March 31, 2011

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

Re: Tennessee Gas Pipeline Company
Gas Quality and Interchangeability
Docket No. RP11-

Dear Ms. Bose:

Pursuant to Section 4 of the Natural Gas Act ("NGA") and Part 154 of the Regulations of the Federal Energy Regulatory Commission ("Commission"),[1] Tennessee Gas Pipeline Company ("Tennessee") hereby submits for filing and acceptance tariff sheets to its FERC Gas Tariff, Sixth Revised Volume No. 1 ("Tariff"), which Tariff sheets are identified in Appendix A. Tennessee proposes that the Tariff sheets be effective on May 1, 2011.

Statement of Nature, Reasons and Basis for Filing

BACKGROUND

Tennessee proposes to revise the gas quality and interchangeability provisions in Article II of the General Terms & Conditions (GT&C) of its Tariff. Over the past several years, Tennessee has experienced significant diversification in the natural gas supplies entering its system. Receipts into Tennessee from unconventional shale plays, such as the Haynesville Shale in northern Louisiana and Texas and the Marcellus Shale in Pennsylvania, have been increasing, while receipts from conventional sources in the Gulf of Mexico and South Texas have been declining. Tennessee has also experienced a surge in supplies from the Rocky Mountains entering its system at the interconnection in Ohio with Rockies Express Pipeline LLC and from the Appalachian Supply Basin. Liquefied natural gas ("LNG") terminals on the Gulf Coast may also contribute significant supplies of regasified LNG to the Tennessee system. Because the composition of gas from each of these sources of supply is different and changes in gas composition may affect end users, Tennessee and its customers have discussed the need to update the gas quality and interchangeability provisions in its Tariff. In crafting the proposed revisions to the gas quality and interchangeability provisions, Tennessee has sought to develop a flexible approach that seeks to address the gas quality and interchangeability concerns of end users while at the same time maximizing the supplies available to the Tennessee system.

[1] 18 C.F.R. Part 154.

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COMMISSION POLICY

In developing its gas quality and interchangeability Tariff proposal, Tennessee has adhered to the Commission's guidance in the *Policy Statement on Provisions Governing Natural Gas Quality and Interchangeability in Interstate Natural Gas Pipeline Company Tariffs* ("*Policy Statement*").[2] The *Policy Statement* sets forth five general principles to guide pipelines in developing tariff provisions to address gas quality and interchangeability concerns. Tennessee's proposal is consistent with each of these principles. First, Tennessee's proposal establishes gas quality and interchangeability provisions in Tennessee's Tariff. Second, Tennessee's proposal is designed to maximize its flexibility to accept natural gas supplies at receipt points while maintaining its ability to manage gas quality and interchangeability within acceptable limits at delivery points. Third, Tennessee's proposal is based upon sound technical, engineering and scientific considerations, and is the product of an extensive collaborative process that addressed the concerns and interests of all stakeholders on its system. Fourth, Tennessee's proposal is consistent with the Interim Guidelines in the NGC+ *White Paper on Natural Gas Interchangeability and Non-Combustion End Use* ("*Interchangeability White Paper*").[3] Finally, as a result of extensive negotiations in the collaborative process, Tennessee believes that its proposal is either supported or not opposed by nearly all of the participants in the collaborative process. To the extent that specific provisions are contested by individual parties, Tennessee asks the Commission to resolve those issues.

THE COLLABORATIVE PROCESS

Consistent with the Commission's *Policy Statement*, Tennessee and its customers engaged in a collaborative process to discuss changes to the gas quality and interchangeability provisions in Tennessee's Tariff. The goal of the collaborative process was to identify and resolve issues to the greatest extent possible and to build consensus around Tennessee's proposal before filing it with the Commission.

Tennessee initiated the collaborative process in March of 2007. After initial consultations with its customers, it became apparent that other interstate pipelines serving the Northeast United States were planning to revise the gas quality and interchangeability specifications in their tariffs and that many of Tennessee's customers were heavily involved in ongoing collaborative efforts with certain of these pipelines (referred to herein as "Northeast Pipeline Collaboratives").[4] In order to gain better perspective on the issues involved in these proceedings, Tennessee and its major Northeast shippers determined to hold off on proposing revisions to its Tariff until these proceedings had run their course.

In July of 2010, Tennessee renewed discussions with its customers on revising the gas quality and interchangeability provisions in its Tariff. Tennessee started the process with a series of meetings with its largest local distribution company customers in the Northeast. In these initial consultations, Tennessee outlined its proposal to set delivery point specifications to meet end user specifications and to adopt safe

[2] 115 FERC ¶ 61,325 (2006).

[3] Submitted to the Commission by the NGC+ Interchangeability Working Group on February 28, 2005, in Docket No. PL04-3-000.

[4] The proceedings arising out of the Northeast Pipeline Collaboratives include: Docket No. RP07-443, Iroquois Gas Transmission System, LP; Docket No. RP07-504, Algonquin Gas Transmission, LLC; Docket No. RP08-374, Maritimes & Northeast Pipeline, L.L.C; and Docket No. RP10-30, Texas Eastern Transmission, LP. Each of these proceedings was concluded with a negotiated settlement. *See*, *Iroquois Gas Transmission System, LP,* 124 FERC ¶ 61,080 (2008) (approving uncontested settlement), *Algonquin Gas Transmission, LLC*, 126 FERC ¶ 61,130 (2009) (approving contested settlement); *Maritimes & Northeast Pipeline, L.L.C.*, 127 FERC ¶ 61,065 (2009) (approving uncontested settlement); *Texas Eastern Transmission, LP*, 133 FERC ¶ 61,114 (2010) (approving uncontested settlement).

harbor ranges and limits for interchangeability specifications at receipt points. Tennessee explained how this approach would address interchangeability concerns of end users while maximizing its flexibility to accommodate diverse supply. Tennessee also described some of the specific receipt point safe harbor specifications and receipt and delivery point specifications that it intended to propose and how these specifications addressed end user concerns. Tennessee explained how the proposed specifications were generally consistent with historical averages on its system and designed to maximize Tennessee's flexibility to accommodate new sources of supply entering the system.

Following these initial consultations with customers, Tennessee held a series of WebEx meetings in the Fall of 2010 from October 25 through November 10 in which all interested parties were invited to participate. Tennessee posted notice of these meetings on Passkey (its electronic bulletin board) and also notified customers via email. During the WebEx meeting customers participated via telephone and viewed a presentation delivered by Tennessee on the internet. Tennessee's presentations described historical operating conditions on Tennessee's system and recent changes to those conditions brought about by the introduction of new supplies from the Haynesville and Marcellus Shale plays, the Appalachian Supply Basin, the Rocky Mountains, and LNG terminals on the Gulf Coast. Tennessee demonstrated these conditions with numerous graphs, flow studies and blending studies that demonstrated the need for the changes being proposed by Tennessee and how the new provisions would address end user concerns and maximize supplies available to the system. Tennessee encouraged its customers to share their interests relating to gas quality and interchangeability and to suggest solutions to address concerns. Throughout the collaborative process, in response to customer requests, Tennessee has provided additional data and information to its customers to address specific concerns.

As a result of these initial consultations, Tennessee developed revisions to its Tariff that are designed to address the gas quality and interchangeability concerns of end users while maximizing the supplies available to the Tennessee system. On January 31, 2011, Tennessee circulated a draft of its proposed Tariff revisions to its customers and asked them to comment on the proposal in a WebEx that was held on February 11, 2011. In response to customer comments on the Tariff proposal, Tennessee made revisions to its draft Tariff revisions and invited further comments on the revised proposal in a WebEx held on March 11, 2011.

The Tariff revisions that Tennessee proposes to adopt in this proceeding are the product of the sharing of information and extensive negotiation by all participants in the collaborative process. Additionally, the efforts of Tennessee and its customers in arriving at the instant proposal were significantly informed by the aforementioned Northeast Pipeline Collaboratives in which they were involved, while tailoring Tennessee's interchangeability proposal to addresses the specific market, supply and operational dynamics of the Tennessee system. The information provided by Tennessee and the dialogue with its customers has significantly advanced the process and allowed Tennessee to craft a Tariff proposal that it believes is supported or not opposed by most of its customers and stakeholders.

In support of this filing, Tennessee is submitting Exhibit A, copies of the presentations it made to its customers and participants in the WebEx process.[5] Tennessee has also attached as Exhibit B the Affidavit of Jody L. Bertini ("Bertini Affidavit"), who is the Manager, Gas Quality, for Tennessee. The

[5] These presentations include, in the following order: (A-1) "Interchangeability Supplement to Tariff Filing," which is a collection of flow studies and historical data from previous WebEx presentations; (A-2) WebEx presentation from March 2011; (A-3) WebEx presentation from February 2011; (A-4) WebEx presentation from "October 2010," which was used at the WebEx presentations conduction in the Fall of 2010; (A-5) presentation to customers from "July 2010;" and (A-6), which is a collection of statistical data accompanying the July 2010 presentation to customers.

Bertini Affidavit discusses each of the specifications proposed by Tennessee and provides support and justification for each specification with a discussion of historical data and flow studies prepared by Tennessee.

SAFE HARBORS AND PROPOSED SPECIFICATIONS

Safe Harbors

Tennessee's currently-effective Tariff contains specifications on gas characteristics, like heating value, and gas constituents, such as sulfur, oxygen, carbon dioxide, nitrogen and water vapor. These specifications apply to gas delivered to Tennessee at receipt points. At delivery points, Tennessee is obligated to deliver gas within a certain range of heating values.

These specifications were appropriate for Tennessee's system when most of the supply entering its system was from the Gulf of Mexico and South Texas. In recent years, however, as the supplies available to Tennessee's system have diversified, it has become apparent that specific delivery point specifications for gas characteristics and constituents are needed to accommodate the needs of end users and that more flexible receipt point specifications will greatly enhance Tennessee's ability to accept a wider range of natural gas supplies. As a starting point for designing its revised Tariff provisions, Tennessee considered the specifications required by end users for the efficient and reliable operation of distribution systems, LNG peak shaving facilities, combustion equipment and power generation facilities, and developed delivery point specifications to address these concerns. In designing delivery point specifications, Tennessee also considered the Interim Guidelines in the *Interchangeability White Paper*. Based on these considerations, in Article II, Section 3, Tennessee is proposing specifications for heating value, Wobbe Number, the non-methane, heavier hydrocarbons ethane and propane ("C2+"), non-methane, heavier hydrocarbons like butane, etc. ("C4+"), combined carbon dioxide, nitrogen and oxygen, and individual specifications for carbon dioxide, oxygen, sulfur and hydrogen sulfide.

After determining the appropriate gas quality and interchangeability specifications at delivery points, Tennessee considered what receipt point specifications would be appropriate in order to permit Tennessee to maximize the supplies available to its system while still maintaining its ability to meet the required specifications at delivery points. To this end, Tennessee is proposing to adopt safe harbor ranges and limits for gas delivered to Tennessee at receipt points for specifications for heating value, Wobbe Number, C2+, C4+, combined carbon dioxide, nitrogen and oxygen, and an individual safe harbor for carbon dioxide. The safe harbor provisions provide that Tennessee shall not refuse to accept delivery of gas that falls within the specified safe harbor range or below a specified limit.[6] Tennessee is also proposing to adopt hard limits on combined carbon dioxide and nitrogen, sulfur, hydrogen sulfide, and oxygen.

Notwithstanding the safe harbors for deliveries to Tennessee at receipt points, Tennessee recognizes that, due to the size of its system and diversity of supply entering at different points along the system, under certain circumstances, it may be able to accept gas that does not fall within a safe harbor or otherwise meet a constituent specification. In the *Policy Statement*, the Commission's second principle provides that, "if the pipeline has the ability to transport such out-of-spec gas without jeopardizing system operations, its tariff should be flexible enough to allow it to do so." Consistent with this principle, Tennessee is proposing to add Section 5(o)(i) to its Tariff that would require Tennessee to accept gas that has a heating value, Wobbe Number, carbon dioxide, nitrogen, C2+ or C4+ content outside of the safe

[6] *Policy Statement* at P 30; *see also* PP 39-41 (discussing blending on interstate pipelines).

harbor standards,[7] to the extent that Tennessee is able to meet delivery point specifications set forth in Section 3 and all other gas quality Tariff specifications. Under this provision, Tennessee's intention is to accept gas outside of the safe harbor ranges, whenever it will be able to blend this gas with other system supplies such that it will be able to meet all delivery point specifications in Section 3. In the collaborative process, Tennessee had provided that Tennessee "may" accept gas outside of the safe harbor ranges if it was able to meet specifications at downstream delivery points. After discussions with its customers in the collaborative process, however, Tennessee has agreed that, if blending opportunities exist such that it will be able to meet specifications at downstream delivery points, it will be obligated to accept gas outside of the safe harbor ranges. To this end, Tennessee agreed to replace the "may" in Section 5(o)(i) with "shall."

In order to manage its ability to accept gas that exceeds the safe harbor limits for heating value, Wobbe Number, carbon dioxide, nitrogen, C2+ or C4+, Tennessee is also proposing to adopt Posting Procedures similar to the procedures that it currently employs to manage hydrocarbon dewpoint on its system. Under these Posting Procedures, Tennessee may post limits on Passkey for heating value, Wobbe Number, carbon dioxide, nitrogen, C2+ or C4+, when such limits are necessary to correct an actual or anticipated Interchangeability Problem and protect Tennessee's ability to deliver gas that conforms to the delivery point specification in Section 3. These Posting Procedures and the defined terms are discussed in more detail below.

Tennessee submits that its safe harbor approach to interchangeability specifications coupled with the obligation to accept gas outside of the safe harbor specifications where Tennessee will be able to meet specifications at downstream delivery points, subject to certain hard limits and postings regarding Interchangeability Problems, will best serve the needs of the pipeline and all customers on its system. This approach will ensure that gas delivered to end users at delivery points meets all of the specifications in the Tariff and at the same time gives Tennessee the flexibility needed to maximize the supplies available to the system.

Proposed Specifications

Tennessee's proposed gas quality and interchangeability specifications are summarized below:

Specification	Receipt Point	Delivery Point
Heating Value	Safe Harbor[8] = 967 Btu – 1110 Btu	Minimum = 967 Btu Maximum = 1110 Btu
Wobbe Number	Safe Harbor = 1314 – 1400	Minimum = 1314 Maximum = 1400
Non-Methane Hydrocarbons – C2+ (Ethane)	Safe Harbor = 12% or less	Not more than 12%
Heavier Hydrocarbons – C4+	Safe Harbor = 1.5% or less	Not more than 1.5%
Diluents	Safe Harbor = less than 4%, combined CO2, N and O CO2 does not exceed 3 % O2 does not exceed 0.2% N and O2 combined does not exceed 2.75%	Not more than 4 % combined CO2, N and O CO2 does not exceed 2% N and O2 combined does not exceed 2.75%

[7] Deliveries to Tennessee would still be subject to the hard limits on combined carbon dioxide and nitrogen, sulfur, hydrogen sulfide, and oxygen that are contained in Section 5.

[8] "Safe Harbor" indicates that Tennessee shall not refuse to accept gas that meets the specification provided the gas meets all other gas quality specifications.

Carbon Dioxide (CO2)	Safe Harbor = 2% or less CO2 not more than 3%	Not more than 2%
CO2 and Nitrogen (N) combined	CO2 and N combined not more than 4% CO2 shall not exceed 3%	N and O2 combined does not exceed 2.75%
Oxygen (O2)	O2 not more than 0.2%	O2 not more than 0.2%
Sulfur (S) and Hydrogen Sulfide (H2S)	S not more than 10 grains per 100 cf, H2S not more than .25 grain per 100 cf	S not more than 10 grains per 100 cf, H2S not more than .25 grain per 100 cf
Water (H2O) Vapor	H2O not more than 7 pounds per MMcf	H2O not more than 7 pounds per MMcf

Heating Value

For gas delivered to the pipeline, Tennessee proposes that it will not refuse to accept gas with a heating value between 967 British thermal units ("Btu") and 1110 Btu. This range shall be referred to as the total heating value low and high Safe Harbor. At delivery points, Tennessee shall deliver gas within this same Btu range. The high end of the safe harbor, 1110 Btu, is an increase of 10 Btu from the maximum Btu content in Tennessee's currently-effective Tariff. In response to comments in the collaborative process, Tennessee is also proposing to clarify a shipper's option to refuse to accept delivery of gas outside the proposed heating value range by deleting the language "in any month" referring to the evaluation of whether gas delivered by Tennessee conforms to the heating value specification. Tennessee is also proposing to delete the currently-effective language limiting a shipper's right to refuse to accept delivery of gas to "citygate deliveries."

Tennessee's proposed shift to the higher 1110 Btu limit is consistent with the Interim Guidelines contained in the *Interchangeability White Paper*,[9] which the Commission has encouraged pipelines to follow.[10] As discussed in the Bertini Affidavit, the delivery specifications for Btu are generally consistent with Tennessee's 5-year historical data with average ranges from 1005 to 1054.[11] Furthermore, the delivery specifications are consistent with those adopted and approved by the Commission in proceedings involving each of the pipelines in the Northeast Pipeline Collaboratives.

Wobbe Number

The Commission has recognized that the Wobbe Number is a widely acceptable measure of interchangeability.[12] In the *Interchangeability White Paper*, the NGC+ Interchangeability Working Group noted the benefits of establishing a maximum and minimum Wobbe Number:

> In general, establishing a maximum Wobbe Number can address certain combustion phenomena such as yellow tipping, incomplete combustion and potential for increased emissions of NOx and CO. Establishing a minimum Wobbe Number can be used to address lifting, blowout and CO.[13]

[9] *Interchangeability White Paper* at 26.
[10] *Policy Statement* at P 32.
[11] *See* Exhibit A-1 at 18.
[12] *See Policy Statement* at P 8
[13] *Interchangeability White Paper* at 6.0.5.

Wobbe Number, however, is not without its limitations:

> Laboratory testing and combustion theory has shown that simply selecting a maximum Wobbe is not sufficient to address incomplete combustion over a range of gas compositions (especially for natural gas with heating values in excess of about 1,100 Btu/scf. However, this limitation can be overcome by selecting a more conservative maximum Wobbe Number coupled with an additional parameter such as heating value.[14]

Tennessee's currently-effective Tariff does not contain a specification for Wobbe Number. In developing the proposed Wobbe Number range, Tennessee followed the guidance in the Interim Guidelines from the *Interchangeability White Paper*.[15] The Interim Guidelines recommend that the Wobbe Number range be based on the local historical average plus or minus 4 %. Tennessee's local historical average Wobbe Number is 1348, yielding a plus or minus 4% range of 1293 to 1402. Tennessee initially proposed to adopt a Wobbe Number delivery point limitation and safe harbor range of 1293 to 1400, however, after consultations with its customers in the collaborative process, Tennessee is now proposing to raise the minimum Wobbe Number to 1314. Under this proposal, Tennessee would not refuse to accept gas with a Wobbe Number between 1314 and 1400. At delivery points, Tennessee would be required to deliver gas with a Wobbe Number between 1314 and 1400.

Selecting a maximum Wobbe Number of 1400, which is slightly below the plus 4% range, is consistent with the recommendation in the Interim Guidelines to set the maximum Wobbe Number at 1400. The 1400 Wobbe Number maximum, as opposed to a lower maximum, is also necessary to accommodate new sources of supply entering the Tennessee system. As discussed in the Bertini Affidavit, new supplies entering the Tennessee system from the Appalachian Supply Basin and LNG terminals on the Gulf Coast can have a Wobbe Number up to 1415 and 1444, respectively.[16] Although these Wobbe Numbers exceed the proposed maximum of 1400, in most circumstances, when this gas is blended with lower Wobbe Number gas flowing on the system, Tennessee can deliver gas at the upper end of the proposed Wobbe Number range at downstream delivery points. Tennessee recognizes that adopting a lower maximum Wobbe Number might be preferable to some of its customers, but Tennessee submits that, consistent with the Interim Guidelines, its proposed maximum Wobbe Number of 1400 strikes the best balance between addressing end user concerns and maximizing supplies available to the system.

As to the lower end of the proposed range, numerous customers expressed concern with Tennessee adopting a minimum Wobbe Number delivery specification of 1293 and suggested instead, that Tennessee should adopt a minimum Wobbe Number of 1314 consistent with that adopted and approved by the Commission in proceedings involving each of the pipelines in the Northeast Pipeline Collaboratives. Tennessee agreed to this accommodation to its customers given the extensive record developed in these proceedings for other pipelines serving the Northeast, which serve many of Tennessee's same customers, combined with its analysis of historical data that indicates such a lower Wobbe limit is acceptable for Tennessee.

Non-Methane Hydrocarbons – C2+

Tennessee's currently-effective Tariff contains no limitation on the non-methane, heavier hydrocarbons in the C2+ range. Historically, high levels of C2+ have not been a concern on Tennessee's

[14] *Id.*
[15] *See id.* at 26.
[16] *See* Exhibit A-1 at 7.

system. Data from 2009 shows an average C2+ level of 2.66%, with C2+ levels reaching above 5% for only brief and isolated periods of time, and hitting a maximum of 6% on only one occasion.[17] Data from 2010 shows an average C2+ level of 2.56%, with levels reaching above 6% for only brief and isolated periods of time, and reaching a maximum of only 6.89% on one occasion.[18] Tennessee is proposing to adopt a C2+ safe harbor of 12%. Tennessee shall not refuse to accept gas that contains 12% or less C2+. Gas delivered by Tennessee at delivery points shall not contain more than 12% C2+.

In the collaborative process, some producers in the ethane-rich portions of the Marcellus Shale expressed concerns over the 12% upper limit on C2+. Tennessee explained that, assuming blending opportunities were available, it expected to be able to accept gas with C2+ levels in excess of 12% and still be able to meet the 12% maximum C2+ delivery specification at downstream points. As discussed in the Bertini Affidavit, Tennessee's flow studies, which are based on extreme supply assumptions designed to test the blending limits of the system, indicated only two scenarios in which gas for delivery by Tennessee would significantly exceed the 12% C2+ delivery specification and even then only at one point on the system. Based on these producer concerns and on its blending studies showing that, in most circumstances, it would be able to blend C2+ receipts in excess of 12% to meet delivery specifications, Tennessee agreed to revise the language in its proposed new Section 5(o)(i) to provide that Tennessee "shall" accept deliveries of gas exceeding the 12% C2+ maximum limit, where blending opportunities exist such that Tennessee will able to meet delivery specifications at downstream points.

Tennessee's C2+ proposal is also consistent with the Tariff provisions of other pipelines serving the Northeast, including Algonquin Gas Transmission, LLC ("Algonquin") and Texas Eastern Transmission, LP ("Texas Eastern").

Heavier Hydrocarbons – C4+

Tennessee's currently-effective Tariff contains no limitation on heavier hydrocarbons in the C4+ range. Historically, high levels of C4+ have not been a concern on Tennessee's system. As discussed in the Bertini Affidavit, data from 2009 shows an average C4+ level of 0.18%, with C4+ levels never reaching above 1%.[19] Data from 2006 through 2010 also shows average levels of C4+ of 0.514% or less.[20] Tennessee is proposing to adopt a C4+ safe harbor of 1.5%. Tennessee shall not refuse to accept gas that contains 1.5% or less C4+. Gas delivered by Tennessee at delivery points shall not contain more than 1.5% C4+. Tennessee's proposal is consistent with the Interim Guidelines in the *Interchangeability Whitepaper*, which recommend that pipelines adopt a 1.5% maximum limit on C4+. Tennessee's C4+ proposal is also consistent with the Tariff provisions of other pipelines serving the Northeast, including Algonquin and Texas Eastern.

Diluents - Carbon Dioxide, Nitrogen and Oxygen

Tennessee's currently-effective Tariff provides that gas delivered to Tennessee shall not contain more than 4% of a combined total of carbon dioxide and nitrogen, with carbon dioxide not to exceed 3%. The currently-effective Tariff also provides that gas delivered to Tennessee shall not contain more than 0.2% oxygen. Tennessee is proposing to retain these specifications in its Tariff. As discussed above, in accordance with proposed Section 5(o)(i) of the Tariff, Tennessee will accept gas outside of the safe harbor specifications for carbon dioxide and nitrogen, but below the applicable hard limits, to the extent

[17] *See id.* at 58.
[18] *See id.* at 59.
[19] *See id.* at 60.
[20] *See id.* at 21.

that Tennessee is able to meet the delivery point specifications in proposed Section 3 and all other Tariff specifications are met. Without the limits on combined carbon dioxide and nitrogen, and oxygen, Tennessee may not be able to sufficiently blend gas in order to meet the delivery specifications in proposed Section 3. Furthermore, because carbon dioxide and oxygen can cause corrosion in the presence of water, the limits on carbon dioxide and oxygen are also required in order to minimize corrosion on Tennessee's system.

Tennessee proposes to adopt a safe harbor for the diluents carbon dioxide, nitrogen and oxygen. The safe harbor provides that Tennessee shall not refuse to accept gas that contains less than 4% of the diluents carbon dioxide, nitrogen and oxygen. Within this safe harbor, the carbon dioxide content must not exceed 3%, the oxygen content must not exceed 0.2% and the combined total nitrogen and oxygen content must not exceed 2.75%. Tennessee also proposes to adopt a carbon dioxide safe harbor of 2%. Tennessee shall not refuse to accept gas that contains 2% or less carbon dioxide; provided, however, that the carbon dioxide content shall not exceed 3%. As discussed in the Bertini Affidavit, data from 2006 through 2010 shows annual system average levels of carbon dioxide plus nitrogen of less than 2.5%.[21] With the exception of a brief and isolated period in 2009 at the Yscloskey, Louisiana monitoring point, no daily maximum has exceeded 4% total carbon dioxide plus nitrogen.[22] The 2009 and 2010 system averages for carbon dioxide plus nitrogen were 1.35% and 1.16% respectively.[23]

Tennessee proposes to adopt a 2% limit on carbon dioxide for deliveries by Tennessee to customers at delivery points. This specification is stricter than the standard for deliveries to Tennessee at receipt points and is intended to accommodate end users' concerns over carbon dioxide content. As discussed in the Bertini Affidavit, data from the previous 5 years shows that the highest annual average carbon dioxide on the system was 1.4% in 2009.[24] With one exception of a brief and isolated period at the Yscloskey, Louisiana monitoring point in 2006, no daily maximum carbon dioxide level has exceeded 2% in the previous 5 years.[25] Data from 2009 shows that the average carbon dioxide content of gas on the system was 0.81%, with the maximum content never exceeding 2%.[26] Data from 2010 shows that the average carbon dioxide on the system was 0.73%, with the maximum content never exceeding 2%.[27] These historical levels of carbon dioxide well below the 2% delivery specification were achieved even though during that time shippers were permitted to deliver gas to Tennessee with up to 3% carbon dioxide. Based on these historical operating conditions and projections of new supply entering the system, Tennessee expects to be able to accept receipts of gas at up to 3% carbon dioxide and satisfy the delivery standard of up to 2%. Indeed, according to proposed Section 5(o)(i), Tennessee will be obligated to accept gas with up to 3% carbon dioxide assuming all other Tariff specifications are met and it will be able to blend the gas to meet the 2% carbon dioxide delivery specification.

With respect to total diluents, Tennessee shall not deliver gas with a combined carbon dioxide, nitrogen and oxygen of more than 4%; provided, however, that carbon dioxide content shall not exceed 2% and the combined nitrogen and oxygen content shall not exceed 2.75%. Consistent with the receipt point specification for oxygen, Tennessee shall not deliver gas with more than 0.2% oxygen.

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[21] *See id.* at 22.
[22] *See id.* at 47.
[23] *See id.* at 62, 63.
[24] *See id.* at 23.
[25] *See id.* at 49.
[26] *See id.* at 64.
[27] *See id.* at 65.

Tennessee's proposal to adopt a delivery point specification limiting combined nitrogen and oxygen is consistent with the Interim Guidelines in the *Interchangeability White Paper* and with the tariff provisions of other pipelines serving the Northeast, including Algonquin, Columbia Gas Transmission Corporation, National Fuel Gas Supply Corporation ("National Fuel") and Texas Eastern.

Sulfur and Hydrogen Sulfide

Tennessee's currently-effective Tariff provides that gas delivered to Tennessee shall not contain more than 20 grains of total sulfur and no more than 0.25 grain of hydrogen sulfide. Tennessee is not proposing any change to the currently-effective limit on hydrogen sulfide. With respect to sulfur, Tennessee is proposing to reduce the allowable sulfur content on deliveries to Tennessee at receipts and deliveries by Tennessee at delivery points to 10 grains. In the collaborative process, some customers suggested an even lower sulfur content of 5 grains. Tennessee appreciates the concerns of end users with respect to sulfur, but believes that based on historical operating conditions on the system and sulfur limitations on other pipelines serving the Northeast, 10 grains is an appropriate limit on sulfur. Historically, sulfur levels on Tennessee's system have been below 5 grains. These historically low levels suggest that lowering the limit from 20 to 10 grains should not adversely affect any customers on Tennessee's system. Although these low levels, may suggest that an even lower sulfur limit would be appropriate, Tennessee believes that because other major pipelines to which Tennessee is connected, including Dominion Transmission, Inc., National Fuel, and Transcontinental Gas Pipe Line Company, LLC, have a 20 grain limit on sulfur, the most prudent and balanced approach is to lower its currently-effective sulfur limit to 10 grains.

Biological Agents

Tennessee proposes to add a new subsection providing that gas shall not contain any microbiological organism, pathogen, active bacteria or bacterial agent capable of producing or contributing to corrosion and/or other operational problems. As a result of discussions in the collaborative process, Tennessee is also proposing to include language further delineating the term "microbiological organisms" and setting forth industry-standard procedures that will be used to test for bacteria or bacterial agents.

Failure to Conform to Specifications

Tennessee's currently-effective Tariff contains Section 2 – "Failure to conform to specifications against objectionable matter." During the collaborative process, it was suggested that Tennessee remove the words "objectionable matter" from the heading, as the provisions in this Section are not limited to objectionable matter. Tennessee is proposing to make this change, along with redesignating this section as Section 4 and designating the paragraphs as subsections.

Tennessee is also making certain changes to this Section to clarify the rights of shippers with regard to any failure of Tennessee to remedy any deficiency in gas that does not conform to delivery specifications. In proposed Section 4(a), Tennessee is proposing to add language to give itself an opportunity to correct any failure to conform to a delivery specification before a shipper may make changes to conform the gas to delivery point specifications and seek reimbursement from Tennessee.

In proposed Section 4(b), Tennessee is proposing clarifications to a shipper's right to request that Tennessee deliver gas that does not meet a delivery point specification. Specifically, Tennessee is proposing to clarify that a shipper may agree to indemnify, defend and hold harmless Tennessee from any damages to other downstream party's facilities, in addition to the shipper's facilities. Tennessee is also

proposing to delete the current language limiting a shipper's right to request delivery of non-conforming gas at points in the supply area. This provision was designed to accommodate producers who use gas for gas lift in enhanced oil recovery operations ("EOR") where the characteristics and composition of the gas is not important. Tennessee is proposing to delete the supply area limitation, even though Tennessee has only ever received requests pursuant to this Section from producers using gas in EOR operations. In all other circumstances, as stated in proposed Section 4(c),[28] Tennessee will continue to be obligated to delivery gas that meets the specifications in Section 3.

Procedures for Postings Regarding Interchangeability Problems

As discussed above, through its safe harbor approach, Tennessee has sought to develop flexible Tariff provisions to maximize supplies available to the system while at the same time meeting specific gas quality and interchangeability specifications at delivery points. In order to help manage its ability to accept gas outside of the safe harbor specifications and at the same time meet the proposed delivery point specification in Section 3, Tennessee is proposing to adopt, in Section 5(o), Posting Procedures under which it may post additional limits on heating value, Wobbe Number, carbon dioxide, nitrogen, C2+ or C4+. In no event, shall these limits exceed the limits established in the safe harbor specifications provided for in Section 5.

The proposed posting procedures are based on the hydrocarbon dewpoint posting procedures in Section 3.1 of Tennessee's currently-effective Tariff. Tennessee used the hydrocarbon dewpoint posting procedures as a starting point because they are the product of extensive negotiations with Tennessee's customers culminating in an offer of settlement. The offer of settlement was contested by several parties but the Commission rejected arguments in opposition and approved the settlement as just and reasonable.[29]

Tennessee is proposing that it will post on Passkey limits on the referenced specifications applicable to certain Interchangeability Segments[30] where such limits are necessary to prevent an Interchangeability Problem, correct an actual Interchangeability Problem, or to assure that Tennessee will be able to meet the delivery point specifications in Section 3. Tennessee is proposing to include a definition of the term Interchangeability Problem in Article I – "Definitions" – of the GT&C.[31]

According to the proposed Posting Procedures, Tennessee would determine the maximum limit for the applicable specification that it could accept and still meet delivery specifications and post the limit, which limit shall be no lower than the applicable safe harbor, on Passkey. If gas delivered to Tennessee does not comply with the posted limit, then Tennessee may refuse to accept the gas, or may restrict receipts which do not comply with the posted limit volumetrically on a pro rata basis as necessary to achieve a blended stream which will allow Tennessee to meet its delivery specifications. Volumes would remain restricted until such time as Tennessee could meet its delivery specifications without the posted limit.

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[28] Proposed Section 4(c) is a redesignation of the last sentence of the second paragraph of currently-effective Section 2.

[29] *See Indicated Shippers v. Tennessee Gas Pipeline Co.*, 121 FERC ¶ 61,151 (2007).

[30] The terms "Interchangeability Segment(s)" and "Monitoring Point(s)" shall have the same meaning as the terms "HDP Segment(s)" and "Monitoring Point(s)," which are defined in currently-effective Section 3.1 of the Tariff.

[31] The definition of "Interchangeability Problem" is based on the currently-effective definition of "HDP Problem."

Posted limits on the referenced specifications shall be applicable to the specified Interchangeability Segment(s) where the delivery point specification cannot be met due to blending or other means, and any immediately upstream Interchangeability Segment(s) to the extent Tennessee deems necessary to meet the delivery point specification. Tennessee will provide as much notice as reasonably practicable of a limitation in an Interchangeability Segment and will attempt to provide such notice at least 10 days prior to the effective date of the limit. Specification limits posted by Tennessee shall not exceed the limits necessary to correct the Interchangeability Problem or enable Tennessee to meet delivery point specifications. Tennessee may post limits in contiguous upstream Interchangeability Segments to the extent such limits are operationally necessary; provided, however, that the limit in any upstream segment may be no stricter than the limit in the first segment.

Tennessee is also proposing to add several Monitoring Points to the list in currently-effective Section 3.1(b) of the Tariff.[32] These points will be used to establish both HDP Segments and Interchangeability Segments. The addition of these points, which are across all Zones of Tennessee's system will lessen the impact of interchangeability and hydrocarbon dewpoint postings by permitting Tennessee to focus these limitations on smaller parts of the system.

For receipts into Tennessee from storage, Tennessee will not apply the heating value, Wobbe Number, carbon dioxide, nitrogen, C2+ or C4+ limits in the proposed Section 5. Tennessee is adding this provision to address concerns raised during the collaborative process about customer's ability to control the quality and interchangeability specifications of gas entering the Tennessee system from storage.

Plant Thermal Reduction

Tennessee is proposing to revise currently-effective Section 12 relating to Plant Thermal Reduction ("PTR") and transportation of liquefiable hydrocarbons on Tennessee. Tennessee is also proposing to add a sentence at the end of this section to clarify that any shipper transporting PTR shall be required to enter into a PTR Transportation Agreement with Tennessee and that any shipper transporting PTR make-up shall be required to enter into a Transportation Contract with Tennessee under Rate Schedule IT.

CONCLUSION

For all of the reasons expressed above and in the Bertini Affidavit, Tennessee submits that the revisions to the gas quality and interchangeability provisions in its Tariff proposed in this filing are just and reasonable and should be accepted and approved by the Commission to be effective on May 1, 2011.

Contents of Filing

In compliance with Section 154.7(a)(1) of the Commission's regulations, Tennessee provides an eTariff .xml filing package containing:

(1) Revised Tariff sheets in RTF format with metadata attached;
(2) A transmittal letter in PDF format;
(3) A clean version of the Tariff sheets in PDF format for posting on eLibrary;

[32] Currently-effective Section 3.1 will be redesignated as Section 6.

(4) A marked version of the Tariff sheets in PDF format pursuant to 18 C.F.R. § 154.201 showing changes to Tennessee's effective Tariff sheets for posting on eLibrary; and
(5) Presentations as Exhibits A-1 through A-6;
(6) Affidavit of Jody L. Bertini as Exhibit B;
(7) A copy of the entire filing in PDF format for posting on eLibrary.

Service and Correspondence

The undersigned certifies that a copy of this filing has been served electronically pursuant to 18 CFR § 154.208 on Tennessee's customers and affected state regulatory commissions. A paper copy of this filing may only be served if a customer has been granted waiver of electronic service pursuant to 18 CFR Part 390 of the Commission's Regulations. In addition, an electronic copy of this filing is available for public inspection during regular business hours in Tennessee's office at 1001 Louisiana Street, Houston, Texas 77002.

Pursuant to 18 C.F.R. § 385.2005 and § 385.2011(c)(5) of the Commission's Regulations, the undersigned has read this filing and knows its contents, and the contents are true as stated, to the best knowledge and belief of the undersigned.

Tennessee requests that all correspondence and communications concerning this filing be directed to the following persons:

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(*Persons designated for service in accordance with Rule 203 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 395.203. Tennessee requests the Commission waive Rule 203(b)(3), 18 C.F.R. § 385.203(b)(3), to allow more than two persons to be designated to receive service.)

Effective Date and Waiver Request

Tennessee respectfully requests that the Commission grant all waivers of its Regulations necessary to accept and approve Tennessee's proposed tariff sheets to be effective May 1, 2011.

Pursuant to Section 154.7(a)(9) of the Commission's Regulations, Tennessee hereby moves to place the revised Tariff sheets into effect at the requested effective date or at the expiration of any suspension period set by the Commission. If the Commission conditions the acceptance of this filing in any way, Tennessee reserves the right to withdraw the proposed Tariff sheets or to file a later motion to place such Tariff sheets into effect at a later date.

Any questions regarding this filing may be directed to the undersigned at (713) 420-3297.

