.0114089	Current Month's HDD
58													
59	District 250 - Dona Ana	NMSU	9/11 - 8/17	SUMMARY OUTPUT									
60													
61				*Regression Statistics*									
62				Multiple R	0.9907404								
63				R Square	0.98156653								
64				Adjusted R Square	0.9813032								
65				Standard Error	0.43823147								
66				Observations	72								
67													
68				ANOVA									
69					*df*	*SS*	*MS*	*F*	*Significance F*				
70				Regression	1	715.8432018	715.843202	3727.44101	1.8968E-62				
71				Residual	70	13.44327755	0.19204682						
72				Total	71	729.2864794							
73													
74					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
75				Intercept	1.10591124	0.067745431	16.324514	1.4499E-25	0.97079724	1.24102524	0.97079724	1.24102524	
76				X Variable 1	0.01261593	0.00020664	61.0527724	1.8968E-62	0.0122038	0.01302806	0.0122038	0.01302806	Current Month's HDD

Zia Natural Gas Company
Summary of Statistical Results from Heating
Degree Day Regression Analysis

Line No.	[A] Description	[B] Weather Station	[C] Analysis Period	Regression Output	Comments
77					
78	**Small Commercial**				
79	District 210 - Hobbs & Jal	Hobbs	9/08 -8/17	SUMMARY OUTPUT	
80					

	Regression Statistics	
81	Multiple R	0.97795602
82	R Square	0.95639797
83	Adjusted R Square	0.95598663
84	Standard Error	1.68953396
85	Observations	108

86

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
87 Regression	1	6636.998102	6636.9981	2325.07968	6.1889E-74
88 Residual	106	302.5796512	2.85452501		
89 Total	107	6939.577753			

90

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
91 Intercept	2.2703633	0.217989571	10.4150088	6.4709E-18	1.83817778	2.70254883	1.83817778	2.70254883	
92 X Variable 1	0.0302303	0.000626936	48.21908	6.1889E-74	0.02898733	0.03147326	0.02898733	0.03147326	Current Month's HDD
93									
94 District 220 - Ruidoso	Ruidoso	9/08 -8/17	SUMMARY OUTPUT						
95									

	Regression Statistics	
96	Multiple R	0.96882816
97	R Square	0.938628
98	Adjusted R Square	0.93804902
99	Standard Error	2.06863733
100	Observations	108

101

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
102 Regression	1	6937.41691	6937.41691	1621.17195	4.6151E-66
103 Residual	106	453.6016012	4.27926039		
104 Total	107	7391.018512			

105

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
106 Intercept	2.88111535	0.31158645	9.24660024	2.785E-15	2.2633649	3.49886579	2.2633649	3.49886579	
107 X Variable 1	0.02487682	0.000617846	40.2637796	4.6151E-66	0.02365188	0.02610176	0.02365188	0.02610176	Current Month's HDD

Zia Natural Gas Company
Summary of Statistical Results from Heating
Degree Day Regression Analysis

Line No.	[A] Description	[B] Weather Station	[C] Analysis Period	[D] Regression Output	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M] Comments
116													
117	District 230 - Maxwell	Cimarron	9/08 -8/17	SUMMARY OUTPUT									
118													
119				*Regression Statistics*									
120				Multiple R	0.97186566								
121				R Square	0.94452285								
122				Adjusted R Square	0.94399948								
123				Standard Error	3.57722758								
124				Observations	108								
125													
126				ANOVA									
127					*df*	*SS*	*MS*	*F*	*Significance F*				
128				Regression	1	23093.90439	23093.9044	1804.69669	2.1801E-68				
129				Residual	106	1356.43506	12.7965572						
130				Total	107	24450.33945							
131													
132					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
133				Intercept	1.41229894	0.551108176	2.56265286	0.0117915	0.31967338	2.50492451	0.31967338	2.50492451	
134				X Variable 1	0.0400298	0.000942283	42.4817219	2.1801E-68	0.03816163	0.04189797	0.03816163	0.04189797	Current Month's HDD
135													
136	District 250 - Dona Ana	NMSU	9/11 - 8/17	SUMMARY OUTPUT									
137													
138				*Regression Statistics*									
139				Multiple R	0.87810163								
140				R Square	0.77106247								
141				Adjusted R Square	0.76779194								
142				Standard Error	2.40778135								
143				Observations	72								
144													
145				ANOVA									
146					*df*	*SS*	*MS*	*F*	*Significance F*				
147				Regression	1	1366.799198	1366.7992	235.760272	4.1939E-24				
148				Residual	70	405.8187716	5.79741102						
149				Total	71	1772.61797							
150													
151					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
152				Intercept	5.80048252	0.372214677	15.5837018	1.8737E-24	5.05812376	6.54284129	5.05812376	6.54284129	
153				X Variable 1	0.01743262	0.001135344	15.354487	4.1939E-24	0.01516825	0.01969699	0.01516825	0.01969699	Current Month's HDD

Zia Natural Gas Company
Summary of Statistical Results from Heating
Degree Day Regression Analysis

Line No.	[A] Description	[B] Weather Station	[C] Analysis Period	Regression Output									Comments
154													
155	**Large Commercial**												
156	District 210 - Hobbs & Jal	Hobbs	9/08 -8/17	SUMMARY OUTPUT									
157													
158				*Regression Statistics*									
159				Multiple R	0.9830533								
160				R Square	0.96639378								
161				Adjusted R Square	0.96607674								
162				Standard Error	7.35492576								
163				Observations	108								
164													
165				ANOVA									
166					*df*	*SS*	*MS*	*F*	*Significance F*				
167				Regression	1	164891.0022	164891.002	3048.17832	6.2486E-80				
168				Residual	106	5734.062897	54.094933						
169				Total	107	170625.0651							
170													
171					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
172				Intercept	26.8481182	0.948958201	28.2922031	3.2867E-51	24.9667163	28.7295201	24.9667163	28.7295201	
173				X Variable 1	0.1506798	0.002729197	55.2103099	6.2486E-80	0.14526891	0.1560907	0.14526891	0.1560907	Current Month's HDD
174													
175	District 220 - Ruidoso	Ruidoso	9/08 -8/17	SUMMARY OUTPUT									
176													
177				*Regression Statistics*									
178				Multiple R	0.96351933								
179				R Square	0.92836949								
180				Adjusted R Square	0.92769373								
181				Standard Error	16.6796454								
182				Observations	108								
183													
184				ANOVA									
185					*df*	*SS*	*MS*	*F*	*Significance F*				
186				Regression	1	382210.2468	382210.247	1373.81641	1.6761E-62				
187				Residual	106	29490.32052	278.210571						
188				Total	107	411700.5673							
189													
190					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
191				Intercept	77.183555	2.512355085	30.7215948	1.3587E-54	72.2025667	82.1645433	72.2025667	82.1645433	
192				X Variable 1	0.18464905	0.004981759	37.0650294	1.6761E-62	0.17477223	0.19452587	0.17477223	0.19452587	Current Month's HDD

