BEFORE THE
PUBLIC SERVICE COMMISSION OF UTAH

Application of QUESTAR GAS COMPANY for Recovery of Gas Management Costs in its 191 Gas Cost Balancing Account	Docket Nos. 04-057-04, 04-057-09, 04-057-11, 04-057-13 and 05-057-01

DIRECT TESTIMONY OF

LAWRENCE A. CONTI

FOR

QUESTAR GAS COMPANY

APRIL 15, 2005

QGC Exhibit 2

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I. INTRODUCTION

Q. Please state your name and business address.

A. Lawrence A. Conti, 180 East 100 South, Salt Lake City, Utah.

Q. Please state the name of your employer and your employment position.

A. I am employed by Questar Pipeline Company (Questar Pipeline) as the General Manager of Operations and Gas Control. As part of my job function, I am responsible for the daily gas control operations of Questar Gas Company (Questar Gas or Company). A summary of my education and employment history is attached as QGC Exhibit 2.1.

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

A. My testimony will address the following issues:

- Natural gas combustion and interchangeability theory.
- The evolution of the interstate natural gas pipeline grid and the natural gas marketplace. I will explain how these industry-wide changes impacted Questar Gas and made it an island when compared to the British Termal Unit (Btu) content of gas supplies in the rest of the country.
- The history of set point changes on Questar Gas' system.
- Questar Gas' past and ongoing efforts to provide interchangeable gas supplies for its system.

- The impact of liquid hydrocarbon processing on Questar Pipeline's northern system and southern system.
- The impact of coal bed methane (CBM) gas from the Ferron area on Questar Pipeline's southern system.
- Problems posed to Questar Gas' system due to the changing heat content of gas supplies on Questar Pipeline's system.
- Factors that include the interstate grid, Federal Energy Regulatory Commission (FERC) policy and Questar Pipeline's tariff provisions that prevent Questar Pipeline from keeping CBM gas off of its system.
- The efforts of Questar Pipeline and Questar Gas to blend volumes to avoid more expensive solutions to manage the heat content of natural gas.
- Questar Gas' decision to proceed with carbon dioxide (CO_2) removal and how CO_2 removal created an economical and reliable means of creating interchangeable gas supplies for Questar Gas.
- Questar Pipeline's Mainline 104's contribution to gas interchangeability, with a substantial explanation that Mainline 104 does not resolve all interchangeability problems.
- An analysis of 14 alternatives for managing Questar Gas' heat content issue.
- That the alternative of going to FERC to change Questar Pipeline's Tariff was rejected by all parties in the recent technical conferences.
- The three preferred alternatives for managing heat content. I will identify CO_2 removal or precision blending coupled with CO_2 removal as a backup, as the two safest, most reliable and economical alternatives to deal with Questar Gas' heat

content management. Of these two alternatives Questar Gas will recommend precision blending with CO_2 removal as a back up as the preferred alternative.

II. NATURAL GAS COMBUSTION AND INTERCHANGEABILITY THEORY

a. COMBUSTION THEORY

Q. Please explain natural gas combustion theory.

A. Natural gas combustion occurs when natural gas is mixed with air, which contains oxygen, and is burned to produce heat. The primary byproducts of the combustion process are heat, water, CO_2, carbon monoxide (CO) and some other trace elements. Simply said the hydrocarbon molecules in natural gas chemically react with the oxygen to produce heat. The efficient and safe combustion of natural gas requires the correct ratio of oxygen and fuel. The ability of an appliance to properly combust the hydrocarbon molecules is largely dependent on the appliance being properly adjusted for the heating value and specific gravity of the natural gas.

Q. Please explain how natural gas combustion occurs in an appliance.

A. Natural gas is introduced into an appliance through an orifice and combined with air that contains oxygen, and is then ignited in the appliance's combustion chamber. The orifice is a device that regulates the quantity (measured in cubic feet) of fuel that enters the combustion burner at a specific fuel pressure. The orifice, air mixture and fuel pressure must be adjusted or sized based on the installation altitude and the expected composition of the natural gas that will fuel the appliance.

Q. Please explain how altitude and gas composition impact combustion.

A. Questar Gas is unique because the majority of its service areas require a deration of Btu input for altitude considerations. Deration is simply reducing the energy input into appliances to compensate for the reduction in combustion air flow at higher elevations. Deration is required because Questar Gas has customers whose elevation ranges from 2,000 feet to over 8,000 feet. Because the density of the air decreases as altitude increases, the fuel rate to an appliance needs to be adjusted to maintain the correct ratio of fuel and air for safe and efficient combustion. In addition to adjustments for altitude, appliances need to be adjusted for the gas composition that is delivered. Gas composition affects the density of the gas (specific gravity) and the heating value (Btu).

Q. Mr. Conti, can you please explain what specific gravity is?

A. Specific gravity is the molecular weight of a substance divided by the molecular weight of air. A specific gravity greater than one means that the substance is heavier than air while a specific gravity less than one means that the substance is lighter than air. Specific gravity for natural gas runs between 0.56 to 0.65, therefore, natural gas is lighter than air.

Q. Please explain heating value.

A. The heating value of natural gas is the number of Btus produced by the combustion of one cubic foot of natural gas. A Btu is a unit of measurement that is defined as the quantity of heat required to raise the temperature of one pound of water (at its maximum density) one degree Fahrenheit at constant pressure.[1]

Q. How do specific gravity and Btu impact combustion?

A. These two factors are major components of natural gas interchangeability indices described by Mr. Benson. For purposes of my testimony, I will describe Questar Gas' use of specific gravity and Btu to determine a Wobbe number that is utilized to determine the interchangeability of natural gas for combustion in appliances.

Q. What is a Wobbe number?

A. A Wobbe number is defined as the heating value (Btu) of natural gas divided by the square root of its specific gravity. In my testimony when I reference the term heat content of natural gas, I am referring to the Btu and specific gravity of this gas.

Q. What is the purpose of the Wobbe number?

A. The Wobbe number or index is an internationally recognized standard used by the natural gas industry to help describe and manage the interchangeability of gas supplies in natural-gas burning appliances.

[1] As Mr. Benson discusses in his testimony, the definition of Btu most commonly used in this country is Higher Heating Value (HHV). For purposes of my testimony, when I refer to Btu, the HHV definition will apply.

Q. In the day-to-day operations, how is the Wobbe index used?

A. Questar Gas manages the daily heat content of gas supply to be within a specific Wobbe range to ensure that gas deliveries are interchangeable for appliance set points. The range that Questar Gas manages heat content to is a plus 3% to a minus 5% of the Wobbe number for its appliance set point.

b. INTERCHANGEABILITY AND APPLIANCE SET POINTS

Q. Please explain the concept of interchangeability.

A. Interchangeability is the ability to substitute one gas supply for another in a gas-burning appliance without significantly impacting operational safety, efficiency and performance.

Q. What are the consequences of introducing natural gas to an appliance outside of the appliance's interchangeability range?

A. There are significant safety and efficiency concerns for the appliance user. These concerns are addressed in more detail by Mr. Benson.

Q. Why is Questar Gas so concerned about interchangeability?

A. Questar Gas has been concerned about interchangeability throughout its history of providing natural gas service. Under Questar Gas' Tariff, Commission rules, other codes and standards, and appliance manufacturer's installation instructions, Questar

Gas has the responsibility to manage the heat content of natural gas within a specific range. However, the dynamics of the natural gas market in the Rocky Mountains have significantly changed the character of the natural gas supplies during the last decade. More specifically, this case focuses on being aware of the implication of the introduction of the Ferron area CBM production onto Questar Gas' system.

As new gas sources and changes to existing supplies (including liquid hydrocarbon processing, changes in gas composition, and volumes of gas transported to Questar Gas) have been introduced, the heat content of volumes reaching the Questar Gas system has declined, thus impacting its interchangeability for appliances on Questar Gas' system.

Q. Please illustrate how a change in the characteristics of the gas would impact the gas appliance combustion with respect to interchangeability.

A. As presented in the technical conferences, QGC Exhibit 2.2, page 1 shows a Questar Gas appliance adjusted for a pre-1998 set point of 1088 Btu/cubic ft. and a 0.62 specific gravity at the appropriate altitude. An appliance properly adjusted to these characteristics will have the proper flame attributes, will perform as rated, and will burn safely with low CO emissions at the pre-1998 set point. This exhibit demonstrates a typical, average Questar Gas northern gate heat content.

c. SPECIFIC INTERCHANGEABILITY CONCERNS WITH FERRON AREA CBM GAS SUPPLIES

Q. Please explain how the nature of the gas supplies coming into Questar Pipeline's system have caused the issue from 1998 onward with respect to gas interchangeability.

A. As explained by Mr. Lamarre in his testimony, the development of CBM natural gas in the Ferron, Utah, area began in the early 1990s. Natural gas production ramped up slowly during that time period, and in the late 1990s, it became apparent that this production would come on in much greater quantities than anyone predicted. The Ferron area CBM production presented Questar Pipeline and Questar Gas with a substantial amount of gas that had a composition with a lower Btu content than had traditionally come onto Questar Pipeline's system.

Q. What would be the consequences of introducing the Ferron area CBM gas into natural gas appliances?

A Ferron area CBM gas has a Btu of 985 and a 0.575 specific gravity as illustrated on page 2 of QGC Exhibit 2.2. The CBM gas has a Wobbe number of 1299, compared to a Wobbe number set point in the appliance of 1382. As discussed by Mr. Benson, the CBM gas that represents a 1299 Wobbe number burning in the appliance set at the 1382 Wobbe number would likely result in flame lift off, flame flashback and the potential to emit carbon monoxide in excess of established safe levels. Questar Gas would deem this CBM gas to be non-interchangeable and would not allow it to be delivered to a 1382 Wobbe set point appliance.

Q. Why would Questar Gas not allow the delivery of this gas?

A. Questar Gas is unwilling to expose its customers to the increased risk of flame liftoff, flame flashback and CO poisoning.