Respectfully submitted,
TENNESSEE GAS PIPELINE COMPANY

/s/ Milton Palmer, Jr.
Milton Palmer, Jr.
Director, Rates & Regulatory Affairs

APPENDIX A

Tariff Sheets/Records

Tennessee Gas Pipeline FERC Gas Tariff
Sixth Revised Volume No. 1

Section Title

Narrative Name	Record Contents Description	Tariff Record Title	Version
First Revised First Revised Sheet No.	300	Quality Definitions	1.0.1
First Revised Sheet No.	301	Quality	1.0.0
Original Sheet No.	301A	Quality	0.0.0
First Revised Sheet No.	302	Quality	1.0.0
Original Sheet No.	302A	Quality	0.0.0
Original Sheet No.	302B	Quality	0.0.0
First Revised Sheet No.	303	Quality Hydrocarbon Dewpoint	1.0.0
First Revised Sheet No.	304	Quality Hydrocarbon Dewpoint	1.0.0
First Revised Sheet No.	305	Quality Hydrocarbon Dewpoint	1.0.0
First Revised Sheet No.	306	Quality Hydrocarbon Dewpoint	1.0.0
First Revised Sheet No.	307	Quality	1.0.0

GENERAL TERMS AND CONDITIONS (continued)

I. DEFINITION OF TERMS (continued)

30. The terms "Central Clock Time" and "CCT" shall mean central daylight time when daylight savings time is in effect and central standard time when daylight savings time is not in effect.

31. The term "business day" shall mean Monday through Friday, excluding Federal Banking Holidays for transactions in the United States, and similar holidays for transactions occurring in Canada and Mexico.

32. NAESB Standard 1.2.3 (Version 1.9) states: Pooling is: 1) the aggregation of gas from multiple physical and/or logical points to a single physical or logical point, and/or 2) the disaggregation of gas from a single physical or logical point to multiple physical and/or logical points. NAESB Standard 1.3.18 (Version 1.9) states: Deliveries from receipt points should be able to be delivered directly into at least one pool and delivery points should be able to receive quantities from at least one pool, excluding non-contiguous facilities.

33. The term "Pooling Area" shall refer to Supply Area Pooling Area, Market Area Pooling Area or both Supply and Market Area Pooling Areas, as applicable.

34. The term "capacity path" shall mean the mainline pipeline path, up to the transportation quantity under Shipper's firm transportation contract, from a Shipper's Primary Receipt Point(s) to Primary Delivery Point(s), and the leg(s) of Transporter's system, up to the transportation quantity associated with the Primary Receipt Point(s) or Primary Delivery Point(s), where such points are located. For segmented releases, the capacity path of the Replacement Shipper's contract shall be that portion of the Releasing Shipper's capacity path released to the Replacement Shipper up to the transportation quantity under the Replacement Shipper's contract and the Releasing Shipper's capacity path shall be modified accordingly. Receipt point nominations from Supply Area Pooling Areas shall be considered to be Secondary Receipt Points within a Shipper's capacity path up to the transportation quantity under Shipper's firm transportation contract associated with the respective leg of Transporter's system. Receipt point nominations from Market Area Pooling Areas shall be deemed to be Secondary Receipt Points either within or outside of the Shipper's capacity path, depending on the Market Area Pooling Area's assigned geographic location and the transportation quantity under Shipper's firm transportation quantity associated with the respective leg of Transporter's system.

35. The term "Daily Variance" or "Daily Imbalance" shall have the meaning set forth in Section 7 of Rate Schedule LMS-MA and Section 5 of Rate Schedule LMS-PA.

36. The term "Hydrocarbon Dewpoint" shall mean cricondentherm, the highest temperature at which the vapor-liquid equilibrium may be present. The Hydrocarbon Dewpoint (cricondentherm) calculations are performed using the Peng-Robinson equation of state.

37. The term "HDP Segment(s)" shall have the meaning as defined in Article II, Section 6(a).

38. The term "HDP Problem(s)" shall mean actual or anticipated operational problems on Transporter's system or at its Interconnects with interstate or intrastate pipelines, storage facilities, end users, and local distribution companies specifically related to actual or anticipated hydrocarbon liquid fallout. The term "Interconnect," in this context solely, shall mean the integrated metering, measurement, pressure regulation and gas handling facilities and other equipment ("Interconnect Equipment") located within the measurement/delivery complex where Transporter delivers gas to an interstate or intrastate pipeline, end user, storage facility or local distribution company, typically contained within a fenced or other secure enclosure. Interconnect Equipment may or may not be owned by Transporter and may or may not be located before the meter demarcating the change in possession of the gas.

39. The term “Interchangeability Segment(s)” shall have the meaning as defined in Article II, Section 5(o).

40. The term “Interchangeability Problem(s)” shall mean actual or anticipated problems in Transporter’s ability to meet any of the gas quality specifications for gas delivered by Transporter as provided pursuant to Article II, Section 3 of these General Terms and Conditions.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

1. Composition of gas: The gas delivered by Transporter or received by Transporter from Shipper(s) shall be a combustible gas consisting wholly or in part of:

   (a) Natural gas of the quality and composition produced by nature in petroleum, oil, and gas fields.

   (b) Gas from revaporized liquefied natural gas.

   (c) Manufactured, synthesized or mixed gas consisting essentially of the hydrocarbons of the quality and character of natural gas such that when it is comingled with natural gas, the two become indistinguishable.

   (d) Gas derived and recovered from biomass such as dairy-derived biomethane, methane recovered from a landfill, or methane recovered from a wastewater treatment facility, such that when it is comingled with natural gas, the two become indistinguishable.

2. Transporter, in its own right or in accord with the instructions of Shipper, may subject, or permit the subjection of, the natural gas to compression, cooling, cleaning and other processes and helium, natural gasoline, butane, propane, and any other hydrocarbons except methane may be removed prior to delivery to Shipper. Title to the products will remain with the party that has contracted for the processing rights and notified Transporter of such contract; otherwise, title to the products will remain with Transporter.

3. The provisions set forth in this Article II Section 3 shall apply to all gas delivered by Transporter under this FERC Gas Tariff.

   (a) Heating value: The natural gas shall have a total heating value of not less than nine hundred and sixty-seven British thermal units per cubic foot nor more than eleven hundred and ten British thermal units. In the event that the total heating value of gas, per cubic foot, when determined as provided in Section 2 of Article III of the General Terms and Conditions, falls below nine hundred and sixty-seven or above eleven hundred and ten British thermal units per cubic foot, Shipper shall have the option to refuse to accept said gas so long as said total heating value remains below nine hundred and sixty-seven or above eleven hundred and ten British thermal units per cubic foot.

   (b) Wobbe Number: The gas shall have a Wobbe Number of at least 1314 but no more than 1400. The Wobbe Number shall be calculated by dividing the total heating value (dry) of the gas (at standard conditions of 14.73 psia and 60 degrees Fahrenheit) by the square root of the specific gravity of the gas.

   (c) Non-Methane Hydrocarbons: The gas shall not contain more than 12% by volume of non-methane (C2+) hydrocarbons.

   (d) Heavier Hydrocarbons: The gas shall not contain more than 1.5% by volume of heavier hydrocarbons (C4+).

   (e) Carbon Dioxide: The gas shall not contain more than 2% by volume of carbon dioxide.

   (f) Total Sulfur: The gas shall not contain more than 10 grains of total sulfur per 100 cubic feet.

   (g) Total Diluents: The gas shall not contain more than 4% by volume total diluents, which shall be the combined nitrogen, carbon dioxide, and oxygen by volume, provided however, that the carbon dioxide content does not exceed 2% and the combined nitrogen and oxygen content does not exceed 2.75%.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

3. (continued)

(h) Hydrogen Sulfide: The gas shall not contain more than 0.25 grain of hydrogen sulfide (H2S) per 100 cubic feet.

(i) Water Vapor: The gas shall not contain more than 7 pounds of entrained water vapor per million cubic feet at a pressure base of fourteen and seventy three hundredths (14.73) pounds per square inch and a temperature of sixty degrees (60 degrees) Fahrenheit.

(j) Oxygen: The gas shall not contain more than 0.2% by volume of oxygen.

(k) Freedom from objectionable matter: The natural gas delivered by Transporter under this Tariff shall be commercially free from objectionable odors, dust, or other solid or liquid matters (including hydrocarbon liquids) which might interfere with its merchantability or cause injury to or interference with proper operation of the lines, regulators, meters or other appliances through which it flows at the point of delivery.

(l) Transporter's obligation hereunder shall in no way require Transporter to deliver gas to Shipper at anything other than at the prevailing pressure and temperature in Transporter's pipeline.

(m) If required under Governmental Regulations, Transporter shall odorize the gas to be delivered by use of a malodorant agent as to indicate by a distinctive odor the presence of gas.

4. Failure to conform to specifications:

(a) If the gas offered for delivery by Transporter shall fail at any time to conform to any of the specifications set forth in Section 3 of this Article II, then Shipper may notify Transporter of such deficiency and thereupon may, at Shipper's option, refuse to accept delivery or require correction by Transporter. If Shipper notifies Transporter of such deficiencies as provided above, then Transporter shall make such correction or upon Transporter's failure promptly to remedy any deficiency in quality as specified in Section 3 of this Article II, Shipper may accept delivery of such gas and may make changes necessary to bring such gas into conformity with such specifications, and Transporter may reimburse Shipper for any reasonable expense incurred by it in effecting such changes..

(b) If a Shipper requests delivery ("Requesting Shipper") of gas that does not meet one or more of the gas quality specifications contained in Article II, Section 3 above ("Non-Conforming Gas"), nothing in this Article II shall prevent the Requesting Shipper from waiving any of its rights under this Section 4 or agreeing to indemnify, defend, and hold Transporter harmless from any damages to the Requesting Shipper's or other downstream party's facilities relating to Transporter's delivery of such Non-Conforming Gas. The Requesting Shipper may specify whether it is waiving one or more of the gas quality specifications contained in Article II, Section 3 above. Transporter may reject any request to deliver Non-Conforming Gas if Transporter determines, in its sole judgment, that it will adversely impact Transporter's system or other Shippers.

(c) Except under the specific circumstances of a Requesting Shipper, nothing in this Article II shall relieve Transporter of its obligation to deliver gas that conforms to the specifications of Article II, Section 3.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY (continued)

5. The provisions set forth in this Article II Section 5 shall apply to all gas delivered to Transporter. Gas delivered to Transporter hereunder:

(a) Transporter shall not refuse to accept delivery of gas that has a total heating value of not less than nine hundred sixty-seven (967) Btu's per cubic foot, and not more than eleven hundred and ten (1110) Btu's per cubic foot. This standard shall be referred to as Transporter's total heating value low (967) and high (1110) Safe Harbor;

(b) Transporter shall not refuse to accept delivery of gas that has a Wobbe Number of at least 1314 but no more than 1400. This standard shall be referred to as Transporter's Wobbe low (1314) and high (1400) Safe Harbor;

(c) Transporter shall not refuse to accept delivery of gas that contains 12% or less by volume of non-methane (C2+) hydrocarbons. This standard shall be referred to as Transporter's C2+ Safe Harbor;

(d) Transporter shall not refuse to accept delivery of gas that contains 1.5% or less by volume of heavier hydrocarbons (C4+). This standard shall be referred to as Transporter's C4+ Safe Harbor;

(e) Transporter shall not refuse to accept delivery of gas that contains less than 4% by volume total diluents, which shall be the combined nitrogen, carbon dioxide, and oxygen by volume, provided however, that the carbon dioxide content does not exceed 3% and the oxygen content does not exceed 0.2% and the combined nitrogen and oxygen content does not exceed 2.75%. This standard shall be referred to as Transporter's diluent Safe Harbor;

(f) shall not contain more than 3% by volume of Carbon Dioxide. However, Transporter shall not refuse to accept delivery of gas that contains 2% or less by volume carbon dioxide, which standard shall be referred to as Transporter's carbon dioxide Safe Harbor limit;

(g) shall not contain, either in the gas or in any liquids with the gas, any microbiological organism, pathogen, active bacteria or bacterial agent capable of producing or contributing to corrosion and/or operational or other problems or are injurious to utility facilities or cause the gas to be unmarketable. Microbiological organisms, bacteria or bacterial agents include, but are not limited to, sulfate reducing bacteria and acid producing bacteria. Tests for bacteria or bacterial agents shall be conducted on samples taken from the meter run or the appurtenant piping using American Petroleum Institute (API) test method API-RP38 or any other test method acceptable to Pipeline and Customer which is currently available or may become available at any time;

(h) shall be commercially free from objectionable odors, dust, water, any other solid or liquid matter that might interfere with its merchantability or cause injury to, or interference with, proper operation of the equipment through which it flows and any substance that might become separated from the gas in Transporter's facilities. Shipper shall furnish, install, maintain and operate drips, separators, heaters, and other mechanical devices as may be necessary to effect compliance with such requirements (after having secured the prior approval of Transporter as to the design and construction of such facilities, which approval shall not be unreasonably withheld);

(i) shall not contain more than ten (10) grains of total sulfur, nor more 0.25 grain of hydrogen sulfide per one hundred (100) cubic feet;

(j) shall not contain more than 0.2% by volume of oxygen, and Shipper shall make every reasonable effort to keep the gas free of oxygen;

(k) shall not contain more than 4% by volume of a combined total of carbon dioxide and nitrogen components; provided, however, that the total carbon dioxide content shall not exceed 3% by volume;

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

5. (continued)

(l) shall have a temperature of not more than one hundred twenty degrees (120 degrees) Fahrenheit;

(m) shall have been dehydrated by Shipper for removal of entrained water present therein in a vapor state, and in no event contain more than seven (7) pounds of entrained water per million cubic feet, at a pressure base of fourteen and seventy three hundredths (14.73) pounds per square inch and a temperature of sixty degrees (60 degrees) Fahrenheit as determined by dewpoint apparatus approved by the Bureau of Mines or such other apparatus as may be mutually agreed upon.

(n) Governmental authorities may require the odorization of gas by use of a malodorant agent as to indicate by a distinctive odor the presence of gas. Whenever odorized gas is delivered to Transporter, the quality and specifications of the gas shall be determined prior to the addition of such malodorant. Transporter shall not be obligated to receive such odorized gas from Shipper when such receipt may, in Transporter's sole discretion, be detrimental to Transporter's operations.

(o) Procedures for Postings. Interchangeability Segment(s) and Monitoring Point(s) shall have the same meaning as HDP Segment(s) and Monitoring Point(s) as defined in Section 6 (a) and (b) of this Article II. Transporter shall, from time to time, and as Transporter deems operationally necessary, establish and post on PASSKEY a limit on heating value, Wobbe Number, Carbon Dioxide, Nitrogen, C2+ or C4+ content (no lower than the applicable Safe Harbor) for receipts on specified Interchangeability Segments to cure or prevent an actual or anticipated Interchangeability Problem. As set forth below, Transporter shall post on PASSKEY such limits when operational and engineering considerations on Transporter's System demonstrate, based on Transporter's determination, the need for such limits in order to prevent an anticipated Interchangeability Problem(s), to correct an actual Interchangeability Problem(s), or to assure that gas meets the specifications as defined in Article II, Section 3.

(i) To the extent that Transporter is able to meet delivery specifications set forth in Article II, Section 3 and to the extent that all other gas quality Tariff specifications are met, Transporter shall receive gas that has a heating value, Wobbe number, Carbon Dioxide, Nitrogen, C2+ or C4+ content outside of the Safe Harbor standards. In the event Transporter is unable to meet the delivery specifications as set forth in Article 3, Section 3, Transporter will post on Passkey a limit for the specifications that cannot be met, not to be more stringent than the Safe Harbor value for the specifications. Transporter shall post the limit for the Interchangeability Segment(s) where the delivery specification cannot be met through blending or other means, and any immediately upstream Interchangeability Segment(s) to the extent that Transporter deems it necessary to meet the delivery specifications.

(ii) The receipts in an Interchangeability Segment for which there is a posted limit that do not meet the Safe Harbor standard for the constituent for which there is a posting will be restricted volumetrically on a non-discriminatory, pro-rata basis**.** The posting will be applied to all segments upstream of the segment where it is anticipated that the delivery specification cannot be met provided that no segment is skipped between the segment where the delivery specification is not met and the segment where the limit is posted.

(iii) Transporter shall post limits in a given Interchangeability Segment only to the extent necessary to prevent or cure an Interchangeability Problem. Such posted limits shall remain in effect no longer than necessary.

(iv) In the event of an actual or anticipated Interchangeability Problem, Transporter will provide as much notice of such limitation as reasonably practicable and will attempt to provide such notice at least ten (10) days prior to the effective date of the limitation.

(v) Posted limits shall not exceed the limits needed to correct the specifically identified or anticipated inability to meet the delivery specifications set forth in Article II, Section 3.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

5. (o)(continued)

(vi) Where the Transporter cannot fully correct an identified or anticipated inability to meet the delivery specifications set forth in Article II, Section 3 by posting an limit in the most downstream Interchangeability Segment experiencing or anticipating the inability, it shall post a limit in contiguous upstream Interchangeability Segment(s) if Transporter determines that such upstream posting is operationally necessary. However, the limit in such Interchangeability Segment(s) may be no stricter than the limit in the first Interchangeability Segment. Where the gas flowing at upstream Interchangeability Monitoring Point complies with the posted limit, Transporter shall not apply any limit to that point or any other upstream receipt point.

(vii) When Transporter posts a limit for a particular Interchangeability Segment, all gas receipts into the affected Interchangeability Segment either from interconnects or from any adjacent Interchangeability Segment feeding gas directly into the affected Interchangeability Segment must meet the posted limitation for the affected Interchangeability Segment.

(viii) To the extent that it does not create undue risk of an Interchangeability Problem, Transporter will not apply the heating value, Wobbe Number, Carbon Dioxide, Nitrogen, C2+ or C4+ content limits of this Section 5 to receipts into Transporter's system from storage facilities (storage withdrawals).

6. Hydrocarbon Dewpoint. Transporter may not refuse to accept delivery of gas with a Hydrocarbon Dewpoint equal to or less than 15 degrees Fahrenheit ("F"), provided that such gas satisfies all other applicable provisions of Transporter's FERC Gas Tariff. This Standard shall be referred to as Transporter's Hydrocarbon Dewpoint Safe Harbor. Transporter shall, from time to time, and as Transporter deems operationally necessary, establish and post on PASSKEY a limit on Hydrocarbon Dewpoint (no lower than the Hydrocarbon Dewpoint Safe Harbor) for receipts on specified HDP Segments to cure or prevent hydrocarbon liquid fallout. As set forth below, Transporter shall post on PASSKEY such limits when operational and engineering considerations on Transporter's System demonstrate, based on Transporter's determination, the need for such limits in order to prevent anticipated hydrocarbon liquid fallout, to correct problems from actual hydrocarbon liquid fallout, or to assure that gas would be accepted for delivery into interconnects, including with interstate or intrastate pipelines, storage facilities, end users, and local distribution companies.

(a) Procedures for Postings. Transporter shall establish Monitoring Points on its system for the purpose of posting Hydrocarbon Dewpoint limits pursuant to this Section 6. For purposes of this Section, "HDP Segment(s)" shall be that portion of Transporter's System between Monitoring Points or, for the furthermost upstream Monitoring Points of Transporter's System, the applicable HDP Segment shall be the remaining portion of Transporter's upstream system.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY
6(a) Hydrocarbon Dewpoint
(continued)

(i) HDP Problem(s) - Actual Hydrocarbon Liquid Fallout - If Transporter experiences an HDP Problem and Transporter determines that a limit on Hydrocarbon Dewpoint is operationally necessary, Transporter shall post on PASSKEY Hydrocarbon Dewpoint limits (no lower than 15 degrees F) at the point where the liquid fallout occurs and then to the receipt points upstream of that location within the HDP Segment where the fallout is occurring. If that will not correct the HDP Problem, Transporter shall apply Hydrocarbon Dewpoint limits for each HDP Segment immediately upstream of the HDP Segment where the liquid fallout occurs up to the nearest Monitoring Point that satisfies the Hydrocarbon Dewpoint limit. Any such Hydrocarbon Dewpoint limit shall be applied uniformly to all receipt points in such HDP Segments. Transporter's analysis and posting of HDP limits shall not skip over any HDP Segment between the HDP Problem and the furthermost upstream HDP Segment to which an HDP limit is posted.

(ii) HDP Problem(s) - Anticipated Hydrocarbon Liquid Fallout - When Transporter anticipates an HDP Problem under foreseeable operating conditions and Transporter determines that Hydrocarbon Dewpoint limits are necessary, Transporter shall post on PASSKEY, pursuant to the procedures established in this section below, Hydrocarbon Dewpoint limits (no lower than 15 degrees F) for the HDP Segment(s) of Transporter's System required to prevent the anticipated liquid fallout. Transporter shall make such a posting when Transporter's analysis of system operating factors indicates to Transporter a need for a limitation. Such factors may include, but are not limited to, anticipated processing plant operation, pressure reduction, flow patterns, flowing gas temperatures, and Hydrocarbon Dewpoint temperatures. Hydrocarbon Dewpoint limitations posted pursuant to this section shall be applied to all HDP Segment(s) where potential for liquid fallout is anticipated absent such Hydrocarbon Dewpoint limitation and to all HDP Segments required to prevent the anticipated liquid fallout under foreseeable operating conditions, provided such posting shall not skip over any HDP Segment between the HDP Problem and the furthermost upstream HDP Segment to which an HDP limit is posted. Transporter shall post on PASSKEY an explanation of the basis for the HDP limit. Upon Shipper's request, Transporter shall provide, within three Business Days, a written detailed explanation of the nature and level of the anticipated hydrocarbon liquid fallout problem, the reasons for its choices of the posted HDP limit and the affected HDP Segments and the specific points (i.e., valve, delivery meter, interconnection facility, etc.), if applicable, where Transporter anticipated hydrocarbon liquids fallout.

(iii) Transporter shall post HDP limits in a given HDP Segment only to the extent necessary to prevent or cure an HDP Problem. Such posted Hydrocarbon Dewpoint limits shall remain in effect no longer than necessary.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY
6(a) Hydrocarbon Dewpoint
(continued)

(iv) To the extent that it does not create undue risk of an HDP Problem, Transporter will not apply the Hydrocarbon Dewpoint limits of this Section to receipts into Transporter's system from storage facilities and from meters that are not upstream of a processing plant with available capacity and that flow 500 dth or less per day.

(v) Transporter will provide as much notice of such limitation as reasonably practicable and will attempt to provide such notice at least ten (10) days prior to the effective date of the limitation.

(vi) Posted Hydrocarbon Dewpoint limitations shall not exceed the limits needed to correct the specifically identified or anticipated HDP Problem on specific HDP Segments of Transporter's system.

(vii) Where the Transporter can not fully correct an HDP Problem by posting a Hydrocarbon Dewpoint limit in the most downstream HDP Segment experiencing or anticipating an HDP Problem, it shall post a Hydrocarbon Dewpoint limit in subsequent upstream HDP Segment(s) if Transporter determines that such upstream posting is operationally necessary. However, the Hydrocarbon Dewpoint limit in the subsequent HDP Segment(s) may be no stricter than the limit in the first HDP Segment. Where the Hydrocarbon Dewpoint of an upstream Monitoring Point complies with the posted Hydrocarbon Dewpoint limit, Transporter shall not apply any Hydrocarbon Dewpoint limit to that point or any other upstream receipt point in the sequential HDP Segment.

(viii) When Transporter posts a Hydrocarbon Dewpoint limit for a particular HDP Segment, all gas receipts into the affected HDP Segment either from interconnects or from any adjacent HDP Segment feeding gas directly into the affected HDP Segment must meet the posted HDP limit for the affected HDP Segment.

(ix) Transporter will not require processing of gas at receipt points upstream of the tailgate of a straddle plant that meets the posted Hydrocarbon Dewpoint limit without processing.

(x) To the extent operationally feasible, Transporter shall allow gas that does not meet a posted Hydrocarbon Dewpoint limitation at receipt points to continue to flow provided that Transporter approves a pairing proposal as set forth in Section 6(c).

(xi) Transporter shall allow gas that does not meet a posted Hydrocarbon Dewpoint limitation at receipt points to continue to flow provided that the Shipper or a third party provides to Transporter proof of processing at a plant within the HDP Segment where the gas at the tailgate of that plant satisfies the Hydrocarbon Dewpoint limitation for the applicable HDP Segment.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY
6 Hydrocarbon Dewpoint
(continued)

(b) Monitoring Points. Transporter shall utilize the following Monitoring Points to establish HDP Segments on Transporter's System for purposes of posting Hydrocarbon Dewpoint limits per this Section 6.

1. Rio Bravo, TX
2. Agua Dulce, TX
3. Natchitoches, LA
4. Kinder, LA
5. Yscloskey, LA
6. Heidelberg, MS
7. Batesville, MS
8. Centerville, TN
9. TVA, TN
10. Portland, TN
11. Dry Creek, KY
12. North Means, KY
13. Catlettsburg, KY
14. Greenup, KY
15. Petersburg, OH
16. Mercer, PA
17. Coudersport, PA
18. Union Dale, PA
19. Mahwah, NJ
20. Greenwich, CT
21. Bloomfield, CT
22. East Aurora, NY
23. Clifton Springs, NY
24. Niagara Mohawk, NY
25. Agawam, MA
26. Mendon, MA
27. Hopkinton, MA
28. Dracut, MA
29. Malden, MA

For purposes of defining the HDP Segments upstream of the monitoring points established at Yscloskey and Kinder, and in recognition that although Kinder and Yscloskey are located on different supply legs of Tennessee's system, some of the facilities upstream of Kinder and Yscloskey are physically interconnected, Transporter shall limit the Yscloskey HDP Segment to that portion of the facilities upstream of Yscloskey that are receiving gas that physically flows in the direction of the Yscloskey Point, and shall similarly limit the Kinder HDP Segment to those receipt points that are receiving gas that flows in the direction of the Kinder Monitoring Point.

(c) Pairing. Subject to the conditions below, Transporter shall allow a shipper or supplier whose gas does not meet a posted Hydrocarbon Dewpoint limit to contractually pair its gas with a shipper or supplier whose gas satisfies the posted specification, or to self-pair its own gas supplies so that the combined supply meets the posted Hydrocarbon Dewpoint limit, so long as the pairing arrangement does not create undue risk of an HDP Problem.

(i) A shipper or supplier wishing to contractually pair or to self-pair supplies must provide Transporter with a written proposal for the pairing of its volumes (including but not limited to e-mail or facsimile).

(ii) Within two (2) Business Days of receipt of a pairing proposal, Transporter will determine and notify shipper or supplier whether the proposal can physically occur on Transporter's system without creating an undue risk of an HDP Problem, provided that such evaluation shall not consider receipts of gas from production area storage facilities upstream of Station 87.

(iii) If Transporter determines that shipper's or supplier's proposal is physically possible, then Transporter will evaluate whether the commingled stream that would result from the proposal satisfies the Hydrocarbon Dewpoint limitation.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY
6(c) Hydrocarbon Dewpoint
(continued)

(iv) Once Transporter approves a specific pairing arrangement, such arrangement shall remain in effect until terminated by shipper or supplier, terminated by Transporter due to a material change in Transporter's operations so that the pairing arrangement creates undue risk of an HDP Problem or until Transporter reduces the Hydrocarbon Dewpoint limit on the segment(s) of Transporter's System that include the gas subject to the pairing arrangement. If Transporter reduces a Hydrocarbon Dewpoint limit, it will allow existing pairing arrangements to continue, so long as the parties to such arrangements notify Transporter within one (1) Business Day of adjustment of the affected volumes to meet the newly posted Hydrocarbon Dewpoint limit, and such volume adjustments do not create undue risk of an HDP Problem.

(v) To the extent that Transporter determines that the pairing proposal does not meet one or more of the above listed conditions, Transporter will provide shipper or supplier a written denial specifying the basis for the determination.

(vi) Transporter shall permit all shippers and suppliers interested in pairing to post relevant data, including contact information, on PASSKEY.

(d) Transporter shall post on PASSKEY each Receipt Point Hydrocarbon Dewpoint value Transporter calculates, within 24 hours after making the calculations, and the method by which the Hydrocarbon Dewpoint value was calculated.

(e) Transporter shall post on PASSKEY each blended Hydrocarbon Dewpoint and blended BTU values Transporter calculates for a line segment of its system within 24 hours of such calculation.

(f) HDP Measurement - Transporter shall perform the Hydrocarbon Dewpoint (cricondentherm) calculations for Section 3.1 using the Peng-Robinson equation of state and C6+ assumptions consistent with industry practices. Upon a shipper's request, Transporter shall conduct a C9+ analysis; provided that in no event shall Transporter be required to conduct such C9+ analysis at any one receipt point more frequently than once every twelve months, except if a new source of supply has been added at that point.

7. The design and construction of any facilities to be installed by Shipper in order to comply with the quality specifications in Article II Sections 5 and 6 shall be approved by Transporter prior to such facilities being placed in service, such approval not to be unreasonably withheld.

8. Tests to determine sulfur, hydrogen sulphide, oxygen, carbon dioxide and nitrogen content shall be made by approved standard methods in general use in the gas industry.

9. If gas fails to meet the quality specifications set out in Sections 5 and 6 of this Article II, then Transporter shall have the right to refuse to accept delivery of such gas and in the event Shipper does not correct the quality deficiency within a reasonable period of time, Transporter may terminate the applicable gas service contract as to the deficient gas.

Nothing in this Article II shall prevent Transporter from waiving any quality specifications where the acceptance of non-conforming gas will not, in the reasonable judgment of Transporter, adversely impact Transporter's operations or create an HDP Problem or Interchangeability Problem and further provided that once such gas has been blended, to the extent that blending occurs, the comingled gas stream at any point on Transporter’s system is compliant with the specifications set forth in Section 3 of this Article II.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY (continued)

10. Notwithstanding the exercise by Transporter of the options in Section 9 above, Shipper shall use its best efforts to correct any quality deficiency in the gas tendered for transportation. Further, notwithstanding Transporter's election under Section 9 above, Shipper shall reimburse Transporter for all expenses incurred in repairing injuries to Transporter's facilities resulting from deliveries of gas which do not conform to the quality specifications set forth in Sections 5 and 6 of this Article II.

11. Transporter shall have the right to collect from all Shippers delivering gas to Transporter at a common Receipt Point their pro rata share of the cost of any additional gas analysis and quality control equipment which Transporter, at its reasonable discretion, determines is required to be installed at such Receipt Point to monitor the quality of gas delivered. With respect to Shippers subject to Rate Schedules contained in Volume No. 1 of Transporter's FERC Gas Tariff, the collection shall be by means of an Incidental Charge.

12. In the event that any separation and dehydration and/or processing required by Transporter is to occur after delivery of transportation gas to Transporter, then such transportation of liquefiable hydrocarbons shall be done pursuant to a PTR Transportation Agreement in the form included in Transporter's FERC Gas Tariff. Transportation and separation of liquid and gas dehydration may be done by separate agreement with Transporter. Any Shipper transporting PTR shall be required to enter into a PTR Transportation Agreement with Transporter or a Transportation Contract under Rate Schedule IT for the transportation of PTR make-up quantities.

III. MEASUREMENT AND MEASURING EQUIPMENT

1. Determination of volume: The volume of gas received and delivered by Transporter shall be determined as follows:

   (a) Unit of Measurement: The service unit of gas scheduled, received, or delivered by Transporter shall be a dekatherm. Daily quantities shall be prorated uniformly over periods of hours for scheduling of service changes during the day.

   (b) Dekatherms shall be determined by multiplying the Mcf volume by the ratio of the heating value per cubic foot to 1,000.

   (c) The unit of volume, for the purpose of measurement, shall be defined as one cubic foot (1cf) of gas at a temperature of sixty degrees Fahrenheit (60^{o}F), and at a pressure of thirty-three hundredths pounds per square inch (.33 PSI) above an assumed atmospheric pressure of fourteen and four tenths pounds per square inch (14.4 PSI) resulting in a pressure of fourteen and seventy-three hundredths pounds per square inch (14.73 PSI) absolute pressure. One thousand (1,000) cubic feet shall be denoted as 1 Mcf.

   (d) The closing of measurement shall be no later than the fifth (5th) business day after the close of the production month.

2. Determination of Total Heating Value: The total heating value of gas received and delivered by Transporter shall be determined as follows:

   (a) The total heating value of the gas per cubic foot shall be determined by taking the average of the heating values as determined each day by a chromatograph or the chromatographic analysis of a sample of gas, or any other method mutually agreed upon. The average (flow weighted) heating value of the gas per cubic foot (Btu/cf) for a unit of time shall be determined by the total dekatherms divided by the total Mcf volume multiplied by 1000.

   (b) The temperature of the gas passing through the meters shall be determined continuously by a recording thermometer so installed that it may properly record the temperature of the gas flowing through the meters. Arithmetic averages of the temperature recorded each day shall be used in computing the Mcf of gas.

GENERAL TERMS AND CONDITIONS (continued)

I. DEFINITION OF TERMS (continued)

30. The terms "Central Clock Time" and "CCT" shall mean central daylight time when daylight savings time is in effect and central standard time when daylight savings time is not in effect.

31. The term "business day" shall mean Monday through Friday, excluding Federal Banking Holidays for transactions in the United States, and similar holidays for transactions occurring in Canada and Mexico.

32. NAESB Standard 1.2.3 (Version 1.9) states: Pooling is: 1) the aggregation of gas from multiple physical and/or logical points to a single physical or logical point, and/or 2) the disaggregation of gas from a single physical or logical point to multiple physical and/or logical points. NAESB Standard 1.3.18 (Version 1.9) states: Deliveries from receipt points should be able to be delivered directly into at least one pool and delivery points should be able to receive quantities from at least one pool, excluding non-contiguous facilities.

33. The term "Pooling Area" shall refer to Supply Area Pooling Area, Market Area Pooling Area or both Supply and Market Area Pooling Areas, as applicable.

34. The term "capacity path" shall mean the mainline pipeline path, up to the transportation quantity under Shipper's firm transportation contract, from a Shipper's Primary Receipt Point(s) to Primary Delivery Point(s), and the leg(s) of Transporter's system, up to the transportation quantity associated with the Primary Receipt Point(s) or Primary Delivery Point(s), where such points are located. For segmented releases, the capacity path of the Replacement Shipper's contract shall be that portion of the Releasing Shipper's capacity path released to the Replacement Shipper up to the transportation quantity under the Replacement Shipper's contract and the Releasing Shipper's capacity path shall be modified accordingly. Receipt point nominations from Supply Area Pooling Areas shall be considered to be Secondary Receipt Points within a Shipper's capacity path up to the transportation quantity under Shipper's firm transportation contract associated with the respective leg of Transporter's system. Receipt point nominations from Market Area Pooling Areas shall be deemed to be Secondary Receipt Points either within or outside of the Shipper's capacity path, depending on the Market Area Pooling Area's assigned geographic location and the transportation quantity under Shipper's firm transportation quantity associated with the respective leg of Transporter's system.

35. The term "Daily Variance" or "Daily Imbalance" shall have the meaning set forth in Section 7 of Rate Schedule LMS-MA and Section 5 of Rate Schedule LMS-PA.

36. The term "Hydrocarbon Dewpoint" shall mean cricondentherm, the highest temperature at which the vapor-liquid equilibrium may be present. The Hydrocarbon Dewpoint (cricondentherm) calculations are performed using the Peng-Robinson equation of state.

37. The term "HDP Segment(s)" shall have the meaning as defined in Article II, Section ~~3.1~~6(a).

38. The term "HDP Problem(s)" shall mean actual or anticipated operational problems on Transporter's system or at its Interconnects with interstate or intrastate pipelines, storage facilities, end users, and local distribution companies specifically related to actual or anticipated hydrocarbon liquid fallout. The term "Interconnect," in this context solely, shall mean the integrated metering, measurement, pressure regulation and gas handling facilities and other equipment ("Interconnect Equipment") located within the measurement/delivery complex where Transporter delivers gas to an interstate or intrastate pipeline, end user, storage facility or local distribution company, typically contained within a fenced or other secure enclosure. Interconnect Equipment may or may not be owned by Transporter and may or may not be located before the meter demarcating the change in possession of the gas.

39. The term “Interchangeability Segment(s)” shall have the meaning as defined in Article II, Section 5(o).

40. The term “Interchangeability Problem(s)” shall mean actual or anticipated problems in Transporter’s ability to meet any of the gas quality specifications for gas delivered by Transporter as provided pursuant to Article II, Section 3 of these General Terms and Conditions.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

1. Composition of gas: The gas delivered by Transporter or received by Transporter from Shipper(s) shall be a combustible gas consisting wholly or in part of:

(a) Natural gas of the quality and composition produced by nature in petroleum, oil, and gas fields.

(b) Gas from revaporized liquefied natural gas.

(c) Manufactured, synthesized or mixed gas consisting essentially of the hydrocarbons of the quality and character of natural gas such that when it is comingled with natural gas, the two become indistinguishable.

(d) Gas derived and recovered from biomass such as dairy-derived biomethane, methane recovered from a landfill, or methane recovered from a wastewater treatment facility, such that when it is comingled with natural gas, the two become indistinguishable.

2. Transporter, in its own right or in accord with the instructions of Shipper, may subject, or permit the subjection of, the natural gas to compression, cooling, cleaning and other processes and helium, natural gasoline, butane, propane, and any other hydrocarbons except methane may be removed prior to delivery to Shipper. Title to the products will remain with the party that has contracted for the processing rights and notified Transporter of such contract; otherwise, title to the products will remain with Transporter.

~~1~~3. The provisions set forth in this Article II Section ~~1~~ 3 shall apply to all gas delivered by Transporter under this FERC Gas Tariff.

(a) Heating value: The natural gas shall have a total heating value of not less than nine hundred and sixty-seven British thermal units per cubic foot nor more than eleven hundred and ten British thermal units. ~~. Transporter, in its own right or in accord with the instructions of Shipper, may subject, or permit the subjection of, the natural gas to compression, cooling, cleaning and other processes and helium, natural gasoline, butane, propane, and any other hydrocarbons except methane may be removed prior to delivery to Shipper. Title to the products will remain with party that has contracted for the processing rights and notified Transporter of such contract; otherwise, title to the products will remain with Transporter.~~ In the event that the total heating value of gas, per cubic foot, ~~in any month~~ when determined as provided in Section 2 of Article III ~~hereof,~~ of the General Terms and Conditions, falls below nine hundred and sixty-seven ~~(~~or above eleven hundred and ten ~~in the case of citygate deliveries)~~ British thermal units per cubic foot, Shipper shall have the option to refuse to accept said gas so long as said total heating value remains below nine hundred and sixty-seven ~~(~~or above eleven hundred and ten ~~in the case of citygate deliveries)~~ British thermal units per cubic foot.