Zia Natural Gas Company
Summary of Statistical Results from Heating
Degree Day Regression Analysis

Line No.	[A] Description	[B] Weather Station	[C] Analysis Period	[D] Regression Output	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M] Comments
193													
194	District 230 - Maxwell	Cimarron	9/09 -8/17	SUMMARY OUTPUT									
195													
196				*Regression Statistics*									
197				Multiple R	0.94307445								
198				R Square	0.88938941								
199				Adjusted R Square	0.8882127								
200				Standard Error	37.8190692								
201				Observations	96								
202													
203				ANOVA									
204					*df*	*SS*	*MS*	*F*	*Significance F*				
205				Regression	1	1081047.495	1081047.5	755.828219	9.944E-47				
206				Residual	94	134446.5078	1430.282						
207				Total	95	1215494.003							
208													
209					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
210				Intercept	27.680774	6.148691404	4.50189678	1.93E-05	15.4724031	39.889145	15.4724031	39.889145	
211				X Variable 1	0.28629112	0.010413491	27.4923302	9.944E-47	0.26561489	0.30696735	0.26561489	0.30696735	Current Month's HDD
212													
213	District 250 - Dona Ana	NMSU	9/12 - 8/17	SUMMARY OUTPUT									
214													
215				*Regression Statistics*									
216				Multiple R	0.98342352								
217				R Square	0.96712181								
218				Adjusted R Square	0.96655495								
219				Standard Error	6.78700546								
220				Observations	60								
221													
222				ANOVA									
223					*df*	*SS*	*MS*	*F*	*Significance F*				
224				Regression	1	78588.26335	78588.2634	1706.08747	1.0368E-44				
225				Residual	58	2671.679703	46.0634432						
226				Total	59	81259.94305							
227													
228					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
229				Intercept	24.1270415	1.148910621	20.999929	8.6858E-29	21.827247	26.426836	21.827247	26.426836	
230				X Variable 1	0.14751619	0.003571405	41.3048117	1.0368E-44	0.14036725	0.15466513	0.14036725	0.15466513	Current Month's HDD

Zia Natural Gas Company
Summary of Statistical Results from Heating
Degree Day Regression Analysis

Line No.	[A] Description	[B] Weather Station	[C] Analysis Period	[D] Regression Output	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M] Comments
231													
232	**Wholesale**												
233	Las Vegas	Las Vegas	9/07 -8/17	SUMMARY OUTPUT									
234													
235				*Regression Statistics*									
236				Multiple R	0.98699357								
237				R Square	0.97415631								
238				Adjusted R Square	0.97393729								
239				Standard Error	5361.97219								
240				Observations	120								
241													
242				ANOVA									
243					*df*	*SS*	*MS*	*F*	*Significance F*				
244				Regression	1	1.27881E+11	1.2788E+11	4447.91132	1.5834E-95				
245				Residual	118	3392588000	28750745.8						
246				Total	119	1.31273E+11							
247													
248					*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*	
249				Intercept	7488.98032	791.5660201	9.46096741	3.7911E-16	5921.46409	9056.49654	5921.46409	9056.49654	
250				X Variable 1	88.8766689	1.332630378	66.6926632	1.5834E-95	86.2376979	91.5156399	86.2376979	91.5156399	Current Month's HDD

Zia Natural Gas Company
Heating Adjustment

Line No.	[A] Customer Classification	[B] Weather Station	[C] 2016-2017 Month	[D] HDD Current Month Actual	[E] HDD Current Month Normal (1)	[F] HDD Previous Month Actual	[G] HDD Previous Month Normal (1)	[H] Per Customer Adjustment mscf/cust. (3)	[I] Base/Test Year # of Cust.	[J] Volumetric Adjustment mscf [H]X[I]	[K] Distribution Margin Rate $/mscf	[L] Distribution Margin Amount $ [J]X[K]	[M] Transmission Margin Rate $/mscf	[N] Transmission Margin Amount $ [J]X[M]	[O] Cost of Gas Rate $/mscf (4)	[P] Cost of Gas Amount $ [J]X[O]	[Q] Total Adjustment $ [L]+[N]+[P]
1	**Residential**																
2	District 210 - Hobbs & Jal																
3		Hobbs			0.0117	(2)		(2)									
4			September	4	6	-	-	0.03	9,406	254	2.43600	619	0.63200	160	3.9531	1,004	1,783
5			October	33	104	4	6	0.83	9,402	7,791	2.43600	18,979	0.63200	4,924	3.9531	30,798	54,701
6			November	314	391	33	104	0.91	9,441	8,566	2.43600	20,866	0.63200	5,414	3.9531	33,861	60,140
7			December	634	670	314	391	0.42	9,491	3,988	2.43600	9,715	0.63200	2,520	3.9531	15,765	28,000
8			January	591	686	634	670	1.12	9,519	10,659	2.43600	25,965	0.63200	6,736	3.9531	42,135	74,836
9			February	326	493	591	686	1.96	9,479	18,591	2.43600	45,288	0.63200	11,750	3.9531	73,492	130,529
10			March	175	286	326	493	1.31	9,514	12,440	2.43600	30,303	0.63200	7,862	3.9531	49,176	87,341
11			April	108	113	175	286	0.06	9,478	545	2.43600	1,328	0.63200	345	3.9531	2,155	3,827
12			May	16	37	108	113	0.25	9,520	2,391	2.43600	5,825	0.63200	1,511	3.9531	9,453	16,789
13			June	-	-	16	37	-	9,416	-	2.43600	-	0.63200	-	3.9531	-	-
14			July	-	-	-	-	-	9,442	-	2.43600	-	0.63200	-	3.9531	-	-
15			August	-	-	-	-	-	9,444	-	2.43600	-	0.63200	-	3.9531	-	-
16			Total	2,200	2,786	2,200	2,786	6.88	9,463	65,224		158,887		41,222		257,838	457,946
17	District 220 - Lincoln County																
18		Ruidoso			0.0103	(2)		(2)									
19			September	67	97	30	10	0.30	12,270	3,740	2.43600	9,111	0.63200	2,364	3.9531	14,785	26,259
20			October	178	327	67	97	1.53	12,290	18,819	2.43600	45,844	0.63200	11,894	3.9531	74,394	132,132
21			November	599	628	178	327	0.30	12,322	3,718	2.43600	9,057	0.63200	2,350	3.9531	14,697	26,103
22			December	763	866	599	628	1.06	12,372	13,110	2.43600	31,935	0.63200	8,285	3.9531	51,824	92,045
23			January	813	890	763	866	0.79	12,386	9,847	2.43600	23,986	0.63200	6,223	3.9531	38,925	69,134
24			February	573	717	813	890	1.48	12,390	18,360	2.43600	44,725	0.63200	11,603	3.9531	72,579	128,907
25			March	439	569	573	717	1.34	12,412	16,616	2.43600	40,476	0.63200	10,501	3.9531	65,684	116,662
26			April	373	389	439	569	0.16	12,408	2,044	2.43600	4,980	0.63200	1,292	3.9531	8,082	14,354
27			May	220	215	373	389	(0.05)	12,377	(599)	2.43600	(1,459)	0.63200	(379)	3.9531	(2,368)	(4,206)
28			June	14	9	220	215	(0.05)	12,346	(610)	2.43600	(1,487)	0.63200	(386)	3.9531	(2,412)	(4,285)
29			July	-	7	14	9	0.07	12,375	892	2.43600	2,173	0.63200	564	3.9531	3,526	6,263
30			August	6	10	-	7	0.04	12,351	509	2.43600	1,239	0.63200	322	3.9531	2,011	3,572
31			Total	4,045	4,724	4,069	4,724	6.99	12,358	86,445		210,581		54,633		341,726	606,940
32	District 230 - Maxwell																
33		Cimarron			0.0110	(2)		(2)									
34			September	103	114	46	20	0.12	1,048	126	2.43600	308	0.63200	80	3.9531	499	886
35			October	245	394	103	114	1.63	1,052	1,716	2.43600	4,181	0.63200	1,085	3.9531	6,785	12,051
36			November	599	693	245	394	1.03	1,052	1,083	2.43600	2,638	0.63200	684	3.9531	4,281	7,603
37			December	1,008	998	599	693	(0.11)	1,054	(115)	2.43600	(281)	0.63200	(73)	3.9531	(456)	(810)
38			January	975	987	1,008	998	0.13	1,055	139	2.43600	338	0.63200	88	3.9531	548	973
39			February	612	849	975	987	2.60	1,053	2,733	2.43600	6,657	0.63200	1,727	3.9531	10,803	19,187
40			March	415	650	612	849	2.57	1,061	2,730	2.43600	6,651	0.63200	1,726	3.9531	10,793	19,169
41			April	469	472	415	650	0.03	1,058	35	2.43600	85	0.63200	22	3.9531	137	244
42			May	317	277	469	472	(0.44)	1,053	(461)	2.43600	(1,124)	0.63200	(291)	3.9531	(1,823)	(3,238)
43			June	35	29	317	277	(0.07)	1,047	(69)	2.43600	(168)	0.63200	(43)	3.9531	(272)	(483)
44			July	5	7	35	29	0.02	1,050	23	2.43600	56	0.63200	15	3.9531	91	161
45			August	28	20	5	7	(0.09)	1,046	(92)	2.43600	(223)	0.63200	(58)	3.9531	(362)	(643)
46			Total	4,811	5,490	4,829	5,490	7.44	1,052	7,848		19,117		4,960		31,023	55,099