Q. How is an appliance adjusted to compensate for the change in gas composition?

A. As illustrated on page 3 of QGC Exhibit 2.2, an appliance adjustment set point is established for the characteristics of lower Btu gas. Those characteristics are a 1003 Btu/cubic foot (Btu/cf) heating value and a corresponding 0.56 specific gravity that produces a 1340 Wobbe number. When an appliance is properly adjusted to these set point characteristics (1340 Wobbe number) it safely burns natural gas represented by a 985 Btu/cf and a 0.575 specific gravity with a 1299 Wobbe number. An appliance adjusted to this 1340 Wobbe number set point burning lower Btu production will have proper flame characteristics, proper Btu firing and low carbon monoxide emissions deemed safe by the applicable codes. The 1340 Wobbe set point adjustment can be accomplished by different appliance adjustments.

d. QUESTAR GAS' RESPONSE TO GAS INTERCHANGEABILITY ISSUES

Q. Prior to 1998, how did Questar Gas use its set points to manage interchangeability?

A. Questar Gas managed natural gas deliveries within its Tariff range based on a Wobbe number. This resulted in gas supplies that were interchangeable with the recommended set point.

Q. Based on your last answer, Questar Gas delivers volumes that are within a range and not at one specific point.

A. That is correct. As I will describe later in my testimony, natural gas within Questar Gas' system has and continues to encompass a wide range of compositions, and therefore, corresponding heat content and specific gravity. Natural gas appliances are able to operate within a certain range as described by Mr. Benson. This flexibility allows Questar Gas to manage heat content over that same range to ensure interchangeability.

Q. Beginning in the 1980s, what challenges has Questar Gas faced in managing the heat content of gas and maintaining interchangeability within appropriate ranges?

A. As was discussed at length in the technical conferences in this Docket, the heating content of natural gas volumes within the Rocky Mountains has substantially shifted. Expanded CBM production and increased natural gas processing for the extraction of liquid hydrocarbons were both factors. This decline continued through the mid-1990's in the Wasatch Front and is illustrated on QGC Exhibit 2.3. Up to 1998, when Questar Gas established a new appliance set point in its Tariff, it became increasingly difficult and expensive to manage heat content and specific gravity to maintain interchangeable gas volumes for residential customers.

Q. Prior to 1998, what was Questar Gas' approximate range for interchangeable gas volumes?

A. For residential users along the Wasatch Front, the pre-1998 appliance set point corresponded to 1088 Btu/cf and a 0.62 specific gravity that equates to a Wobbe number of 1382. An illustration of the range around this Wobbe number represented simply as "Btus" is shown in QGC Exhibit 2.4.

Q. What does the line marked "KRGT" on that same exhibit represent?

A. The line labeled KRGT represents an approximation of the Wobbe number for volumes off of Kern River Gas Transmission Company's (Kern River) pipeline that also delivers natural gas to Questar Gas' Wasatch Front customers.

Q. Why is the KRGT line merely an approximation?

A. In Kern River's FERC Tariff, only Btu, hydrocarbon dew point, and inert specifications are referenced. A representative Wobbe number was calculated from these values.

Q. The pre-1998 Questar Gas line and the KRGT line do not cover the same range on the graph. What does that indicate?

A. This demonstrates that prior to 1998 it was possible that Kern River could transport volumes for delivery to Questar Gas that were not interchangeable with Questar Gas' pre-1998 set point, because the volumes that Kern River's tariff allows it to transport had the potential to contain high enough inerts and too low a heat content to be interchangeable for Questar Gas.

III. THE EVOLUTION OF THE INTERSTATE NATURAL GAS PIPELINE GRID AND THE NATIONAL MARKETPLACE

Q. Why would Kern River potentially have volumes that were non-interchangeable with Questar Gas?

A. Kern River's FERC Tariff contains gas quality specifications that directly relate to heat content that are compatible with the interstate natural gas pipeline grid.

Q. In the late 1990s, were Questar Gas' traditional supply sources showing the same trend toward lower Btus?

A. Yes.

Q. Please explain why this is an issue.

A. During the 1970s and 1980s, a minimal interstate pipeline infrastructure existed to transport Rocky Mountain production outside of the area. During that time, Questar Gas was able to produce its own natural gas volumes and to purchase third-party volumes of a higher heat content (Btu value) with an associated higher specific gravity. These sources of gas helped establish the Questar Gas pre-1998 set point on Questar Gas of 1088 Btu/cf and 0.62 specific gravity.

Q. During several of the technical conferences you have discussed that the Rocky

Mountain natural gas infrastructure and market situation has changed. In what ways?

A. First, the infrastructure to export gas out of the Rocky Mountains has substantially changed with the addition of new and reinforced interstate pipeline capacity. This can be visually illustrated by QGC Exhibit 2.5, pages 1-3. Page 1 shows the Rocky Mountain major pipelines in 1975. It shows four major interstate pipelines that export natural gas out of the Rocky Mountains, while page 2 shows 1998, illustrating substantially more interstate pipelines that export gas out of the Rockies to the south (Transwestern, El Paso), to the California market (Kern River) and to the east (CIG, WIC). Today, as shown on page 3, Kern River has looped its pipeline to California totaling approximately 2,000 MMDth/d capacity, El Paso has built its Cheyenne Plains pipeline with a capacity in late 2005 of 730 MMDth/d out of Wyoming to the mid-continent markets, and numerous expansions on El Paso, Northwest, CIG, Questar Pipeline, Pony Express and TransColorado continue to export volumes out of the Rocky Mountains. Dr. Reid's testimony quantifies the growth in volumes exported out of the Rocky Mountain region over the last decade.

Q. What has prompted all of these interstate pipeline expansions?

A. Today, the Rocky Mountain area continues to be the only major source of natural gas supply in the lower 48 states where exploration and production continues to grow and expand, as testified to by Dr. Reid.

a. THE IMPLICATIONS OF THE EVOLVING INTERSTATE NATURAL GAS PIPELINE GRID TO QUESTAR GAS

Q. How is this new Rocky Mountain production finding its way to Questar Gas?

A. Questar Gas' main transporters, Questar Pipeline and Kern River, are connected to several of these developing and expanding production basins in the Rocky Mountains. Kern River's main sources of gas are the Overthrust and Green River basins along with its interconnect with Questar Pipeline at Goshen in central Utah, which gives Kern River access to Ferron and Uinta basin production. Questar Pipeline has access to these and other producing basins that provide gas supplies to Questar Gas as illustrated on QGC Exhibit 2.6. This exhibit also indicates the approximate range of Btu from each of the producing areas.

Q. QGC Exhibit 2.6 shows a wide range in Btu content for the areas. What is the reason for this disparity?

A. Natural gas is comprised of many different components, each having its own heating value in Btu/cf. The composition in each producing basin, and within zones within each basin, can result in natural gas of varying heat content (Btu/cf) and an associated specific gravity. It is common that higher-Btu gas or lower Btu gas can be found in every producing basin. Typically, lower-Btu gas is represented as CBM type natural gas that is predominantly (93%-98%) pure methane with a minor amount of inert gases. Mr. Lamarre has testified as to the extent of CBM reserves in the Rocky Mountains and their increasing importance as part of the domestic gas supply.

b. HISTORICAL GAS QUALITY TRENDS AS THEY RELATE TO QUESTAR GAS

Q. Could you provide an example of different natural gas compositions?

A. Yes, I've provided in QGC Exhibit 2.7 examples of various gas compositions, one being CBM and the other being representative production from the Uinta basin area and northern gate deliveries from Questar Pipeline to Questar Gas. The Northern Gates Gas on QGC Exhibit 2.7 reflects substantial blending and processing of the different gas sources found on the northern system as reflected in QGC Exhibit 2.6. These three compositions show a variance in composition and corresponding heat content for volumes that could potentially be delivered to Questar Gas and other interstate pipeline systems in the area.

Q. Are all the natural gas sources illustrated by QGC Exhibits 2.6 and 2.7 interchangeable with Questar Gas' pre-1998 appliance set point?

A. No. Several of the producing basins contain higher-Btu gas that would be non-interchangeable on the high side of the set point while other volumes, CBM production or high-Btu volumes that have been processed to remove hydrocarbon liquids, are non-interchangeable and are on the low side of the pre-1998 set point. Referencing QGC Exhibit 2.7, the northern system gates (Wobbe 1363) and Uinta basin gas (Wobbe 1402) would be interchangeable with the pre-1998 Questar Gas 1088 Btu/cf and 0.62 specific gravity (Wobbe 1382). However, the CBM (Wobbe

1283) would not be interchangeable.

Q. How does Questar Gas manage these varied gas supplies to ensure that the gas reaching its customers is interchangeable?

A. Gas supplies from the varied sources need to be blended and/or processed to ensure that the gas supply reaching Questar Gas customers is interchangeable.

Q. Earlier you discussed interchangeability ranges in terms of heating value. You also discussed the importance of using specific gravity in conjunction with heating value (Wobbe) to determine interchangeability. Has Questar Gas developed a Wobbe operating range to determine interchangeability?

A. The operating range Questar Gas has adopted is plus 3% and minus 5% of the Wobbe number for Questar Gas' established appliance set point. These values were derived by Questar Gas based on combustion theory, industry-accepted interchangeability indices, appliance testing and operational experience.

Q. How was Questar Gas able to manage interchangeability prior to 1998 given the low and high-Btu sources of gas from around the Rockies' producing basins?

A. Given the flexibility of Questar Pipeline and the location of the various sources on Questar Pipeline, lower and higher-Btu sources were managed to a blend that met the pre-1998 set point on Questar Gas. As mentioned earlier and illustrated by QGC Exhibit 2.3 the decline in the quantity of high Btu gas due to hydrocarbon processing, and the increase in lower-Btu gas due to the growth of CBM production resulted in an overall decline in heat content delivered to the Wasatch Front.

Q. Your QGC Exhibit 2.6 shows several major producing areas from which Questar Pipeline receives volumes destined for Questar Gas. How many individual receipt points are aggregated over all those producing basins?

A Questar Pipeline has over 150 receipts points from which it receives different natural gas compositions that represent a wide variety of heat content.

Q. You've already said that some of the gas in those basins is non-interchangeable with the pre-1998 Questar Gas appliance set point.

A. Yes. In reviewing the maximum and minimum Btu for each basin on Exhibit 2.6, the range of Btus for each basin and its associated heat content (expressed as Btu) could be outside of the Questar Gas pre-1998 appliance set point as defined in QGC Exhibit 2.4. Production with a Btu value and an associated specific gravity below or above the indicated range on QGC Exhibit 2.4 would be non-interchangeable for Questar Gas.