(b) Wobbe Number: The gas shall have a Wobbe Number of at least 1314 but no more than 1400. The Wobbe Number shall be calculated by dividing the total heating value (dry) of the gas (at standard conditions of 14.73 psia and 60 degrees Fahrenheit) by the square root of the specific gravity of the gas.

(c) Non-Methane Hydrocarbons: The gas shall not contain more than 12% by volume of non-methane (C2+) hydrocarbons.

(d) Heavier Hydrocarbons: The gas shall not contain more than 1.5% by volume of heavier hydrocarbons (C4+).

(e) Carbon Dioxide: The gas shall not contain more than 2% by volume of carbon dioxide.

(f) Total Sulfur: The gas shall not contain more than 10 grains of total sulfur per 100 cubic feet.

(g) Total Diluents: The gas shall not contain more than 4% by volume total diluents, which shall be the combined nitrogen, carbon dioxide, and oxygen by volume, provided however, that the carbon dioxide content does not exceed 2% and the combined nitrogen and oxygen content does not exceed 2.75%.

~~(b) Freedom from objectionable matter: The natural gas delivered by Transporter under this Tariff shall be commercially free from objectionable odors, dust, or other solid or liquid matters (including hydrocarbon liquids) which might interfere with its merchantability or cause injury to or interference with proper operation of the lines, regulators, meters or other appliances through which it flows at the point of delivery; and shall not contain more than twenty grains of total sulphur nor more than one grain of hydrogen sulphide per one hundred cubic feet. Transporter's obligation hereunder shall in no way require Transporter to deliver natural gas to Shipper at anything other than at the prevailing pressure and temperature in Transporter's pipeline.~~

~~2. Failure to conform to specifications against objectionable matter:~~

~~If the gas offered for delivery by Transporter shall fail at any time to conform to any of the specifications set forth in Section 1 of this Article, then Shipper shall notify Transporter of such deficiency and thereupon may at Shipper's option refuse to accept delivery pending correction by Transporter. Upon Transporter's failure promptly to remedy any deficiency in quality as specified in Section 1 of this Article, Shipper may accept delivery of such gas and may make changes necessary to bring such gas into conformity with such specifications, and Transporter may reimburse Shipper for any reasonable expense incurred by it in effecting such changes.~~

~~If a Shipper requests delivery ("Requesting Shipper") of gas that does not meet one or more of the gas quality specifications contained in Article II, Section 1 above ("Non-Conforming Gas"), nothing in this Article II shall prevent the Requesting Shipper from waiving any of its rights under this Section 2 or agreeing to indemnify, defend, and hold Transporter harmless from any damages to the Requesting Shipper's facilities relating to Transporter's delivery of such Non-Conforming Gas, provided that the delivery to the Requesting Shipper occurs at a point on Transporter's system located in the supply area, as defined in Article I, Section 21 of these General Terms and Conditions. The Requesting Shipper may specify whether it is waiving one or more of the gas quality specifications contained in Article II, Section 1 above. Transporter may reject any request to deliver Non-Conforming Gas if Transporter determines, in its sole judgment, that it will adversely impact Transporter's system or other Shippers. Except under the specific circumstances of a Requesting Shipper, nothing in this Article II shall relieve Transporter of its obligation to deliver gas that conforms to the specifications of Article II, Section 1.~~

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

3. (continued)

(h) Hydrogen Sulfide: The gas shall not contain more than 0.25 grain of hydrogen sulfide (H2S) per 100 cubic feet.

(i) Water Vapor: The gas shall not contain more than 7 pounds of entrained water vapor per million cubic feet at a pressure base of fourteen and seventy three hundredths (14.73) pounds per square inch and a temperature of sixty degrees (60 degrees) Fahrenheit.

(j) Oxygen: The gas shall not contain more than 0.2% by volume of oxygen.

(k) Freedom from objectionable matter: The natural gas delivered by Transporter under this Tariff shall be commercially free from objectionable odors, dust, or other solid or liquid matters (including hydrocarbon liquids) which might interfere with its merchantability or cause injury to or interference with proper operation of the lines, regulators, meters or other appliances through which it flows at the point of delivery.

(l) Transporter's obligation hereunder shall in no way require Transporter to deliver gas to Shipper at anything other than at the prevailing pressure and temperature in Transporter's pipeline.

(m) If required under Governmental Regulations, Transporter shall odorize the gas to be delivered by use of a malodorant agent as to indicate by a distinctive odor the presence of gas.

4. Failure to conform to specifications:

(a) If the gas offered for delivery by Transporter shall fail at any time to conform to any of the specifications set forth in Section 3 of this Article II, then Shipper may notify Transporter of such deficiency and thereupon may, at Shipper's option, refuse to accept delivery or require correction by Transporter. If Shipper notifies Transporter of such deficiencies as provided above, then Transporter shall make such correction or upon Transporter's failure promptly to remedy any deficiency in quality as specified in Section 3 of this Article II, Shipper may accept delivery of such gas and may make changes necessary to bring such gas into conformity with such specifications, and Transporter may reimburse Shipper for any reasonable expense incurred by it in effecting such changes..

(b) If a Shipper requests delivery ("Requesting Shipper") of gas that does not meet one or more of the gas quality specifications contained in Article II, Section 3 above ("Non-Conforming Gas"), nothing in this Article II shall prevent the Requesting Shipper from waiving any of its rights under this Section 4 or agreeing to indemnify, defend, and hold Transporter harmless from any damages to the Requesting Shipper's or other downstream party's facilities relating to Transporter's delivery of such Non-Conforming Gas. The Requesting Shipper may specify whether it is waiving one or more of the gas quality specifications contained in Article II, Section 3 above. Transporter may reject any request to deliver Non-Conforming Gas if Transporter determines, in its sole judgment, that it will adversely impact Transporter's system or other Shippers.

(c) Except under the specific circumstances of a Requesting Shipper, nothing in this Article II shall relieve Transporter of its obligation to deliver gas that conforms to the specifications of Article II, Section 3.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY (continued)

~~3~~5. The provisions set forth in this Article II Section ~~3~~ 5 shall apply to all gas delivered to Transporter. Gas delivered to Transporter hereunder:

(a) Transporter shall not refuse to accept delivery of gas that has~~shall have~~ a total heating value of not less than nine hundred sixty-seven (967) Btu's per cubic foot, and not more than eleven hundred and ten (~~1100~~1110) Btu's per cubic foot.~~;~~ This standard shall be referred to as Transporter's total heating value low (967) and high (1110) Safe Harbor;

(b) Transporter shall not refuse to accept delivery of gas that has a Wobbe Number of at least 1314 but no more than 1400. This standard shall be referred to as Transporter's Wobbe low (1314) and high (1400) Safe Harbor;

(c) Transporter shall not refuse to accept delivery of gas that contains 12% or less by volume of non-methane (C2+) hydrocarbons. This standard shall be referred to as Transporter's C2+ Safe Harbor;

(d) Transporter shall not refuse to accept delivery of gas that contains 1.5% or less by volume of heavier hydrocarbons (C4+). This standard shall be referred to as Transporter's C4+ Safe Harbor;

(e) Transporter shall not refuse to accept delivery of gas that contains less than 4% by volume total diluents, which shall be the combined nitrogen, carbon dioxide, and oxygen by volume, provided however, that the carbon dioxide content does not exceed 3% and the oxygen content does not exceed 0.2% and the combined nitrogen and oxygen content does not exceed 2.75%. This standard shall be referred to as Transporter's diluent Safe Harbor;

(f) shall not contain more than 3% by volume of Carbon Dioxide. However, Transporter shall not refuse to accept delivery of gas that contains 2% or less by volume carbon dioxide, which standard shall be referred to as Transporter's carbon dioxide Safe Harbor limit;

(g) shall not contain, either in the gas or in any liquids with the gas, any microbiological organism, pathogen, active bacteria or bacterial agent capable of producing or contributing to corrosion and/or operational or other problems or are injurious to utility facilities or cause the gas to be unmarketable. Microbiological organisms, bacteria or bacterial agents include, but are not limited to, sulfate reducing bacteria and acid producing bacteria. Tests for bacteria or bacterial agents shall be conducted on samples taken from the meter run or the appurtenant piping using American Petroleum Institute (API) test method API-RP38 or any other test method acceptable to Pipeline and Customer which is currently available or may become available at any time;

~~(b)~~(h) shall be commercially free from objectionable odors, dust, water, any other solid or liquid matter that might interfere with its merchantability or cause injury to, or interference with, proper operation of the equipment through which it flows and any substance that might become separated from the gas in Transporter's facilities. Shipper shall furnish, install, maintain and operate drips, separators, heaters, and other mechanical devices as may be necessary to effect compliance with such requirements (after having secured the prior approval of Transporter as to the design and construction of such facilities, which approval shall not be unreasonably withheld);

~~(c)~~(i) shall not contain more than ~~twenty~~ ten (~~20~~10) grains of total ~~sulphur~~sulfur, nor more ~~than one fourth (1/4) of one~~ 0.25 grain of hydrogen ~~sulphide~~ sulfide per one hundred (100) cubic feet;

~~(d)~~(j) shall not contain more than ~~two tenths of one percent (~~0.2%~~)~~ by volume of oxygen, and Shipper shall make every reasonable effort to keep the gas free of oxygen;

~~(e)~~(k) shall not contain more than ~~four percent (~~4%~~)~~ by volume of a combined total of carbon dioxide and nitrogen components; provided, however, that the total carbon dioxide content shall not exceed ~~three percent (~~3%~~)~~ by volume;

~~(f) shall have a temperature of not more than one hundred twenty degrees (120 degrees) Fahrenheit;~~

~~(g) shall have been dehydrated by Shipper for removal of entrained water present therein in a vapor state, and in no event contain more than seven (7) pounds of entrained water per million cubic feet, at a pressure base of fourteen and seventy three hundredths (14.73) pounds per square inch and a temperature of sixty degrees (60 degrees) Fahrenheit as determined by dew point apparatus approved by the Bureau of Mines or such other apparatus as may be mutually agreed upon.~~

~~3.1 Hydrocarbon Dewpoint. Transporter may not refuse to accept delivery of Gas with a Hydrocarbon Dewpoint equal to or less than 15 degrees Fahrenheit ("F"), provided that such Gas satisfies all other applicable provisions of Transporter's FERC Gas Tariff. This Standard shall be referred to as Transporter's Hydrocarbon Dewpoint Safe Harbor. Transporter shall, from time to time, and as Transporter deems operationally necessary, establish and post on PASSKEY a limit on Hydrocarbon Dewpoint (no lower than the Hydrocarbon Dewpoint Safe Harbor) for receipts on specified HDP Segments to cure or prevent hydrocarbon liquid fallout. As set forth below, Transporter shall post on PASSKEY such limits when operational and engineering considerations on Transporter's System demonstrate, based on Transporter's determination, the need for such limits in order to prevent anticipated hydrocarbon liquid fallout, to correct problems from actual hydrocarbon liquid fallout, or to assure that gas would be accepted for delivery into interconnects, including with interstate or intrastate pipelines, storage facilities, end users, and local distribution companies.~~

~~(a) Procedures for Postings. Transporter shall establish Monitoring Points on its system for the purpose of posting Hydrocarbon Dewpoint limits pursuant to Section 3.1. For purposes of this Section, "HDP Segment(s)" shall be that portion of Transporter's System between Monitoring Points or, for the furthermost upstream Monitoring Points of Transporter's System, the applicable HDP Segment shall be the remaining portion of Transporter's upstream system.~~

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

5. (continued)

(l) shall have a temperature of not more than one hundred twenty degrees (120 degrees) Fahrenheit;

(m) shall have been dehydrated by Shipper for removal of entrained water present therein in a vapor state, and in no event contain more than seven (7) pounds of entrained water per million cubic feet, at a pressure base of fourteen and seventy three hundredths (14.73) pounds per square inch and a temperature of sixty degrees (60 degrees) Fahrenheit as determined by dewpoint apparatus approved by the Bureau of Mines or such other apparatus as may be mutually agreed upon.

(n) Governmental authorities may require the odorization of gas by use of a malodorant agent as to indicate by a distinctive odor the presence of gas. Whenever odorized gas is delivered to Transporter, the quality and specifications of the gas shall be determined prior to the addition of such malodorant. Transporter shall not be obligated to receive such odorized gas from Shipper when such receipt may, in Transporter's sole discretion, be detrimental to Transporter's operations.

(o) Procedures for Postings. Interchangeability Segment(s) and Monitoring Point(s) shall have the same meaning as HDP Segment(s) and Monitoring Point(s) as defined in Section 6 (a) and (b) of this Article II. Transporter shall, from time to time, and as Transporter deems operationally necessary, establish and post on PASSKEY a limit on heating value, Wobbe Number, Carbon Dioxide, Nitrogen, C2+ or C4+ content (no lower than the applicable Safe Harbor) for receipts on specified Interchangeability Segments to cure or prevent an actual or anticipated Interchangeability Problem. As set forth below, Transporter shall post on PASSKEY such limits when operational and engineering considerations on Transporter's System demonstrate, based on Transporter's determination, the need for such limits in order to prevent an anticipated Interchangeability Problem(s), to correct an actual Interchangeability Problem(s), or to assure that gas meets the specifications as defined in Article II, Section 3.

(i) To the extent that Transporter is able to meet delivery specifications set forth in Article II, Section 3 and to the extent that all other gas quality Tariff specifications are met, Transporter shall receive gas that has a heating value, Wobbe number, Carbon Dioxide, Nitrogen, C2+ or C4+ content outside of the Safe Harbor standards. In the event Transporter is unable to meet the delivery specifications as set forth in Article 3, Section 3, Transporter will post on Passkey a limit for the specifications that cannot be met, not to be more stringent than the Safe Harbor value for the specifications. Transporter shall post the limit for the Interchangeability Segment(s) where the delivery specification cannot be met through blending or other means, and any immediately upstream Interchangeability Segment(s) to the extent that Transporter deems it necessary to meet the delivery specifications.

(ii) The receipts in an Interchangeability Segment for which there is a posted limit that do not meet the Safe Harbor standard for the constituent for which there is a posting will be restricted volumetrically on a non-discriminatory, pro-rata basis**.** The posting will be applied to all segments upstream of the segment where it is anticipated that the delivery specification cannot be met provided that no segment is skipped between the segment where the delivery specification is not met and the segment where the limit is posted.

(iii) Transporter shall post limits in a given Interchangeability Segment only to the extent necessary to prevent or cure an Interchangeability Problem. Such posted limits shall remain in effect no longer than necessary.

(iv) In the event of an actual or anticipated Interchangeability Problem, Transporter will provide as much notice of such limitation as reasonably practicable and will attempt to provide such notice at least ten (10) days prior to the effective date of the limitation.

(v) Posted limits shall not exceed the limits needed to correct the specifically identified or anticipated inability to meet the delivery specifications set forth in Article II, Section 3.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

5. (o)(continued)

(vi) Where the Transporter cannot fully correct an identified or anticipated inability to meet the delivery specifications set forth in Article II, Section 3 by posting an limit in the most downstream Interchangeability Segment experiencing or anticipating the inability, it shall post a limit in contiguous upstream Interchangeability Segment(s) if Transporter determines that such upstream posting is operationally necessary. However, the limit in such Interchangeability Segment(s) may be no stricter than the limit in the first Interchangeability Segment. Where the gas flowing at upstream Interchangeability Monitoring Point complies with the posted limit, Transporter shall not apply any limit to that point or any other upstream receipt point.

(vii) When Transporter posts a limit for a particular Interchangeability Segment, all gas receipts into the affected Interchangeability Segment either from interconnects or from any adjacent Interchangeability Segment feeding gas directly into the affected Interchangeability Segment must meet the posted limitation for the affected Interchangeability Segment.

(viii) To the extent that it does not create undue risk of an Interchangeability Problem, Transporter will not apply the heating value, Wobbe Number, Carbon Dioxide, Nitrogen, C2+ or C4+ content limits of this Section 5 to receipts into Transporter's system from storage facilities (storage withdrawals).

6. Hydrocarbon Dewpoint. Transporter may not refuse to accept delivery of gas with a Hydrocarbon Dewpoint equal to or less than 15 degrees Fahrenheit ("F"), provided that such gas satisfies all other applicable provisions of Transporter's FERC Gas Tariff. This Standard shall be referred to as Transporter's Hydrocarbon Dewpoint Safe Harbor. Transporter shall, from time to time, and as Transporter deems operationally necessary, establish and post on PASSKEY a limit on Hydrocarbon Dewpoint (no lower than the Hydrocarbon Dewpoint Safe Harbor) for receipts on specified HDP Segments to cure or prevent hydrocarbon liquid fallout. As set forth below, Transporter shall post on PASSKEY such limits when operational and engineering considerations on Transporter's System demonstrate, based on Transporter's determination, the need for such limits in order to prevent anticipated hydrocarbon liquid fallout, to correct problems from actual hydrocarbon liquid fallout, or to assure that gas would be accepted for delivery into interconnects, including with interstate or intrastate pipelines, storage facilities, end users, and local distribution companies.

(a) Procedures for Postings. Transporter shall establish Monitoring Points on its system for the purpose of posting Hydrocarbon Dewpoint limits pursuant to this Section 6. For purposes of this Section, "HDP Segment(s)" shall be that portion of Transporter's System between Monitoring Points or, for the furthermost upstream Monitoring Points of Transporter's System, the applicable HDP Segment shall be the remaining portion of Transporter's upstream system.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

~~3.1~~6(a) Hydrocarbon Dewpoint (continued)

(i) HDP Problem(s) - Actual Hydrocarbon Liquid Fallout - If Transporter experiences an HDP Problem and Transporter determines that a limit on Hydrocarbon Dewpoint is operationally necessary, Transporter shall post on PASSKEY Hydrocarbon Dewpoint limits (no lower than 15 degrees F) at the point where the liquid fallout occurs and then to the receipt points upstream of that location within the HDP Segment where the fallout is occurring. If that will not correct the HDP Problem, Transporter shall apply Hydrocarbon Dewpoint limits for each HDP Segment immediately upstream of the HDP Segment where the liquid fallout occurs up to the nearest Monitoring Point that satisfies the Hydrocarbon Dewpoint limit. Any such Hydrocarbon Dewpoint limit shall be applied uniformly to all receipt points in such HDP Segments. Transporter's analysis and posting of HDP limits shall not skip over any HDP Segment between the HDP Problem and the furthermost upstream HDP Segment to which an HDP limit is posted.

(ii) HDP Problem(s) - Anticipated Hydrocarbon Liquid Fallout - When Transporter anticipates an HDP Problem under foreseeable operating conditions and Transporter determines that Hydrocarbon Dewpoint limits are necessary, Transporter shall post on PASSKEY, pursuant to the procedures established in this section below, Hydrocarbon Dewpoint limits (no lower than 15 degrees F) for the HDP Segment(s) of Transporter's System required to prevent the anticipated liquid fallout. Transporter shall make such a posting when Transporter's analysis of system operating factors indicates to Transporter a need for a limitation. Such factors may include, but are not limited to, anticipated processing plant operation, pressure reduction, flow patterns, flowing gas temperatures, and Hydrocarbon Dewpoint temperatures. Hydrocarbon Dewpoint limitations posted pursuant to this section shall be applied to all HDP Segment(s) where potential for liquid fallout is anticipated absent such Hydrocarbon Dewpoint limitation and to all HDP Segments required to prevent the anticipated liquid fallout under foreseeable operating conditions, provided such posting shall not skip over any HDP Segment between the HDP Problem and the furthermost upstream HDP Segment to which an HDP limit is posted. Transporter shall post on PASSKEY an explanation of the basis for the HDP limit. Upon Shipper's request, Transporter shall provide, within three Business Days, a written detailed explanation of the nature and level of the anticipated hydrocarbon liquid fallout problem, the reasons for its choices of the posted HDP limit and the affected HDP Segments and the specific points (i.e., valve, delivery meter, interconnection facility, etc.), if applicable, where Transporter anticipated hydrocarbon liquids fallout.

(iii) Transporter shall post HDP limits in a given HDP Segment only to the extent necessary to prevent or cure an HDP Problem. Such posted Hydrocarbon Dewpoint limits shall remain in effect no longer than necessary.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

~~3.1~~6(a) Hydrocarbon Dewpoint (continued)

(iv) To the extent that it does not create undue risk of an ~~HPD~~ HDP Problem, Transporter will not apply the Hydrocarbon Dewpoint limits of this Section to receipts into Transporter's system from storage facilities and from meters that are not upstream of a processing plant with available capacity and that flow 500 dth or less per day.

(v) Transporter will provide as much notice of such limitation as reasonably practicable and will attempt to provide such notice at least ten (10) days prior to the effective date of the limitation.

(vi) Posted Hydrocarbon Dewpoint limitations shall not exceed the limits needed to correct the specifically identified or anticipated HDP Problem on specific HDP Segments of Transporter's system.

(vii) Where the Transporter can not fully correct an HDP Problem by posting a Hydrocarbon Dewpoint limit in the most downstream HDP Segment experiencing or anticipating an HDP Problem, it shall post a Hydrocarbon Dewpoint limit in subsequent upstream HDP Segment(s) if Transporter determines that such upstream posting is operationally necessary. However, the Hydrocarbon Dewpoint limit in the subsequent HDP Segment(s) may be no stricter than the limit in the first HDP Segment. Where the Hydrocarbon Dewpoint of an upstream Monitoring Point complies with the posted Hydrocarbon Dewpoint limit, Transporter shall not apply any Hydrocarbon Dewpoint limit to that point or any other upstream receipt point in the sequential HDP Segment.

(viii) When Transporter posts a Hydrocarbon Dewpoint limit for a particular HDP Segment, all gas receipts into the affected HDP Segment either from interconnects or from any adjacent HDP Segment feeding gas directly into the affected HDP Segment must meet the posted HDP limit for the affected HDP Segment.

(ix) Transporter will not require processing of gas at receipt points upstream of the tailgate of a straddle plant that meets the posted Hydrocarbon Dewpoint limit without processing.

(x) To the extent operationally feasible, Transporter shall allow gas that does not meet a posted Hydrocarbon Dewpoint limitation at receipt points to continue to flow provided that Transporter approves a pairing proposal as set forth in Section ~~3.1~~6(c).

(xi) Transporter shall allow gas that does not meet a posted Hydrocarbon Dewpoint limitation at receipt points to continue to flow provided that the Shipper or a third party provides to Transporter proof of processing at a plant within the HDP Segment where the gas at the tailgate of that plant satisfies the Hydrocarbon Dewpoint limitation for the applicable HDP Segment.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

~~3.1~~6 Hydrocarbon Dewpoint (continued)

(b) Monitoring Points. Transporter shall utilize the following Monitoring Points to establish HDP Segments on Transporter's System for purposes of posting Hydrocarbon Dewpoint limits per this ~~s~~Section ~~3.1~~6.

~~1. Donna, Texas~~
~~2. Agua Dulce, Texas~~
~~3. Natchitoches, Louisiana~~
~~4. Kinder, Louisiana~~
~~5. Yscloskey, Louisiana Plant Tailgate~~
~~6. Centerville, Tennessee~~
~~7. Portland, Tennessee~~
~~8. Mercer, Pennsylvania~~
~~9. Coudersport, Pennsylvania~~
~~10. Clifton Springs, New York~~
~~11. Greenwich, Connecticut~~
~~12. Agawam, Massachusetts~~
~~13. Hopkinton, Massachusetts~~
~~14. Dracut, Massachusetts~~

1.	Rio Bravo, TX	16.	Mercer, PA
2.	Agua Dulce, TX	17.	Coudersport, PA
3.	Natchitoches, LA	18.	Union Dale, PA
4.	Kinder, LA	19.	Mahwah, NJ
5.	Yscloskey, LA	20.	Greenwich, CT
6.	Heidelberg, MS	21.	Bloomfield, CT
7.	Batesville, MS	22.	East Aurora, NY
8.	Centerville, TN	23.	Clifton Springs, NY
9.	TVA, TN	24.	Niagara Mohawk, NY
10.	Portland, TN	25.	Agawam, MA
11.	Dry Creek, KY	26.	Mendon, MA
12.	North Means, KY	27.	Hopkinton, MA
13.	Catlettsburg, KY	28.	Dracut, MA
14.	Greenup, KY	29.	Malden, MA
15.	Petersburg, OH		

For purposes of defining the HDP Segments upstream of the monitoring points established at Yscloskey and Kinder, and in recognition that although Kinder and Yscloskey are located on different supply legs of Tennessee's system, some of the facilities upstream of Kinder and Yscloskey are physically interconnected, Transporter shall limit the Yscloskey HDP Segment to that portion of the facilities upstream of Yscloskey that are receiving gas that physically flows in the direction of the Yscloskey Point, and shall similarly limit the Kinder HDP Segment to those receipt points that are receiving gas that flows in the direction of the Kinder Monitoring Point.

(c) Pairing. Subject to the conditions below, Transporter shall allow a shipper or supplier whose gas does not meet a posted Hydrocarbon Dewpoint limit to contractually pair its gas with a shipper or supplier whose gas satisfies the posted specification, or to self-pair its own gas supplies so that the combined supply meets the posted Hydrocarbon Dewpoint limit, so long as the pairing arrangement does not~~e~~ create undue risk o~~n~~f an HDP Problem.

(i) A shipper or supplier wishing to contractually pair or to self-pair supplies must provide Transporter with a written proposal for the pairing of its volumes (including but not limited to e-mail or facsimile).

(ii) Within two (2) Business Days of receipt of a pairing proposal, Transporter will determine and notify shipper or supplier whether the proposal can physically occur on Transporter's system without creating an undue risk of an HDP Problem, provided that such evaluation shall not consider receipts of gas from production area storage facilities upstream of Station 87.

(iii) If Transporter determines that shipper's or supplier's proposal is physically possible, then Transporter will evaluate whether the commingled stream that would result from the proposal satisfies the Hydrocarbon Dewpoint limitation.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY

~~3.1~~6(c) Hydrocarbon Dewpoint (continued)

(iv) Once Transporter approves a specific pairing arrangement, such arrangement shall remain in effect until terminated by shipper or supplier, terminated by Transporter due to a material change in Transporter's operations so that the pairing arrangement creates undue risk of an HDP Problem or until Transporter reduces the Hydrocarbon Dewpoint limit on the segment(s) of Transporter's System that include the gas subject to the pairing arrangement. If Transporter reduces a Hydrocarbon Dewpoint limit, it will allow existing pairing arrangements to continue, so long as the parties to such arrangements notify Transporter within one (1) Business Day of adjustment of the affected volumes to meet the newly posted Hydrocarbon Dewpoint limit, and such volume adjustments do not create undue risk of an HDP Problem.

(v) To the extent that Transporter determines that the pairing proposal does not meet one or more of the above listed conditions, Transporter will provide shipper or supplier a written denial specifying the basis for the determination.

(vi) Transporter shall permit all shippers and suppliers interested in pairing to post relevant data, including contact information, on PASSKEY.

(d) Transporter shall post on PASSKEY each Receipt Point Hydrocarbon Dewpoint value Transporter calculates, within 24 hours after making the calculations, and the method by which the Hydrocarbon Dewpoint value was calculated.

(e) Transporter shall post on PASSKEY each blended Hydrocarbon Dewpoint and blended BTU values Transporter calculates for a line segment of its system within 24 hours of such calculation.

(f) HDP Measurement - Transporter shall perform the Hydrocarbon Dewpoint (cricondentherm) calculations for Section 3.1 using the Peng-Robinson equation of state and C6+ assumptions consistent with industry practices. Upon a shipper's request, Transporter shall conduct a C9+ analysis; provided that in no event shall Transporter be required to conduct such C9+ analysis at any one receipt point more frequently than once every twelve months, except if a new source of supply has been added at that point.

~~4~~7. The design and construction of any facilities to be installed by Shipper in order to comply with the quality specifications in Article II Sections ~~3~~5 and 6 shall be approved by Transporter prior to such facilities being placed in service, such approval not to be unreasonably withheld.

~~5~~8. Tests to determine ~~sulphur~~sulfur, hydrogen sulphide, oxygen, carbon dioxide and nitrogen content shall be made by approved standard methods in general use in the gas industry.

~~6~~9. If gas fails to meet the quality specifications set out in Sections ~~3~~ 5 and 6 of this Article II, then Transporter shall have the right to refuse to accept delivery of such gas and in the event Shipper does not correct the quality deficiency within a reasonable period of time, Transporter may terminate the applicable gas service contract as to the deficient gas.

Nothing in this Article II shall prevent Transporter from waiving any quality specifications where the acceptance of non-conforming gas will not, in the reasonable judgment of Transporter, adversely impact Transporter's operations or create an HDP Problem or Interchangeability Problem, and further provided that once such gas has been blended, to the extent that blending occurs, the comingled gas stream at any point on Transporter's system is compliant with the specifications set forth in Section 3 of this Article II.

GENERAL TERMS AND CONDITIONS (continued)

II. QUALITY (continued)

~~7~~10. Notwithstanding the exercise by Transporter of the options in Section ~~6~~ 9 above, Shipper shall use its best efforts to correct any quality deficiency in the gas tendered for transportation. Further, notwithstanding Transporter's election under Section ~~6~~ 9 above, Shipper shall reimburse Transporter for all expenses incurred in repairing injuries to Transporter's facilities resulting from deliveries of gas which do not conform to the quality specifications set forth in Sections ~~3~~5 and 6 of this Article II.

~~8~~11. Transporter shall have the right to collect from all Shippers delivering gas to Transporter at a common Receipt Point their pro rata share of the cost of any additional gas analysis and quality control equipment which Transporter, at its reasonable discretion, determines is required to be installed at such Receipt Point to monitor the quality of gas delivered. With respect to Shippers subject to Rate Schedules contained in Volume No. 1 of Transporter's FERC Gas Tariff, the collection shall be by means of an Incidental Charge.

~~9~~12. In the event that any separation and dehydration and/or processing required by Transporter is to occur after delivery of transportation gas to Transporter, then such transportation of liquefiable hydrocarbons shall be done pursuant to a PTR Transportation Agreement in the form included in Transporter's FERC Gas Tariff. Transportation and separation of liquid and gas dehydration may be done by separate agreement with Transporter. Any Shipper transporting PTR shall be required to enter into a PTR Transportation Agreement with Transporter or a Transportation Contract under Rate Schedule IT for the transportation of PTR make-up quantities.

III. MEASUREMENT AND MEASURING EQUIPMENT

1. Determination of volume: The volume of gas received and delivered by Transporter shall be determined as follows:

(a) Unit of Measurement: The service unit of gas scheduled, received, or delivered by Transporter shall be a dekatherm. Daily quantities shall be prorated uniformly over periods of hours for scheduling of service changes during the day.

(b) Dekatherms shall be determined by multiplying the Mcf volume by the ratio of the heating value per cubic foot to 1,000.

(c) The unit of volume, for the purpose of measurement, shall be defined as one cubic foot (1cf) of gas at a temperature of sixty degrees Fahrenheit (60^{o}F), and at a pressure of thirty-three hundredths pounds per square inch (.33 PSI) above an assumed atmospheric pressure of fourteen and four tenths pounds per square inch (14.4 PSI) resulting in a pressure of fourteen and seventy-three hundredths pounds per square inch (14.73 PSI) absolute pressure. One thousand (1,000) cubic feet shall be denoted as 1 Mcf.

(d) The closing of measurement shall be no later than the fifth (5th) business day after the close of the production month.

2. Determination of Total Heating Value: The total heating value of gas received and delivered by Transporter shall be determined as follows:

(a) The total heating value of the gas per cubic foot shall be determined by taking the average of the heating values as determined each day by a chromatograph or the chromatographic analysis of a sample of gas, or any other method mutually agreed upon. The average (flow weighted) heating value of the gas per cubic foot (Btu/cf) for a unit of time shall be determined by the total dekatherms divided by the total Mcf volume multiplied by 1000.

(b) The temperature of the gas passing through the meters shall be determined continuously by a recording thermometer so installed that it may properly record the temperature of the gas flowing through the meters. Arithmetic averages of the temperature recorded each day shall be used in computing the Mcf of gas.

Exhibit A-1

Interchangeability Supplement to Tariff Filing

INTERSTATE PIPELINES

Interchangeability

Supplement to Tariff Filing

Flow Study Results & Historical Data

March 21, 2011

Tennessee Gas Pipeline
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Defining Our Purpose

Tennessee Gas Pipeline
an El Paso company

El Paso Corporation provides natural gas and related energy products in a safe, efficient, and dependable manner

Tennessee Gas Pipeline
an El Paso company

TGP Interchangeability Flow Studies

March 11, 2011

Flow Studies

- Summer 2009 Average Day and Winter 2009 Peak Day were used for system demand
- Assumed LNG receipts at Trunkline Lake Charles, Golden Pass (Qatar), Chenier Sabine Pass (Oman) and Sempra Cameron (Oman)
- Gulf of Mexico supply is displaced by LNG
- Average and high BTU receipts from Appalachian Basin supply scenarios and high and zero volumes of Rocky Mountain gas
- Assumed decreased volumes of Canadian gas
- 500 line impact of LNG mitigated by processing at Yscloskey Plant

Flow Studies - Volumes

Source	Summer Average (mmscf/d)	Winter Peak (mmscf/d)
LNG from Gulf Terminals	850	850
Haynesville	310	310
Appalachian Supply Basin	90 -300 (processed and unprocessed)	90 - 300 (processed and unprocessed)
Rocky Mountain	0 - 500	0 - 500
Marcellus Shale	1,000	1,000
Canadian	0	0

New System Supplies - LNG

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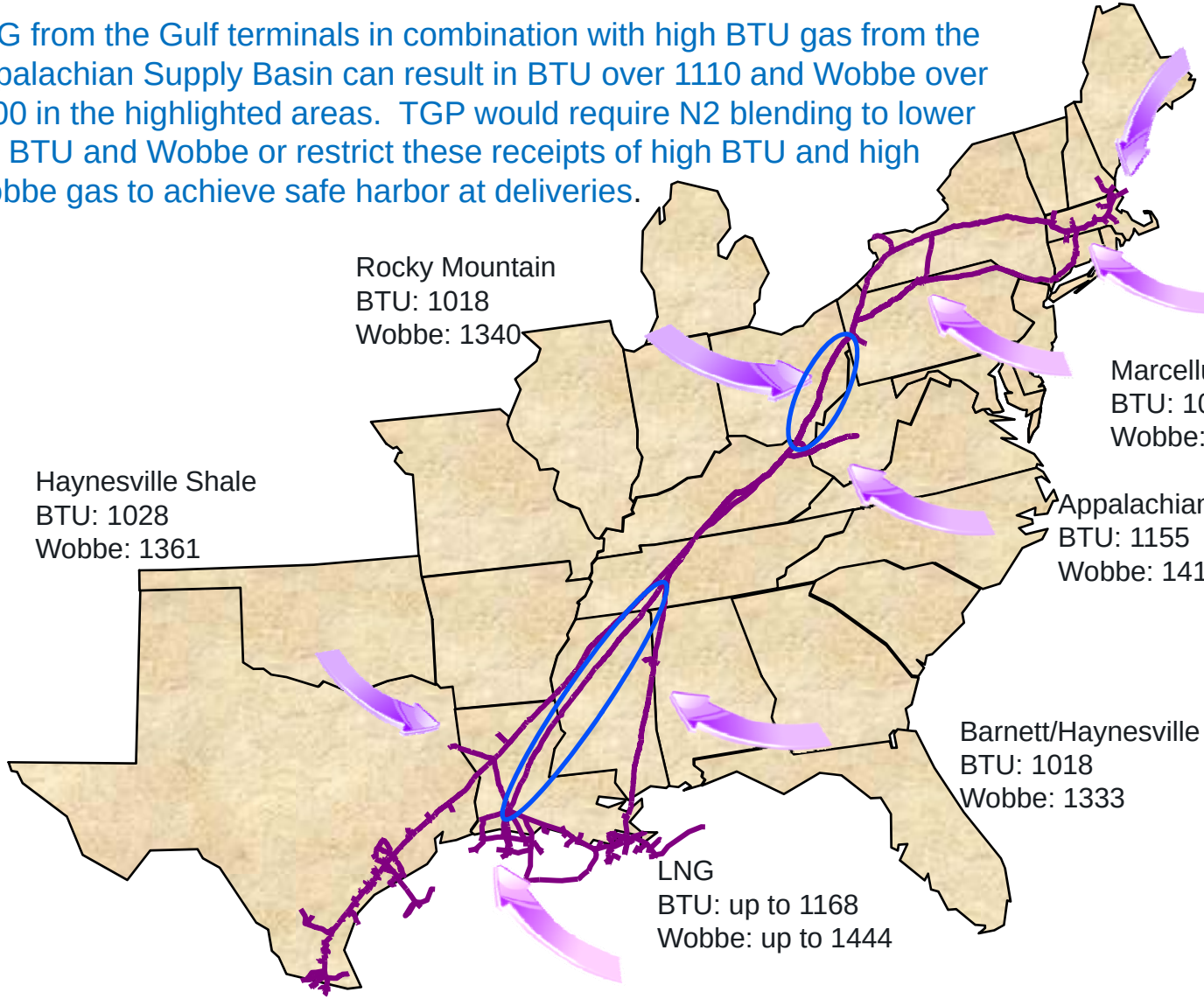
Origin	Trinidad	Algeria	Nigeria	Qatar	Abu Dhabi	Oman
Methane	96.13	89.57	90.48	89.18	85.82	86.52
Ethane	3.40	8.61	5.05	7.07	12.57	8.31
Propane	0.39	1.18	2.95	2.50	1.33	3.32
I-Butane	0.04	0.13	0.58	0.46	0.06	0.85
N-Butane	0.03	0.18	0.87	0.69	0.08	0.85
I-Pentane	0.00	0.01	0.02	0.01	0.00	0.06
N-Pentane	0.00	0.00	0.00	0.00	0.00	0.00
Nitrogen	0.01	0.32	0.05	0.09	0.13	0.09
Btu/scf	1047.82	1120.47	1131.05	1132.19	1132.96	1168.24
Gravity	.5765	.6146	.6303	.6313	.6319	.6544
Wobbe	1380.03	1406.27	1424.65	1424.95	1425.25	1444.14

Flow Study Results

LNG from the Gulf terminals in combination with high BTU gas from the Appalachian Supply Basin can result in BTU over 1110 and Wobbe over 1400 in the highlighted areas. TGP would require N2 blending to lower the BTU and Wobbe or restrict these receipts of high BTU and high Wobbe gas to achieve safe harbor at deliveries.