Zia Natural Gas Company
Heating Adjustment

Line No.	[A] Customer Classification	[B] Weather Station	[C] 2016-2017 Month	[D] HDD Current Month Actual	[E] HDD Current Month Normal (1)	[F] HDD Previous Month Actual	[G] HDD Previous Month Normal (1)	[H] Per Customer Adjustment mscf/cust. (3)	[I] Base/Test Year # of Cust.	[J] Volumetric Adjustment mscf [H]X[I]	[K] Distribution Margin Rate $/mscf	[L] Distribution Margin Amount $ [J]X[K]	[M] Transmission Margin Rate $/mscf	[N] Transmission Margin Amount $ [J]X[M]	[O] Cost of Gas Rate $/mscf (4)	[P] Cost of Gas Amount $ [J]X[O]	[Q] Total Adjustment $ [L]+[N]+[P]
47																	
48	District 250 - Dona Ana																
49		NMSU			0.0126	(2)		(2)									
50			September	3	2	-	-	(0.01)	11,379	(144)	2.43600	(350)	0.63200	(91)	3.9531	(567)	(1,008)
51			October	6	72	3	2	0.83	11,438	9,524	2.43600	23,200	0.63200	6,019	3.9531	37,649	66,868
52			November	294	370	6	72	0.96	11,538	11,063	2.43600	26,949	0.63200	6,992	3.9531	43,732	77,673
53			December	571	643	294	370	0.91	11,617	10,552	2.43600	25,705	0.63200	6,669	3.9531	41,714	74,088
54			January	618	669	571	643	0.64	11,642	7,491	2.43600	18,247	0.63200	4,734	3.9531	29,611	52,592
55			February	369	455	618	669	1.08	11,665	12,656	2.43600	30,830	0.63200	7,999	3.9531	50,031	88,860
56			March	154	278	369	455	1.56	11,679	18,270	2.43600	44,507	0.63200	11,547	3.9531	72,224	128,278
57			April	71	106	154	278	0.44	11,659	5,148	2.43600	12,541	0.63200	3,254	3.9531	20,351	36,145
58			May	22	26	71	106	0.05	11,645	588	2.43600	1,432	0.63200	371	3.9531	2,323	4,126
59			June	-	-	22	26	-	11,617	-	2.43600	-	0.63200	-	3.9531	-	-
60			July	-	-	-	-	-	11,632	-	2.43600	-	0.63200	-	3.9531	-	-
61			August	-	-	-	-	-	11,614	-	2.43600	-	0.63200	-	3.9531	-	-
62			Total	2,108	2,621	2,108	2,621	6.47	11,594	75,148		183,061		47,494		297,068	527,622
63																	
64	**Small Commercial**																
65	District 210 - Hobbs & Jal																
66		Hobbs			0.0302	(2)		(2)									
67			September	4	6	-	-	0.07	871	61	2.43600	148	0.63200	38	3.9531	239	425
68			October	33	104	4	6	2.13	867	1,850	2.43600	4,508	0.63200	1,169	3.9531	7,315	12,992
69			November	314	391	33	104	2.34	876	2,047	2.43600	4,987	0.63200	1,294	3.9531	8,092	14,372
70			December	634	670	314	391	1.08	888	961	2.43600	2,341	0.63200	607	3.9531	3,799	6,747
71			January	591	686	634	670	2.88	888	2,561	2.43600	6,239	0.63200	1,619	3.9531	10,124	17,981
72			February	326	493	591	686	5.05	882	4,455	2.43600	10,853	0.63200	2,816	3.9531	17,613	31,282
73			March	175	286	326	493	3.37	881	2,967	2.43600	7,227	0.63200	1,875	3.9531	11,728	20,831
74			April	108	113	175	286	0.15	872	129	2.43600	315	0.63200	82	3.9531	511	907
75			May	16	37	108	113	0.65	872	564	2.43600	1,374	0.63200	357	3.9531	2,230	3,961
76			June	-	-	16	37	-	864	-	2.43600	-	0.63200	-	3.9531	-	-
77			July	-	-	-	-	-	863	-	2.43600	-	0.63200	-	3.9531	-	-
78			August	-	-	-	-	-	862	-	2.43600	-	0.63200	-	3.9531	-	-
79			Total	2,200	2,786	2,200	2,786	17.72	874	15,596		37,991		9,856		61,651	109,498
80	District 220 - Lincoln County																
81		Ruidoso			0.0249	(2)		(2)									
82			September	67	97	30	10	0.74	897	661	2.43600	1,609	0.63200	417	3.9531	2,611	4,637
83			October	178	327	67	97	3.70	902	3,337	2.43600	8,128	0.63200	2,109	3.9531	13,190	23,427
84			November	599	628	178	327	0.73	917	668	2.43600	1,628	0.63200	422	3.9531	2,642	4,693
85			December	763	866	599	628	2.56	925	2,368	2.43600	5,768	0.63200	1,496	3.9531	9,360	16,625
86			January	813	890	763	866	1.92	926	1,778	2.43600	4,332	0.63200	1,124	3.9531	7,030	12,486
87			February	573	717	813	890	3.58	923	3,304	2.43600	8,049	0.63200	2,088	3.9531	13,062	23,199
88			March	439	569	573	717	3.23	924	2,988	2.43600	7,279	0.63200	1,889	3.9531	11,813	20,980
89			April	373	389	439	569	0.40	918	365	2.43600	890	0.63200	231	3.9531	1,444	2,565
90			May	220	215	373	389	(0.12)	916	(107)	2.43600	(261)	0.63200	(68)	3.9531	(423)	(752)
91			June	14	9	220	215	(0.12)	910	(109)	2.43600	(265)	0.63200	(69)	3.9531	(430)	(763)
92			July	-	7	14	9	0.17	910	158	2.43600	386	0.63200	100	3.9531	626	1,113
93			August	6	10	-	7	0.10	906	90	2.43600	220	0.63200	57	3.9531	356	633
94			Total	4,045	4,724	4,069	4,724	16.89	915	15,502		37,764		9,797		61,282	108,843