Q. Why is that?

A. There are two reasons. First, Questar Pipeline accepts natural gas whose gas quality specifications comply with Questar Pipeline's FERC-approved Tariff. Questar Pipeline's FERC Tariff is aligned to enable it to meet deliveries with interconnecting interstate pipeline companies. Second, a great percentage of the volumes that flow on Questar Pipeline require processing, or some sort of blending, not only to meet the requirements of the interstate natural gas pipeline grid as well as to be compatible with Questar Gas' pre-1998 set point. Without blending and processing to manage heat content there would not be a sufficient supply of interchangeable gas for Questar Gas to meet its system demand. As I stated earlier in my testimony, Questar Gas was able to meet its pre-1998 set point by working with Questar Pipeline to manage heat content delivered to the Wasatch Front.

c. QUESTAR GAS' SUPPLY PIPELINES AND THEIR POSITION IN THE INTERSTATE NATURAL GAS PIPELINE GRID

Q. What has the FERC done to establish the obligations of Questar Pipeline as a participant in the interstate natural gas pipeline grid?

A. The FERC has promulgated rules and regulations to require interstate pipelines, like Questar Pipeline and Kern River, to adopt standards that allow the free flow of gas across the interstate natural gas pipeline grid and to create a non-discriminating natural gas marketplace. Questar Pipeline can no longer be primarily dedicated to making deliveries to Questar Gas, but must provide open access to all shippers that meet its Tariff specifications.

Q. Would you please explain what you meant by stating that Questar Pipeline is aligned to meet deliveries to interconnecting interstate pipeline companies?

A. As I described earlier in my testimony, the Rocky Mountain interstate pipeline infrastructure has expanded over the last 20 years to export natural gas production out of the Rockies. Questar Pipeline has expanded its system to where nearly 45% of its contracted transportation volumes are delivered to interconnecting interstate pipeline companies. To facilitate these deliveries, Questar Pipeline is required to deliver volumes that meet the gas quality specifications of the interconnecting pipeline. This is illustrated by QGC Exhibit 2.8 that shows the major interconnect points between Questar Pipeline and other pipeline systems, including Questar Gas, with their maximum/minimum FERC specification for Btu/cf at each interconnecting delivery point. Comparing the Btu ranges for interconnecting pipelines demonstrates that Questar Pipeline, from a Btu maximum/minimum perspective, is aligned with the other pipelines that transport natural gas out of the Rockies, as well as being aligned with Questar Gas. Comparing these maximum and minimum interconnect Btus, from QGC Exhibit 2.8, with the producing maximum and minimum Btus from QGC Exhibit 2.6 one can observe that the producing area maximum Btus may be higher than the pipeline maximum Btus and therefore will require hydrocarbon processing or blending to meet the maximum pipeline Btu specifications. However, the lower Btu limit from any of those producing areas, including CBM production, is above the minimum interconnecting pipeline Btu for all pipelines on QGC Exhibit 2.8. This means that the Btu content of CBM gas is within Tariff specifications to flow on any Rockies' interstate pipeline.

Q. QGC Exhibit 2.8 shows that pipelines such as Kern River and Northwest Pipeline have no maximum Btu. Would a higher Btu gas supply be acceptable to those pipelines without processing?

A. No. Most interstate pipelines that do not specify a maximum Btu limit rely on their hydrocarbon dew point specification to limit maximum Btu. Most of these pipelines have a FERC Tariff specification of 15-20 degrees Fahrenheit for hydrocarbon dew point. In order to achieve this hydrocarbon dew point, processing is required that will reduce the Btu level for typical natural gas below 1080 Btu. In fact a reasonable Btu for 15 degree hydrocarbon gas is 1040-1050 Btu/cf. A listing of interstate pipelines across the United States showing their maximum and minimum Btu, with the majority of those pipelines not showing a maximum Btu is attached in QGC Exhibit 2.9.

Q. How is Questar Gas impacted by the current status of these gas supplies and Questar Pipeline's Tariff standards?

A. Questar Gas' range for interchangeable gas is more narrow than the Questar Pipeline and Kern River's tariff ranges. Generally, pipelines manage their supplies to be compatible with downstream customers so long as it is in the pipeline's FERC Tariff approved range, but in general, these customers require gas in the new (post-1998) Questar Gas range, not the old Questar Gas range.

IV. THE HISTORICAL CHALLENGE TO PROVIDING INTERCHANGEABLE SUPPLIES FOR QUESTAR GAS

Q. Earlier you stated managing the heat content of gas supplies was not new and

that even prior to 1998, Questar Pipeline and Questar Gas coordinated to manage heat content to ensure that Questar Gas had sufficient supplies that were interchangeable for its customers.

A. Yes, providing interchangeable gas for Questar Gas has required substantial coordination on managing heat content over the years.

Q. Please explain the issues that have challenged Questar Gas with regard to managing heat content.

A. As I've discussed in my testimony, the development of new natural gas production in the Rockies and the increased capacity to transport those volumes out of the Rockies has resulted in a decline of heat content in natural gas supplies available to Questar Gas. This is a result of two phenomena. The first phenomenon that has impacted Questar Gas has been the processing of natural gas to make liquid hydrocarbon products, such as propane, butane and ethane. Higher Btu natural gas may contain substantial quantities of these liquid hydrocarbons. As the market for liquid hydrocarbon from natural gas has fluctuated, we have seen a corresponding increase or decrease in the heat content of volumes delivered to Questar Gas from each of its transportation providers, Questar Pipeline and Kern River. Processing for these liquids decreases heat content. In particular this phenomenon is impacted by the price for natural gas itself and the price of liquid hydrocarbon products. The economic spread between natural gas prices and liquid prices determines the quantity of hydrocarbon liquids extracted from the gas. When hydrocarbon liquids prices are higher than natural gas prices, liquids are extracted (processed) from the natural gas reducing the heat content of the natural gas. Second, the Rockies have seen an explosion in CBM production over the last two decades. Natural gas prices and newer technology have made the development of CBM production economical and profitable. Mr. Lamarre discusses this in greater detail. This production meets the FERC gas quality Btu specifications of interstate pipelines, including Questar Pipeline's.

Q. How did these two phenomena, hydrocarbon liquid processing and CBM production, impact the heat content of deliveries from Questar Pipeline and Kern River to Questar Gas?

A. Each of these phenomena separately and combined resulted in lowering the overall heat content of natural gas supplies available to Questar Gas. Hydrocarbon liquid processing has had more of an impact on Questar Pipeline's northern system and Kern River deliveries to Questar Gas, while CBM production has impacted Questar Gas via deliveries off of Questar Pipeline's southern system.

a. THE IMPACT OF LIQUID HYDROCARBON PROCESSING ON QUESTAR PIPELINE'S NORTHERN SYSTEM

Q. Please define Questar Pipeline's northern system.

A. Refer to QGC Exhibit 2.10 for details. In general, the Questar Pipeline northern system extends from Craig, Colorado, in the east, through southwest Wyoming, including the cities of Rock Springs and Evanston, through Coalville to the Utah gate stations along the Wasatch Front in the west. It includes Mainlines 58 and 101 from Clay Basin north to the Kanda, Coleman and Nighingale stations near Rock Springs, Wyoming. The northern system also includes Mainlines 1, 13 and 15, which feed Questar Pipeline's northern gate stations to Questar Gas.

Q. Would you please describe the location of Questar Pipelines northern gate stations?

A. The northern gate stations include the Hyrum gate in Cache Valley near Logan, the Sunset gate near Ogden, the Porters Lane gate in Davis County near Centerville, and the Little Mountain gate in Salt Lake County.

Q. Do you have data that supports the impact of northern system hydrocarbon processing on Questar Gas' delivered heat content?

A. Yes. I will describe Questar Pipeline's northern system production areas and the deliveries from the northern system to Questar Gas along the northern Wasatch Front. In addition, I will provide data that describes the heat content deliveries from Kern River to Questar Gas' Wasatch Front.

Q. Please continue.

A. Refer back to QGC Exhibit 2.6 which shows how Questar Pipeline's system interconnects with the major producing basins. Questar Pipeline's northern system brings volumes from the three major producing basins, including Overthrust, Green River, and the east field basins. These are the three major producing areas from which volumes may flow to Questar Gas along the northern Wasatch Front. QGC Exhibit 2.11 plots the heating value in Btus for each of these three major producing areas from January 1997 through December 2004. This data was based on monthly volume weighted averages for all the receipt points in the given production basins.

Q. What is the correlation between these plots and liquid hydrocarbon processing?

A. In each of these basins, producers/gathering companies own and operate liquid extraction plants that are capable of removing natural gas hydrocarbon liquids from the gas streams. These plants will extract liquid based on the price dynamics I discussed earlier regarding the price for liquid hydrocarbons in comparison to natural gas. The plots illustrate the swing in heat content (Btu/cf) within a specific producing basin that is directly related to the level at which liquid hydrocarbons are extracted from the gas stream. Decline in Btu is associated with more liquid hydrocarbons extracted out of the gas produced in those basins. Increases in Btu are associated with times when the liquids are "left" in the gas stream because it is more economically advantageous to the producer to refrain from processing.

Q. Is Questar able to predict the swings in heat content due to liquid hydrocarbon processing?

A. No, not beforehand.

b. THE IMPACT OF HYDROCARBON PROCESSING ON THE KERN RIVER SYSTEM

Q. You also stated that gas quality from Kern River is affected by hydrocarbon processing. Would you elaborate?

A. The same market dynamics that impact Questar Pipeline with regard to heat content and the decision to process apply to Kern River because it accesses the same sources of gas supply in several of the same producing basins. Another plot has been developed, QGC Exhibit 2.12, to show the swings in heat content (Btu/cf) delivered off of Kern River to Questar Gas' northern (Wasatch Front) and southern (St. George/southern Utah) gates.

Q. You have referred to several processing plants connected to both Questar Pipeline and Kern River. Would you please indicate where these plants are located?