Sable Island and LNG
BTU: 1048
Wobbe: 1353

LNG
BTU: 1044
Wobbe: 1378

Rocky Mountain
BTU: 1018
Wobbe: 1340

Marcellus Shale
BTU: 1032
Wobbe: 1366

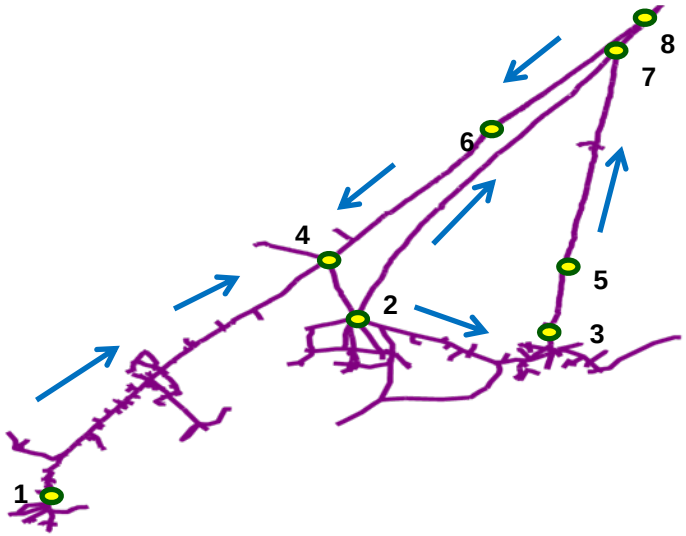
Haynesville Shale
BTU: 1028
Wobbe: 1361

Appalachian Supply Basin
BTU: 1155
Wobbe: 1415

Barnett/Haynesville Shale
BTU: 1018
Wobbe: 1333

LNG
BTU: up to 1168
Wobbe: up to 1444

Summer Average Day Production Area LNG



1- Rio Bravo, TX	RIO1
2- Kinder , LA	CTO2
3-Yscloskey, LA	YSA2
4- Natchitoches, LA	NAT 1
5- Heidelburg, MS	HEI 2
6- Batesville, MS	BAT 1
7- Centerville, TN	CEN 1
8-TVA, TN	TVA 1

- All 800 line gas sourced from LNG at Golden Pass (Qatar), Chenier (Oman) and Sempra (Oman)
- Actual LNG gas properties at Lacassine
- 500 mmcf/d Rocky Mountain Gas
- Null point on 100 line near Sta. 47

	BTU	Wobbe	C2+	C4+	N2	CO2
CTO2	1116.1	1410	9.64	1.18	0.16	0.25
NAT1	1025.2	1346	2.54	0.25	0.47	0.80
BAT1	1077.3	1387	6.38	0.76	0.25	0.31
CEN1	1069.7	1383	5.71	0.67	0.26	0.30
TVA	1077.3	1387	6.38	0.76	0.26	0.31

Potential Impact: LNG volumes restricted and/or N2 blending required to meet delivery spec on the 800 line

Summer Average Day New Sources

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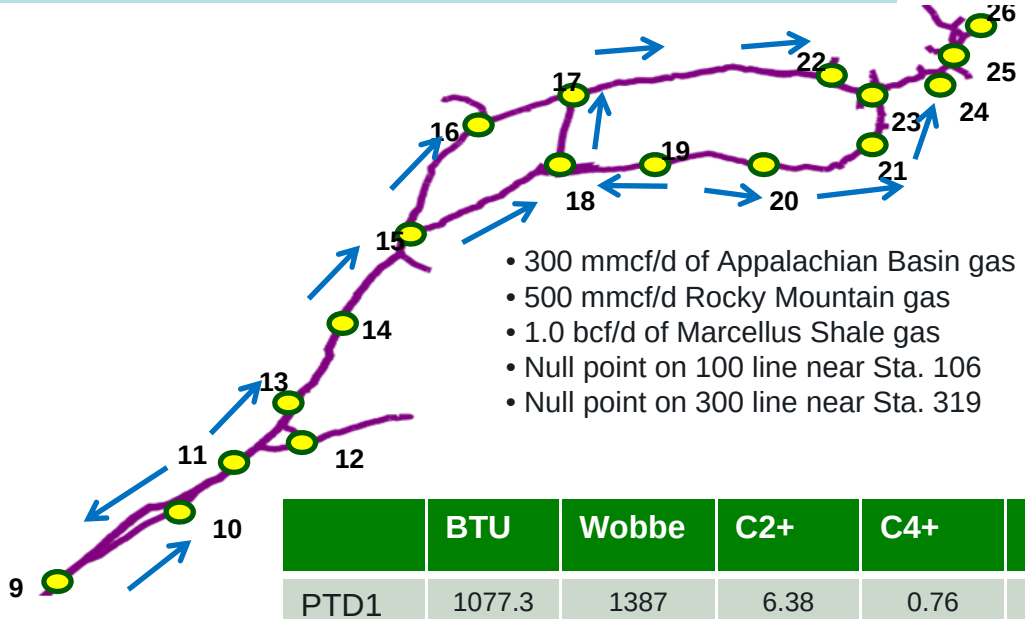
9- Portland, TN	PTD 1
10- Dry Creek, KY	TET 1
11- North Means, KY	NMN 1
12- Catlettburg, KY	CAT 1
13- Hanging Rock, OH	DHR 1
14- Gilmore, OH	GIL 1
15- Mercer, PA	MER 1
16-East Aurora, NY	EAS 2
17- Clifton Springs, NY	CLI 1
18- Coudersport, PA	COU 1
19- Union Dale, PA	UND 1
20- Mahwah, NJ	MAH 1
21- Bloomfield, CT	BLO 1
22- Niagara Mohawk, NY	NIM 2
23- Agawam, MA	AGM 1
24- Mendon, MA	MEN 1
25- Hopkinton, MA	HOP 2
26- Maldon, MA	MAL 1

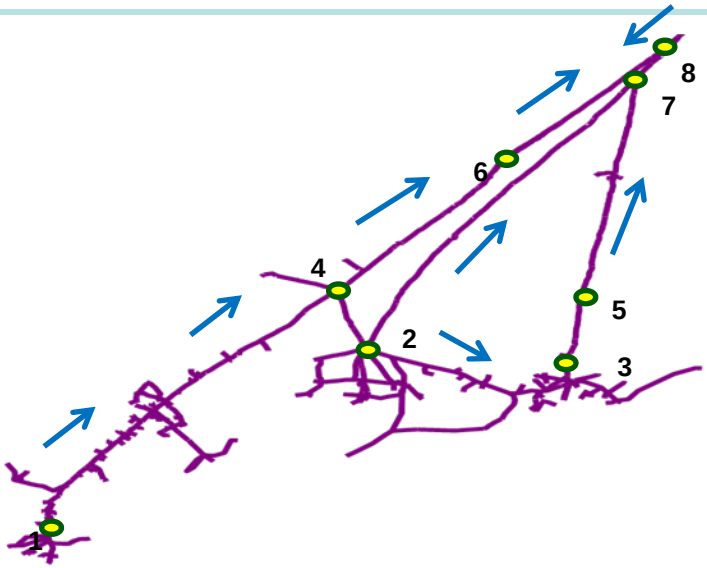


- 300 mmcf/d of Appalachian Basin gas
- 500 mmcf/d Rocky Mountain gas
- 1.0 bcf/d of Marcellus Shale gas
- Null point on 100 line near Sta. 106
- Null point on 300 line near Sta. 319

Potential Impact: High BTU supplies restricted to meet delivery spec at DHR

	BTU	Wobbe	C2+	C4+	N2	CO2
PTD1	1077.3	1387	6.38	0.76	0.25	0.31
DHR1	1124.4	1399	15.38	0.34	1.70	0.14
MER1	1052.3	1364	5.18	0.47	0.54	0.60
MAH1	1027.0	1365	2.24	0.00	0.24	0.03
NIM2	1036.5	1358	3.53	0.28	0.58	0.41
AGA1	1037.1	1359	3.58	0.30	0.57	0.41
HOP1	1037.1	1359	3.58	0.30	0.57	0.41
MAL1	1042.2	1375	3.46	0.13	0.14	0.01

Winter Peak Day Production Area LNG



- All 800 line gas sourced from LNG at Golden Pass (Qatar), Chenier (Oman) and Sempra (Oman)
- Actual LNG gas properties at Lacassine
- 500 mmcf/d Rocky Mountain gas
- Null point on the 100 line near Sta. 79

1- Rio Bravo, TX	RIO1
2- Kinder , LA	CTO2
3-Yscloskey, LA	YSA2
4- Natchitoches, LA	NAT 1
5- Heidelburg, MS	HEI 2
6- Batesville, MS	BAT 1
7- Centerville, TN	CEN 1
8-TVA, TN	TVA 1

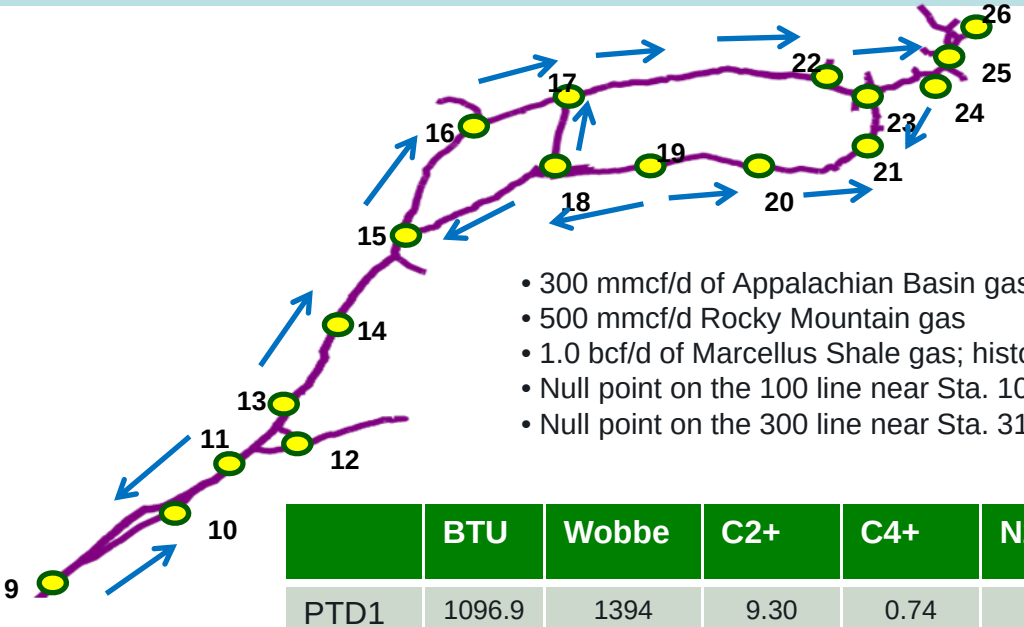
	BTU	Wobbe	C2+	C4+	N2	CO2
CTO2	1120.9	1413	10.01	1.21	0.16	0.23
NAT1	1038.1	1354	3.92	0.28	0.45	0.79
BAT1	1048.5	1361	4.50	0.49	0.36	0.77
CEN1	1059.9	1375	4.65	0.66	0.30	0.39
TVA	1096.9	1394	9.30	0.74	0.64	0.27

Potential Impact: LNG volumes restricted and/or N2 blending required to meet delivery spec on the 800 line

Winter Peak Day New Sources

Tennessee Gas Pipeline
an El Paso company

9- Portland, TN	PTD 1
10- Dry Creek,KY	TET 1
11- North Means, KY	NMN 1
12- Catlettburg, KY	CAT 1
13- Hanging Rock, OH	DHR 1
14- Gilmore, OH	GIL 1
15- Mercer, PA	MER 1
16-East Aurora, NY	EAS 2
17- Clifton Springs, NY	CLI 1
18- Coudersport, PA	COU 1
19- Union Dale, PA	UND 1
20- Mahwah, NJ	MAH 1
21- Bloomfield, CT	BLO 1
22- Niagara Mohawk	NIM 2
23- Agawam, MA	AGM 1
24- Mendon, MA	MEN 1
25- Hopkinton, MA	HOP 2
26- Maldon, MA	MAL 1

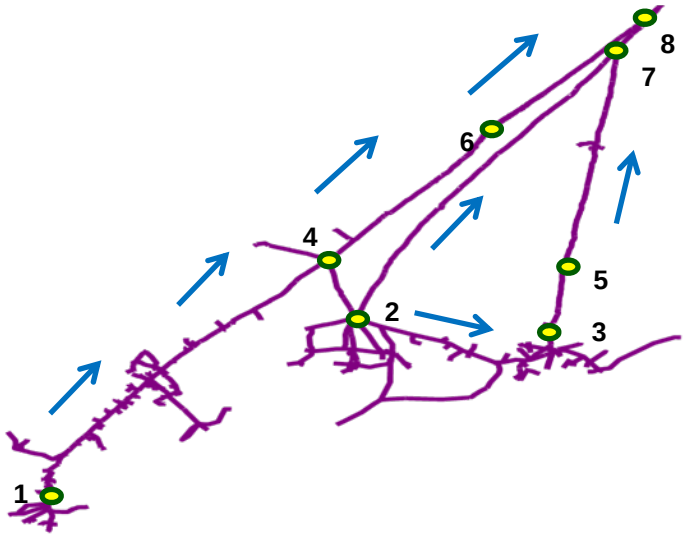


- 300 mmcf/d of Appalachian Basin gas
- 500 mmcf/d Rocky Mountain gas
- 1.0 bcf/d of Marcellus Shale gas; historic gas quality
- Null point on the 100 line near Sta. 106
- Null point on the 300 line near Sta. 319

	BTU	Wobbe	C2+	C4+	N2	CO2
PTD1	1096.9	1394	9.30	0.74	0.64	0.27
DHR1	1061.4	1368	6.69	0.42	0.76	0.55
MER1	1032.9	1360	2.93	0.19	0.30	0.40
MAH1	1029.0	1358	2.61	0.12	0.31	0.36
NIM2	1021.6	1339	2.65	0.20	0.88	0.78
AGA1	1021.3	1339	2.63	0.20	0.89	0.78
HOP2	1021.3	1339	2.63	0.20	0.89	0.78
MAL1	1039.4	1375	3.16	0.05	0.01	0.00

TGP able to meet delivery specs

Summer Average Day
Production Area LNG & High BTU ABS



1- Rio Bravo, TX	RIO1
2- Kinder , LA	CTO2
3-Yscloskey, LA	YSA2
4- Natchitoches, LA	NAT 1
5- Heidelburg, MS	HEI 2
6- Batesville, MS	BAT 1
7- Centerville, TN	CEN 1
8-TVA, TN	TVA 1

- All 800 line gas sourced from LNG at Golden Pass (Qatar), Chenier (Oman) and Sempra (Oman)
- Actual LNG gas properties at Lacassine
- 0 mmcf/d Rocky Mountain gas
- High BTU ABS

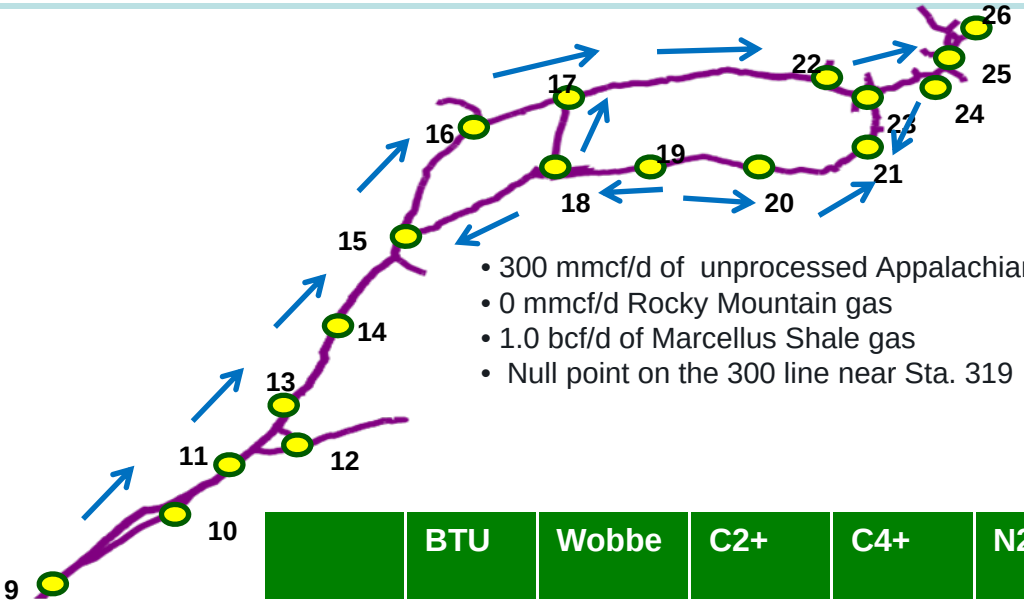
	BTU	Wobbe	C2+	C4+	N2	CO2
CTO2	1116.1	1410	9.64	1.18	0.16	0.25
NAT1	1024.3	1347	2.52	0.23	0.56	0.73
BAT1	1039.0	1353	3.64	0.42	0.38	0.91
CEN1	1063.4	1379	5.18	0.61	0.27	0.31
TVA	1039.0	1353	3.46	0.24	0.38	0.91

Potential Impact: LNG volumes restricted and/or N2 blending required to meet delivery spec on the 800 line

Summer Average Day Production Area LNG & High BTU ABS

Tennessee Gas Pipeline
an El Paso company

9- Portland, TN	PTD 1
10- Dry Creek, KY	TET 1
11- North Means, KY	NMN 1
12- Catlettburg, KY	CAT 1
13- Hanging Rock, OH	DHR 1
14- Gilmore, OH	GIL 1
15- Mercer, PA	MER 1
16-East Aurora, NY	EAS 2
17- Clifton Springs, NY	CLI 1
18- Coudersport, PA	COU 1
19- Union Dale, PA	UND 1
20- Mahwah, NJ	MAH 1
21- Bloomfield, CT	BLO 1
22- Niagara Mohawk, NY	NIM 2
23- Agawam, MA	AGM 1
24- Mendon, MA	MEN 1
25- Hopkinton, MA	HOP 2
26- Maldon, MA	MAL 1



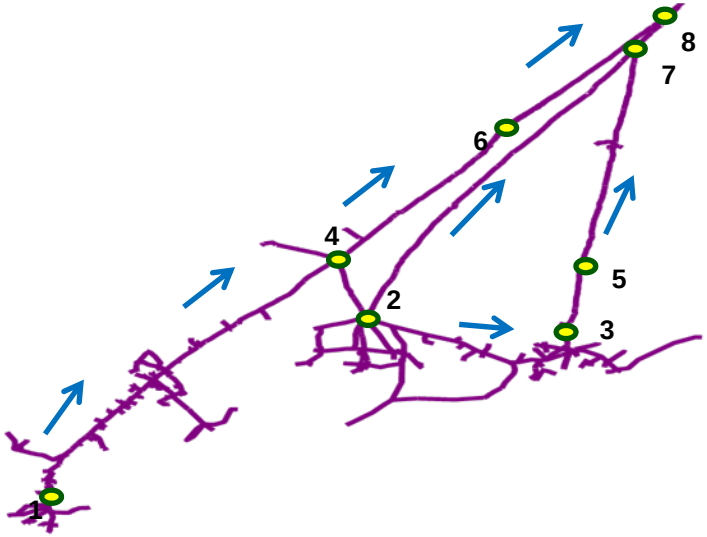
- 300 mmcf/d of unprocessed Appalachian Basin Supply
- 0 mmcf/d Rocky Mountain gas
- 1.0 bcf/d of Marcellus Shale gas
- Null point on the 300 line near Sta. 319

	BTU	Wobbe	C2+	C4+	N2	CO2
PTD1	1051.6	1365	4.51	0.53	0.33	0.69
DHR1	1135.9	1413	12.22	1.18	0.75	0.31
MER1	1135.9	1413	12.22	1.18	0.75	0.31
MAH1	1027.0	1365	2.24	0.00	0.24	0.03
NIM2	1065.7	1376	5.97	0.52	0.65	0.31
AGA1	1066.8	1377	6.06	0.54	0.64	0.31
HOP2	1066.8	1377	6.06	0.54	0.64	0.31
MAL1	1042.2	1375	3.46	0.13	0.14	0.01

Potential Impact: High BTU gas restricted and/or N2 blending required to meet delivery spec between DHR and MER

Winter Peak Day
Production Area LNG & High BTU ABS

Tennessee Gas Pipeline
an El Paso company



- All 800 line gas sourced from LNG at Golden Pass (Qatar), Chenier (Oman) and Sempra (Oman).
- Actual LNG gas properties at Lacassine
- 0 mmcf/d Rocky Mountain gas
- High BTU ABS

1- Rio Bravo, TX	RIO1
2- Kinder , LA	CTO2
3-Yscloskey, LA	YSA2
4- Natchitoches, LA	NAT 1
5- Heidelburg, MS	HEI 2
6- Batesville, MS	BAT 1
7- Centerville, TN	CEN 1
8-TVA, TN	TVA 1

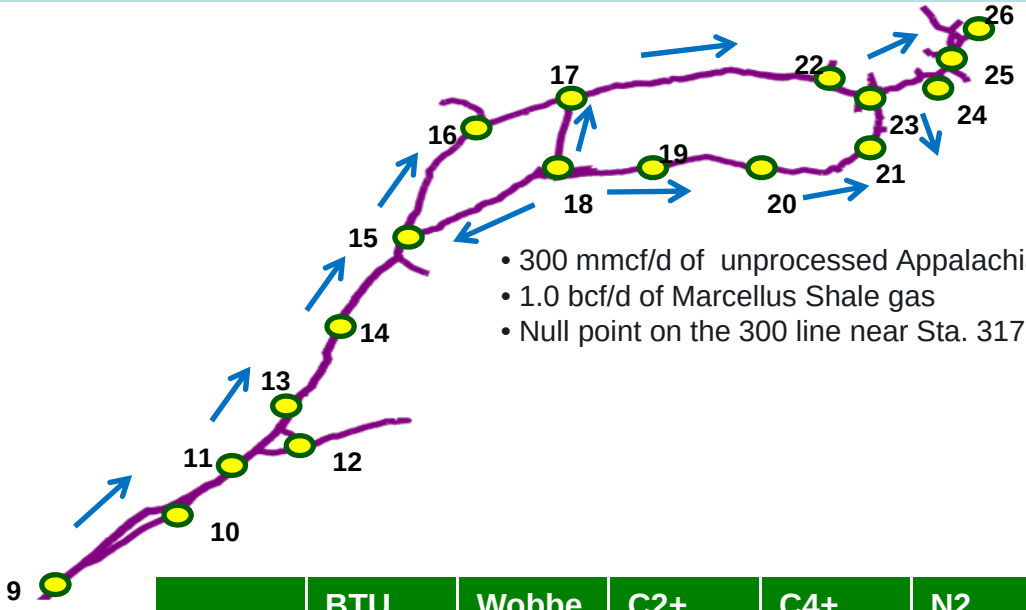
	BTU	Wobbe	C2+	C4+	N2	CO2
CTO2	1120.9	1413	10.01	1.21	0.16	0.23
NAT1	1031.5	1347	3.39	0.26	0.37	0.99
BAT1	1041.7	1355	4.02	0.40	0.34	0.90
CEN1	1059.9	1375	4.65	0.66	0.30	0.39
TVA	1041.7	1355	4.02	0.40	0.34	0.90

Potential Impact: LNG volumes restricted and/or N2 blending required to meet delivery spec on the 800 line

Winter Peak Day
New Sources & High BTU ABS

Tennessee Gas Pipeline
an El Paso company

9- Portland, TN	PTD 1
10- Dry Creek, KY	TET 1
11- North Means, KY	NMN 1
12- Catlettburg, KY	CAT 1
13- Hanging Rock, OH	DHR 1
14- Gilmore, OH	GIL 1
15- Mercer, PA	MER 1
16-East Aurora, NY	EAS 2
17- Clifton Springs, NY	CLI 1
18- Coudersport, PA	COU 1
19- Union Dale, PA	UND 1
20- Mahwah, NJ	MAH 1
21- Bloomfield, CT	BLO 1
22- Niagara Mohawk, NY	NIM 2
23- Agawam, MA	AGM 1
24- Mendon, MA	MEN 1
25- Hopkinton, MA	HOP 2
26- Maldon, MA	MAL 1



- 300 mmcf/d of unprocessed Appalachian Basin gas
- 1.0 bcf/d of Marcellus Shale gas
- Null point on the 300 line near Sta. 317

	BTU	Wobbe	C2+	C4+	N2	CO2
PTD1	1057.7	1368	5.07	0.58	0.30	0.69
DHR1	1167.7	1429	15.19	1.44	0.93	0.29
MER1	1066.7	1379	6.07	0.43	0.46	0.30
MAH1	1029.0	1358	2.61	0.12	0.31	0.36
NIM2	1023.9	1341	2.86	0.22	0.89	0.77
AGA1	1023.5	1340	2.85	0.22	0.90	0.77
HOP2	1023.5	1340	2.84	0.21	0.90	0.77
MAL1	1039.4	1375	3.16	0.05	0.01	0.00

Potential Impact: High BTU gas restricted and/or N2 blending required

TGP Interchangeability Historical data 2006-2010

March 11, 2011

Interchangeability Points of Interest

Compositional data available: Methane, Ethane, Propane, Butanes, Pentanes Hexanes+, CO2, N2

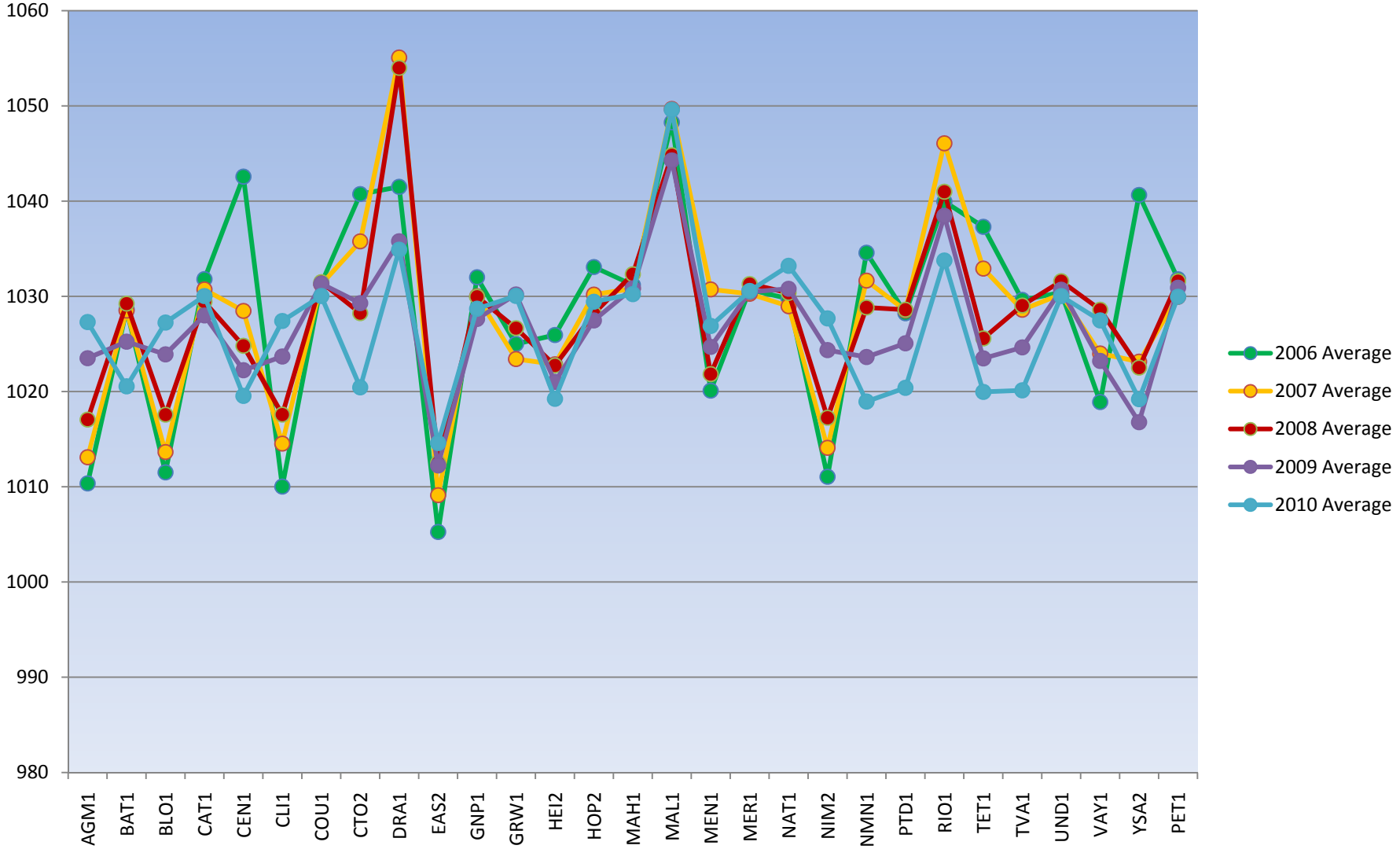
Calculated values: Wobbe, C2+, C4+, N2+CO2, HDP

Additional (where available): Total Diluents, Total Sulfur H2S, O2, H2O

1- Rio Bravo, TX	RIO1
2- Aqua Dulce, TX	VAY1
3 - Kinder , LA	CTO2
4-Yscloskey, LA	YSA2
5- Natchitoches, LA	NAT 1
6- Heidelburg, MS	HEI 2
7- Batesville, MS	BAT 1
8- Centerville, TN	CEN 1
9-TVA, TN	TVA 1
10- Portland, TN	PTD 1
11- Dry Creek,KY	TET 1
12- North Means, KY	NMN 1
13- Catlettburg, KY	CAT 1
14- Greenup, KY	GNP1
15- Petersburg, OH	PET 1
16- Mercer, PA	MER 1
17- Coudersport, PA	COU 1
18- Union Dale, PA	UND 1
19- Mahwah, NJ	MAH 1
20– Greenwich, CT	GRW1
21- Bloomfield, CT	BLO 1
22-East Aurora, NY	EAS 2
23- Clifton Springs, NY	CLI 1
24- Niagara Mohawk, NY	NIM 2
25- Agawam, MA	AGM 1
26- Mendon, MA	MEN 1
27- Hopkinton, MA	HOP 2
28- Dracut, MA	DRA1
29- Maldon, MA	MAL 1

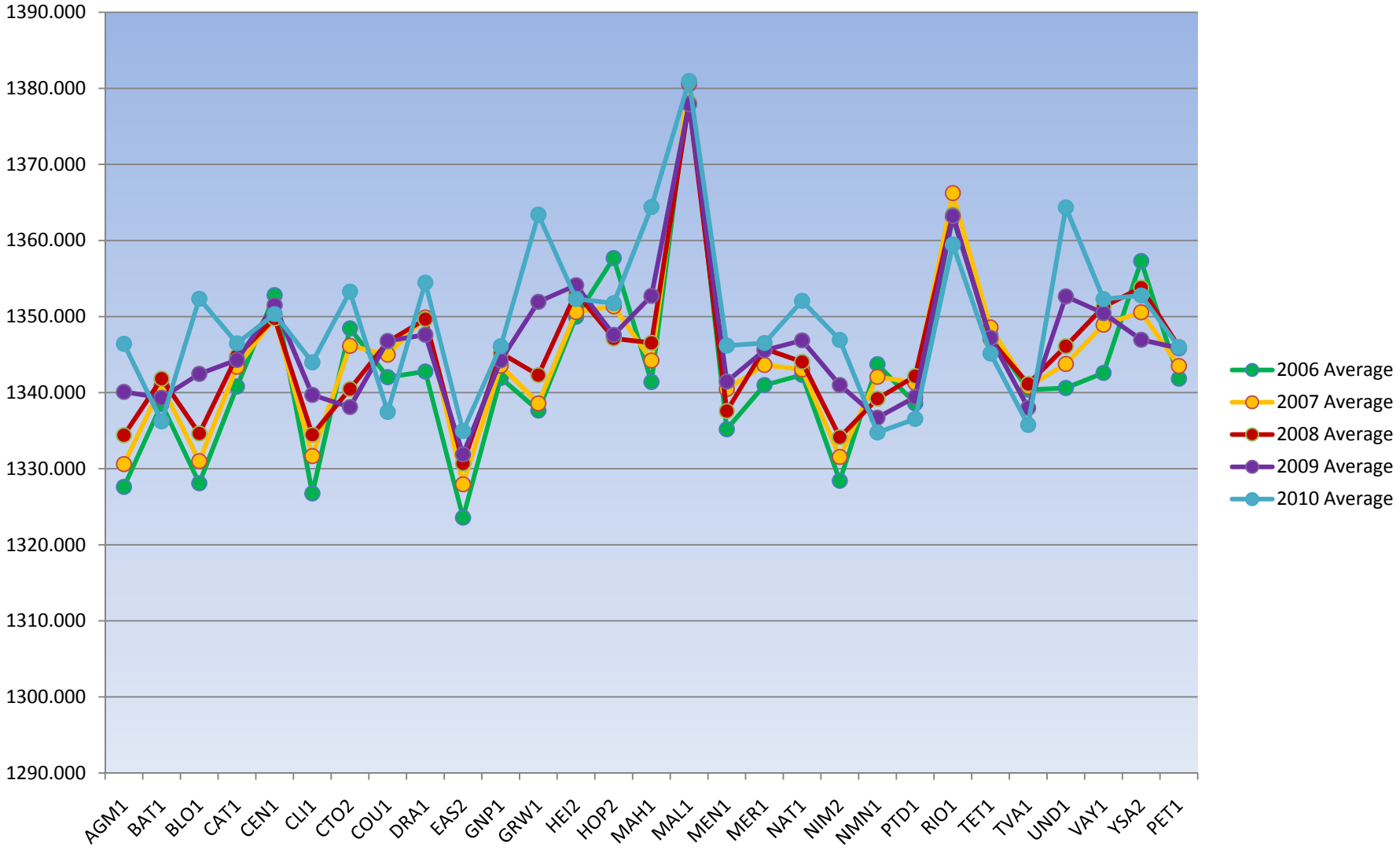
Historical Data
Heating Value (BTU/SCF)

Tennessee Gas Pipeline
an El Paso company

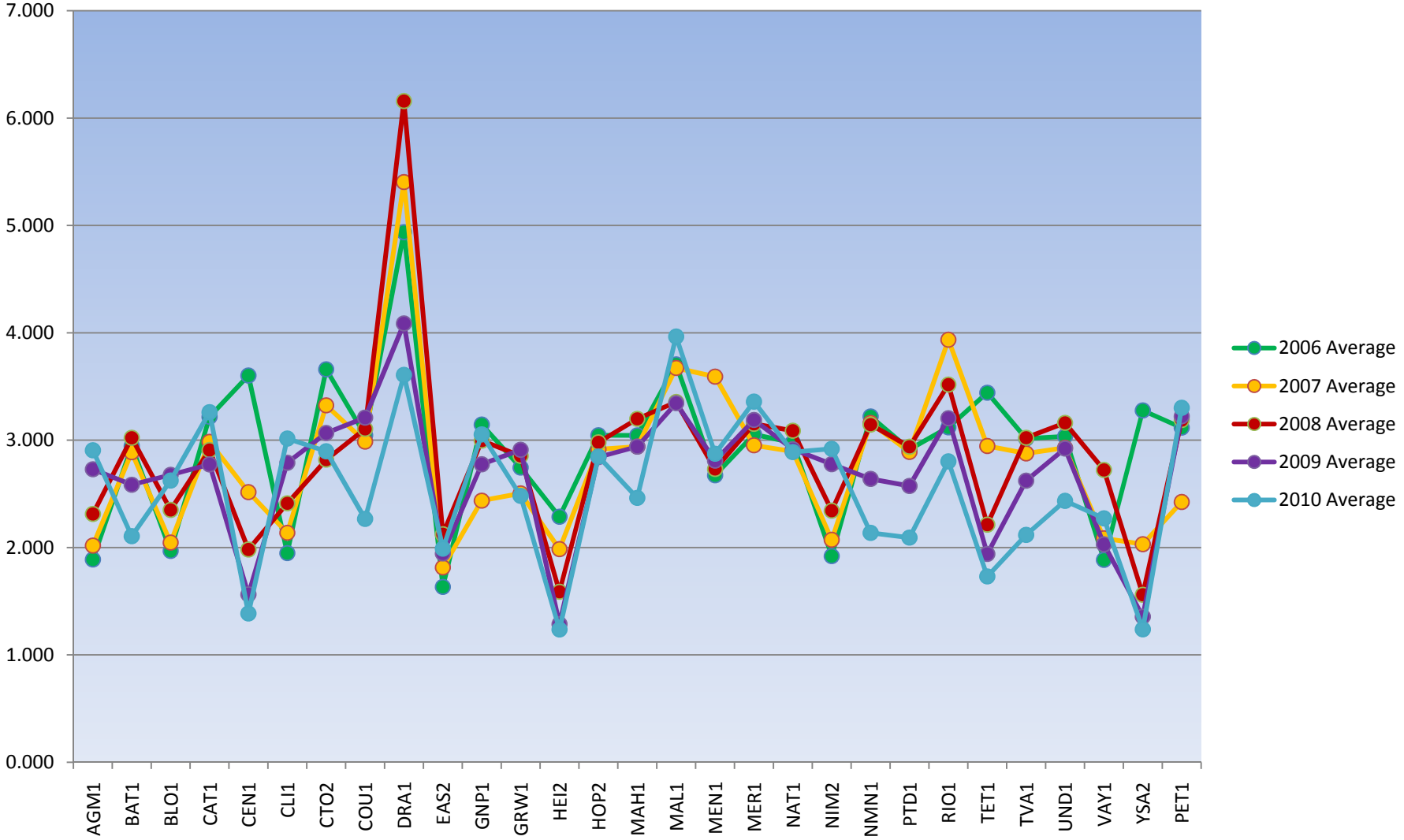


Historical Data
Wobbe Number(HHV/SG $^{0.5}$)