Zia Natural Gas Company
Heating Adjustment

Line No.	[A] Customer Classification	[B] Weather Station	[C] 2016-2017 Month	[D] HDD Current Month Actual	[E] HDD Current Month Normal (1)	[F] HDD Previous Month Actual	[G] HDD Previous Month Normal (1)	[H] Per Customer Adjustment mscf/cust. (3)	[I] Base/Test Year # of Cust.	[J] Volumetric Adjustment mscf [H]X[I]	[K] Distribution Margin Rate $/mscf	[L] Distribution Margin Amount $ [J]X[K]	[M] Transmission Margin Rate $/mscf	[N] Transmission Margin Amount $ [J]X[M]	[O] Cost of Gas Rate $/mscf (4)	[P] Cost of Gas Amount $ [J]X[O]	[Q] Total Adjustment $ [L]+[N]+[P]
95	District 230 - Maxwell																
96		Cimarron			0.0400	(2)		(2)									
97			September	103	114	46	20	0.44	118	52	2.43600	127	0.63200	33	3.9531	205	365
98			October	245	394	103	114	5.96	118	704	2.43600	1,714	0.63200	445	3.9531	2,782	4,941
99			November	599	693	245	394	3.76	119	448	2.43600	1,091	0.63200	283	3.9531	1,770	3,144
100			December	1,008	998	599	693	(0.40)	120	(48)	2.43600	(117)	0.63200	(30)	3.9531	(190)	(337)
101			January	975	987	1,008	998	0.48	120	58	2.43600	140	0.63200	36	3.9531	228	405
102			February	612	849	975	987	9.49	119	1,129	2.43600	2,750	0.63200	714	3.9531	4,463	7,927
103			March	415	650	612	849	9.41	120	1,129	2.43600	2,750	0.63200	713	3.9531	4,462	7,926
104			April	469	472	415	650	0.12	119	14	2.43600	35	0.63200	9	3.9531	56	100
105			May	317	277	469	472	(1.60)	118	(189)	2.43600	(460)	0.63200	(119)	3.9531	(747)	(1,327)
106			June	35	29	317	277	(0.24)	119	(29)	2.43600	(70)	0.63200	(18)	3.9531	(113)	(201)
107			July	5	7	35	29	0.08	119	10	2.43600	23	0.63200	6	3.9531	38	67
108			August	28	20	5	7	(0.32)	119	(38)	2.43600	(93)	0.63200	(24)	3.9531	(151)	(268)
109			Total	4,811	5,490	4,829	5,490	27.18	119	3,239		7,891		2,047		12,805	22,742
110																	
111	District 250 - Dona Ana																
112		NMSU			0.0174	(2)		(2)									
113			September	3	2	-	-	(0.02)	311	(5)	2.43600	(13)	0.63200	(3)	3.9531	(21)	(38)
114			October	6	72	3	2	1.15	310	357	2.43600	869	0.63200	225	3.9531	1,410	2,504
115			November	294	370	6	72	1.32	311	412	2.43600	1,004	0.63200	260	3.9531	1,629	2,893
116			December	571	643	294	370	1.26	314	394	2.43600	960	0.63200	249	3.9531	1,558	2,767
117			January	618	669	571	643	0.89	314	279	2.43600	680	0.63200	176	3.9531	1,104	1,960
118			February	369	455	618	669	1.50	315	472	2.43600	1,150	0.63200	298	3.9531	1,867	3,316
119			March	154	278	369	455	2.16	312	674	2.43600	1,643	0.63200	426	3.9531	2,666	4,735
120			April	71	106	154	278	0.61	312	190	2.43600	464	0.63200	120	3.9531	753	1,337
121			May	22	26	71	106	0.07	308	21	2.43600	52	0.63200	14	3.9531	85	151
122			June	-	-	22	26	-	306	-	2.43600	-	0.63200	-	3.9531	-	-
123			July	-	-	-	-	-	306	-	2.43600	-	0.63200	-	3.9531	-	-
124			August	-	-	-	-	-	305	-	2.43600	-	0.63200	-	3.9531	-	-
125			Total	2,108	2,621	2,108	2,621	8.94	310	2,795		6,809		1,766		11,049	19,625
126																	
127	**Large Commercial**																
128	District 210 - Hobbs & Jal																
129		Hobbs			0.1507	(2)		(2)									
130			September	4	6	-	-	0.35	411	142	2.43600	347	0.63200	90	3.9531	563	1,000
131			October	33	104	4	6	10.64	408	4,340	2.43600	10,573	0.63200	2,743	3.9531	17,158	30,474
132			November	314	391	33	104	11.65	411	4,787	2.43600	11,661	0.63200	3,025	3.9531	18,924	33,611
133			December	634	670	314	391	5.39	414	2,233	2.43600	5,440	0.63200	1,411	3.9531	8,828	15,680
134			January	591	686	634	670	14.37	413	5,937	2.43600	14,462	0.63200	3,752	3.9531	23,469	41,683
135			February	326	493	591	686	25.18	413	10,399	2.43600	25,331	0.63200	6,572	3.9531	41,107	73,011
136			March	175	286	326	493	16.79	412	6,916	2.43600	16,847	0.63200	4,371	3.9531	27,338	48,556
137			April	108	113	175	286	0.74	411	303	2.43600	739	0.63200	192	3.9531	1,200	2,131
138			May	16	37	108	113	3.22	412	1,329	2.43600	3,236	0.63200	840	3.9531	5,252	9,328
139			June	-	-	16	37	-	412	-	2.43600	-	0.63200	-	3.9531	-	-
140			July	-	-	-	-	-	411	-	2.43600	-	0.63200	-	3.9531	-	-
141			August	-	-	-	-	-	410	-	2.43600	-	0.63200	-	3.9531	-	-
142			Total	2,200	2,786	2,200	2,786	88.33	412	36,386		88,637		22,996		143,839	255,472