A. Please see QGC Exhibit 2.13. This exhibit indicates the plants associated with Questar Pipeline and Kern River.

c. THE IMPACT OF HYDROCARBON PROCESSING ON QUESTAR PIPELINE'S SOUTHERN SYSTEM

Q. Please define Questar Pipeline's southern system.

A. Again refer to QGC Exhibit 2.10 for details. The Questar Pipeline southern system begins in the Rifle, Colorado, area and runs west through northeastern Utah near Vernal on Mainlines 40 and 41 to the Payson and Indianola gates in the west. It also includes Mainline 104 from Carbon County to the Goshen interconnect with Kern River and Mainline 58 from Fidlar Station to Clay Basin.

Q. Would you please describe the location of Questar Pipeline's southern gate stations?

A. The southern gate stations include the Indianola and Payson gates near the respective cities in Utah County.

Q. You described how liquid hydrocarbon processing impacts the Questar Gas northern system heat content. Does hydrocarbon processing have an impact on Questar Gas' southern system (Utah County)?

A. I have attached QGC Exhibit 2.14 that plots the heating value in Btu/cf for the producing basins along Questar Pipeline's southern system (please see QGC Exhibit 2.6 for further explanation). These basins, Ferron, Uinta and Piceance, produce volumes that may be delivered to Questar Gas from Questar Pipeline and potentially from Kern River. As illustrated on QGC Exhibit 2.13 there are processing plants located within these basins that extract hydrocarbon liquids and, therefore, can impact heat content of volumes delivered from those basins. However, the capacities of these plants are limited when compared to the processing capacity on Questar Pipeline's northern system.

d. THE IMPACT OF CBM GAS ON QUESTAR PIPELINE'S SOUTHERN SYSTEM

Q. As discussed earlier, hasn't the main driver of heat content on the Questar Pipeline southern system been CBM production?

A. Yes. QGC Exhibit 2.14 illustrates the heat content of the Ferron area natural gas, which is predominantly CBM production. As I have previously discussed, this production has a lower heating value than either the Uinta or Piceance basins.

Q. Why has the Ferron area CBM production been the driver on the heat content delivered to Questar Gas off the southern system?

A. Ferron has had a major impact on delivered heat content to Questar Gas due to its composition as previously described, the volume of CBM production, and its geographic proximity to the Questar Gas gate stations near Payson and Indianola, Utah. These gates are the primary gates for natural gas deliveries to Questar Gas on the southern end of the Wasatch Front and into southern Utah.

Q. How has the volume of CBM production in the Ferron area evolved?

A. QGC Exhibit 2.15 shows the monthly production from each major producing basin on Questar Pipeline's northern and southern systems from January 1997 through December 2004. In January 1997, Ferron area production was approximately 50 MMcf/d (million cubic feet per day) and has grown nearly five-fold to just under 250 MMcf/d. QGC Exhibit 12.15 shows the dramatic impact that the Price area CBM production has had on Questar Pipeline's gas supplies. In January 1997, the Ferron basin was a small component of gas supplies flowing on Questar Pipeline. From early 2000 to today, with the exception of several months, the Ferron basin has been the single largest contributor to Questar Pipeline's gas supplies. Both Mr. Walker and Dr. Reid, in their testimonies describe the economic benefits of Ferron production to Questar Gas and its customers.

Q. How does the proximity of this Ferron area production impact the heat content of natural gas delivered to Questar Gas' southern gates?

A. Because of its geographical location near Price, Utah, the Ferron area production, is the last major source of natural gas on Questar Pipeline's southern system upstream of deliveries to Questar Gas' southern gates (Payson and Indianola). It drives the heat content of gas delivered to Payson and Indianola. Please refer to QGC Exhibit 2.6.

Q. Would you please define what you mean by upstream of Questar Gas' southern gates?

A. In order for Questar Gas to meet its customer demands in Utah county (Payson gate) and its line to southern Utah (Indianola gate), Questar Gas requires daily deliveries of natural gas from Questar Pipeline at its Payson and Indianola gates. To meet these deliveries, all or part of the Ferron supplies are required to be transported "downstream" from Ferron to Payson and Indianola. Therefore, Ferron supplies will always impact deliveries to Questar Gas at these two gates.

V. THE PROBLEM POSED BY THE CHANGING HEAT CONTENT OF GAS SUPPLIES AND QUESTAR GAS' RESPONSE

Q. If Questar Gas requires daily deliveries at Payson and Indianola, and the proximity of Ferron production will result in Ferron supplies being delivered to these gates, does the composition of the Ferron volumes pose a problem for Questar Gas?

A. Yes. As I previously testified regarding combustion theory, appliances will operate effectively within a range around a particular set point. Prior to 1998, Questar Gas had an appliance set point of 1,088 Btu/cf and a 0.62 specific gravity (Wobbe number 1382). CBM production at a Wobbe number of approximately 1300 is non-interchangeable with the pre-1998 set point. The non-interchangeability of CBM production with the pre-1998 adjusted appliances was discussed at length by Mr. Benson in his testimony.

Q. How did Questar Gas respond to the potential of non-interchangeable gas being delivered to its system?

A. Questar Gas, on its own or in conjunction with Questar Pipeline, instituted several short-term measures and long-term solutions to the heat content issue that it faced as set forth below.

a. QUESTAR GAS' SET POINT ADJUSTMENTS

Q. Ultimately, what was Questar Gas' long-term solution to manage the heat content going forward?

A. After considerable study, Questar Gas determined that its pre-1998 appliance set point was not consistent with the gas supply that it would receive from its two interconnecting pipelines, Questar Pipeline and Kern River. Questar Gas decided to change its appliance set point to align with the interstate natural pipeline grid. As I described earlier, the Rocky Mountains had integrated into the interstate natural gas pipeline grid with gas supply more consistent with national heat content. Questar Gas determined that it was not possible to remain an island with a higher recommended set point. To provide higher Btu gas supplies to Questar Gas, above the heat content consistent with the interstate natural gas pipeline grid would be operatively complex and prohibitively expensive.

Q. Were Questar Gas' pre-1998 set point and the associated gas quality deliveries consistent with the gas quality range delivered to other major distribution companies?

A. No. Questar Gas' 1088 Btu/cf with a 0.62 specific gravity set point is significantly higher than the heat content of the vast majority of gas flowing in the interstate natural gas pipeline grid. QGC Exhibit 2.16 demonstrates the range of heat content delivered to major distribution companies in the United States relative to Questar Gas' pre-1998 set point. The range was generated from data gathered from 26 major urban areas and encompasses 90% of the heating values collected in the study. QGC Exhibit 2.16 shows that Questar Gas' pre-1998 set point was unique relative to the heating value of gas flowing on the national grid.

Q. Is the current heating content in the Rocky Mountains consistent with the interstate natural gas pipeline grid as set forth in QGC Exhibit 2.16?

A. Yes. The heat content for production in the Rocky Mountains and, in particular, the heat content for volumes delivered to Questar Gas from Questar Pipeline and Kern River is illustrated in QGC Exhibits 2.17 and 2.12. It is consistent with the heat content of the national interstate pipeline grid as set forth in QGC Exhibit 2.16.

Q. What action did Questar Gas take to realign its appliance set point?

A. As Mr. McKay explained in his testimony, on April 21, 1998, Questar Gas filed Advice No. 98-02, Docket No. 98-057-T02, to change its heat content set points. The Commission approved the tariff change effective on May 1, 1998, with the support of the Division and no one opposed the change.

Q. So the change in the set points was Questar Gas' long-term solution to managing gas heat content?

A. Ultimately, yes. Questar Gas determined that moving its set point to the lower heat content would enable it to more effectively and economically manage heat content received from interstate pipeline sources in the foreseeable future. It would enable Questar Gas to safely and reliably accept additional CBM supplies and be less vulnerable to the heat content impact of hydrocarbon liquids processing.

Q. What did this change require?

A. Questar Gas determined in 1998 that most appliances in its gas service area would have to be adjusted from the pre-1998 set point to the post-1998 set point in order to operate safely and reliably with the lower heat content. During the transition period to adjust from the pre-1998 to post-1998 set point, Questar Gas would manage heat content that was interchangeable with both set points. Only after the appropriate adjustments had been made could Questar Gas deliver supplies outside the narrow range "transition area" as depicted in QGC Exhibit 2.4.

Q. What are the post-1998 appliance set points on Questar Gas along the Wasatch Front?

A. Questar Gas established two new set points along the Wasatch Front. The northern set point is at 1,020 Btu at 0.60 specific gravity and 14.73 psig. This includes Salt Lake County north, (delivered off Questar Pipeline's northern system (QGC Exhibit 2.10)), while the southern set point, which is for Utah County south to Payson including southern Utah to St. George is 1003 Btu at 0.62 specific gravity and 14.73 psig.

Q. How do the post-1998 set points compare to the pre-1998 set points and Kern River values shown in QGC Exhibit 2.4?

A. The post-1998 set points have been included on QGC Exhibit 2.4. The north Wasatch set point is labeled as QGC North Post-1998 while the Utah County/St George set point has been labeled as QGC South Post-1998. This graph illustrates the relative difference from a Btu perspective of the interchangeability range of each set point.

Q. In reviewing the graph for approximate set point ranges on QGC Exhibit 2.4, the pre-1998 and post-1998 ranges do not align. How is Questar Gas handling the difference in post-1998 and pre-1998 set points?

A. During a proposed ten-year transition from pre-1998 to post-1998 heat content set points, Questar Gas has coordinated with Questar Pipeline to manage heat content through the transition. It is important to understand that during the transition from pre-1998 to post-1998 set points, Questar Gas needs to manage a heat content that is narrow enough to be interchangeable with both pre- and post-1998 set points. This narrower heat content range is approximated by the grey rectangular area on QGC Exhibit 2.4 and is labeled "Transition Area."

b. THE IMPACT TO QUESTAR GAS OF THE "TRANSITION" SET POINT AND HOW THOSE IMPACTS HAVE BEEN ADDRESSED

Q. Are there additional concerns in managing the heat content to this narrow transition area?

A. Yes. By restricting the heat content for gas deliveries to this narrow range, Questar Gas loses operational flexibility on its system and also may limit gas supply options. This loss of operational flexibility and potential gas supplies could result in reducing Questar Gas' reliability to meet customer demands.

Q. Would you please summarize the transition phases that Questar Gas has gone through from pre-1998 to post-1998 set points to manage heat content?