Tennessee Gas Pipeline
an El Paso company

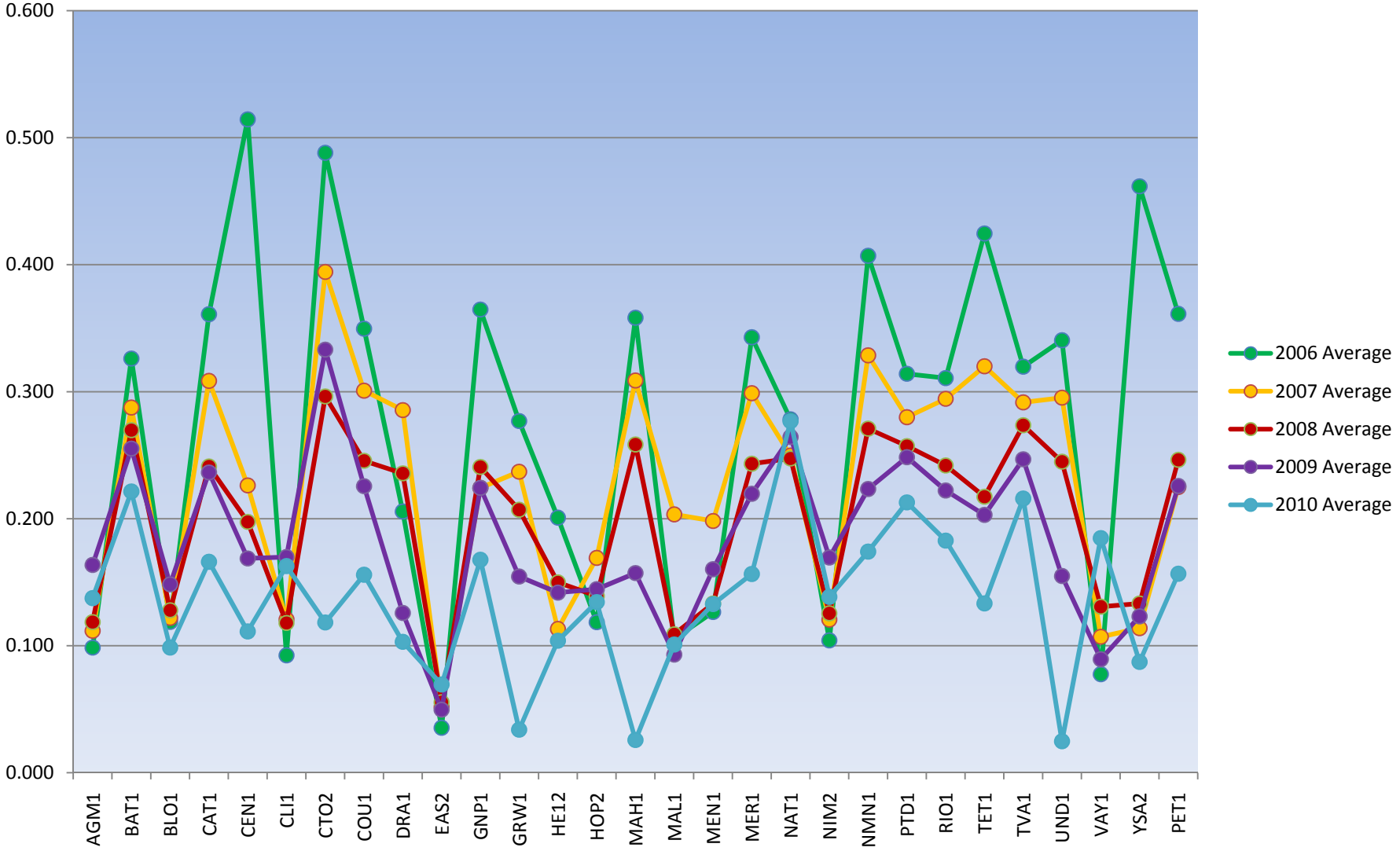


Historical Data– C2 + (Mole %)



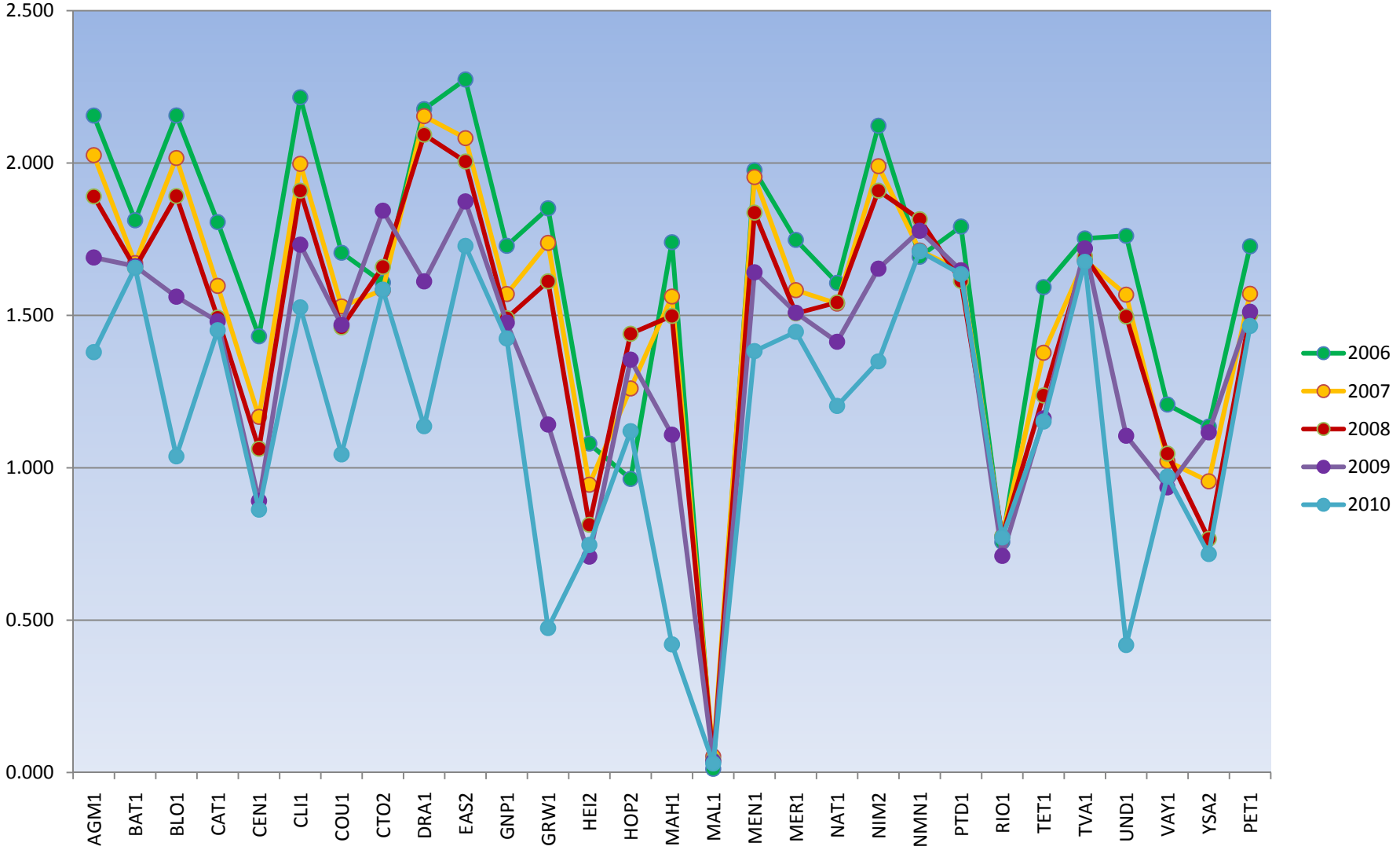
Historical Data
C4 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



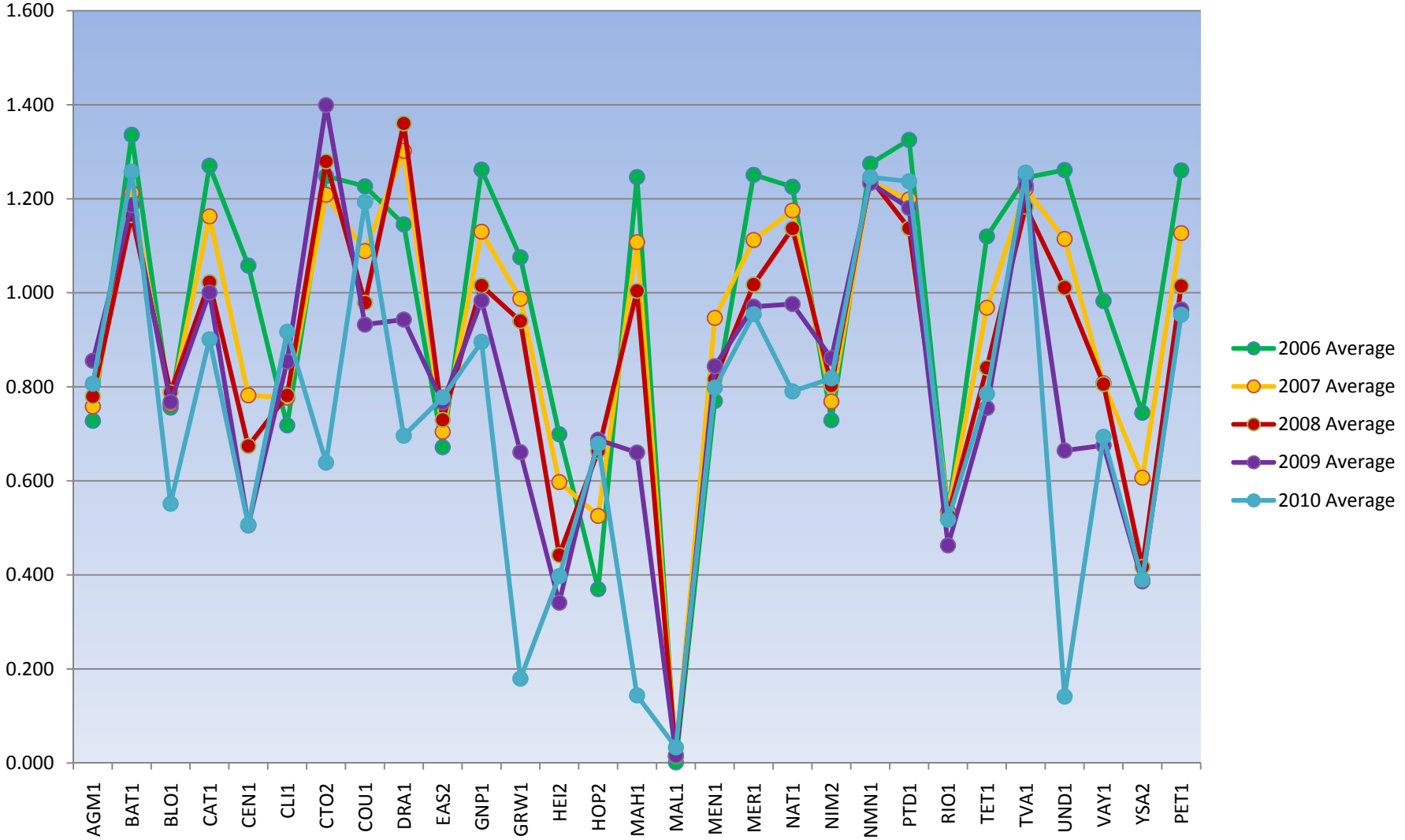
Historical Data
Total Diluents – $CO_2 + N_2$ (Mole %)

Tennessee Gas Pipeline
an El Paso company



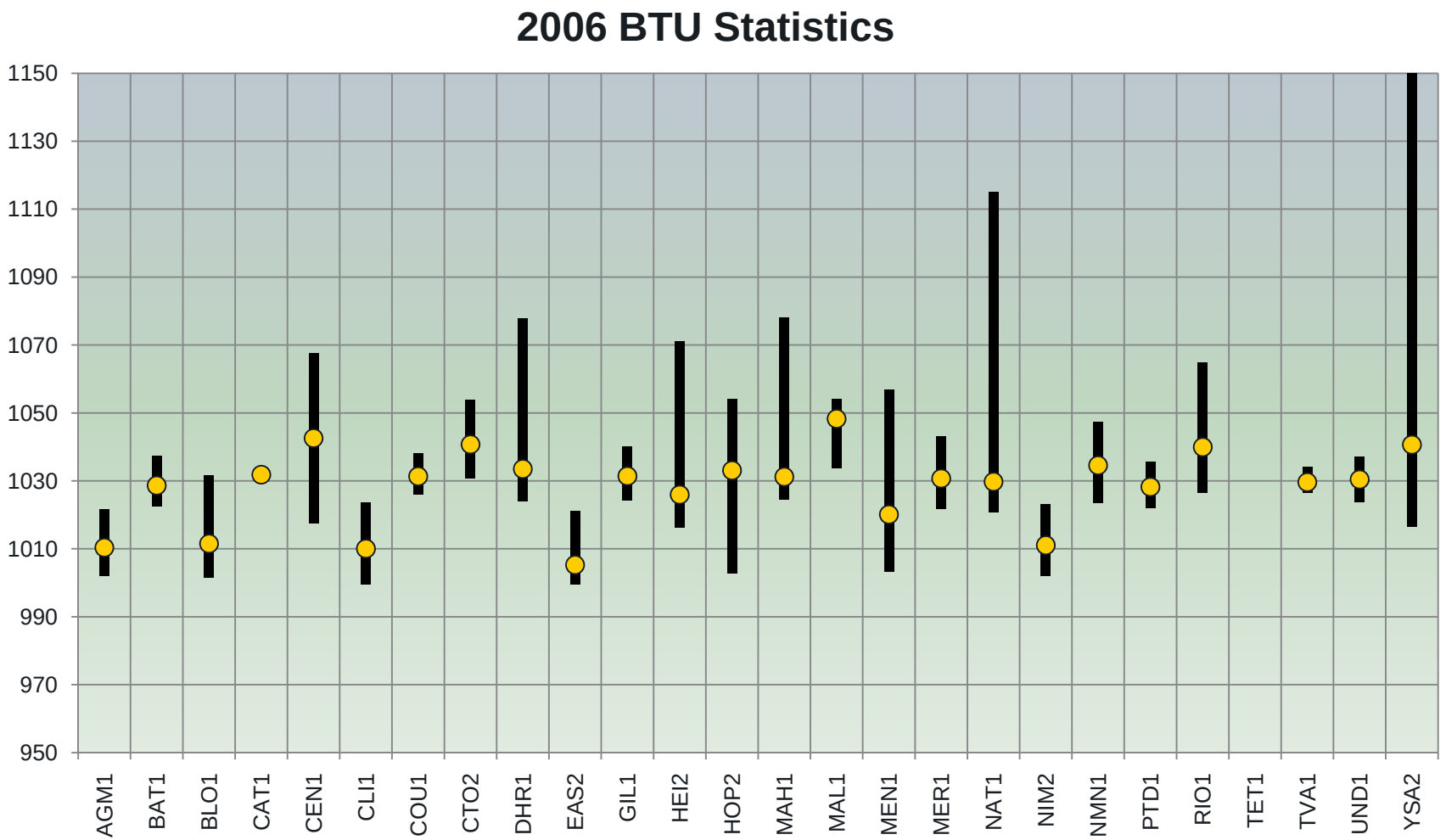
Historical Data
CO_2 (Mole %)

Tennessee Gas Pipeline
an El Paso company



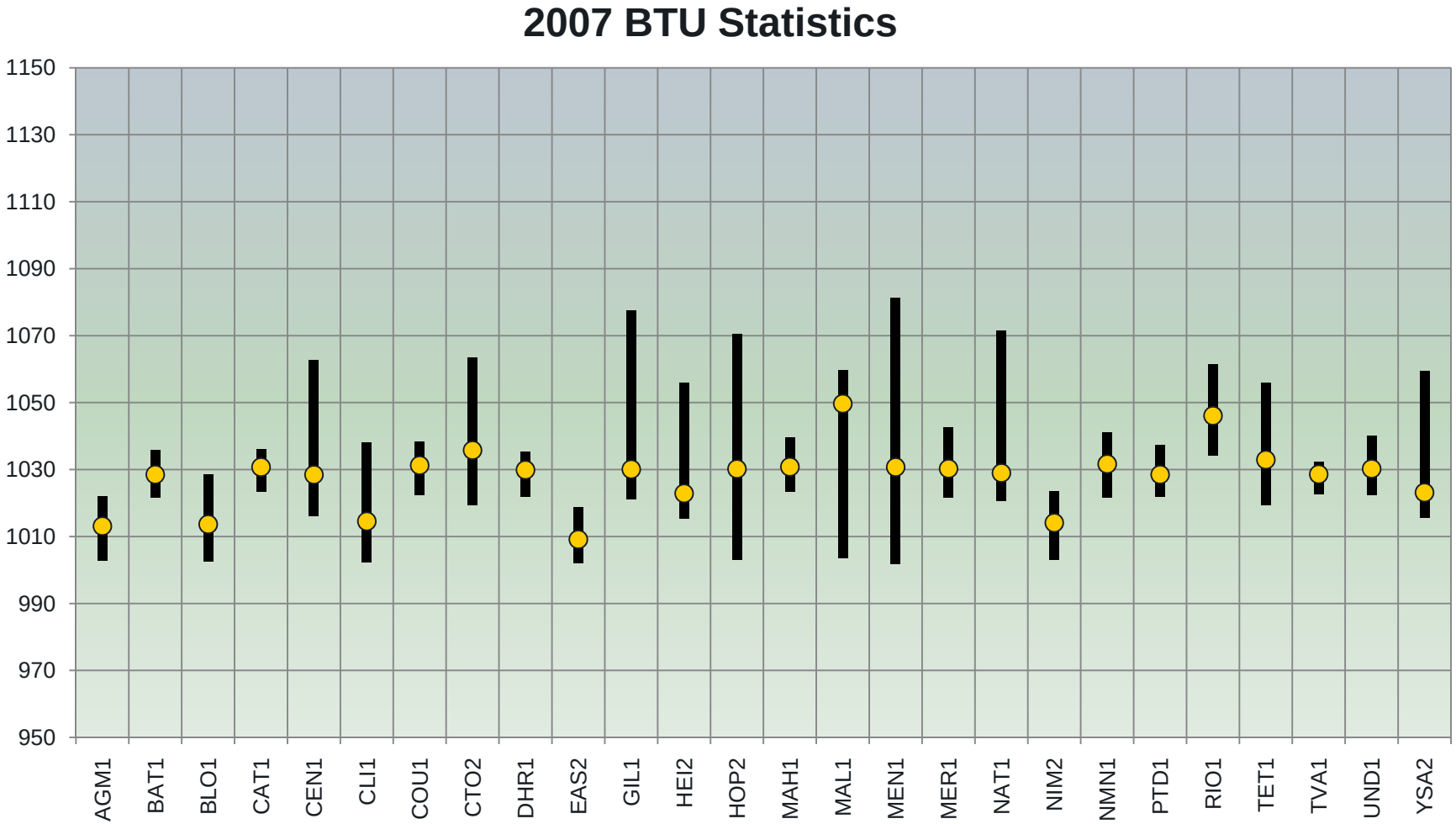
Historical Data
Heating Value (BTU/SCF)

Tennessee Gas Pipeline
an El Paso company



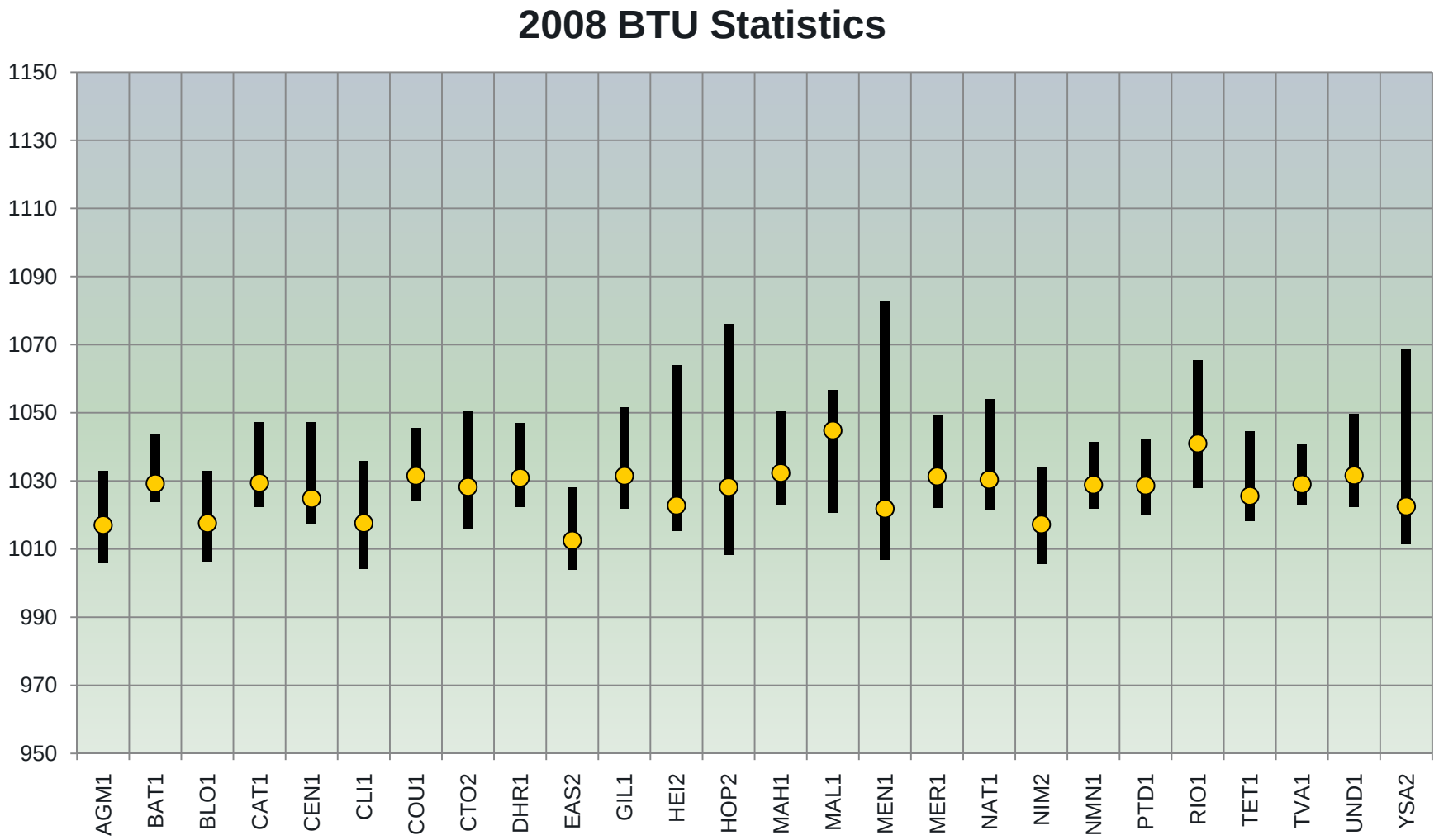
Historical Data
Heating Value (BTU/SCF)

Tennessee Gas Pipeline
an El Paso company



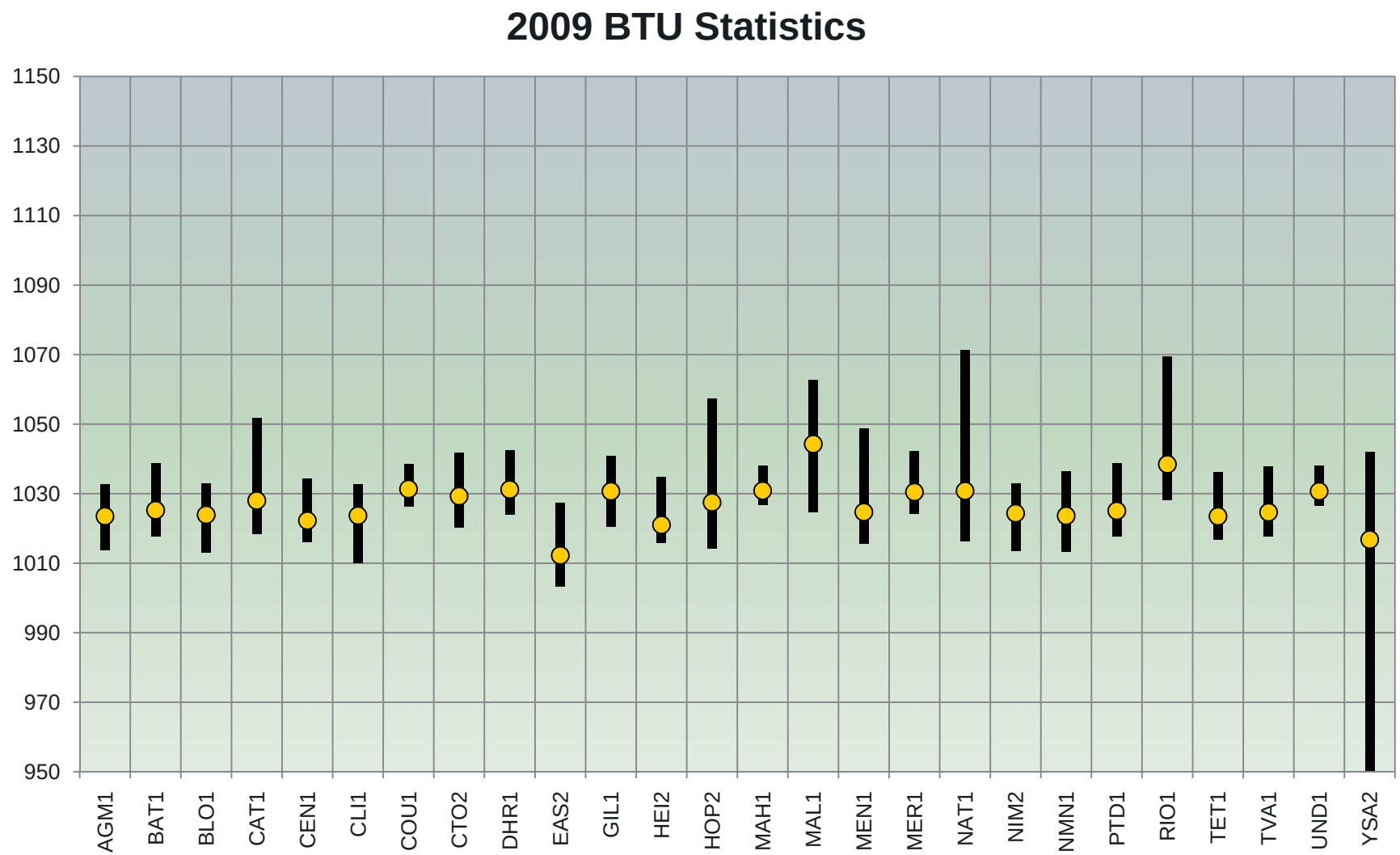
Historical Data
Heating Value (BTU/SCF)

Tennessee Gas Pipeline
an El Paso company



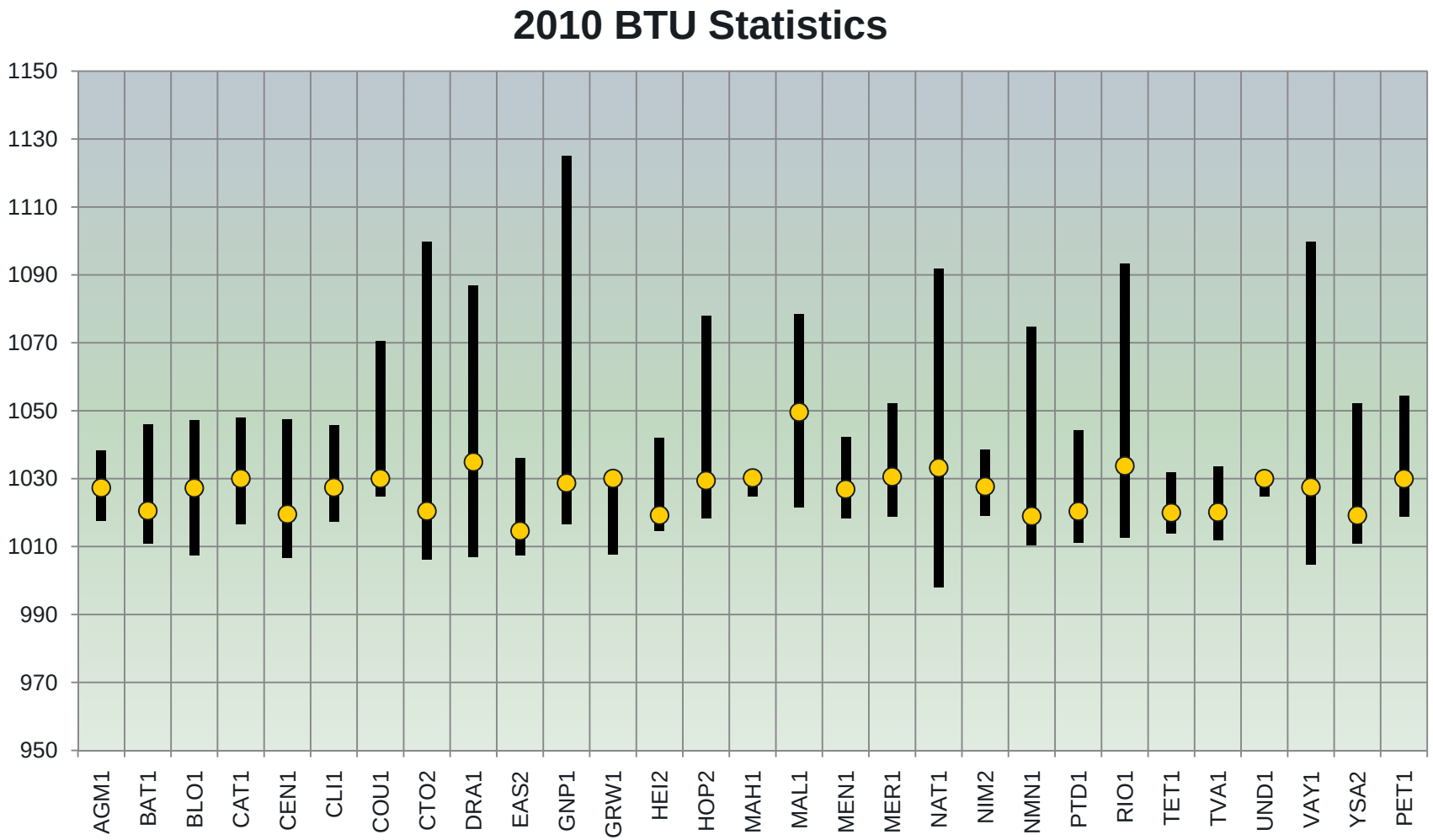
Historical Data
Heating Value (BTU/SCF)

Tennessee Gas Pipeline
an El Paso company



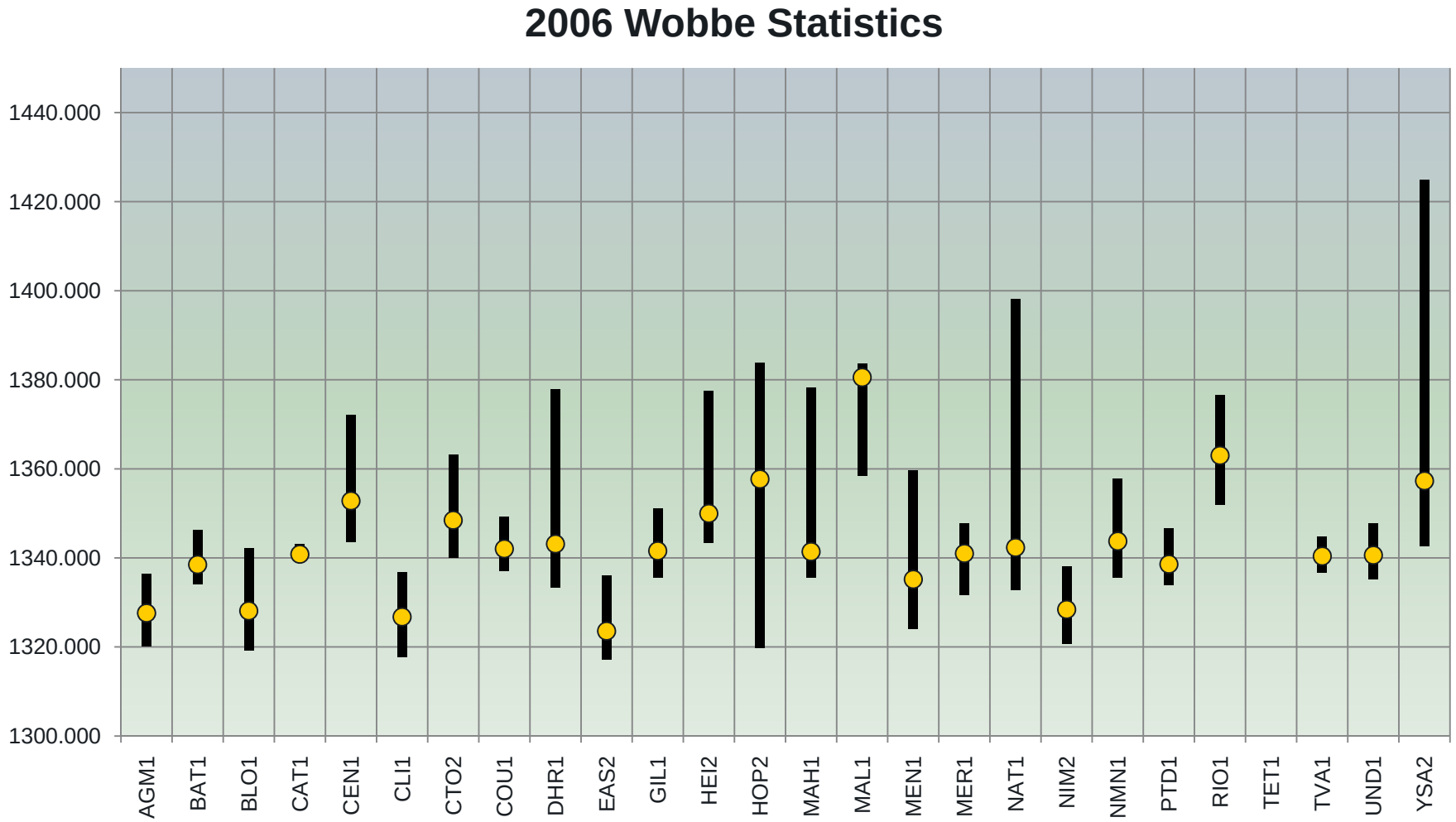
Historical Data
Heating Value (BTU/SCF)

Tennessee Gas Pipeline
an El Paso company



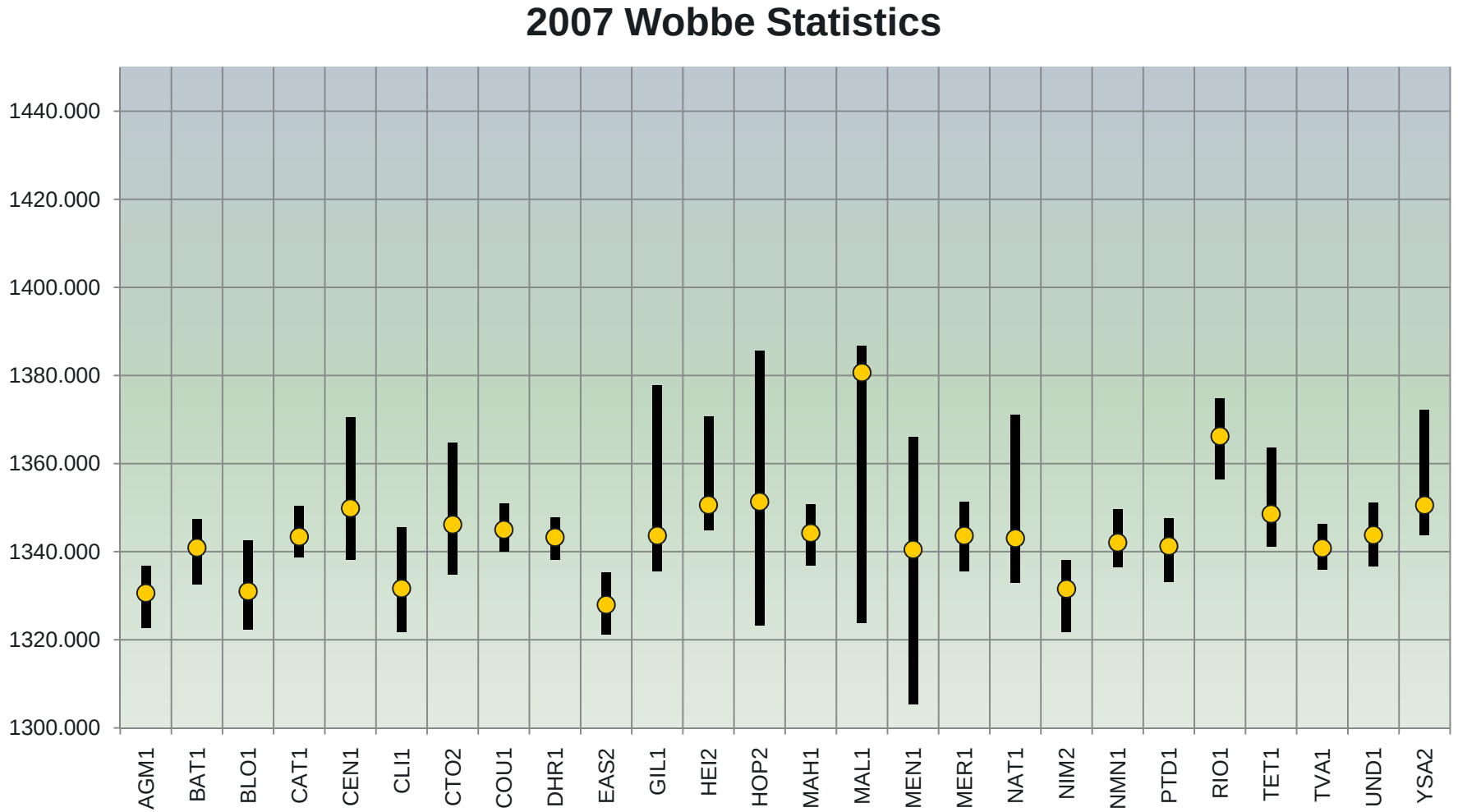
Historical Data
Wobbe Number(HHV/SG $^{0.5}$)