Zia Natural Gas Company
Heating Adjustment

Line No.	[A] Customer Classification	[B] Weather Station	[C] 2016-2017 Month	[D] HDD Current Month Actual	[E] HDD Current Month Normal (1)	[F] HDD Previous Month Actual	[G] HDD Previous Month Normal (1)	[H] Per Customer Adjustment mscf/cust. (3)	[I] Base/Test Year # of Cust.	[J] Volumetric Adjustment mscf [H]X[I]	[K] Distribution Margin Rate $/mscf	[L] Distribution Margin Amount $ [J]X[K]	[M] Transmission Margin Rate $/mscf	[N] Transmission Margin Amount $ [J]X[M]	[O] Cost of Gas Rate $/mscf (4)	[P] Cost of Gas Amount $ [J]X[O]	[Q] Total Adjustment $ [L]+[N]+[P]
143	District 220 - Lincoln County																
144		Ruidoso			0.1846	(2)		(2)									
145			September	67	97	30	10	5.47	74	404	2.43600	985	0.63200	256	3.9531	1,599	2,840
146			October	178	327	67	97	27.46	74	2,032	2.43600	4,950	0.63200	1,284	3.9531	8,032	14,266
147			November	599	628	178	327	5.41	74	400	2.43600	975	0.63200	253	3.9531	1,583	2,811
148			December	763	866	599	628	19.00	74	1,406	2.43600	3,425	0.63200	889	3.9531	5,558	9,872
149			January	813	890	763	866	14.25	74	1,055	2.43600	2,570	0.63200	667	3.9531	4,170	7,406
150			February	573	717	813	890	26.57	74	1,966	2.43600	4,790	0.63200	1,243	3.9531	7,773	13,805
151			March	439	569	573	717	24.00	74	1,776	2.43600	4,327	0.63200	1,123	3.9531	7,022	12,472
152			April	373	389	439	569	2.95	74	219	2.43600	533	0.63200	138	3.9531	864	1,535
153			May	220	215	373	389	(0.87)	74	(64)	2.43600	(156)	0.63200	(41)	3.9531	(254)	(451)
154			June	14	9	220	215	(0.89)	74	(66)	2.43600	(160)	0.63200	(41)	3.9531	(259)	(460)
155			July	-	7	14	9	1.29	72	93	2.43600	227	0.63200	59	3.9531	368	653
156			August	6	10	-	7	0.74	72	53	2.43600	130	0.63200	34	3.9531	210	373
157			Total	4,045	4,724	4,069	4,724	125.40	74	9,275		22,594		5,862		36,666	65,122
158	District 230 - Maxwell																
159		Cimarron			0.2863	(2)		(2)									
160			September	103	114	46	20	3.15	24	76	2.43600	184	0.63200	48	3.9531	299	531
161			October	245	394	103	114	42.66	24	1,024	2.43600	2,494	0.63200	647	3.9531	4,047	7,188
162			November	599	693	245	394	26.91	24	646	2.43600	1,573	0.63200	408	3.9531	2,553	4,535
163			December	1,008	998	599	693	(2.86)	24	(69)	2.43600	(167)	0.63200	(43)	3.9531	(272)	(482)
164			January	975	987	1,008	998	3.44	24	82	2.43600	201	0.63200	52	3.9531	326	579
165			February	612	849	975	987	67.85	24	1,628	2.43600	3,967	0.63200	1,029	3.9531	6,437	11,433
166			March	415	650	612	849	67.28	24	1,615	2.43600	3,933	0.63200	1,020	3.9531	6,383	11,337
167			April	469	472	415	650	0.86	24	21	2.43600	50	0.63200	13	3.9531	81	145
168			May	317	277	469	472	(11.45)	24	(275)	2.43600	(670)	0.63200	(174)	3.9531	(1,086)	(1,930)
169			June	35	29	317	277	(1.72)	24	(41)	2.43600	(100)	0.63200	(26)	3.9531	(163)	(289)
170			July	5	7	35	29	0.57	24	14	2.43600	33	0.63200	9	3.9531	54	96
171			August	28	20	5	7	(2.29)	24	(55)	2.43600	(134)	0.63200	(35)	3.9531	(217)	(386)
172			Total	4,811	5,490	4,829	5,490	194.39	24	4,665		11,365		2,949		18,443	32,756
173																	
174	District 250 - Dona Ana																
175		NMSU			0.1475	(2)		(2)									
176			September	3	2	-	-	(0.15)	82	(12)	2.43600	(29)	0.63200	(8)	3.9531	(48)	(85)
177			October	6	72	3	2	9.74	83	808	2.43600	1,969	0.63200	511	3.9531	3,194	5,674
178			November	294	370	6	72	11.21	82	919	2.43600	2,239	0.63200	581	3.9531	3,634	6,455
179			December	571	643	294	370	10.62	82	871	2.43600	2,122	0.63200	550	3.9531	3,443	6,115
180			January	618	669	571	643	7.52	82	617	2.43600	1,503	0.63200	390	3.9531	2,439	4,331
181			February	369	455	618	669	12.69	82	1,040	2.43600	2,534	0.63200	657	3.9531	4,112	7,304
182			March	154	278	369	455	18.29	82	1,500	2.43600	3,654	0.63200	948	3.9531	5,929	10,531
183			April	71	106	154	278	5.16	82	423	2.43600	1,031	0.63200	268	3.9531	1,674	2,973
184			May	22	26	71	106	0.59	82	48	2.43600	118	0.63200	31	3.9531	191	340
185			June	-	-	22	26	-	82	-	2.43600	-	0.63200	-	3.9531	-	-
186			July	-	-	-	-	-	82	-	2.43600	-	0.63200	-	3.9531	-	-
187			August	-	-	-	-	-	83	-	2.43600	-	0.63200	-	3.9531	-	-
188			Total	2,108	2,621	2,108	2,621	75.68	82	6,215		15,140		3,928		24,569	43,637