A. The first step of managing heat content was the coordination between Questar Pipeline and Questar Gas to blend CBM production from the Ferron area delivered to Questar Gas' Payson and Indianola gates, while also blending low Btu volumes from hydrocarbon liquids processing on Questar Gas' northern system. Questar Gas and Questar Pipeline continue to blend gas on its northern system to manage heat content.

Q. What did blending to the Payson and Indianola city gates involve?

A. In order to provide interchangeable volumes through Payson and Indianola, Questar Gas coordinated with Questar Pipeline to blend higher Btu volumes from Mainline 40 with CBM production from the Ferron area. Please see QGC Exhibit 2.6. Typically, as a rule of thumb, for every two cubic feet of CBM production one cubic foot of higher Btu gas is required to produce interchangeable volumes for the pre-1998 set point. This blending was managed on a daily basis on Questar Pipeline's southern system where CBM supplies entered and intermixed with supplies on Questar Pipeline's Mainline 40, near Price, Utah. This blending was detailed in the DPU's Data Request No. 2.6, and is attached as QGC Exhibit 2.18.

c. QUESTAR PIPELINE'S TARIFF PROVISIONS

Q. Rather than blending, why didn't Questar Pipeline simply refuse to accept non-interchangeable volumes, regardless of whether or not they were CBM or lower Btu hydrocarbon processed volumes?

A. Questar Pipeline, as an interstate pipeline company regulated by the FERC, is required to accept transportation volumes that are within its tariff specifications. Both CBM production and volumes processed for liquid hydrocarbons are well within Questar Pipeline's Tariff specifications for Btu content, inert limits, and hydrocarbon dew point. Based on its Tariff and the applicable FERC regulations, Questar Pipeline cannot refuse service to transportation customers who tender CBM or hydrocarbon-processed gas that meet its Tariff specifications.

Q. What are Questar Pipeline's Tariff specifications for Btu, inert percentages, and hydrocarbon dew point?

A. Please see attached QGC Exhibit 2.19.

Q. Are these specifications consistent with the interstate natural gas pipeline grid that you described earlier in your testimony?

A. Yes. In particular, Questar Pipeline's Btu range and inert specifications are typical when compared with other pipelines in the interstate natural gas pipeline grid. Questar Pipeline differs with its hydrocarbon dew point specifications in that it limits free hydrocarbon liquids in the pipeline rather than specifying a fixed hydrocarbon dew point temperature that is more typical in interstate pipelines. Questar Pipeline's gas quality specifications have benefited Questar Gas by allowing it to flow both very high Btu company-owned gas on Questar Pipeline and much lower Btu CBM gas from the Ferron area. The benefits to Questar Gas of Questar Pipeline's hydrocarbon specifications are discussed in Mr. Walker's testimony.

d. COULD BLENDING WORK INDEFINITELY

Q. Approximately how long was Questar Gas able to manage this Phase 1 transition by blending?

A. On the Northern system, which is basically Little Mountain gate north to Hyrum, Questar Gas, in conjunction with Questar Pipeline, is still able to blend high and lower Btu streams together to manage heat content for both the pre-1998 and post-1998 appliance set points.

Q. Will Questar Gas and Questar Pipeline be able to manage heat content on the north indefinitely?

A. Questar Pipeline and Questar Gas have been able to manage heat content for interchangeability, given the current liquid hydrocarbon market and the production streams that are delivered to Questar Pipeline today, by utilizing Questar Pipeline's multiple pipes and blending facilities near Coalville, Utah. The post-1998 set point allows Questar Gas to accept lower Btu hydrocarbon processed volumes without interchangeability problems. In the event that volumes delivered from the north are above the upper level, it is possible to add air or nitrogen to the gas stream that would result in a lower Wobbe number making the gas interchangeable.

Q. How long were you able to blend on Questar Pipeline's southern system to manage heat content?

A. Questar Pipeline and Questar Gas were able to manage the heat content by blending in Mainline 40 until approximately June 1999 when CBM production in the Ferron area increased to the point that blending of deliveries to Payson and Indianola would no longer result in interchangeable volumes.

Q. Why couldn't you blend indefinitely?

A. Total deliveries to Questar Gas at Payson and Indianola range from a winter average of approximately 175 million cubic feet/day (cf/d) to a summer average of 75 million cf/d. As shown on QGC Exhibit 2.20, the Price area CBM production had increased to 75 million cf/d by 1998, and nearly 140 million cf/d by 1999. As I stated earlier, to provide interchangeable gas by blending requires two parts CBM gas for every one part higher Btu gas. If CBM production is at 75 million cf/d and Questar Gas' summer average load is 75 million cf/d, it is obvious that blending no longer works. One could still blend for interchangeability based on a winter load of 175 million cf/d during 1998. But by mid-1999, CBM production had increased to the level that blending would not produce interchangeable gas. Basically, CBM production increased to the point that it would be the only volumes delivered to Payson and Indianola without any blending. This blending was explained in detail in response to Data Request 2.6, and is included as QGC Exhibit 2.18.

Q. Why didn't Questar Pipeline transport CBM production to another delivery point rather than Payson or Indianola?

A. Referring to QGC Exhibit 2.6, the CBM production in the Ferron area is delivered to Questar Pipeline directly (upstream) of Payson and Indianola and constitutes the physical molecules of gas that are delivered to Questar Gas to meet its residential and commercial demand. It cannot go anywhere else absent prohibitively expensive infrastructure additions. Prior to 2001, when Questar Pipeline's Mainline 104 was constructed, there were no alternatives for additional blending or routing of any of the CBM production.

VI. NEED FOR CO_2 PROCESSING FOR QUESTAR GAS

Q. When Questar Gas recognized that blending was no longer able to provide safe, reliable, interchangeable gas, what action did it take?

A. Questar Gas recognized that to have future access to economic gas supplies it would have to align its heat content with the interstate pipelines that served it. Questar Gas resolved to change the appliance set points to the post-1998 ranges that I discussed earlier in my testimony. Questar Gas determined that a 10-year transition period for customers to move from the pre-1998 set point to the post-1998 set point would be reasonable and not impose an undue burden on customers.

Q. If, in 1999, blending was no longer possible to ensure gas interchangeability and it would take another 10 years before customers had adjusted their appliances to the post-1998 set point, what was Questar Gas' option to manage heat content?

A. After review of multiple options that considered operational reliability, technical feasibility, and economics, Questar Gas elected to process CBM production to remove CO_2 to achieve an interchangeable gas stream.

Q. How does CO_2 removal make CBM supplies interchangeable?

A. CO_2 processing has a two-fold effect. First, by removing CO_2, which is an inert, the heating value of the gas stream is increased. Second, the specific gravity of CO_2 is greater than the specific gravity of the other constituents of coal seam production. Removal of CO_2 effectively reduces the specific gravity of the gas stream. In combination, these two effects increase the Wobbe number of the CBM gas to within the acceptable operating range of an appliance set to the pre-1998 set point and an appliance set to the post-1998 set point.

Q. Has processing the CBM production provided reliable interchangeable volumes for Questar Gas at Payson and Indianola?

A. Yes. Since the installation of the CO_2 removal plant in June 1999, Questar Gas, through coordination with Questar Pipeline, has been able to effectively manage the heat content of natural gas delivered at Payson and Indianola to be interchangeable.

Q. Since 1998, have any other factors impacted the need for CO_2 removal to ensure interchangeable gas volumes?

A. As in 1998, Questar Gas is still required to manage heat content for interchangeability between the pre-1998 and post-1998 appliance set points. The CO_2 plant has remained the primary tool for Questar Gas to manage interchangeable gas for Payson and Indianola.

VII. USE OF MAINLINE 104 TO ASSIST IN ADDRESSING INTERCHANGEABILITY

a. USE OF MAINLINE 104 FOR MANAGING INTERCHANGEABILITY

Q. Are there other tools that Questar Gas and Questar Pipeline have used to help manage heat content?

A. Yes. In the fall of 2001, Questar Pipeline placed its Mainline 104 into service. Mainline 104 parallels much of its Mainlines 41 and 40, from the Ferron area to the Payson gate and continues west to make deliveries to Kern River at Goshen near Elberta, Utah.

Q. How does Questar Pipeline's Mainline 104 aid Questar Gas in managing its heat content for interchangeability at Payson and Indianola?

A. Prior to the installation of Mainline 104, the total CBM production in the Ferron area exceeded the daily deliveries in Mainline 41 to Payson and Indianola. I described this earlier in my testimony. Mainline 104 added an additional 270,000 Dth/d of transportation capacity flowing west to the Kern River pipeline. This additional westward capacity resulted in higher Btu gas volumes being transported from east of Price, Utah, that could then mix with Ferron CBM production. Questar Pipeline has limited capabilities to blend these volumes with Ferron CBM production to provide an interchangeable blend that would meet Questar Gas' heat content requirements.

Q. Have the installation and operational characteristics of Mainline 104 improved Questar Pipeline's ability to coordinate with Questar Gas to manage interchangeable heat content to Payson and Indianola?

A. Yes.

b. THE LIMITATIONS OF MAINLINE 104 TO ASSIST WITH INTERCHANGEABILITY

Q. Do the operational characteristics of Mainline 104 provide the reliable and safe ability to manage interchangeable heat content to Payson and Indianola for Questar Gas?

A. No, not by themselves.

Q. Please elaborate.

A. As I detailed earlier in my testimony, the total production of CBM volumes in the Ferron area exceed the average winter, as well as summer, deliveries at Payson and Indianola combined. Because of the magnitude of these CBM volumes, the gas stream being delivered directly to those gates is non-interchangeable. As CBM gas is non-interchangeable with the pre-1998 appliance set point, those volumes need to be managed by CO_2 removal or blending for interchangeability. To rely on Mainline 104 to provide volumes for blending has several operational drawbacks that jeopardize both the safe and reliable service to Questar Gas' residential customers.

Q. Please explain the present configuration of Questar Pipeline's pipes and compressors that lead to this conclusion.

A. Before I describe the limitations, let me give a description of the piping configuration involved. Mainline 104 begins at a location referred to as Faucett Junction. Faucett Junction is the intersection of Mainline 40, JL102, and JL111. Mainline 40 is Questar Pipeline's main line that travels east to west from its Fidlar Station through Price toward Payson. JL102 and JL111 are pipelines that begin at the outlet of the Price CO_2 removal plant and transport CBM production volumes from the Price/Ferron area to Mainlines 40 and 104. The piping inter-ties between these pipelines have basic volume controls that permit some blending that can best be described as "gross blending." For a reference for this piping and its location, see QGC Exhibit 2.21.