Tennessee Gas Pipeline
an El Paso company



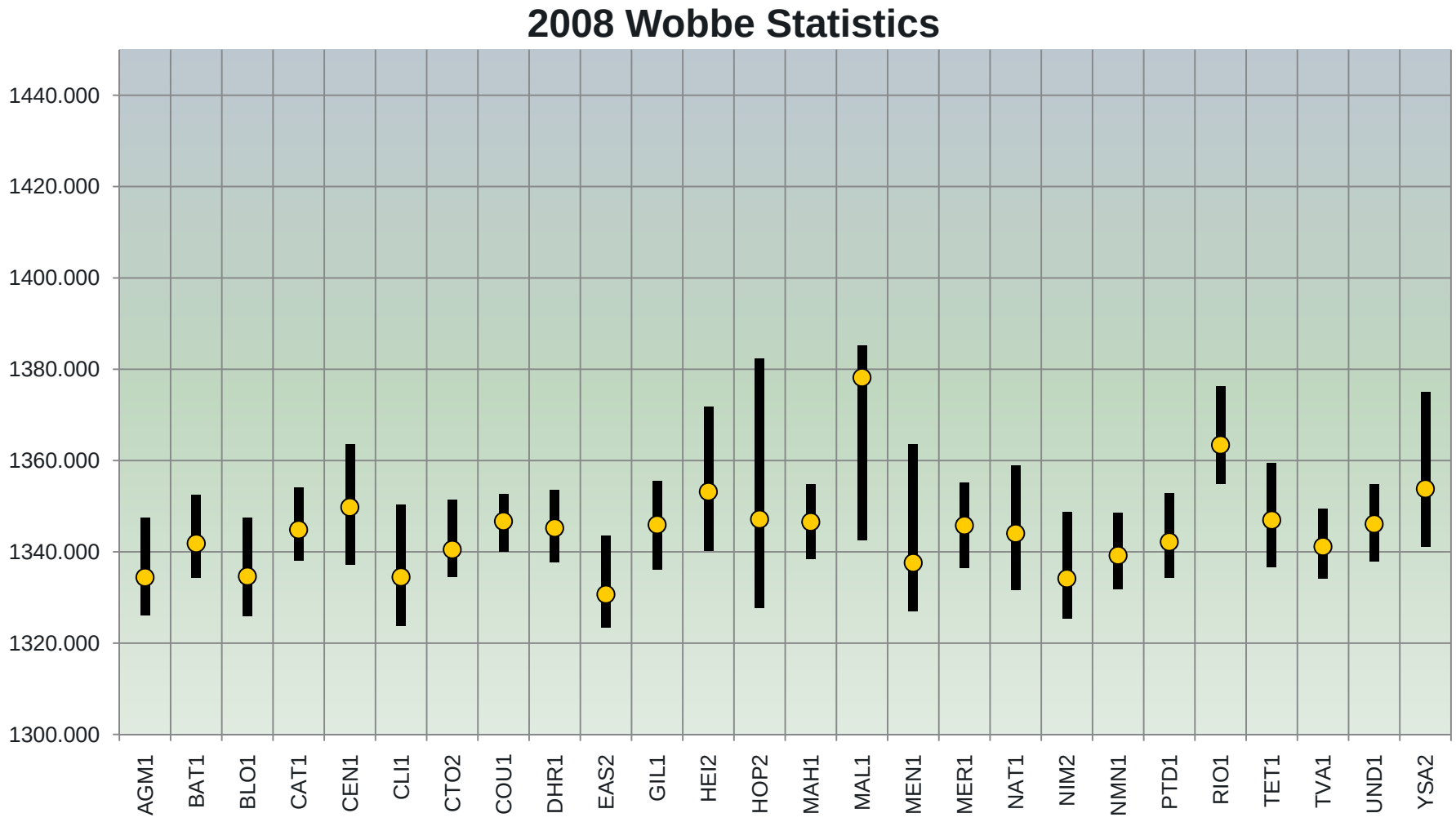
Historical Data
Wobbe Number(HHV/SG $^{0.5}$)

Tennessee Gas Pipeline
an El Paso company



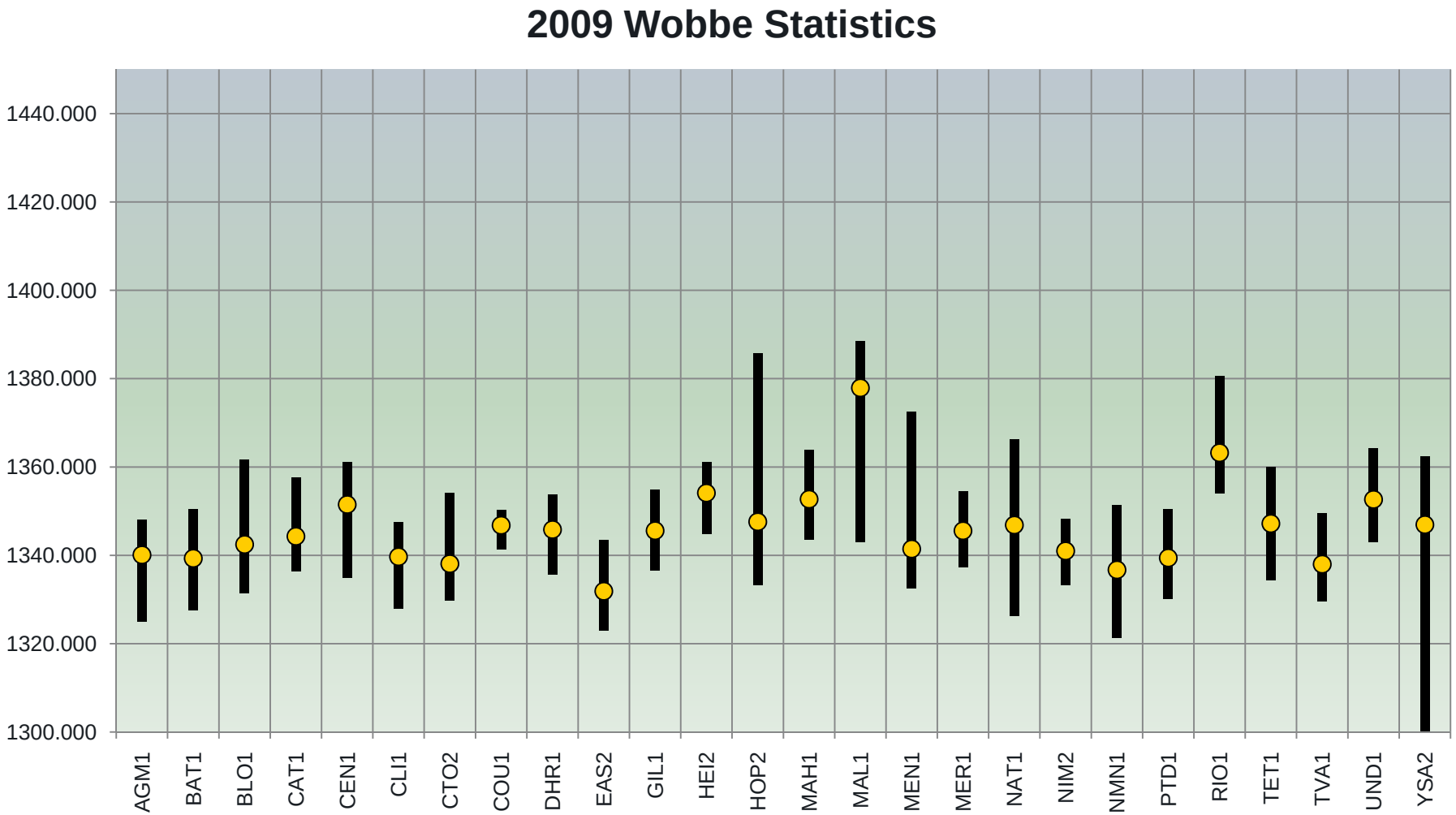
Historical Data
Wobbe Number(HHV/SG $^{0.5}$)

Tennessee Gas Pipeline
an El Paso company



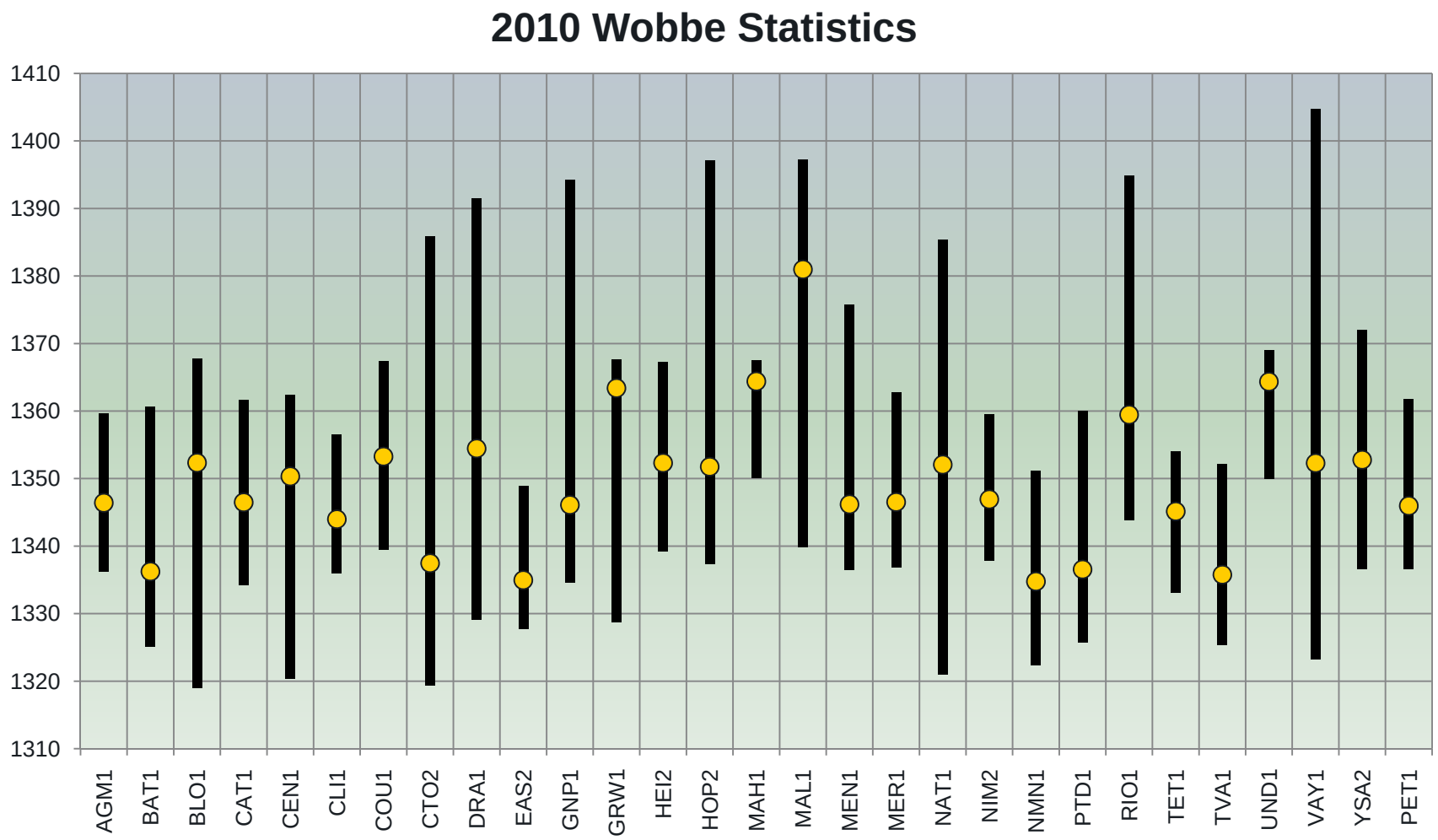
Historical Data
Wobbe Number(HHV/SG $^{0.5}$)

Tennessee Gas Pipeline
an El Paso company



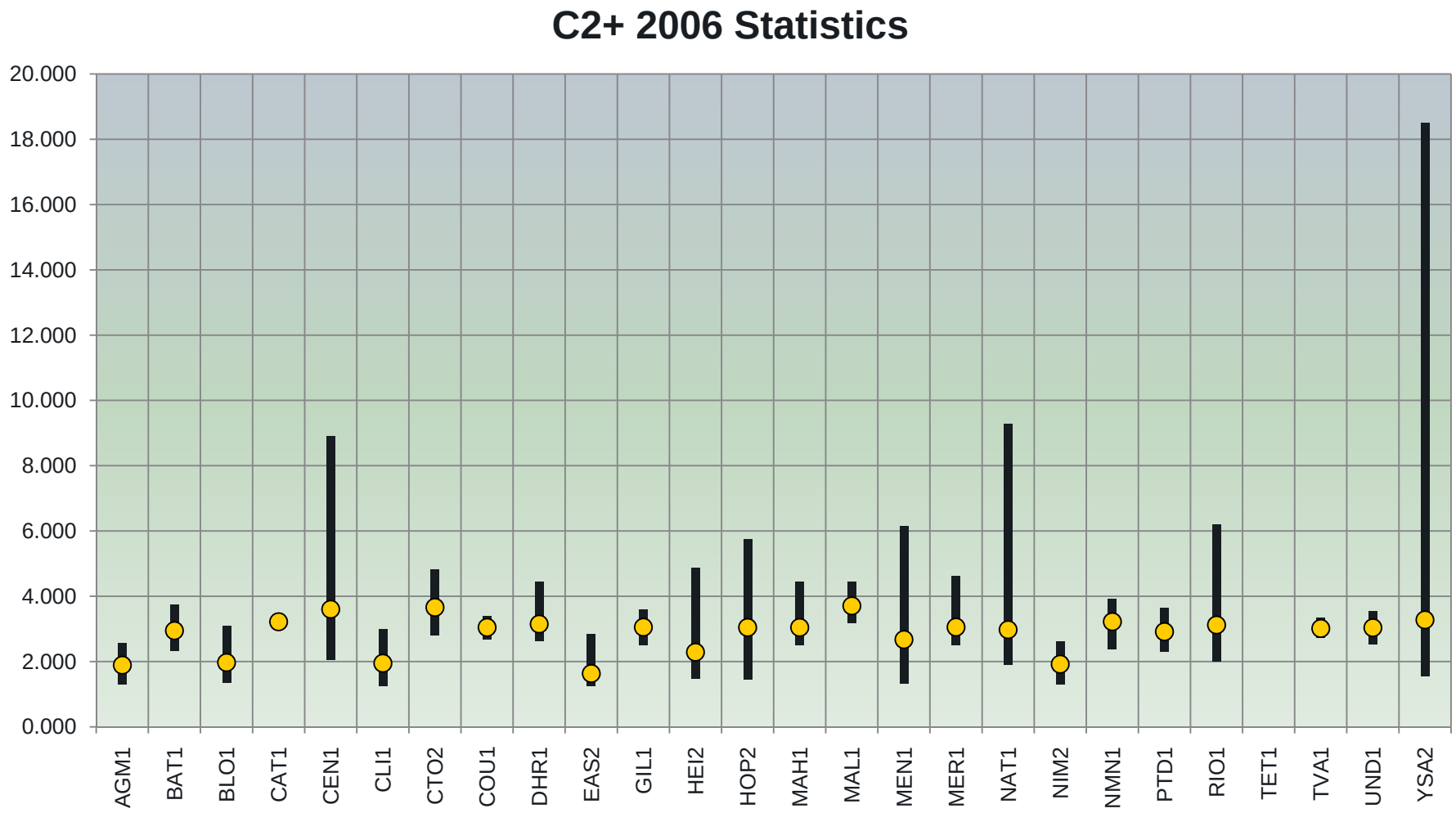
Historical Data
Wobbe Number(HHV/SG $^{0.5}$)

Tennessee Gas Pipeline
an El Paso company



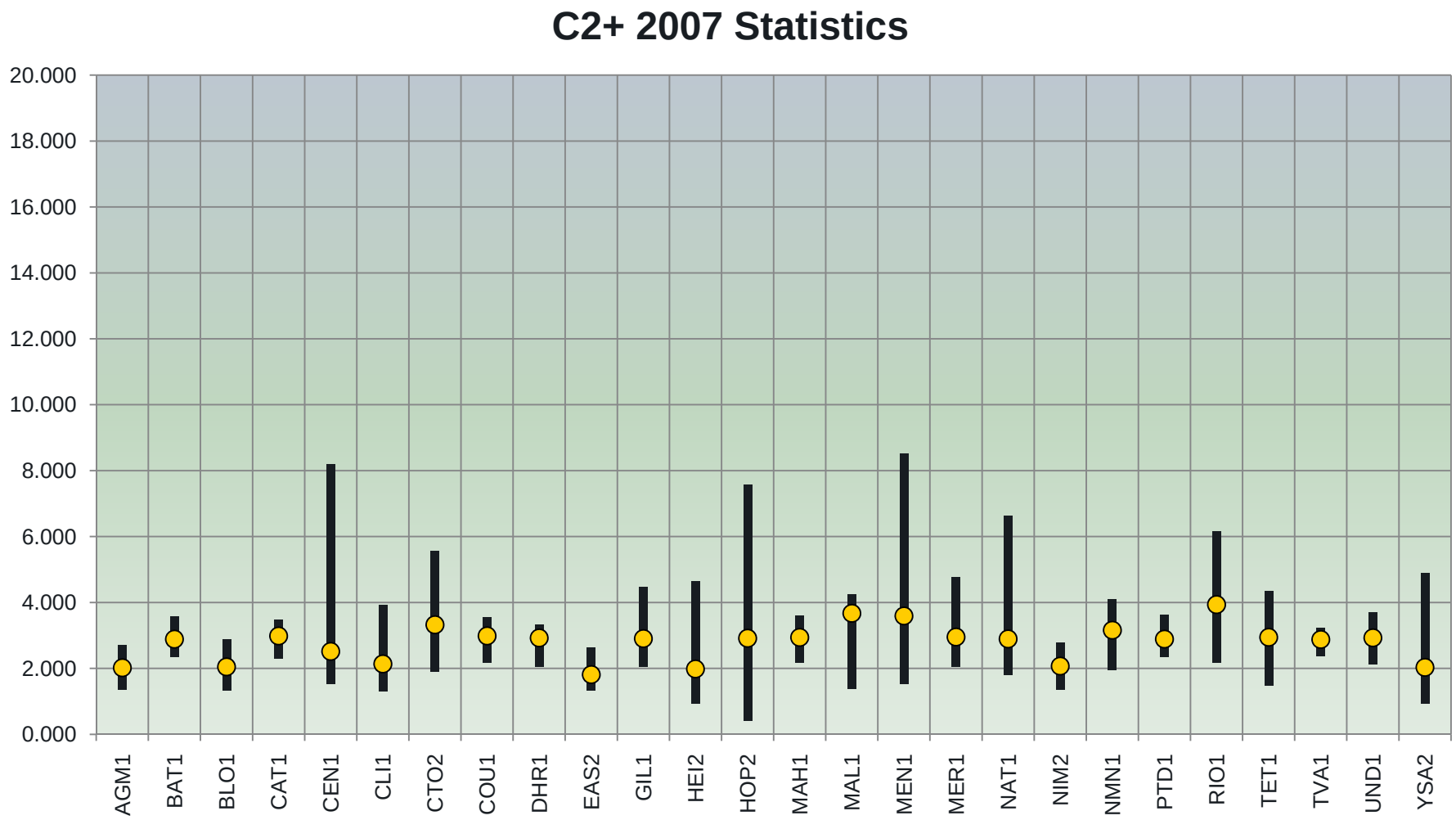
Historical Data
C2 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



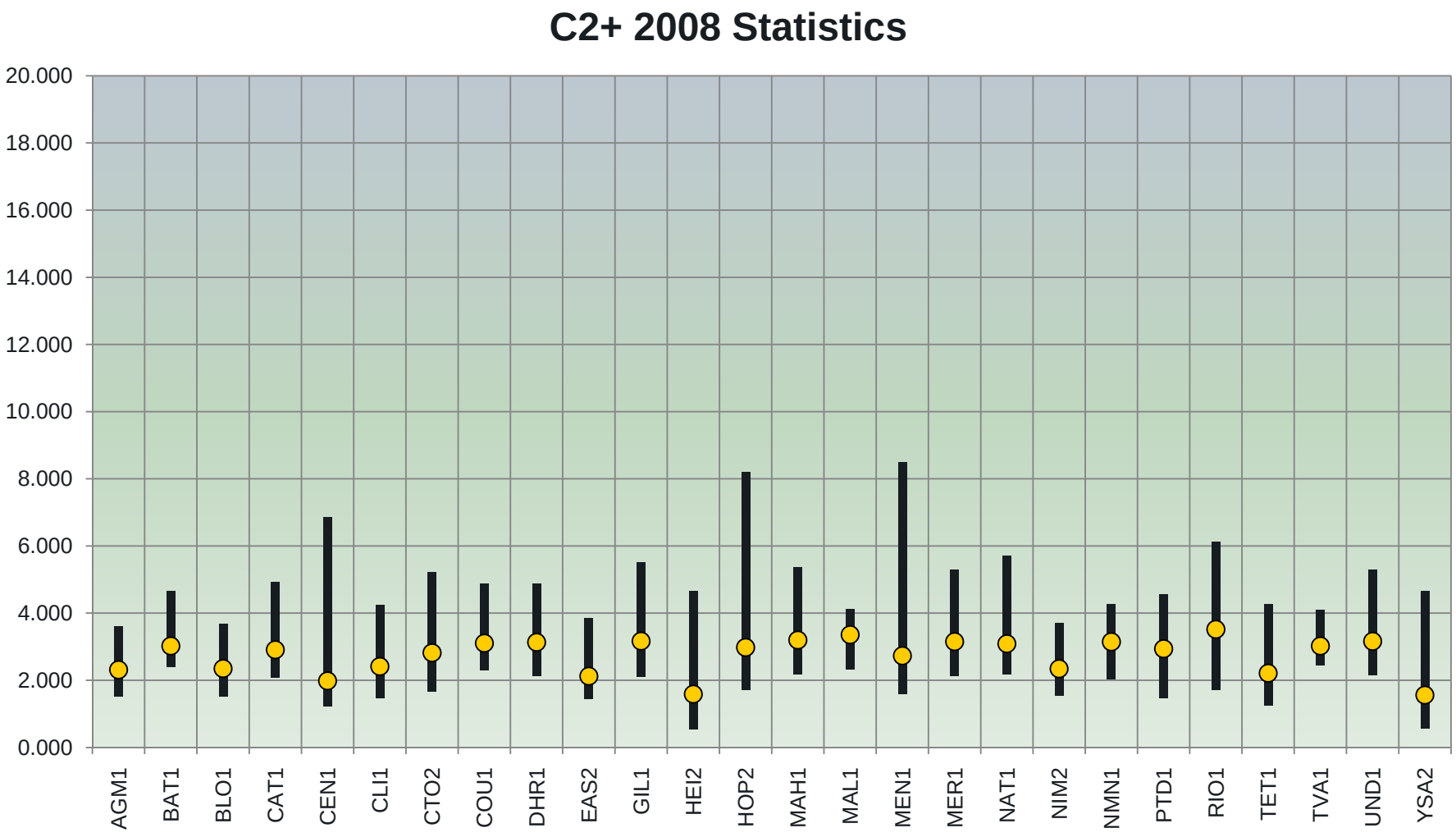
Historical Data
C2 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



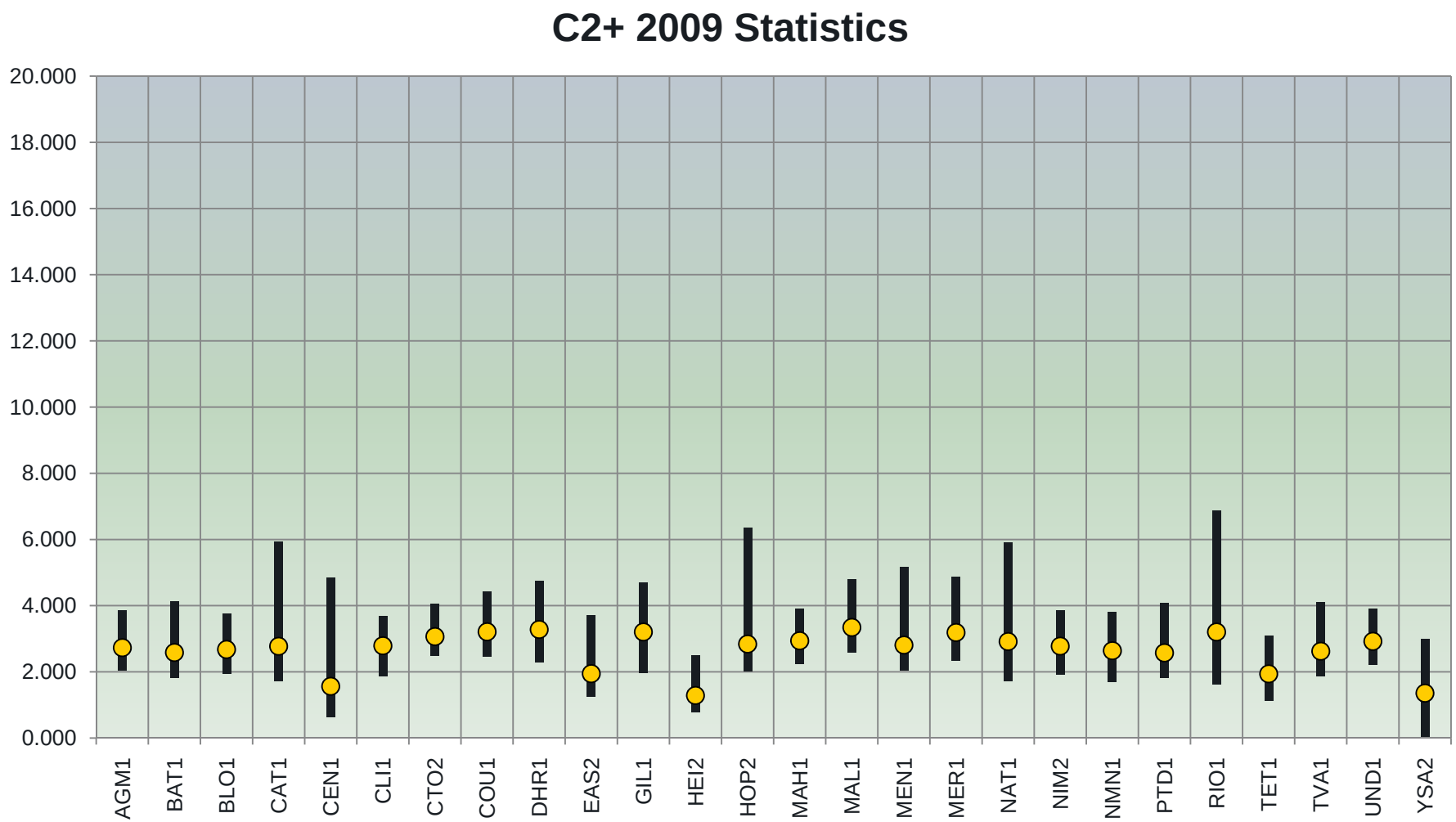
Historical Data
C2 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



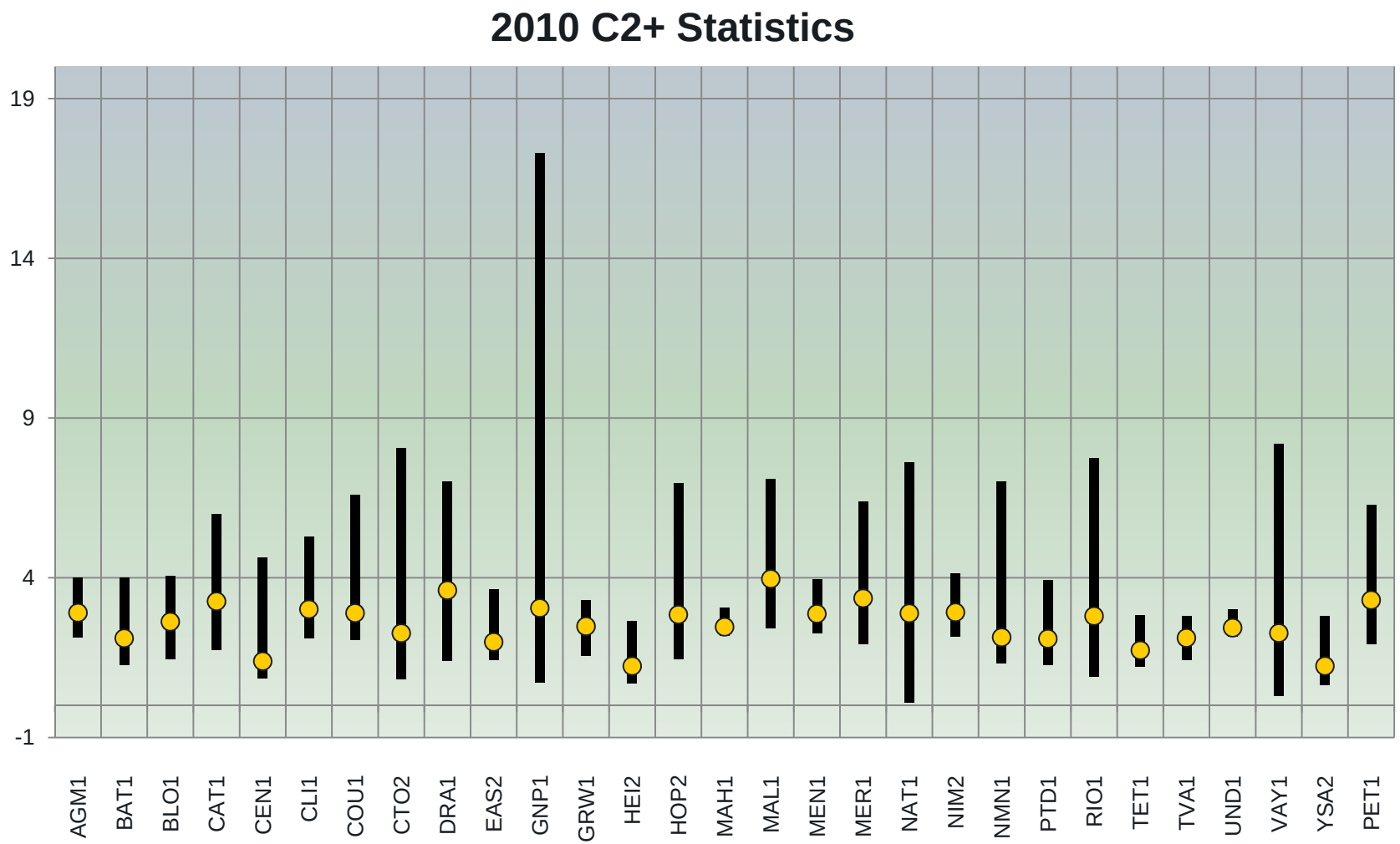
Historical Data
C2 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



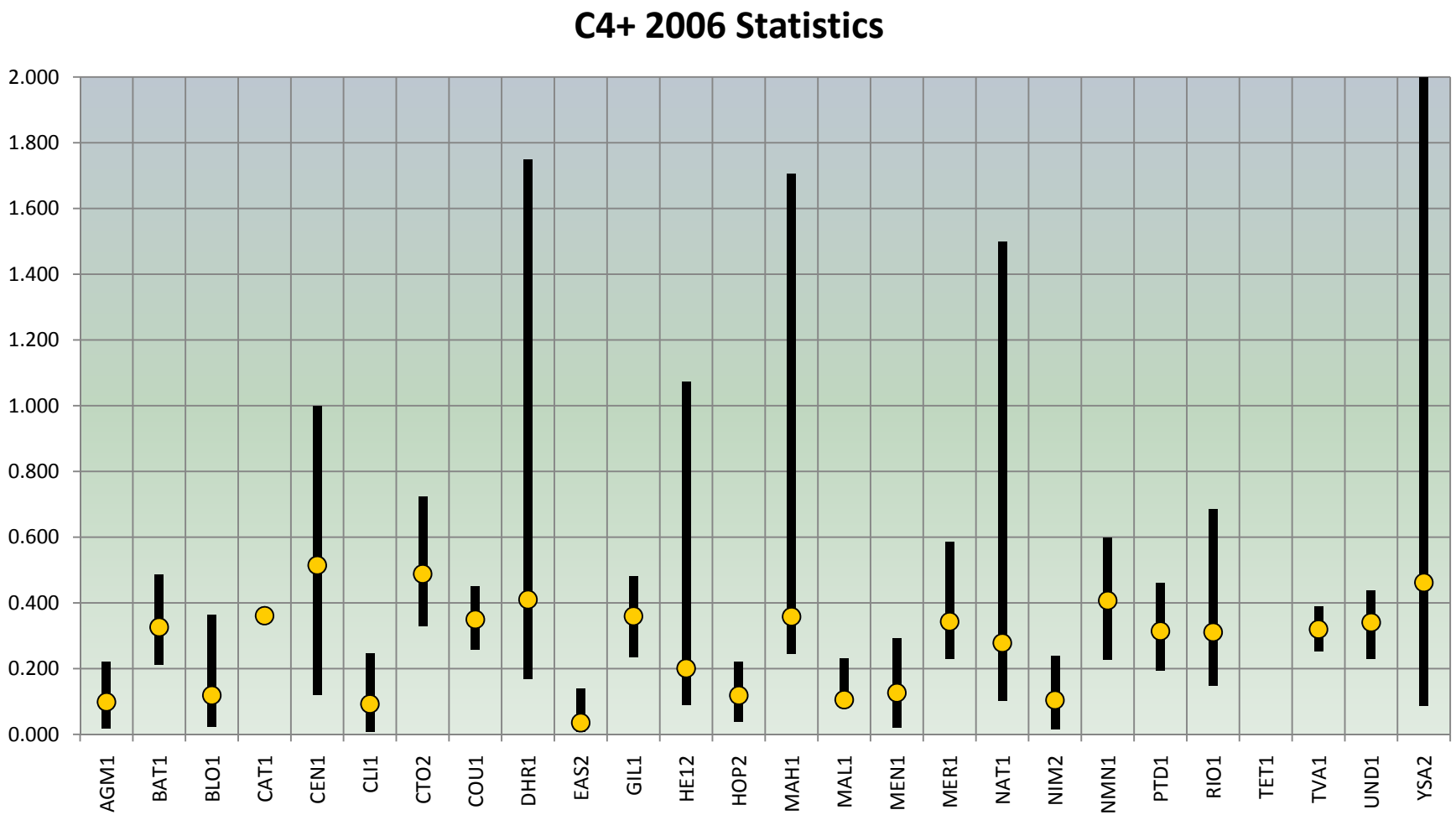
Historical Data
C2 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



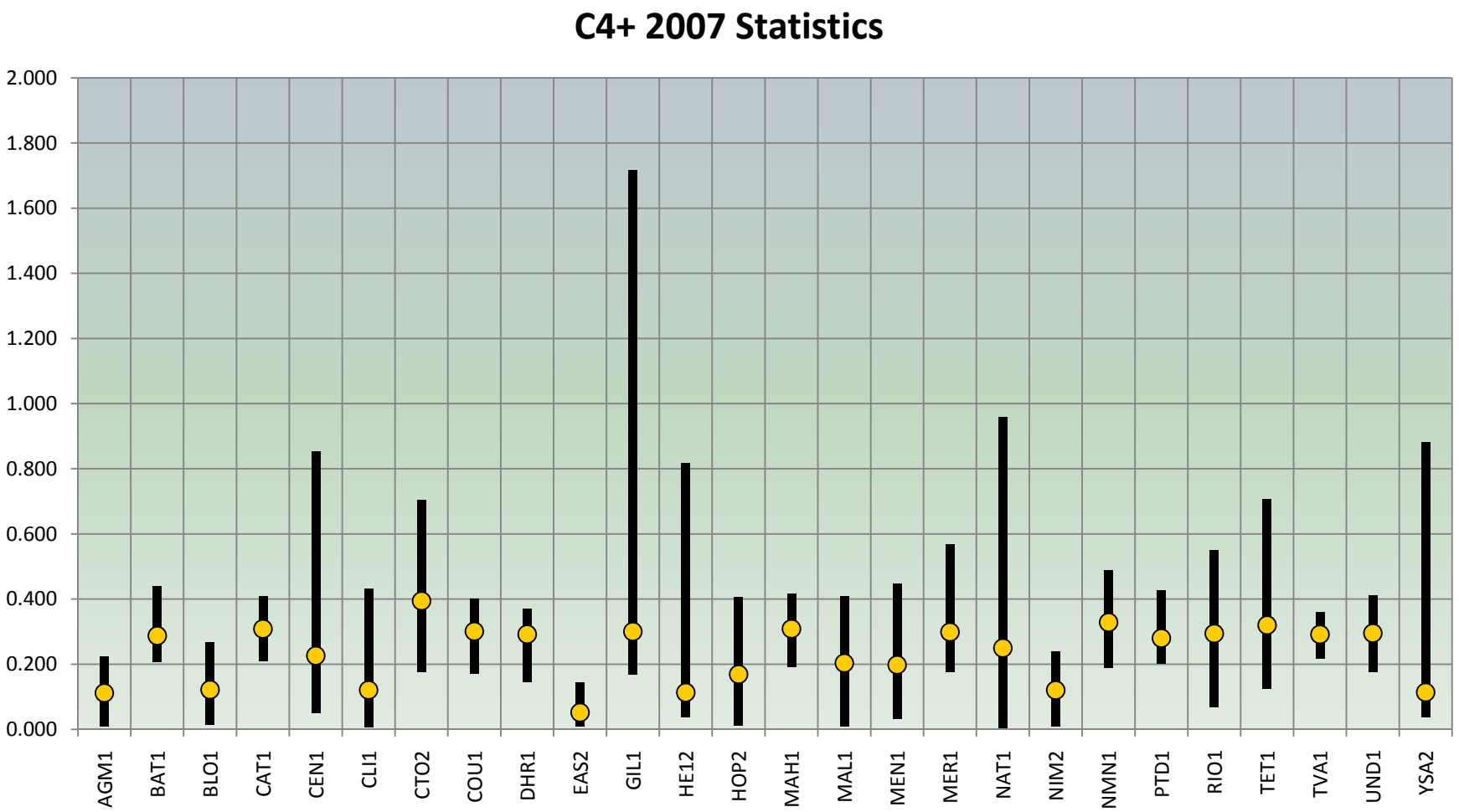
Historical Data
C4 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