Zia Natural Gas Company
Heating Adjustment

Line No.	[A] Customer Classification	[B] Weather Station	[C] 2016-2017 Month	[D] HDD Current Month Actual	[E] HDD Current Month Normal (1)	[F] HDD Previous Month Actual	[G] HDD Previous Month Normal (1)	[H] Per Customer Adjustment mscf/cust. (3)	[I] Base/Test Year # of Cust.	[J] Volumetric Adjustment mscf [H]X[I]	[K] Distribution Margin Rate $/mscf	[L] Distribution Margin Amount $ [J]X[K]	[M] Transmission Margin Rate $/mscf	[N] Transmission Margin Amount $ [J]X[M]	[O] Cost of Gas Rate $/mscf (4)	[P] Cost of Gas Amount $ [J]X[O]	[Q] Total Adjustment $ [L]+[N]+[P]
189																	
190	**City of Las Vegas**																
191		Las Vegas			88.8767	(2)		(2)									
192			September	105	112	47	20	622.14	1	622	-	-	0.31000	193	3.9531	2,459	2,652
193			October	245	404	105	112	14,131.39	1	14,131	-	-	0.31000	4,381	3.9531	55,863	60,243
194			November	668	715	245	404	4,177.20	1	4,177	-	-	0.31000	1,295	3.9531	16,513	17,808
195			December	922	1,010	668	715	7,821.15	1	7,821	-	-	0.31000	2,425	3.9531	30,918	33,342
196			January	975	984	922	1,010	799.89	1	800	-	-	0.31000	248	3.9531	3,162	3,410
197			February	660	835	975	984	15,553.42	1	15,553	-	-	0.31000	4,822	3.9531	61,484	66,306
198			March	530	685	660	835	13,775.88	1	13,776	-	-	0.31000	4,271	3.9531	54,457	58,728
199			April	502	505	530	685	266.63	1	267	-	-	0.31000	83	3.9531	1,054	1,137
200			May	317	295	502	505	(1,955.29)	1	(1,955)	-	-	0.31000	(606)	3.9531	(7,729)	(8,336)
201			June	29	29	317	295	-	1	-	-	-	0.31000	-	3.9531	-	-
202			July	2	9	29	29	622.14	1	622	-	-	0.31000	193	3.9531	2,459	2,652
203			August	28	20	2	9	(711.01)	1	(711)	-	-	0.31000	(220)	3.9531	(2,811)	(3,031)
204			Total	4,983	5,603	5,002	5,603	55,103.53	1	55,104		-		17,082		217,829	234,911
205																	

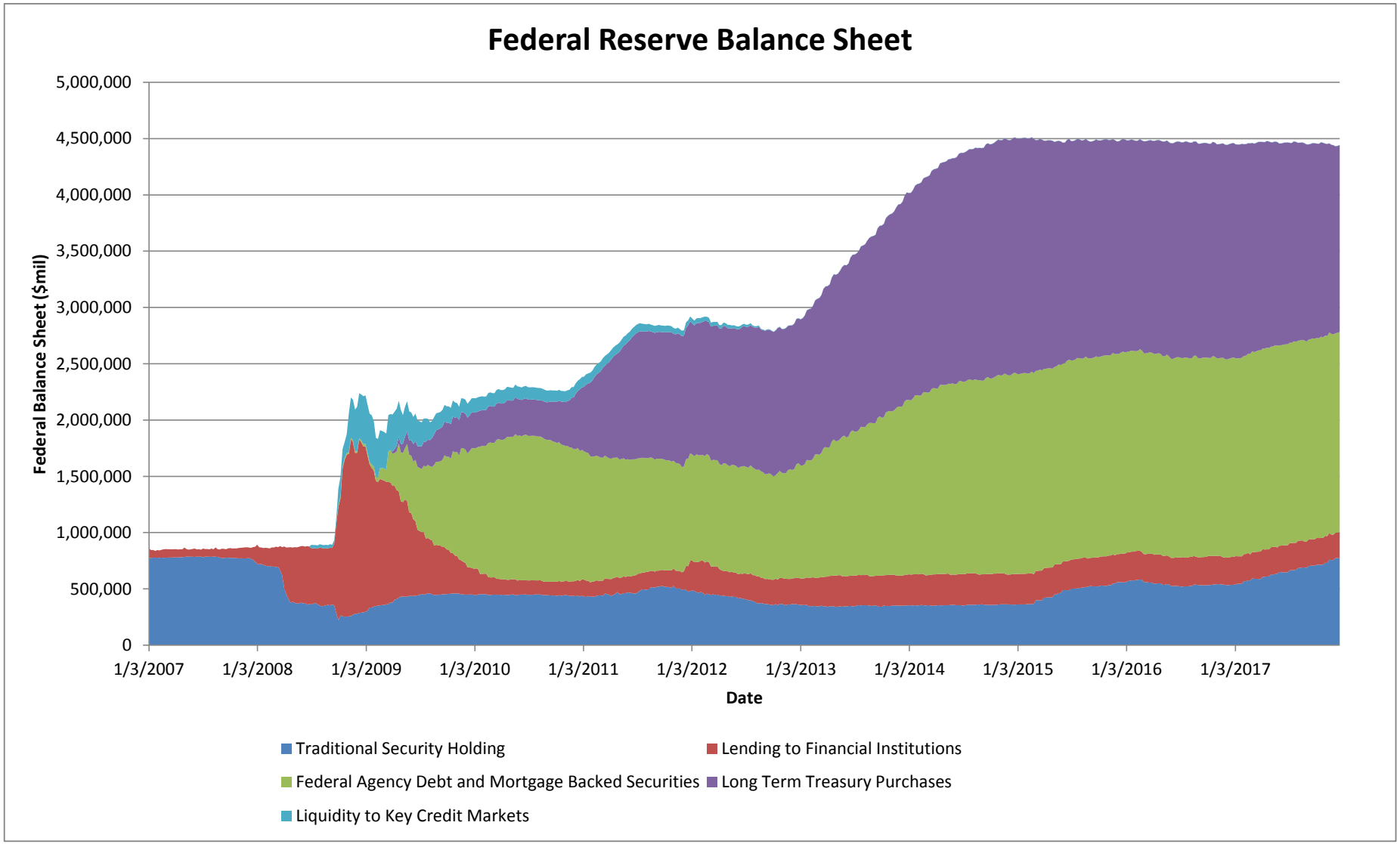
Zia Natural Gas Company
Heating Adjustment