Q. Please describe the limitations with using Mainline 104 to provide blending for the CBM volumes on Questar Pipeline's southern system.

A. There are a number of limitations with using Mainline 104 that affect reliability. The limitations exist because of physical constraints, operational problems, market influence and regulatory requirements. First, supplies upstream of Mainline 104 that have a higher Btu content may not reach Mainline 104. Disruptions can occur on Mainline 104 and Mainline 40 and their ancillary facilities, including compressors, that could prevent or impact the blending activities. Second, operational problems on Kern River could cause problems with blending on Mainline 104. Third, scheduled or unscheduled maintenance on Mainline 104 and Mainline 40 could cause blending issues. Fourth, changes in the nominations through market fluctuations could impact blending on Mainline 104. In addition, Questar Pipeline must comply with FERC regulations and its Tariff when determining how to manage scheduled flows on its system under all circumstances. In each situation, Questar Pipeline must deal with each customer in a nondiscriminatory manner. I will address each of these issues in detail in subsequent questions.

c. MAINLINE 104 CAN HAVE OPERATIONAL AND SUPPLY ISSUES THAT LIMIT ITS USE FOR BLENDING

Q. Please explain the details of limitations in getting gas to Mainline 104.

A. As discussed earlier, Mainline 104 can be utilized to manage interchangeable heat content through blending of higher-Btu supplies east of Price with CBM production from the Ferron area. The major operational drawback is that any disruption or reduction in the higher-Btu volumes flowing from the east into Mainline 104 substantially reduces or prevents the ability to blend for interchangeability.

Q. Would supply disruption on Mainline 40 upstream of Price also limit Questar Pipeline's ability to blend.

A. Yes. Any interruptions of the higher Btu gas from east of Price would limit Questar Pipeline's ability to blend. This is because Mainline 40 "feeds" the higher Btu gas into Faucett Junction, which is then blended with CBM production.

Q. Please describe events that would reduce or disrupt flows in Mainline 104.

A. The major influences that would disrupt or reduce flows are a) a failure at Oak Springs Compressor Station; b) operational problems on Kern River; c) scheduled or unscheduled maintenance on Mainline 104 or Mainline 40; or d) a change in nominations due to market fluctuations.

Q. What is meant by a failure at Oak Springs Compressor Station?

A. The Oak Springs Compressor Station is a fully automated compressor station on Mainline 104 that houses two Solar Taurus centrifugal compressor units. The function of this station is to increase the flowing pressure of the natural gas from 600 psig to 1,300 psig to enable up to 270,000 Dth/d to enter Kern River pipeline at Goshen. If an automation or a compressor malfunction occurs, Questar Pipeline is unable to move volumes in Mainline 104 to Kern River. If these volumes are unable to move via Mainline 104, they are unable to move through Price, which results in Questar Pipeline having to function as if Mainline 104 doesn't exist. In this case, blending cannot work because there are not higher-Btu volumes to blend with CBM volumes.

Q. How often does this circumstance happen at Oak Springs?

A. Please see attached response to DPU Data Request 2.2 that is included as QGC Exhibit 2.22.

d. OPERATIONAL PROBLEMS ON KERN RIVER CAN LIMIT MAINLINE 104'S USE FOR BLENDING

Q. What is meant by operational problems on Kern River?

A. In the event that the Kern River has an operational problem, whether control problems, compressor station problems or physical problems that result in deliveries from Mainline 104 into Kern River being reduced or disrupted. The results would be the same as if Oak Springs had a problem. The amount of gas that could be delivered through Mainline 104 would be reduced. In that case, there may not be sufficient higher-Btu volumes to blend with Ferron CBM production to ensure interchangeable gas at Payson or Indianola.

Q. Are there examples of this?

A. QGC Exhibit 2.23 is a compilation of electronic bulletin board (EBB) notices regarding Kern River's maintenance schedule that lists 64 events that have impacted Kern River's operations from 2001 through 2005.

e. MAINLINE 104 AND MAINLINE 40 MAINTENANCE LIMITS ITS USE FOR BLENDING

Q. What is meant by scheduled or unscheduled maintenance on Mainline 104 and Mainline 40?

A. As part of operating and maintaining a natural gas pipeline there are routine inspections and physical work that require reducing the capacity or shutting in the pipeline. These inspections and maintenance activities are routine and usually are scheduled ahead of time when one can anticipate the disruption. However, there are unscheduled events, potentially even emergency situations, such as physical damage to the pipe or sudden equipment failure that also result in reducing or shutting in pipeline capacity. Any disruption to physical flow of gas on Mainline 104 or Mainline 40 would result in the inability to blend gas streams to manage heat content for interchangeability on Questar Pipeline's southern system.

Q. How often has there been maintenance on Mainline 104 and Mainline 40?

A. Attached as QGC Exhibit 2.24 are Questar Pipeline's critical notices that were posted on its EBB regarding 74 events that impacted operational capacity west of Fidlar on Mainlines 104 and 40, from 2002 forward to April 2005. Also included is the response to the DPU Data Request 2.2, QGC Exhibit 2.22.

f. CHANGES IN NOMINATIONS AFFECT THE USE OF MAINLINE 104 FOR BLENDING

Q. What is meant by a change in nominations due to market fluctuations?

A. The goal of transportation customers on interstate pipeline systems is to deliver gas to the downstream markets not only to meet contractual requirements but also to access markets. Customers on Questar Pipeline are no different than customers on other pipeline systems. Questar Pipeline's system serves several distinct markets. The largest market on Questar Pipeline is Questar Gas. The second largest is the California market, which it serves through its interconnects with Kern River at Goshen and on the north at Roberson Creek. Another major market is injection volumes for shippers into the Clay Basin storage facility, primarily during the summer months. Finally, Questar Pipeline also serves Midwestern markets through its interconnects with WIC and CIG at Kanda-Coleman. Gas prices into these markets fluctuate on a daily and monthly basis. These price fluctuations provide customers economic incentives to move gas from one downstream market to another. If market prices for natural gas alter, customers change their nomination destinations. This changes gas flow patterns on Questar Pipeline and affects the volumes that flow on Mainlines 104 and 40.

Q. How do these fluctuations in market prices influence Questar Pipeline's and Questar Gas' ability to manage heat content to Payson and Indianola?

A. The Goshen interconnect with Kern River is Questar Pipeline's largest delivery point into Kern River. When markets on Kern River are soft, customers will deliver their gas to more attractive markets off of Questar Pipeline's system. The net result of this is less high Btu gas from east of Price flowing in Mainline 40 toward the Payson and Indianola gates, thus providing fewer volumes to blend with CBM volumes.

Q. Can you illustrate market fluctuations you have described?

A. As discussed in the technical conferences, in early 2002 through the end of 2002, demand reduced nominations into Goshen because of market conditions. These reduced nominations prevented blending from providing interchangeable heat content for Payson and Indianola. This is shown in QGC Exhibit 2.18.

Q. What is meant by the term nomination when referring to volumes?

A. When pipeline customers request transportation service they place an order to transport their volumes from a receipt point to a delivery point. This request is referred to as a nomination. The pipeline receives and processes these requests based upon the terms of the customer's contract and determines if these nominations can be accepted based on the pipeline's physical capacity. This process is governed by FERC rules and the pipeline's FERC-approved Tariff. One of the underlying tenets of these rules and the Tariff is that all customers are to be treated on a nondiscriminatory basis.

Q. What impact does Questar Pipeline's FERC Tariff have on nominations and capacity related to coordinating with Questar Gas to manage heat content?

A. Questar Pipeline's Tariff requires that Questar Pipeline transport accepted nominations from their receipt to delivery points. Questar Pipeline cannot alter receipt or delivery volumes to facilitate or advantage one customer's requirements over its contractual obligation to any other customer. With respect to blending, this means that Questar Pipeline cannot transport volumes in Mainline 104 without nominations in Mainline 104 anymore than it could deliver volumes to Questar Gas that Questar Gas did not nominate for delivery. Questar Pipeline's Tariff also gives customers the right to utilize any and all receipt and delivery points on a secondary basis, meaning that if a contract specifies Mainline 104 as a primary delivery point the owner of that contract could utilize any delivery point on Questar Pipeline in place of Mainline 104 on a secondary basis.

g. WHY MAINLINE 104 CANNOT BE USED TO TRANSPORT ALL CBM VOLUMES EXCLUSIVELY

Q. Why didn't Questar Pipeline separate Mainline 104 from the rest of the southern system and flow all or most of the CBM volumes to the Kern River interconnect at Goshen, Utah, away from the Payson and Indianola gates?

A. The only way this could be accomplished would be if Questar Gas held all of the Mainline 104 capacity and purchased all or most of the Ferron area CBM supplies.

Q. Would you please explain why Questar Pipeline constructed Mainline 104 as an integrated pipeline as opposed to a separate or stand alone pipeline?

A. The construction of Mainline 104 was underwritten with firm transportation contracts from four original customers (Questar Gas being one of four). Mainline 104 was designed and constructed to operate as an integral part of Questar Pipeline's southern system based on the requests of these shippers. This provided the four shippers (alongwith all Questar Pipeline shippers) greater flexibility in that they could source gas to Mainline 104 from many sources, other than just Ferron. The FERC Certificate Questar Pipeline received authorizing construction of Mainline 104 specifically stated that Mainline 104 would be integrated into Questar Pipeline's existing southern system.

Q. How could Questar Gas have persuaded Questar Pipeline to build Mainline 104 as a separate line that would transport all of the CBM gas from Ferron?

A. Questar Gas would have to enter into a transportation contract with Questar Pipeline for all of the firm capacity in Mainline 104. As the only underwriter of the project, Questar Gas would request Questar Pipeline to construct Mainline 104 as a separate line from the Ferron CBM fields to Goshen. The annual transportation cost Questar Gas would pay to Questar Pipeline for this option would be on the order of $15 million per year.

h. CONCLUSION ON THE USE OF MAINLINE 104 TO MANAGE HEAT CONTENT FOR QUESTAR GAS

Q. So your conclusion is that blending by relying on Mainline 104 is not sufficient to manage heat content for Questar Gas?