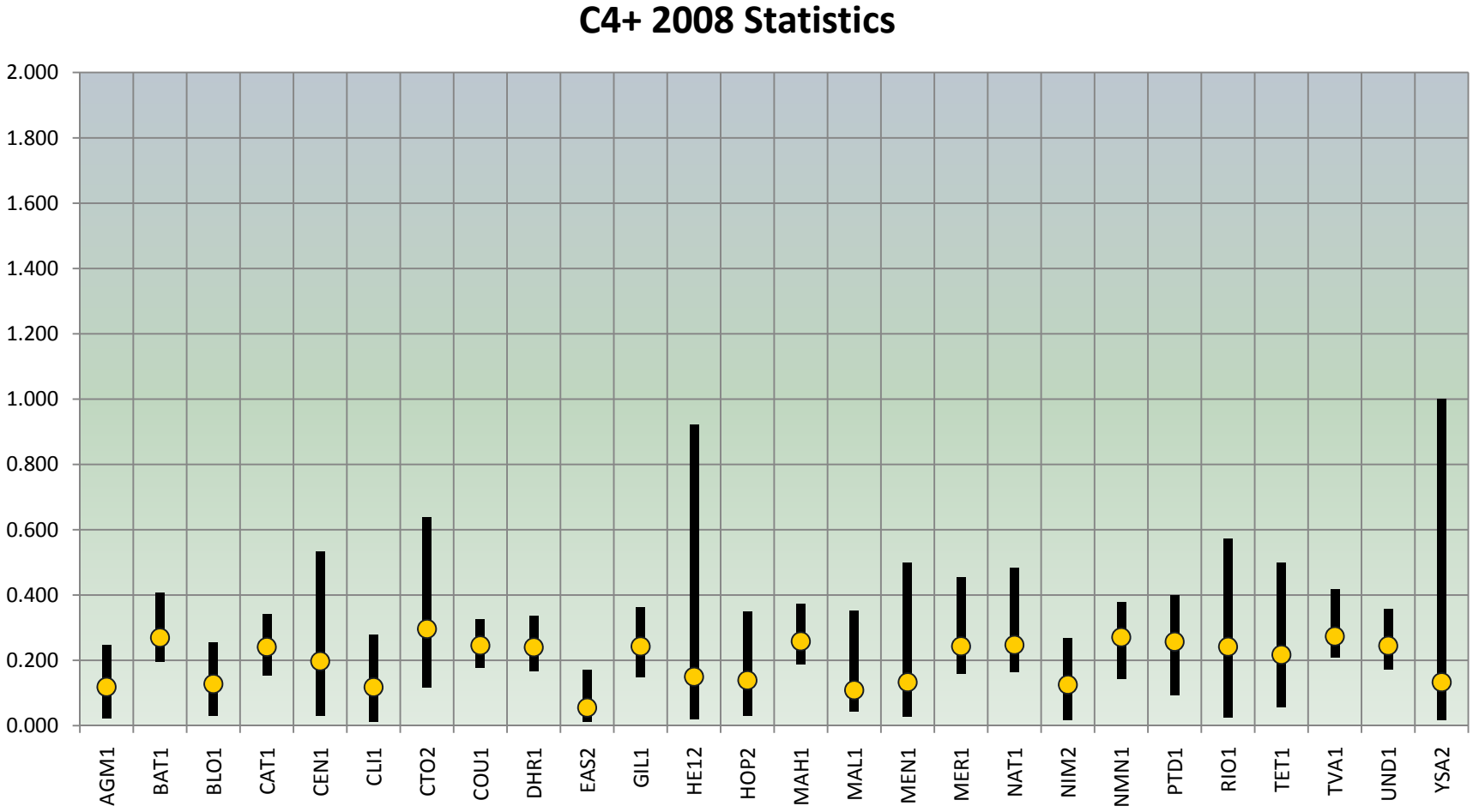
Historical Data
C4 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



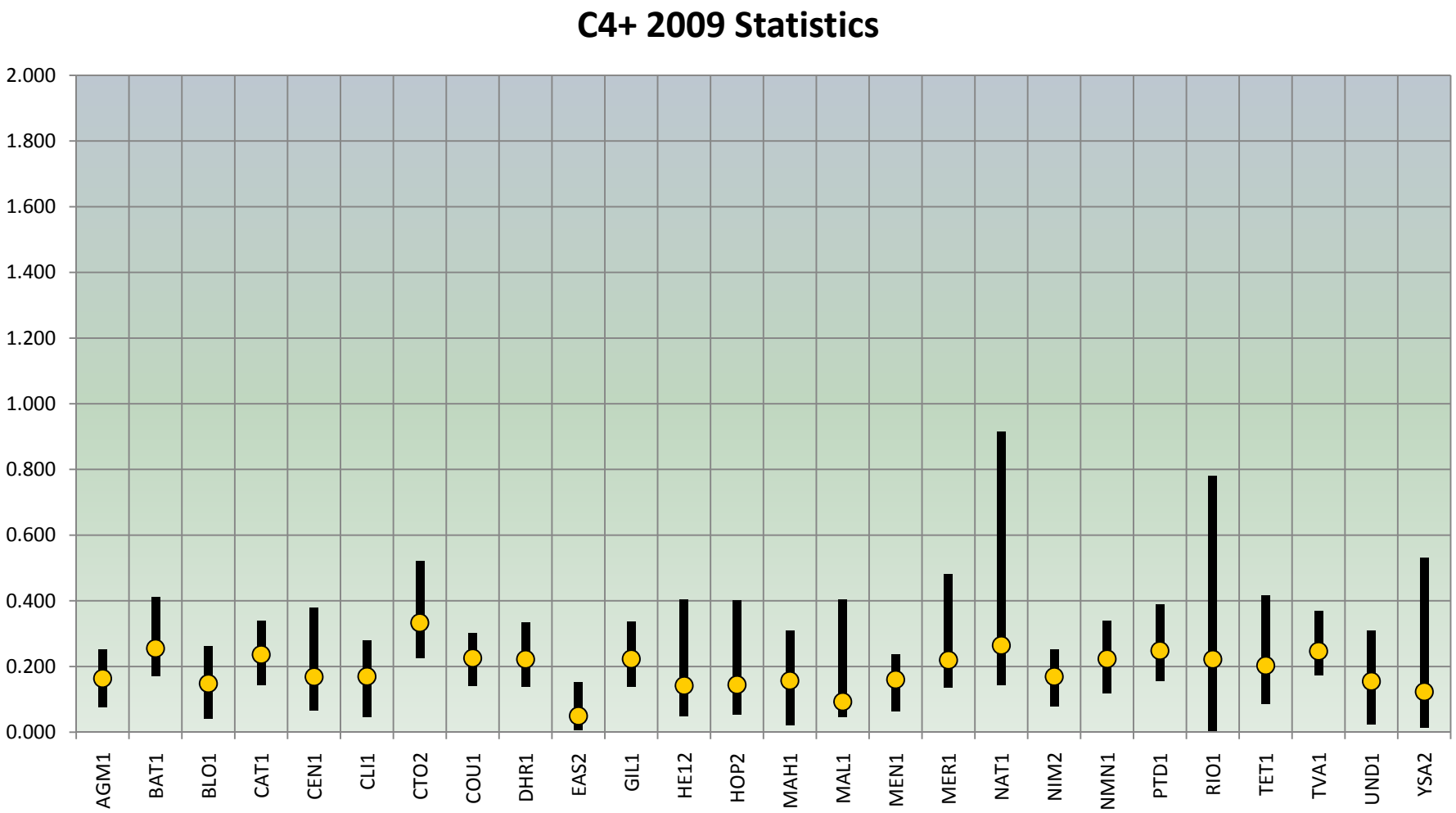
Historical Data
C4 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



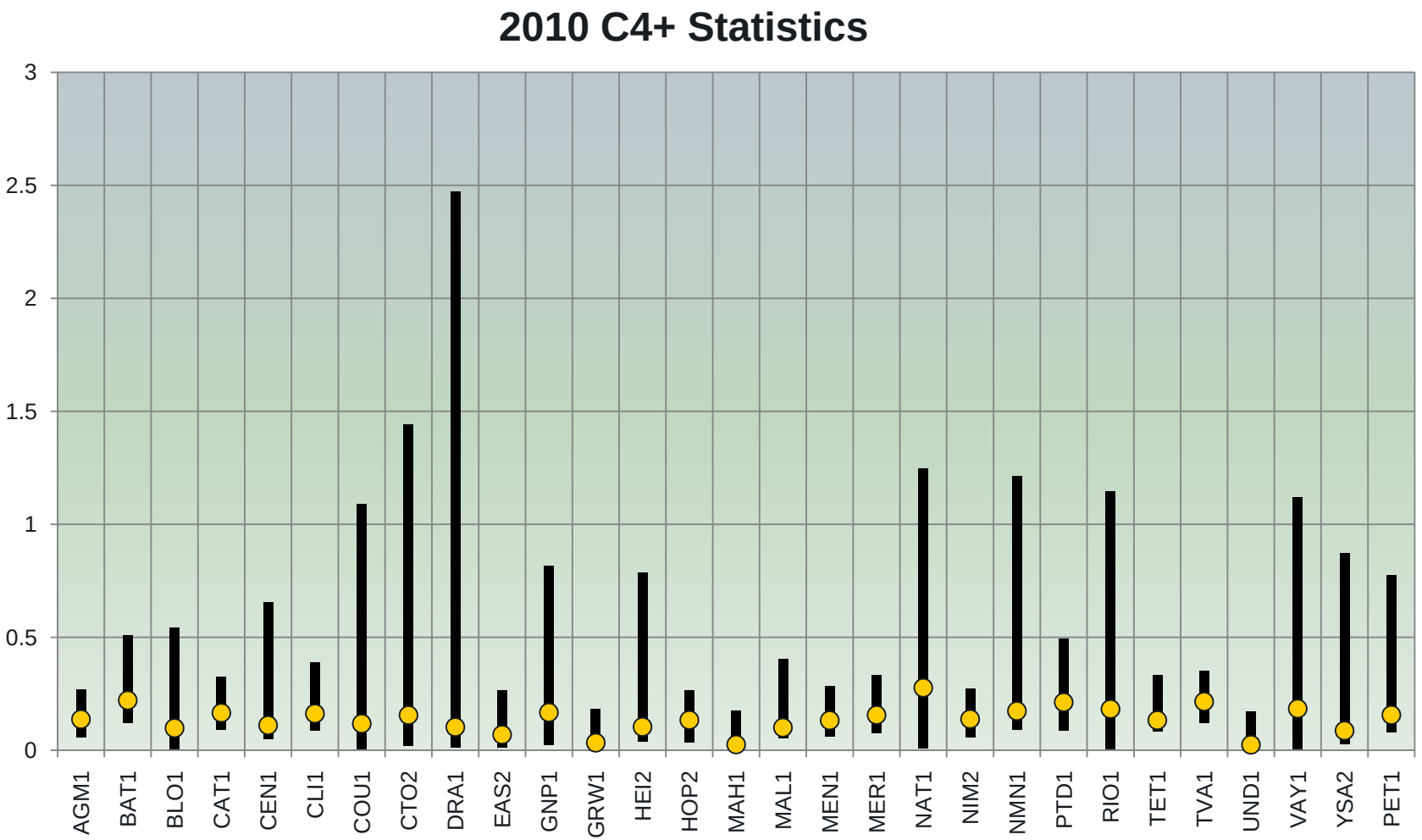
Historical Data
C4 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



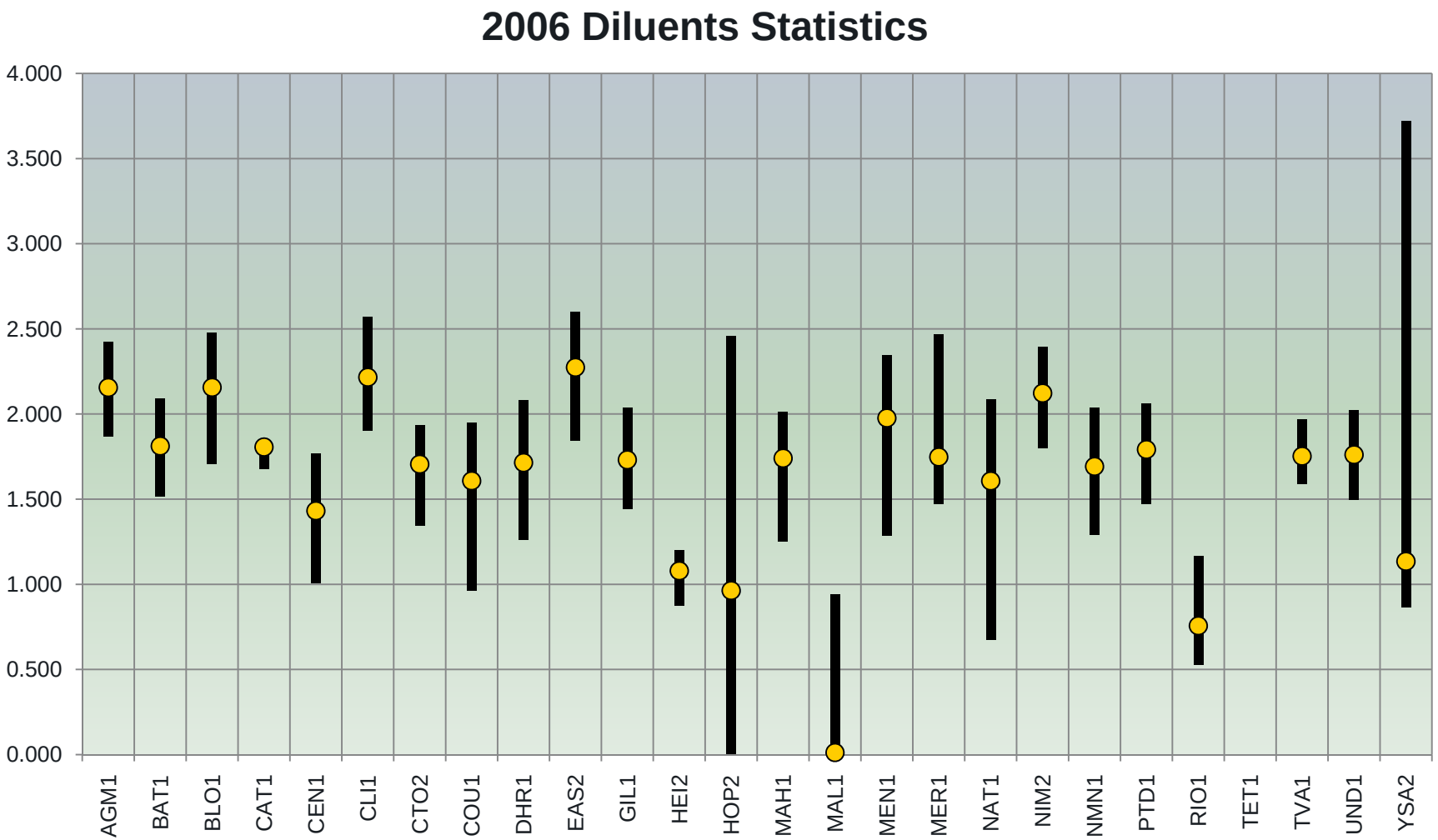
Historical Data
C4 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



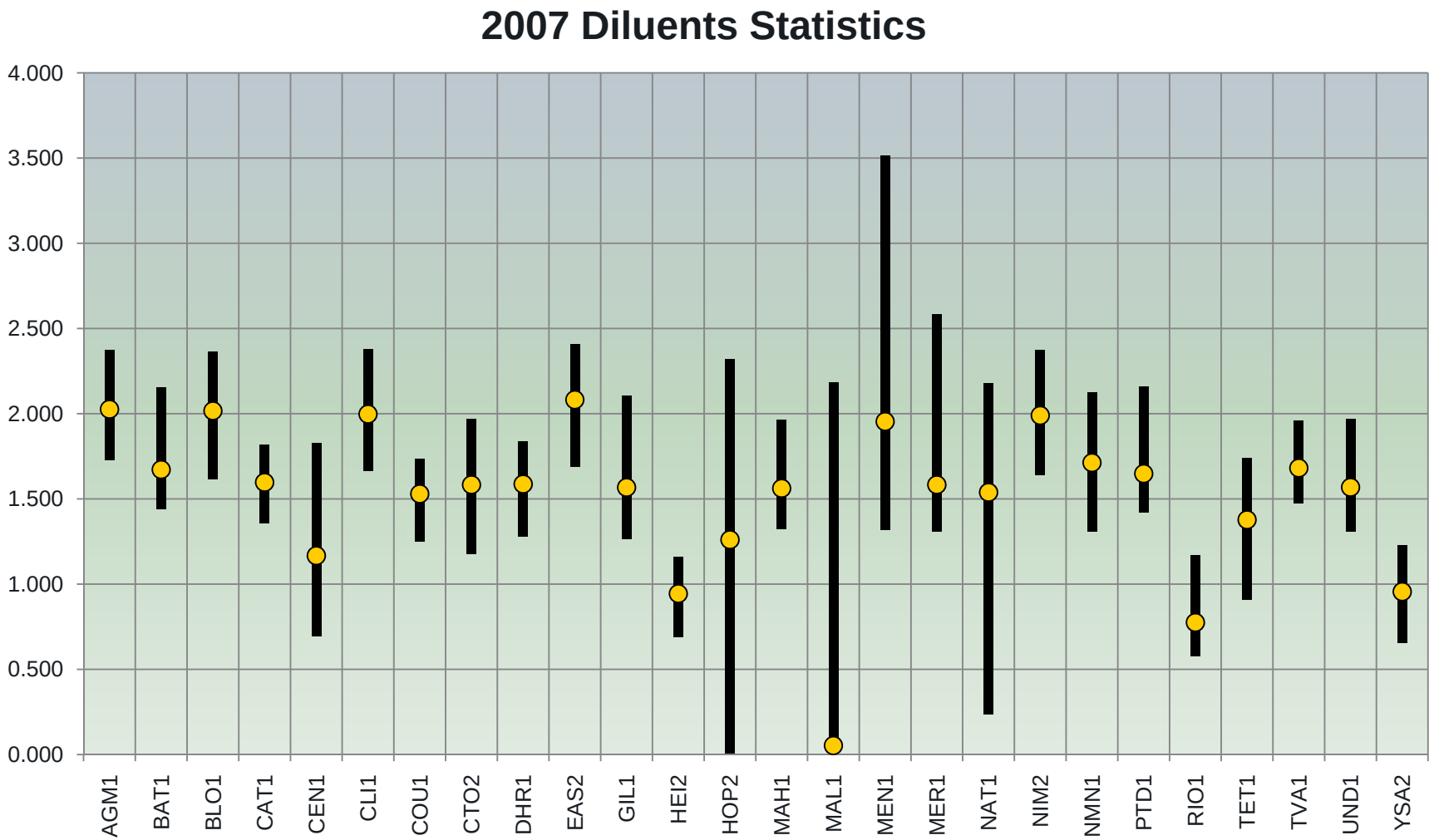
Historical Data
Total Diluents (Mole %)

Tennessee Gas Pipeline
an El Paso company

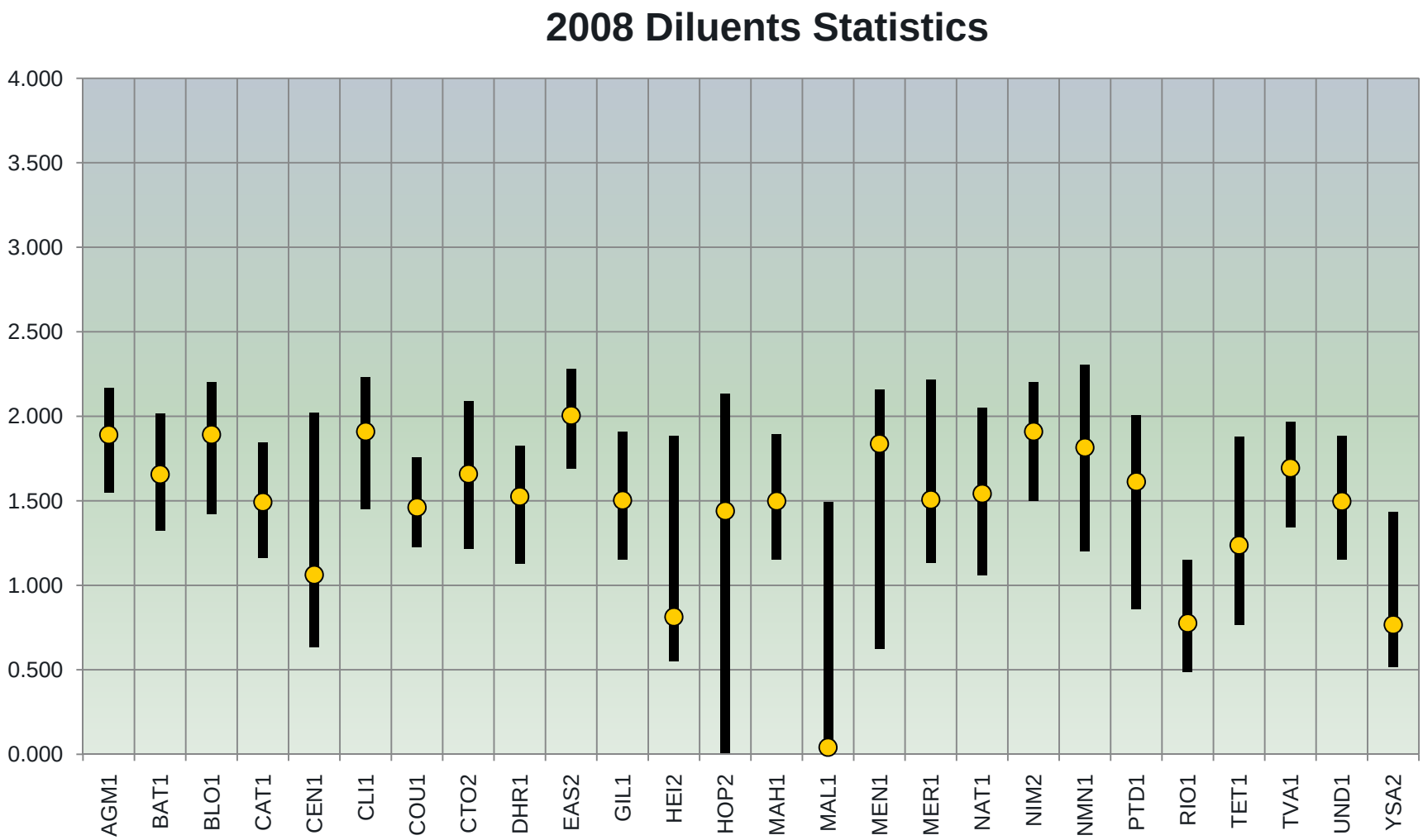


Historical Data
Total Diluents (Mole %)

Tennessee Gas Pipeline
an El Paso company

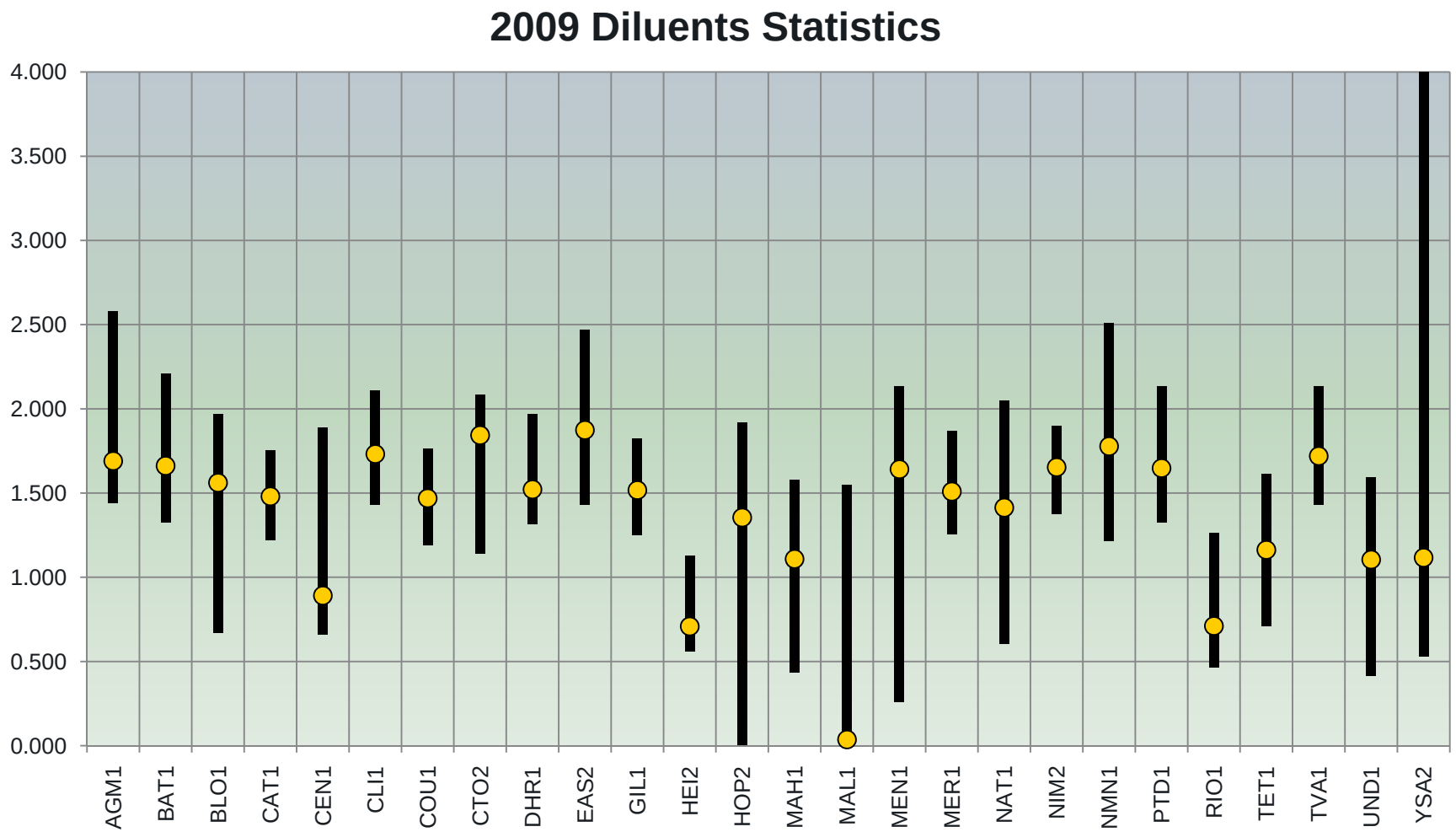


Historical Data
Total Diluents (Mole %)



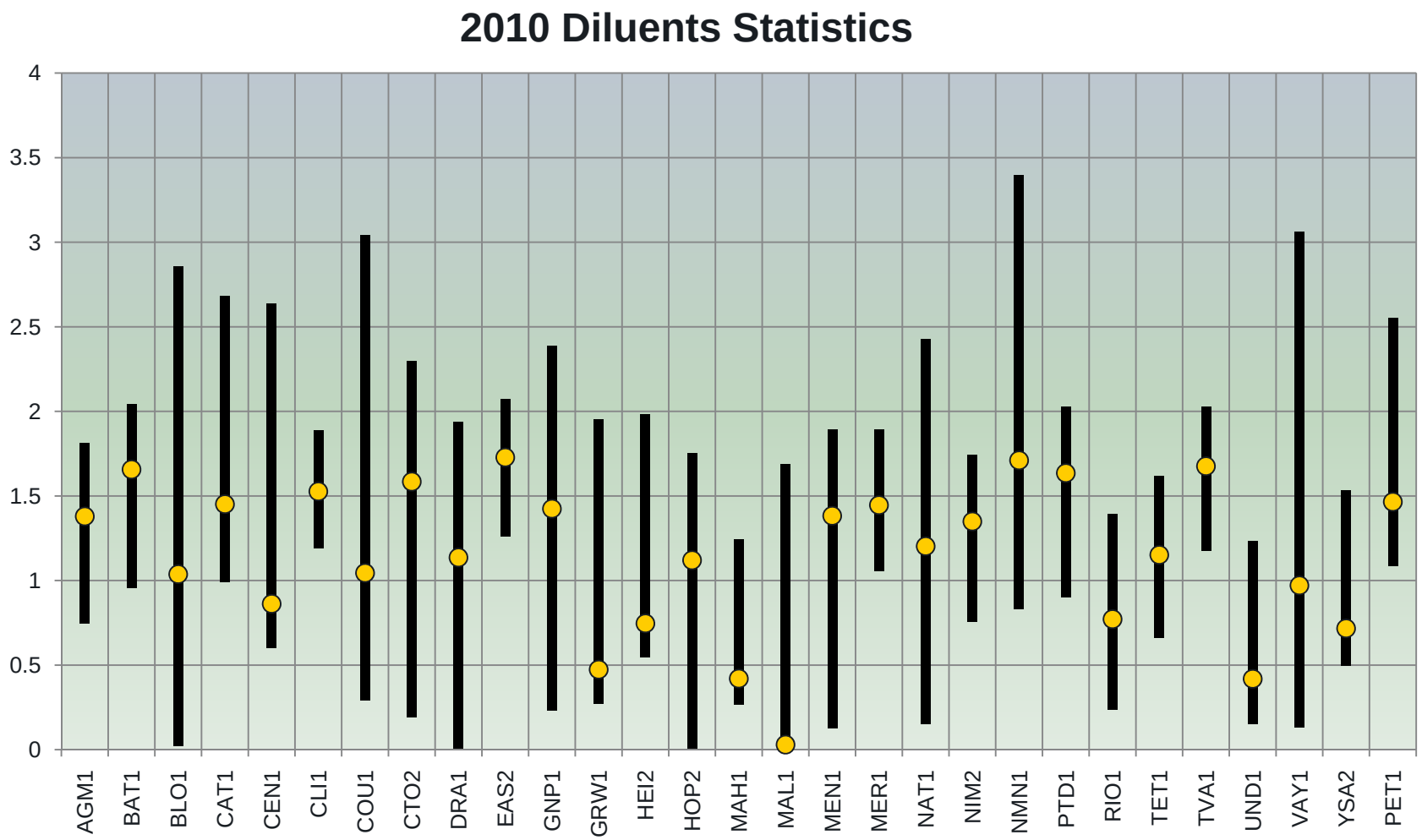
Historical Data
Total Diluents (Mole %)

Tennessee Gas Pipeline
an El Paso company



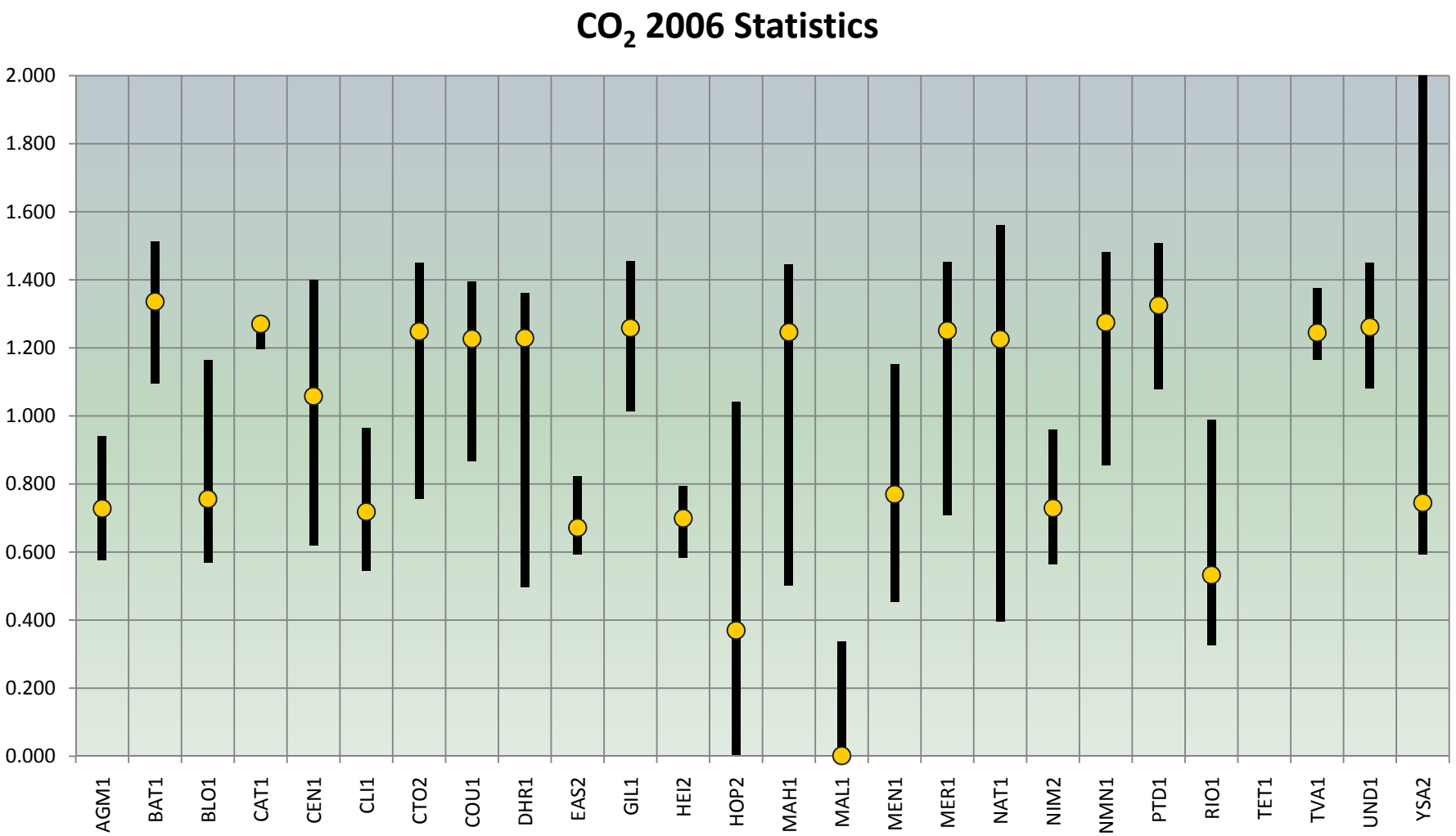
Historical Data
Total Diluents (Mole %)

Tennessee Gas Pipeline
an El Paso company



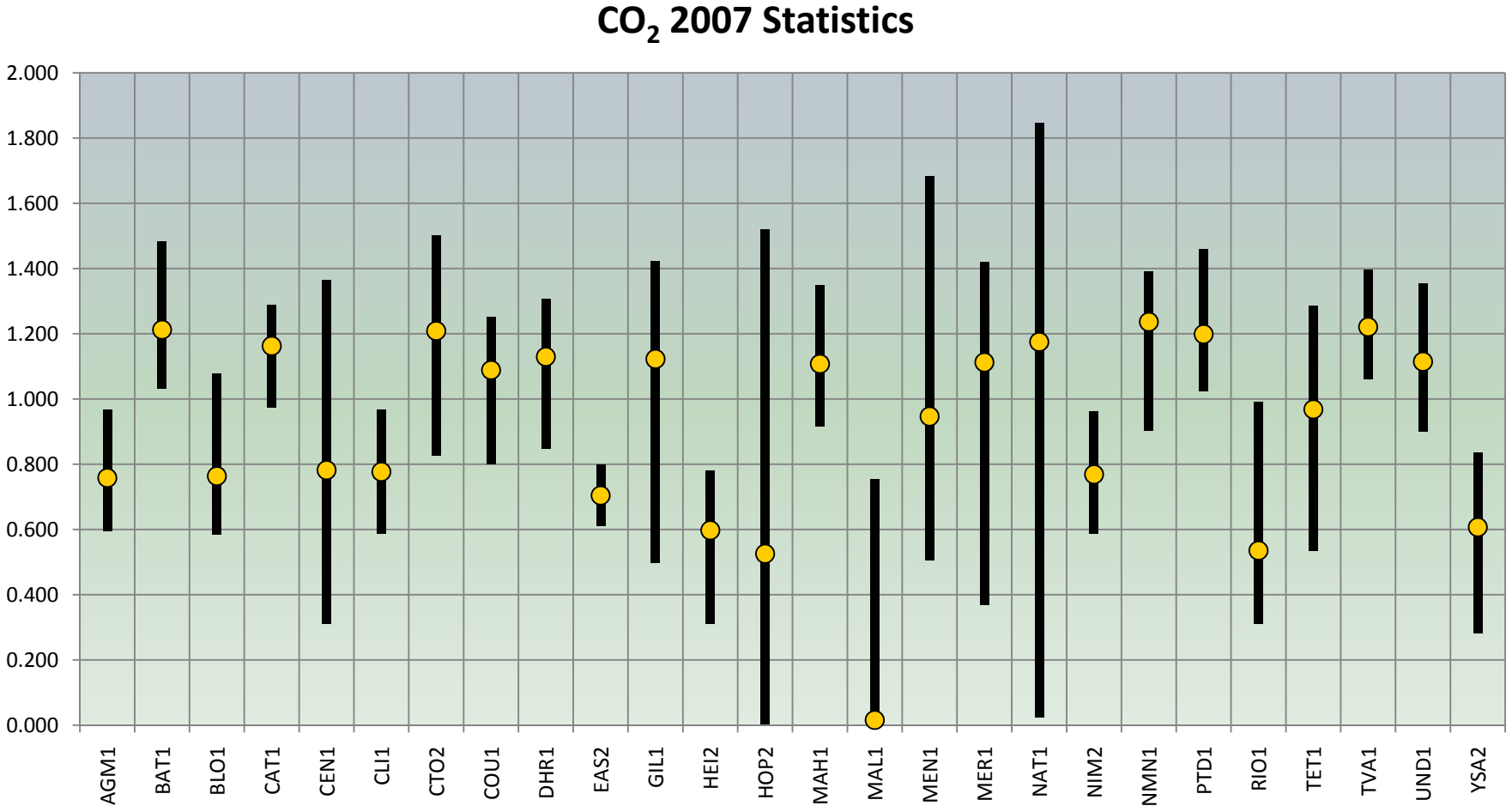
Historical Data
CO_2 (Mole %)