Line No.	[A] Customer Classification	[B] Weather Station	[C] 2016-2017 Month	[D] HDD Current Month Actual	[E] HDD Current Month Normal (1)	[F] HDD Previous Month Actual	[G] HDD Previous Month Normal (1)	[H] Per Customer Adjustment mscf/cust. (3)	[I] Base/Test Year # of Cust.	[J] Volumetric Adjustment mscf [H]X[I]	[K] Distribution Margin Rate $/mscf	[L] Distribution Margin Amount $ [J]X[K]	[M] Transmission Margin Rate $/mscf	[N] Transmission Margin Amount $ [J]X[M]	[O] Cost of Gas Rate $/mscf (4)	[P] Cost of Gas Amount $ [J]X[O]	[Q] Total Adjustment $ [L]+[N]+[P]
206																	
207																	
208	**Summary**																
209	Residential (Includes Texas Customers)								34,467	234,666		571,645		148,309		927,654	1,647,608
210	Small Commercial								2,218	37,132		90,454		23,468		146,787	260,708
211	Large Commercial								591	56,542		137,737		35,735		223,516	396,987
212	City of Las Vegas								1	55,104		-		17,082		217,829	234,911
213	**Total System**								37,277	383,443		799,836		224,593		1,515,786	2,540,215
214																	
215	**Less Texas Residential Customers**																
216		Hobbs			0.0117 (2)		- (2)										
217			September	4	6	-	-	0.03	29	1	2.43600	2	0.63200	0	3.9531	3	5
218			October	33	104	4	6	0.83	28	23	2.43600	57	0.63200	15	3.9531	92	163
219			November	314	391	33	104	0.91	28	25	2.43600	62	0.63200	16	3.9531	100	178
220			December	634	670	314	391	0.42	29	12	2.43600	30	0.63200	8	3.9531	48	86
221			January	591	686	634	670	1.12	29	32	2.43600	79	0.63200	21	3.9531	128	228
222			February	326	493	591	686	1.96	28	55	2.43600	134	0.63200	35	3.9531	217	386
223			March	175	286	326	493	1.31	28	37	2.43600	89	0.63200	23	3.9531	145	257
224			April	108	113	175	286	0.06	27	2	2.43600	4	0.63200	1	3.9531	6	11
225			May	16	37	108	113	0.25	27	7	2.43600	17	0.63200	4	3.9531	27	48
226			June	-	-	16	37	-	27	-	2.43600	-	0.63200	-	3.9531	-	-
227			July	-	-	-	-	-	27	-	2.43600	-	0.63200	-	3.9531	-	-
228			August	-	-	-	-	-	27	-	2.43600	-	0.63200	-	3.9531	-	-
229			Total	2,200	2,786	2,200	2,786	6.88	28	194		472		123		767	1,361
230																	
231	**Net New Mexico Residential**								34,439	234,472		571,173		148,186		926,887	1,646,247

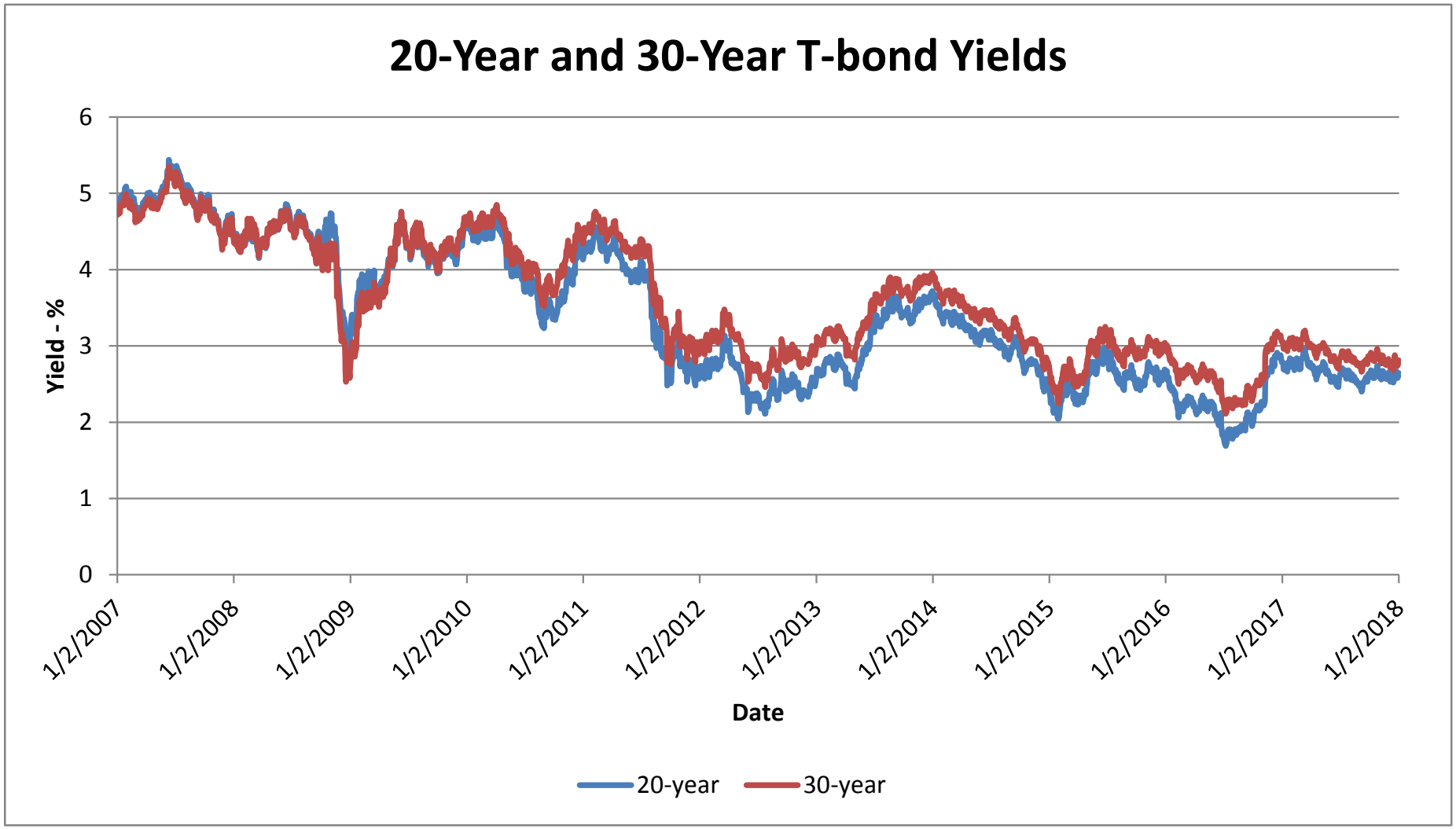
232 **Notes:**
233 (1) Exhibit TJS-3
234 (2) Exhibit TJS-4
235 (3) (Current Month Normal HDD - Current Month Actual HDD) x Current Month HDD Statistic + (Previous Month Normal HDD - Previous Month Actual HDD) * Previous Month HDD Statistic
236 (4) Cost of Gas = 12,430,123 Schedule K-1
237 3,144,408 mscf Schedule K-1
238 3.9531 $/mscf Line 236 / Line 237