A. Yes. In fact, the perspective that blending by itself is not reliable to manage heat content is shared by others in the natural gas industry through a recently published white paper on natural gas interchangeability. This white paper was prepared by a large cross section of the natural gas industry, including LNG suppliers, gas utilities, pipelines, power generators, appliance manufacturers, and state regulators. Questar Gas and the Committee of Consumer Services (Committee) both participated in the development of this document. Provided below is a quote from the white paper regarding the ability of pipelines to manage interchangeability by blending.

> . . . Blending applied by the pipeline operator is also technically feasible. However, widespread use of blending is out of the direct control of the pipeline operator. The transportation of natural gas is governed by daily and sometimes more frequent nomination of volumes and specification of receipt and delivery points by shippers. Consequently, any pipeline blending that occurs is coincidental and historically has not been planned to achieve a specific end point or specification. Even in pipelines where blending currently occurs, this practice is thus not a consistently reliable method of interchangeability management.[2]

Q. In summary, how would you describe the benefit of Mainline 104 in managing heat content for Questar Gas at Payson and Indianola?

A. The primary benefit of Mainline 104 is that it provides Questar Gas and Questar Pipeline a blending option to mix higher Btu supplies from east of Price with CBM supplies. Questar Pipeline's ability to manage blending is limited by the operational, market, and regulatory conditions described above along with the pipeline infrastructure at Faucett Junction. This infrastructure provides Questar Pipeline with only a general ability to blend. Blending on Mainline 104 and Mainline 40, by itself, is not sufficient to provide interchangeable gas for Questar Gas' customers.

VIII. ANALYSIS OF THE ALTERNATIVES TO THE CO_2 PLANT

Q. While the CO_2 removal plant is currently relied on as the primary tool to manage interchangeable heat content, has Questar Gas investigated other

[2] *White Paper on Natural Gas Interchangeability and Non-Combustion End Use,* NGC+ Interchangeability Work Group, February 28, 2005, at p. 15, attached to Mr. McKay's testimony.

alternatives to manage the heat content in place of the CO_2 plant in anticipation of filing its application for cost coverage for the CO_2 plant?

A. Yes. Questar Gas, in cooperation with Questar Pipeline, has reviewed numerous alternatives for managing heat content for Payson and Indianola deliveries. These alternatives were presented at technical conferences held before the Utah Public Service Commission in this Docket.

Q. How many various alternatives were presented?

A. In all, 14 different alternatives, including variations to alternatives, were developed and presented to the parties involved in the technical conferences.

Q. Were all of these alternatives capable of managing the heat content to the level required by Questar Gas?

A. No. As with any technical analysis, each alternative had strengths (pros) and weaknesses (cons) that when analyzed determined if an alternative was feasible. The intent of Questar Gas' analysis was to review each alternative using a standard set of criteria. Upon completion of the analysis, Questar Gas was able to determine which alternatives would meet all the criteria necessary to effectively manage heat content.

Q. Please explain the criteria used.

A. As explained in more detail by Mr. McKay in his testimony, five criteria were used: safety, reliability, implementation, cost and affiliate conflict. I will focus on the first four; affiliate conflict has been addressed by Mr. McKay. I will be referencing QGC

Exhibit 2.25. This exhibit shows the first three major criteria that Questar Gas used as a foundation for its analysis. As included in QGC Exhibit 2.25, each criterion could be evaluated as positive (+1), neutral (0), or negative (-1) depending upon how that criterion impacted a factor in an alternative. These criteria were applied to each alternative that Questar Gas considered.

Q. What did you do to analyze the cost criteria?

A. In addition to the risk factors, Questar Gas reviewed first year cost of service numbers that included operating costs as well as existing or new capital costs. The economic assumptions are detailed on QGC Exhibit 2.26. Along with the economic analysis, Questar Gas identified the pros and cons in respect to managing heat content for each alternative. These pros and cons were used to help identify risk areas related to operating, market, and regulatory considerations for each alternative. The risk criteria for safety, reliability and implementation were then evaluated for each alternative's unique operating, market and regulatory considerations.

Q. What were the results of this analysis?

A. Attached as QGC Exhibit 2.27 is a summary of the alternatives and their analyses. QGC Exhibit 2.28 gives the detail of the analysis for each alternative. The result of this analysis was that 12 of the 14 alternatives identified did not meet the safety, reliability, implementation or cost criteria necessary to manage effectively the heat content at Payson and Indianola. I will briefly address all alternatives reviewed.

Q. As indicated on QGC Exhibit 2.27 the No-Action Alternative No. 1 was the simplest to implement and had little or no capital or operating costs. How did this alternative rank?

A. The No-Action Alternative was unacceptable from a safety and reliability risk criteria perspective. Introducing CBM production to the Payson and Indianola gates without processing or some type of blending, or a combination of the two, would expose Questar Gas customers to an unacceptable level of health and safety risk. This is supported by Mr. Benson in his testimony.

Q. Would Alternative No. 2, Questar Gas petitioning the FERC for a change in Questar Pipeline's CO_2 specification, meet the criteria of the analysis?

A. While a change in Questar Pipeline's CO_2 inert specification might result in interchangeable volumes, the analysis showed a low probability of a favorable ruling from the FERC with a risk that a FERC proceeding may result in a change to Questar Pipeline's hydrocarbon dew point specification that would result in Questar Gas incurring substantial costs for hydrocarbon processing of its Company-owned production. The potential costs to Questar Gas of such processing are addressed by Mr. Walker in his testimony. In the technical conferences, no party supported Questar Pipeline's suggestion for a FERC filing to change Questar Pipeline's inert specifications. In addition, this alternative would negatively impact a portion of Questar Gas' Wexpro production since some of these gas reserves have to be processed to meet Questar Pipeline's inert specifications.

Q. What is the significance of the Division of Public Utilities' (Division's) and Committee's determination in the technical conference that going to the FERC to seek changes in the Questar Pipeline and Kern River tariff was not an option they wanted to pursue?

A. In the first technical conference, Questar Gas presented the option with its pros and cons and stated that it was willing to pursue going to FERC even though success is unlikely, both the Division and Committee declined to pursue the option. Any further attempts to argue against cost coverage by stating or inferring that if the FERC option had been pursued Questar Gas could have avoided the cost of processing or that the CBM gas could have been kept off Questar Pipeline's system should be rejected by the Public Service Commission (Commission).

Q. Was the Alternative No. 3 Reorificing feasible?

A. This alternative to immediately reorifice all customers failed to meet economic and operational considerations. It was not only more expensive than the CO_2 plant, but it also had limited system reliability and would be difficult to implement.

Q. Could Questar Gas utilize Alternative No. 4, Producer Shut-in?

A. Alternative No. 4 assumes that Questar Gas will implement the facilities required for Alternative No. 7, Precision Blending. Negotiating with the producers of coal seam gas production to shut-in their production when precision blending fails would be both difficult and expensive to accomplish. This alternative would result in uncertainty regarding the costs to compensate producers for the revenue associated with their gas volumes. As Mr. Lamarre testified, CBM wells are susceptible to damage when shut in and it is unlikely that producers would support such an option.

Q. From QGC Exhibit 2.27, it appears that Alternative No. 5, Gross Blending, is easy to implement and has a relatively inexpensive cost of service. Could this replace CO_2 processing?

A. As I discussed at length earlier in my testimony, blending, in and of itself, does not provide the reliability to maintain safe heat content to the Payson and Indianola gates. This option lacks the operational facilities to blend different gas streams to produce an interchangeable gas flow to Payson and Indianola.

Q. As implied by Alternative No. 6, Shut-in Gates, why doesn't Questar Gas simply not accept the gas on the days the gas' heat content does not meet Questar Gas' requirements?

A. As with Alternative No. 4, Producer Shut-in, this Alternative No. 6 assumes that precision blending has been implemented. Earlier in my testimony I discussed that Questar Gas relies on deliveries at its Payson and Indianola gates to meet its winter-time residential demand. In the event that precision blending fails, Questar Gas would have to shut-in its Payson and Indianola gates. Without these gas supplies in winter, Questar Gas would be at great risk that residential customers would lose service because sufficient line pressure could not be maintained without the Payson and Indianola receipts. Questar Gas' inability to shut in the Payson and Indianola gates and not lose residential customers was explained in the analysis in the response to DPU Data Request 7.6, attached as QGC Exhibit 2.29.

Q. Alternative No. 7, Precision Blending, has many favorable criteria. It appears to be reliable, reasonable to implement and cost effective on a cost of service basis. Would Questar Gas consider this a viable alternative?

A. Questar Gas, in working with Questar Pipeline, considers precision blending a viable alternative during a portion of the year. The detailed analysis in QGC Exhibit 2.28 demonstrates that the challenge with the Precision Blending Alternative is the uncertainty of higher Btu volumes being available to blend under certain operational circumstances. I will discuss precision blending in concert with other alternatives to provide safe and reliable service year round, later in my testimony.

Q. Would you describe Alternative No. 8, Propane Injection?

A. The analysis determined that the safety and economic impacts of injecting propane into CBM production to provide heat management was not technically practical or economically feasible. Questar Gas' response to DPU Data Request 2.10, set forth in Exhibit 2.30, provides more detail on why this alternative will not work.

Q. The analysis indicates that Alternative No. 9, CO_2 Removal, remains a viable option to manage Questar Gas heat content. Correct?

A. Yes. CO_2 removal remains a reliable, and now proven, means of ensuring safe interchangeable gas supply.

Q. **Alternative No. 10, Kern River Supply, contains four different variations. How would you summarize this alternative and its variations with respect to managing heat content?**

A. As with some other alternatives, Alternative No. 10 requires the Precision Blending, Alternative No. 7, to be implemented and to operate in conjunction with that alternative. It assumes that when precision blending will not work then Questar Gas will purchase gas supply from Kern River to replace Payson and Indianola gas supply. Each of these variations requires constructing pipeline facilities between Kern River and Questar Gas, and the costs associated with these facilities are significant. Added to the substantial capital costs are the costs for Questar Gas to contract for firm gas supply service off of Kern River. In addition, the unavailability of intra-day (no notice) service from Kern River results in Questar Gas being at risk to meet its residential customer requirements. This issue is explained in more detail in Mr. Walker's testimony. The risk analysis shows that the lack of reliability of this service is unacceptable to Questar Gas. From a cost perspective, this alternative, and its variations, is more expensive than the CO_2 removal (Alternative No. 9) or the precision blending with CO_2 removal as a backup (Alternative No. 11). I will discuss these alternatives subsequently in greater detail.