Zia Natural Gas Company
Calculation of Test Year Volumes and Number of Customers

Line No.	Class District	[A] Per Books	[B] Weather Adjustment	[C] Base/Test Year	[D] Adjustment Percentage	[E] HDD Variance from Normal	[F] Test Year Number of Customers	[G] Use Per Customer Per Books	[H] Use Per Customer Test Year	[I]
		mscf	mscf	mscf	%	%	(2)	mscf/cust	mscf/cust	
1	**Residential**									
2	Hobbs/Jal (1)	404,869	65,224	470,093	16.11%	-21.04%	9,463	42.79	49.68	
3	Ruidoso (Lincoln)	604,483	86,445	690,928	14.30%	-14.38%	12,358	48.91	55.91	
4	Maxwell	67,124	7,848	74,972	11.69%	-12.37%	1,052	63.78	71.24	
5	Dona Ana	461,057	75,148	536,205	16.30%	-19.57%	11,594	39.77	46.25	
6	Total	1,537,533	234,666	1,772,199	15.26%		34,467	44.61	51.42	
7	**Small Commercial**									
8	Hobbs/Jal	82,252	15,596	97,848	18.96%	-21.04%	874	94.13	111.98	
9	Ruidoso (Lincoln)	123,763	15,502	139,265	12.53%	-14.38%	915	135.33	152.29	
10	Maxwell	26,148	3,239	29,387	12.39%	-12.37%	119	219.73	246.95	
11	Dona Ana	34,866	2,795	37,661	8.02%	-19.57%	310	112.35	121.36	
12	Total	267,029	37,132	304,161	13.91%		2,218	120.41	137.15	
13	**Large Commercial**									
14	Hobbs/Jal	257,635	36,386	294,022	14.12%	-21.04%	412	626.09	714.51	
15	Ruidoso (Lincoln)	127,448	9,275	136,723	7.28%	-14.38%	74	1,730.06	1,855.97	
16	Maxwell	42,539	4,665	47,204	10.97%	-12.37%	24	1,772.46	1,966.85	
17	Dona Ana	50,714	6,215	56,929	12.26%	-19.57%	82	617.20	692.84	
18	Total	478,336	56,542	534,878	11.82%		591	808.91	904.53	
19	**Sale for Resale**									
20	Las Vegas	522,963	55,104	578,067	10.54%	-11.07%	1	522,963.00	578,066.53	
21	**Irrigation**									
22	Maxwell	2,450	0	2,450			8	309.47	309.47	
23	Dona Ana	95,935	0	95,935			479	200.32	200.32	
24	Total	98,385	0	98,385			487	202.09	202.09	
25	**Industrial**									
26	Hobbs/Jal	58,661	0	58,661			3	19,553.54	19,553.54	
27	Dona Ana	181,501	0	181,501			6	30,250.25	30,250.25	
28	Total	240,162	0	240,162			9	26,684.68	26,684.68	
29	**Subtotal**	3,144,408	383,443	3,527,851			37,773	83.25	93.40	
30	**Transportation**									
31	Hobbs/Jal	2,299	0	2,299			1	2,299.00	2,299.00	
32	**Total**	3,146,707	383,443	3,530,150			37,774	83.30	93.45	
33	(1) Includes Texas Residential.	1,093	194	1,287			28	39.26	46.23	
34	(2) Test Year is the same as Per Books.									



Created from data from: https://www.clevelandfed.org/our-research/indicators-and-data/credit-easing.aspx



Created from data from https://www.federalreserve.gov/datadownload/Choose.aspx?rel=H15

Zia Natural Gas Company
Determination of Class Load Factor

Line No.	[A] Class District	[B] Base Use Factor	[C] Heat Factor	[D] Normal Heating Degree-Days Peak Day	[E] Normal Heating Degree-Days Annual	[F] Load Factor	[G] Base/Test Year Volumes	[H] Weighted Load Factor	[I] Per Books Number of Customers
		Exhibit TJS-4	Exhibit TJS-4	Exhibit TJS-3	Exhibit TJS-3	(1)	mscf Exhibit TJS-6	(2)	Exhibit TJS-6
1	**Residential**								
2	Hobbs	1.3095	0.0117	35	2,786	29.22%	470,093		9,463
3	Ruidoso	0.5647	0.0103	45	4,724	31.50%	690,928		12,358
4	Maxwell	0.6621	0.0110	50	5,490	32.76%	74,972		1,052
5	Dona Ana	1.1059	0.0126	35	2,621	26.56%	536,205		11,594
6	Total						1,772,199	29.50%	34,467
7	Total excl. Dona Ana							30.70%	
8	**Small Commercial**								
9	Hobbs	2.2704	0.0302	35	2,786	26.96%	97,848		874
10	Ruidoso	2.8811	0.0249	45	4,724	34.32%	139,265		915
11	Maxwell	1.4123	0.0400	50	5,490	31.67%	29,387		119
12	Dona Ana	5.8005	0.0174	35	2,621	39.44%	37,661		310
13	Total						304,161	32.30%	2,218
14	Total excl. Dona Ana							31.30%	
13	**Large Commercial**								
14	Hobbs	26.8481	0.1507	35	2,786	33.02%	294,022		412
15	Ruidoso	77.1836	0.1846	45	4,724	45.42%	136,723		74
16	Maxwell	27.6808	0.2863	50	5,490	34.26%	47,204		24
17	Dona Ana	24.1270	0.1475	35	2,621	31.10%	56,929		82
18	Total						534,878	36.10%	591
19	Total excl. Dona Ana							36.70%	
20	**Wholesale - City of Las Vegas**	7,488.9803	88.8767	50	5,603	34.34%	578,067	34.34%	1
21	**Irrigation**								
22	Maxwell						2,450		8
23	Dona Ana						95,935		479
24	Total						98,385	0.00%	487
25	**Industrial**								
26	Hobbs/Jal						58,661		3
27	Dona Ana						181,501		6
28	Total						240,162	85.00%	9
29	**Total**						3,527,851		37,773

30 (1) (([C]x12)+([D]x[F])/365)/([C]/30.4+[D]x[E])
31 (2) Weighted by TY volumes.

VERIFICATION

STATE OF MISSOURI _____)
) ss.
COUNTY OF RAY _____)

Thomas J. Sullivan, first being sworn on his oath, states:

I am the witness identified in the preceding testimony. I have read the testimony and accompanying attachments and am familiar with their contents. Based upon my personal knowledge, the facts stated in the testimony are true and correct. In addition, in my judgment and based upon my professional experience, the opinions and conclusions stated in the testimony are true, valid, and accurate.

Thomas J. Sullivan

Subscribed, sworn to, and acknowledged before me on this 22nd day of January, 2018 by Thomas J. Sullivan.

Notary Public

My commission expires 4-3-20

PATRICIA A. McQUEEN
Notary Public - Notary Seal
State of Missouri
Commissioned for Ray County
My Commission Expires: April 03, 2020
Commission Number: 12414456