Q. What summary conclusions did Questar Gas arrive at from this analysis of heat content management alternatives?

A. The result of the analysis and subsequent technical conference discussions was that all parties agreed that three alternatives would be analyzed in depth to manage heat content to Payson and Indianola. Questar Gas has determined of these three alternatives, only two provide both reliable and economic capability to manage heat content.

IX. THREE ALTERNATIVES GIVEN FURTHER CONSIDERATION

Q. What were the three alternatives?

A. Alternative No. 9, CO_2 Removal, still remains, as in 1998, an acceptable alternative. Alternative No. 10, Kern River Supply, Option (c2), has the potential to work if Questar Gas could resolve the intra-day gas supply reliability issues off of Kern River and the corresponding economic impacts for intra-day service. This option was revised from QGC Exhibit 2.28 to lower the gas supply requirement and thus reduce the cost of service estimations and is referred to as Alternative 10, Option (c2). The third alternative was developed in technical conference discussions and is a combination of Alternative No. 9, CO_2 Removal, and Alternative No. 7, Precision Blending. This Alternative No. 11, attached as QGC Exhibit 2.31, relies on precision blending as the primary means to manage heat content while utilizing the CO_2 removal plant as a backup during periods when precision blending will not work.

Q. From your testimony, it seems that Alternative No. 10, Option (c2) has concerns that would prevent Questar Gas from selecting it.

A. Yes. The ability to call upon gas supply on an intra-day (no notice) basis is critical for Questar Gas to maintain the reliability of service that its customers depend upon.

Currently, Kern River currently does not offer such a service due to lack of gas storage facilities along its pipeline. Please see the testimony of Mr. Walker. This lack of intra-day (no notice) service is a significant reliability issue for Questar Gas. Questar Gas cannot accept this alternative.

Q. How does the lack of no-notice service from Kern River impact Questar Gas' ability to serve its customers?

A. As we've discussed, the Kern River gas supply alternative relies on precision blending as its primary method to manage heat content to Payson and Indianola. In the event that precision blending fails, Questar Gas would immediately shut-in deliveries from Payson and Indianola to prevent non-interchangeable gas supplies from entering its system. Almost simultaneously, Questar Gas would need to replace the Payson and Indianola gas supplies with volumes off of Kern River. This is the essence of no-notice service. Questar Gas has done engineering analyses to model the operational impacts of this circumstance. Without no-notice service, residential customers risk loss of service.

Q. Would you please describe the type of analysis used to model the operational impacts?

A. Questar Gas has conducted what is known as a transient simulation of its Wasatch Front and St. George pipeline systems, which include pressures and load profiles. Transient simulations project time varying conditions on a pipeline system based on assumed initial conditions (beginning time). The simulation also requires an estimate of changes in load or demand along the pipeline over time. With this analysis, Questar Gas is able to forecast how distribution pressures will respond over time to changing gas loads.

Q. What was the purpose of your transient simulations?

A. Questar Gas ran the analysis to determine the impacts along the Wasatch Front and to the Indianola gate that supplies St. George and southern Utah in the event that Payson and Indianola gates were shut-in and no gas supply was delivered from these gates. This simulation was done to determine two things. First, at what demand level could Questar Gas shut-in these gates without jeopardizing service to residential customers. Second, if the Questar Gas demand was above the level determined in the first step of the analysis, how quickly would Questar Gas need to replace the Payson and Indianola gas supply before risking curtailment of residential service.

Q. What was the result of your transient simulations?

A. The results of the simulations indicated that Questar Gas could shut-in the Payson gate on a Salt Lake City mean temperature day of 51ºF or higher and a corresponding Wasatch Front demand of 262,000 Dth/d. Using historical temperature means, Questar Gas would be able to shut-in Payson from June through September without jeopardizing residential customers. The analysis showed that this time period will work for the Indianola to St. George pipeline as well. In the event that Payson or Indianola gates were shut-in, the analysis determined that Questar Gas would need to respond within an hour or two time frame with additional gas supply from Kern River before pressures reached a level that jeopardized service. The analysis is attached as QGC Exhibit 2.29, which was provided in Questar Gas' response to DPU Data Request 7.6.

Q. If the simulations indicate that Questar Gas requires gas supply within one to two hours from Kern River to ensure residential service, is Questar Gas able to contract for this service economically from Kern River?

A. No. First, Questar Gas could not contract for this service because Kern River does not offer a no-notice type service on its pipeline that would allow Questar Gas to immediately (within one hour) take receipt of gas supply off of Kern River in the event that the Payson or Indianola gates had non-interchangeable gas supply and were shut-in. Second, the cost impact for gas supply alone from Kern River was estimated in excess of $10 million per year, which is nearly double the cost of Alternatives Nos. 9 or 11.

Q. Is it your opinion that the remaining two alternatives (Nos. 9 and 11), CO_2 Removal and Precision Blending with CO_2 Removal as a Backup, will reliably and safely enable Questar Gas to manage heat content within the required range?

A. Yes.

Q. Does Questar Gas have a preference between Alternative No. 9, CO_2 Removal, and Alternative No. 11, Precision Blending with CO_2 Processing Removal as a Backup?

A. Both alternatives will provide a reliable and safe option. The CO_2 plant option has proven itself to be reliable and safe since its 1999 in-service date. This option can effectively continue to be the primary tool that Questar Gas utilizes for heat content management. However, Questar Gas recommends Alternative No. 11, Precision Blending with CO_2 Removal, as the preferred means to manage heat content going forward.

Q. Why does Questar Gas select Precision Blending with CO_2 Removal in place of the current CO_2 processing alone?

A. There are several factors that have led to this conclusion. When reviewing the annual cost for each alternative, they are essentially equal, with neither alternative having a cost-of-service advantage over the other. Therefore, we should consider the operational benefits and future potential cost reductions of the alternatives as the selecting criteria. Using these criteria, we selected the precision blending with CO_2 removal alternative.

Q. What are the operational benefits of Precision Blending with CO_2 Removal?

A. Questar Gas, working in conjunction with Questar Pipeline, is able to utilize the benefits of Mainline 104 and the additional volumes flowing west toward Kern River to effectively use precision blending to manage heat content to Payson and Indianola.

This blending capability will become the primary means of managing that heat content. With the CO_2 removal plant as backup, Questar Gas now has the operational flexibility of two tools that provide a redundancy that the CO_2 removal plant alone does not provide. Questar Gas' primary objective to managing heat content has always been the safe, reliable service it provides its customers. Alternative No. 11 increases that ability without any increase in cost.

Q. What other operational benefits does this redundancy offer Questar Gas?

A. Precision blending coupled with CO_2 removal enables Questar Gas to operationally deal with pipeline maintenance or failures on Questar Pipeline and Kern River more effectively and economically. In addition, it provides Questar Gas more flexibility to manage heat content within the "narrow transition range" of the pre-1998 and post-1998 appliance set points.

Q. What potential cost reductions may be realized from this alternative?

A. Cost savings may be realized in two ways. First, the CO_2 removal plant will be utilized as a backup only eight months of the year. One of Questar Gas' significant variable costs of CO_2 plant operation is energy costs, being both fuel gas and electrical power. Eliminating these going forward for a third of the year will significantly reduce annual operating costs. Second, precision blending and reduced use of the CO_2 removal plant may increase the potential for third-party processing that can further reduce Questar Gas' total annual costs for managing heat content.

Q. Will this combination of precision blending and CO_2 removal be required indefinitely?

A. No. This type of gas management will be required only as long as is necessary for the Company and the Commission to feel reasonably comfortable that customers have adjusted their appliances to the set points approved and implemented in 1998.

Q. Has Questar Gas done everything that a prudent utility would do to work through the heat content management issues it has experienced over the past seven years due to the prevalence of lower Btu gas coming into its system?

A. Yes. Questar Gas has identified its objectives, identified every viable (and many nonviable) alternatives, used reasonable criteria to make its decision that either precision blending with CO_2 removal as a backup, or CO_2 removal on its own, would resolve the heat management problem. I cannot recall another matter in my history with the Company that has entailed more time and analysis than in resolving the heat management content problem for Questar Gas.

X. CONCLUSION

Q. Mr. Conti, will you briefly summarize the most important points of your testimony?

A. During the last twenty years, the Rocky Mountain area has evolved from a rather isolated natural gas market into a major exporter of natural gas to an expanded interstate natural gas pipeline grid. As this has occurred, gas supply heat content has changed in the Rocky Mountains due to the introduction of CBM production and market-driven hydrocarbon liquid processing. In order to provide interchangeable, safe gas supplies, Questar Gas has changed its gas appliance set points. During the transition from its older gas supply set points to its current set points, Questar Gas has managed its gas supply heat content between the two ranges. With the proximity and quantity of CBM production to its Payson and Indianola gates, Questar Gas has needed to take additional action to manage that heat content. The action that Questar Gas has taken was to contract for CO_2 removal. After substantial analysis and technical review, Questar Gas believes that a combination of precision blending and CO_2 removal will be required to manage heat content until appliances are adjusted to the post-1998 points. The combination of precision blending and CO_2 removal provides the most economical and reliable alternative for safely managing heat content.

Q. Mr. Conti, does this conclude your testimony?

A. Yes.

State of Utah)
) ss.
County of Salt Lake)

I, Lawrence A. Conti, being first duly sworn on oath, state that the answers in the foregoing written testimony are true and correct to the best of my knowledge, information and belief. Except as stated in the testimony, the exhibits attached to the testimony were prepared by me or under my direction and supervision, and they are true and correct to the best of my knowledge, information and belief. Any exhibits not prepared by me or under my direction and supervision are true and correct copies of the documents they purport to be.

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Lawrence A. Conti

SUBSCRIBED AND SWORN TO this 15th day of April 2005.

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Notary Public