Tennessee Gas Pipeline
an El Paso company



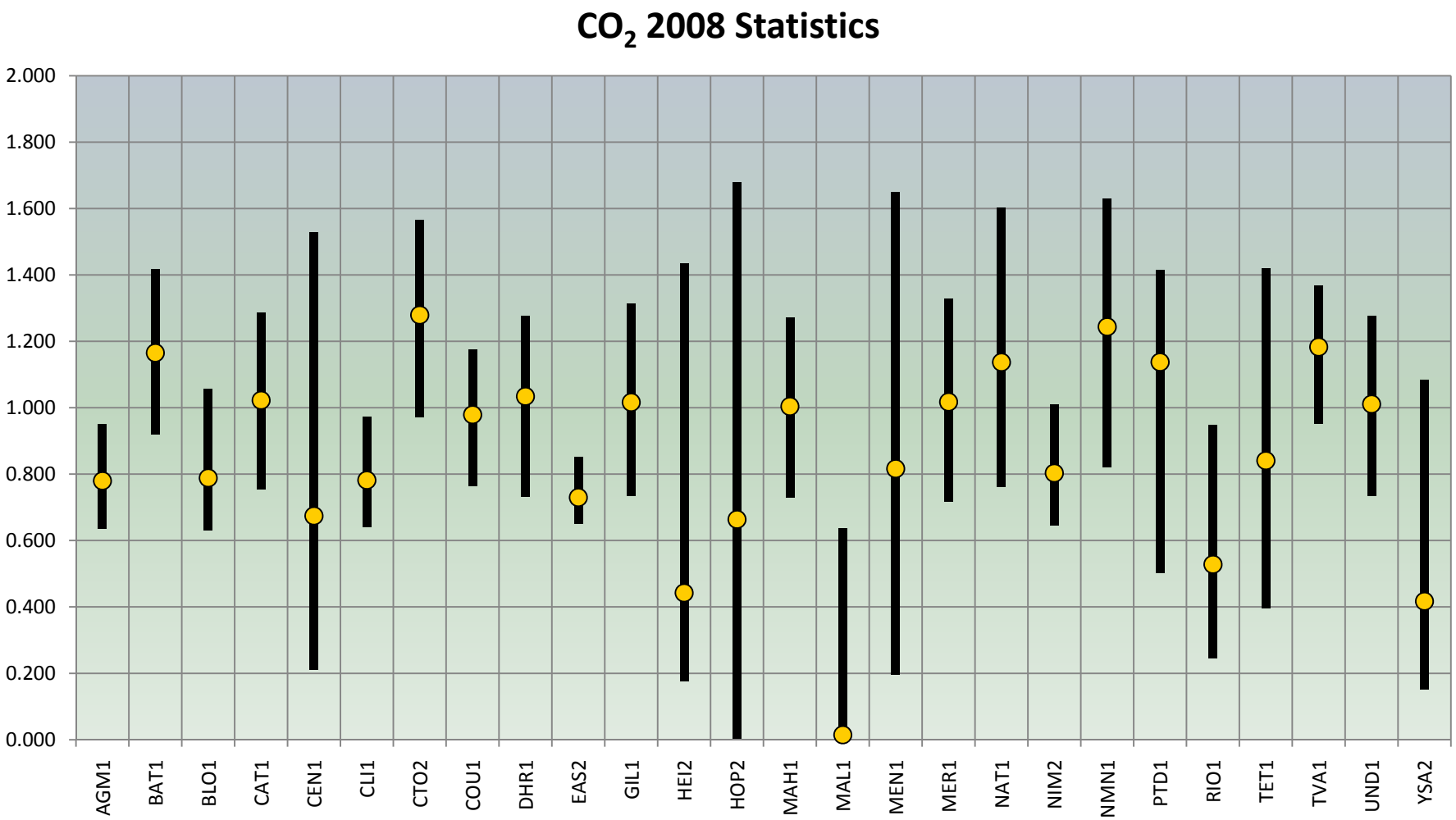
Historical Data
CO_2 (Mole %)

Tennessee Gas Pipeline
an El Paso company



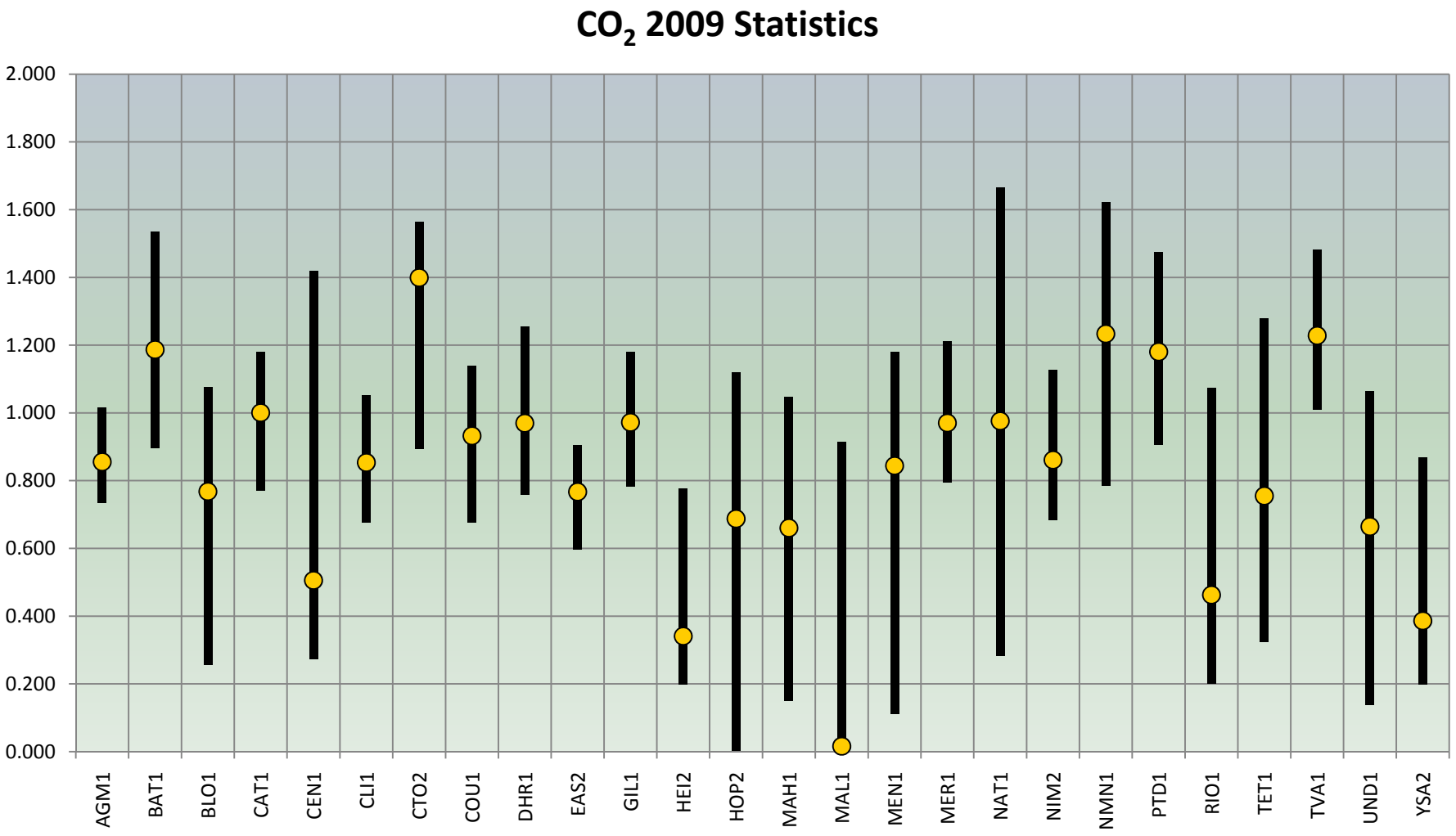
Historical Data
CO_2 (Mole %)

Tennessee Gas Pipeline
an El Paso company



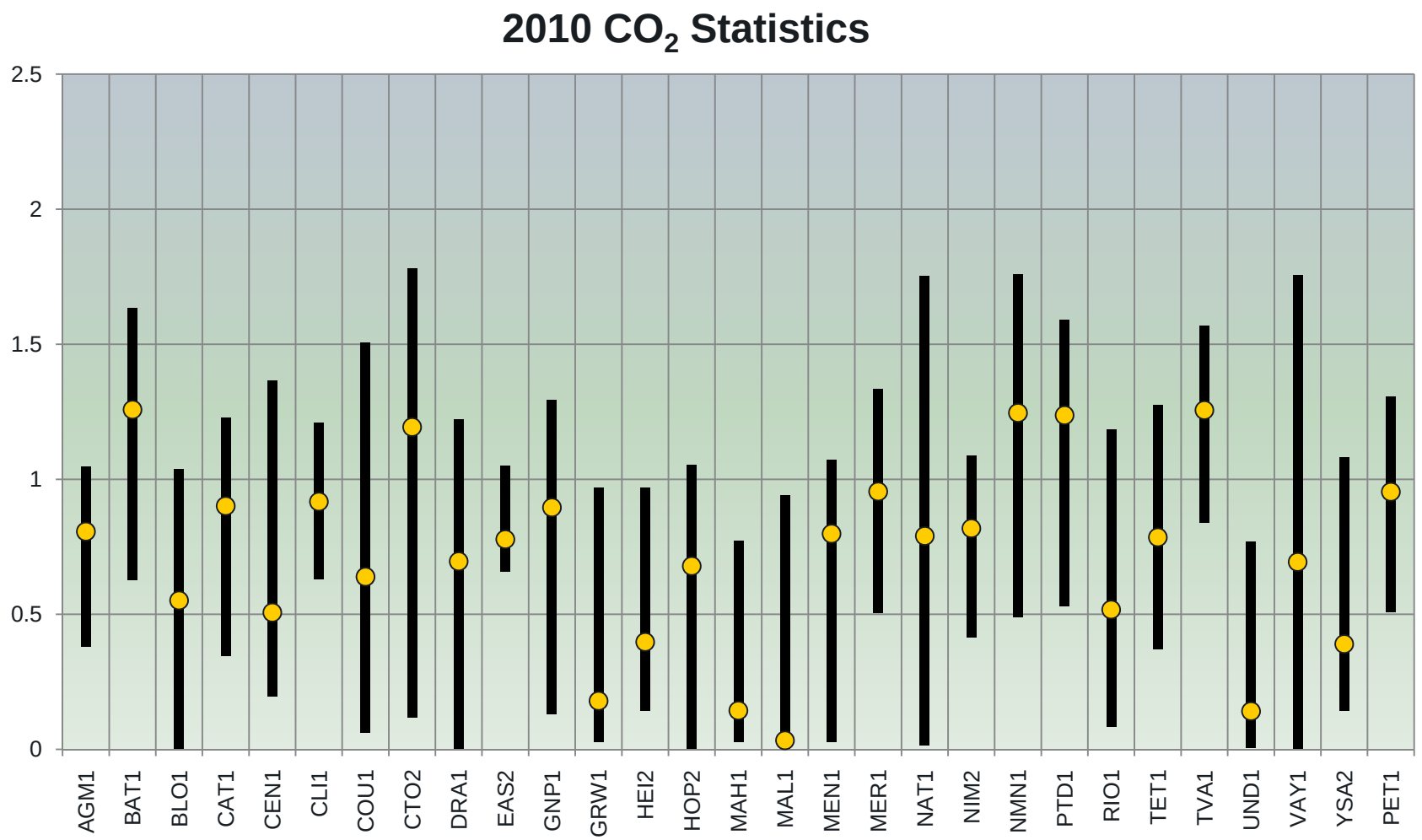
Historical Data
CO_2 (Mole %)

Tennessee Gas Pipeline
an El Paso company



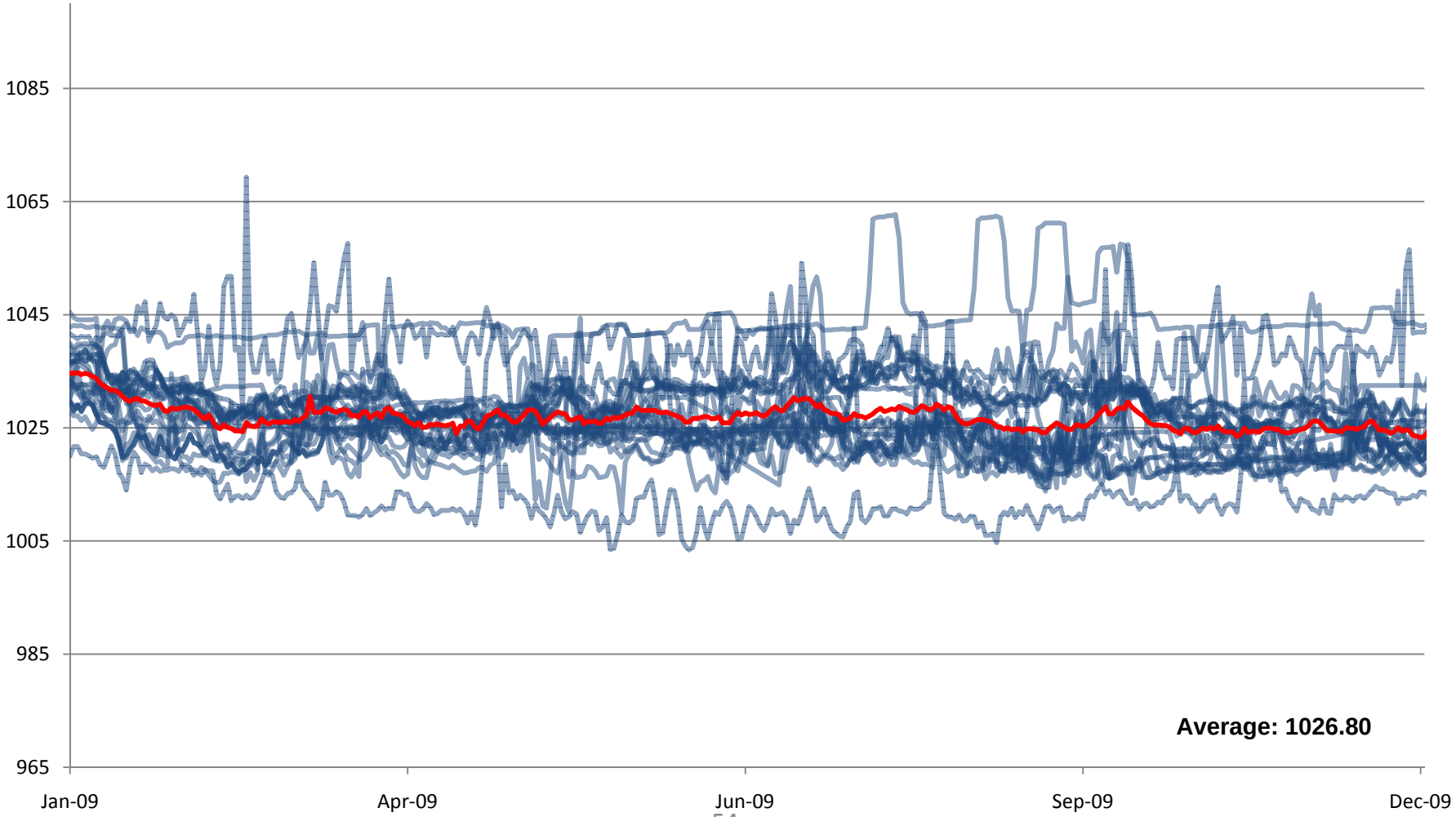
Historical Data
CO_2 (Mole %)

Tennessee Gas Pipeline
an El Paso company



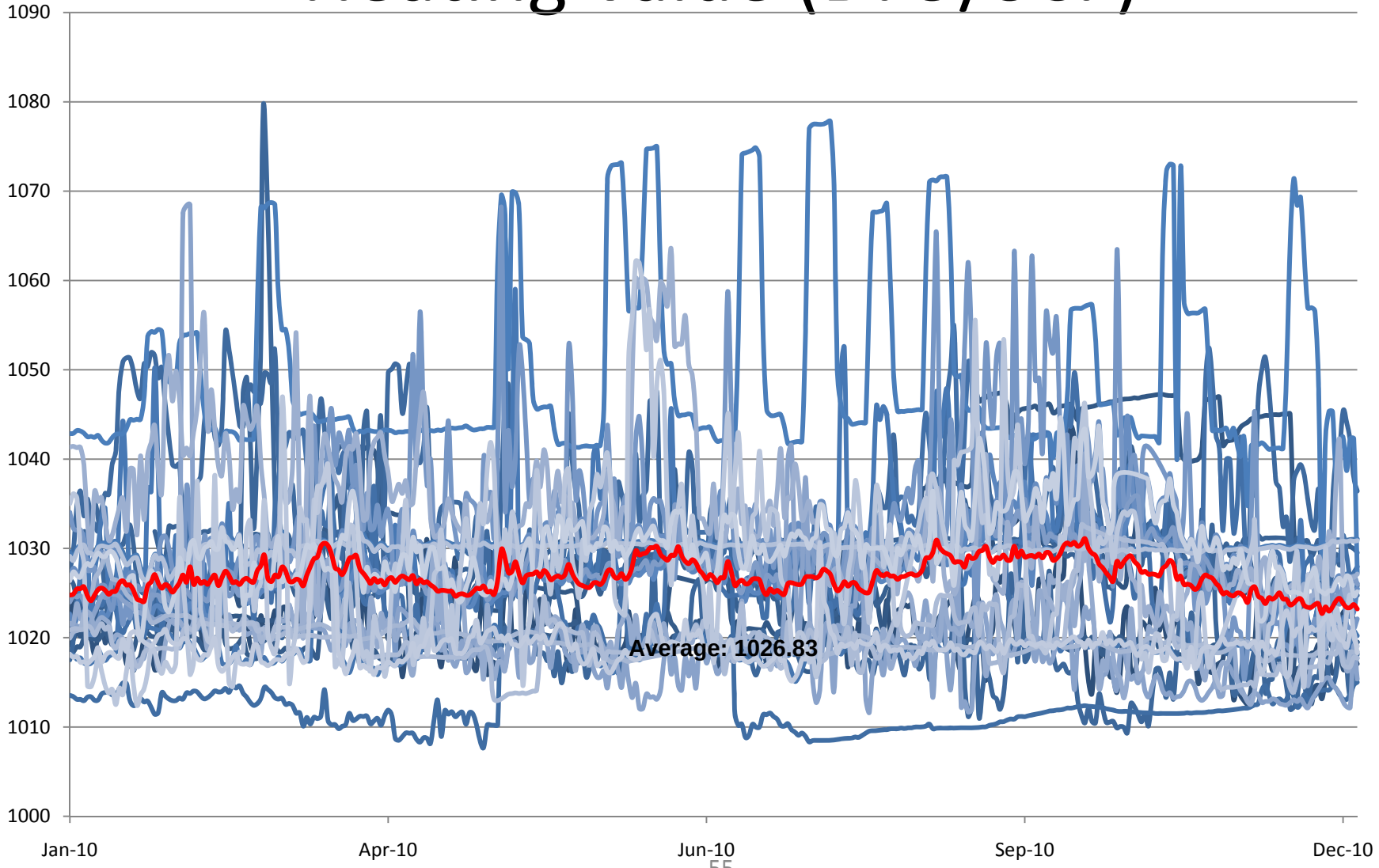
2009 Data
Heating Value (BTU/SCF)

Tennessee Gas Pipeline
an El Paso company

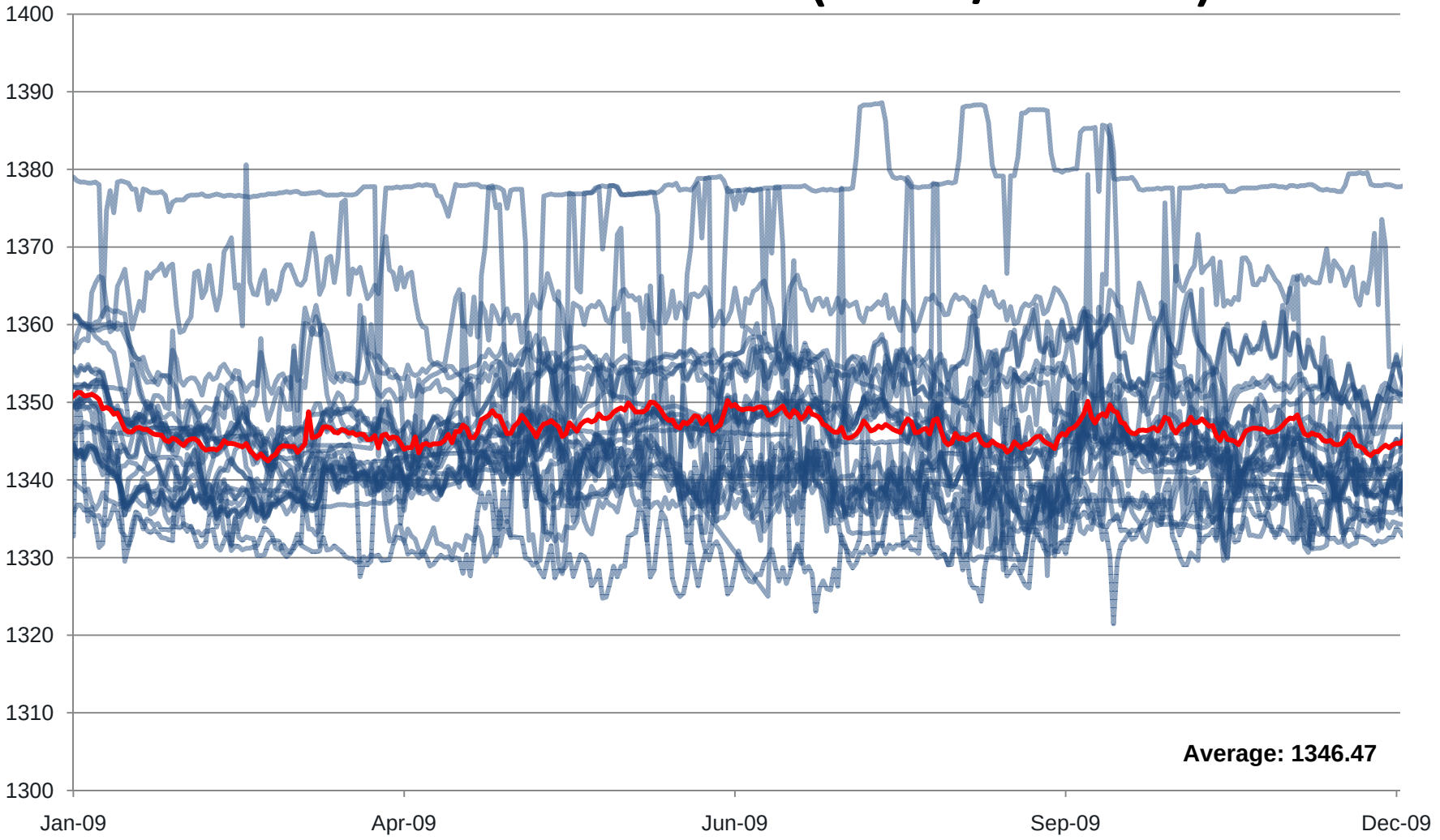


2010 Data
Heating Value (BTU/SCF)

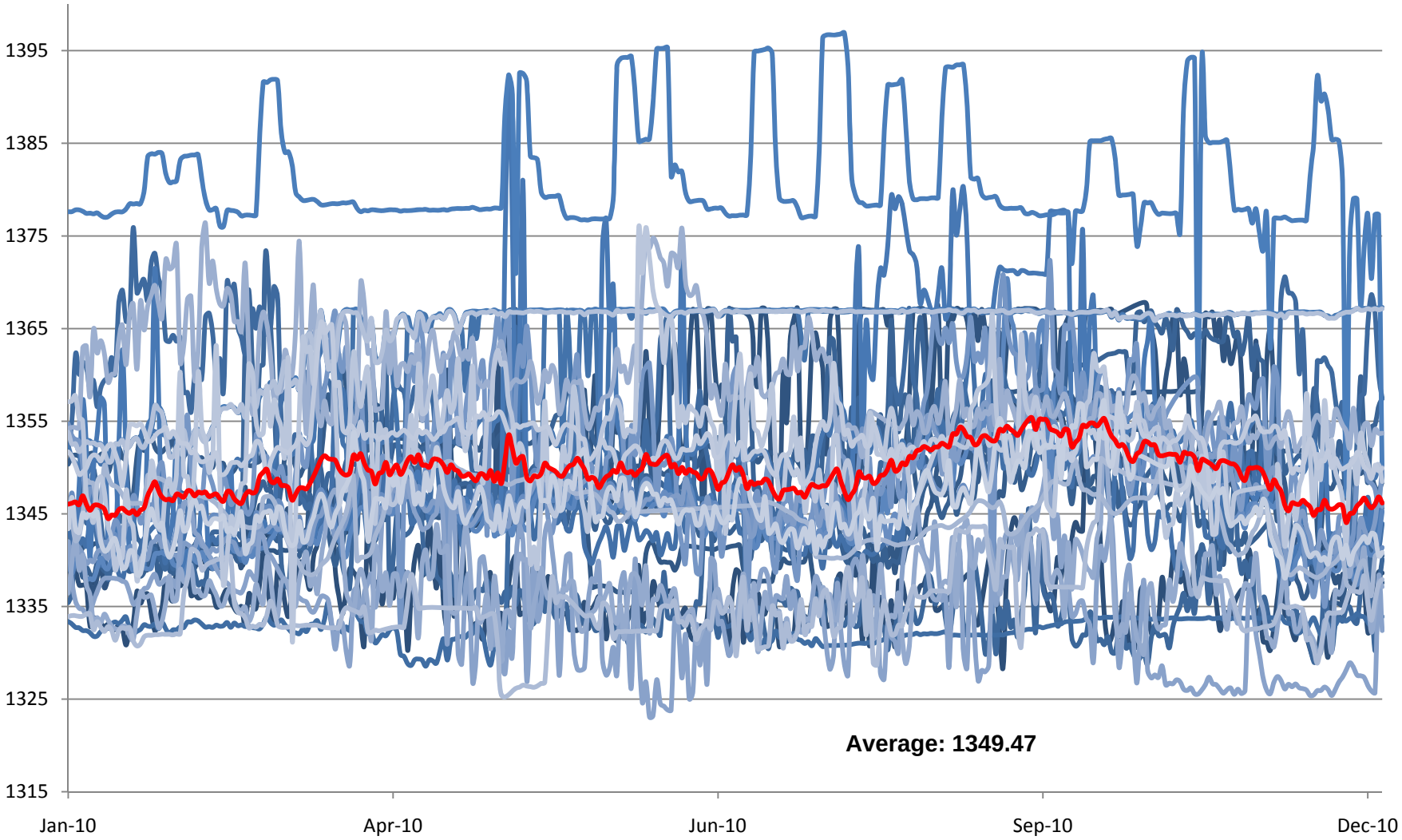
Tennessee Gas Pipeline
an El Paso company



2009 Data
Wobbe Number (BTU/SG $^{0.5}$)

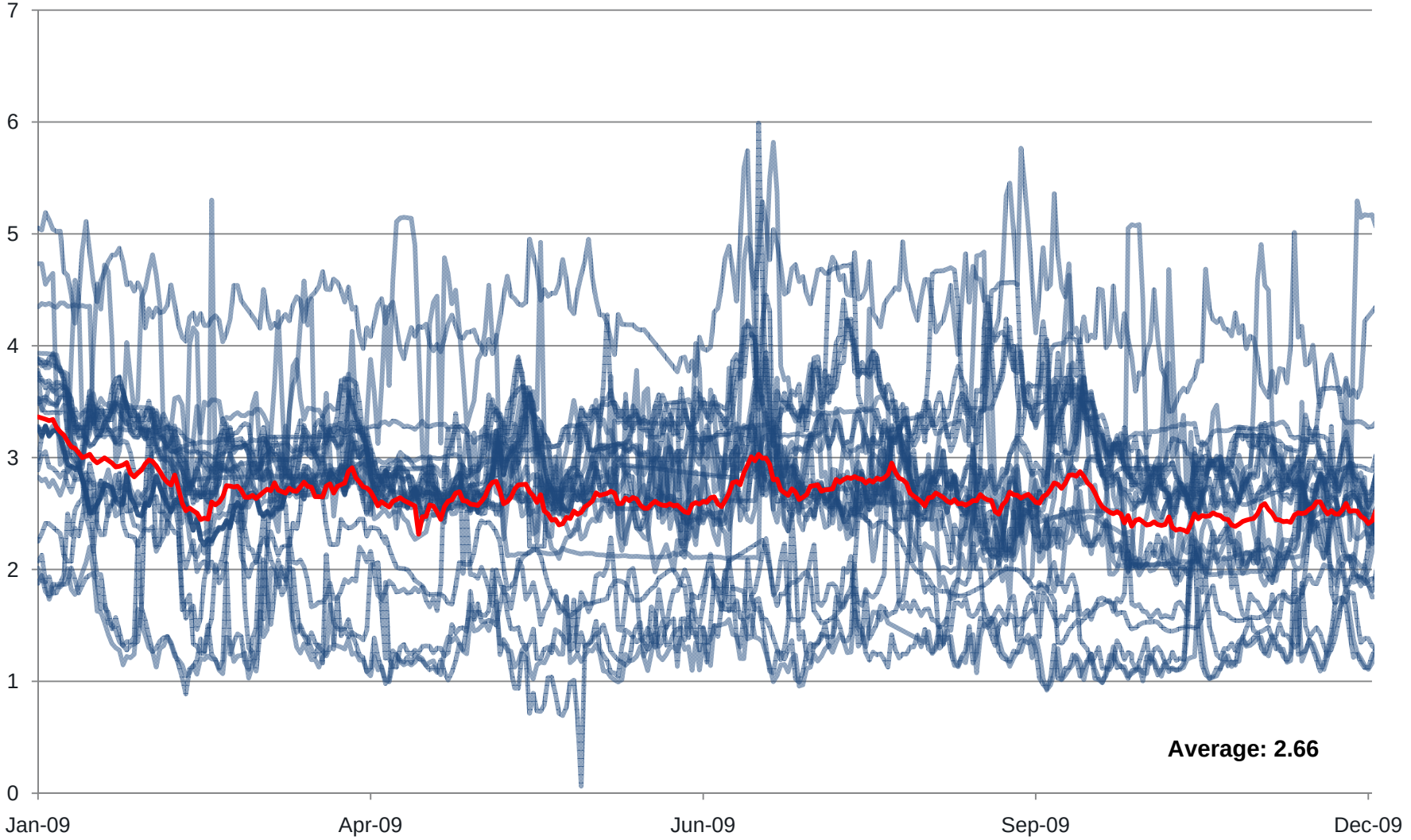


2010 Data
Wobbe Number (BTU/SG $^{0.}$,



2009 Data
C2 Plus (Mole %)

Tennessee Gas Pipeline
an El Paso company



2010 Data
C2 Plus (Mole %)

Tennessee Gas Pipeline
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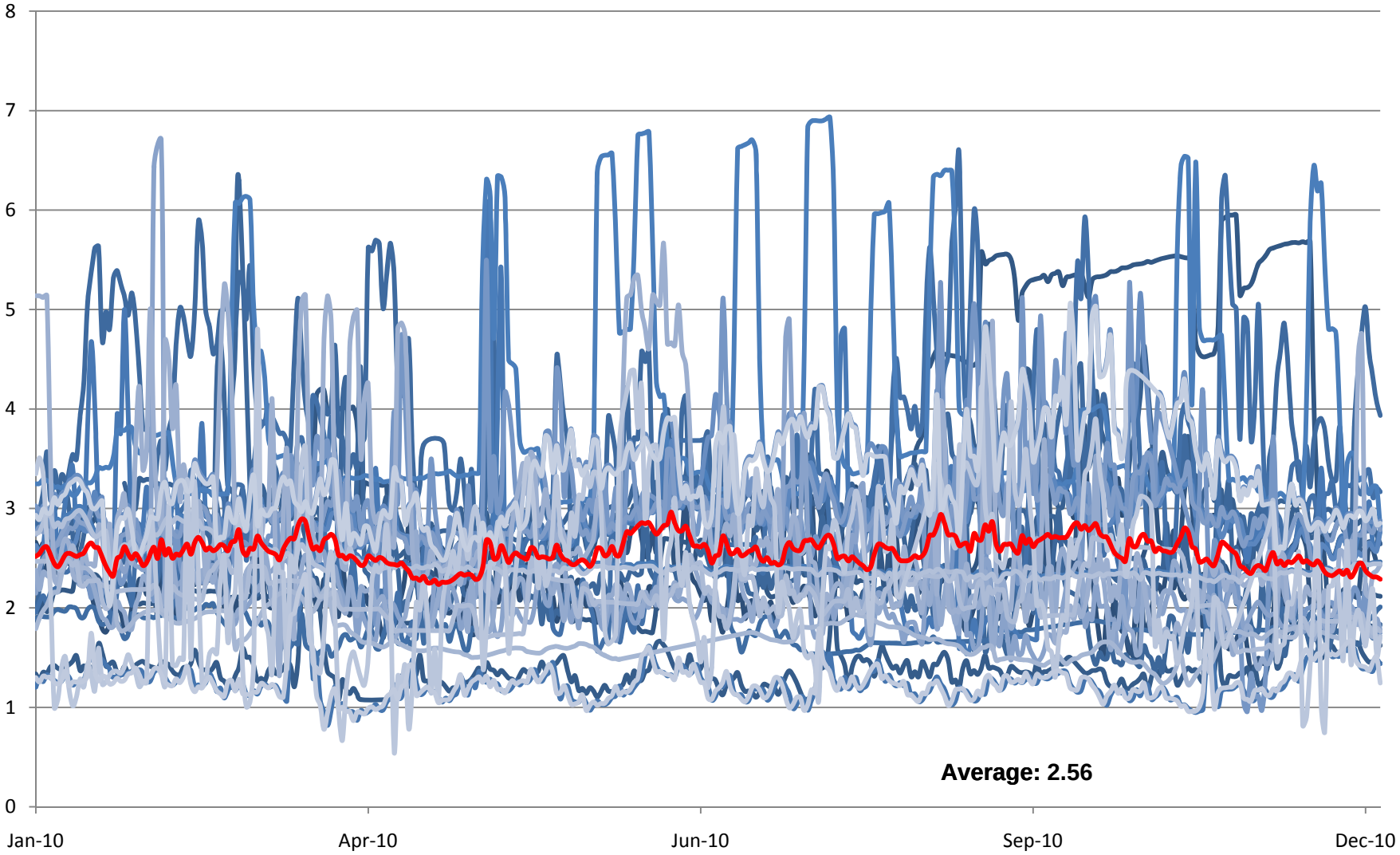
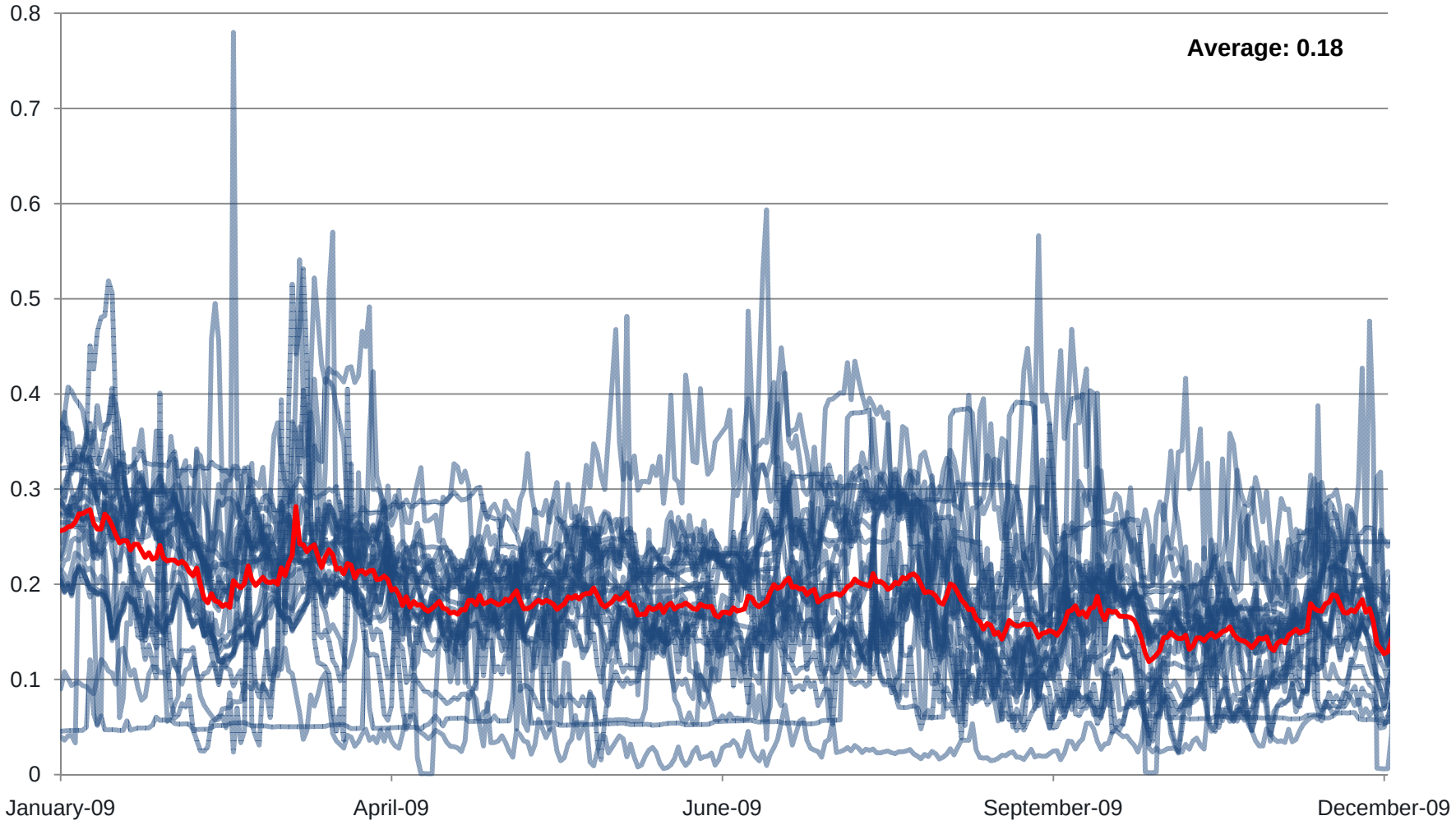


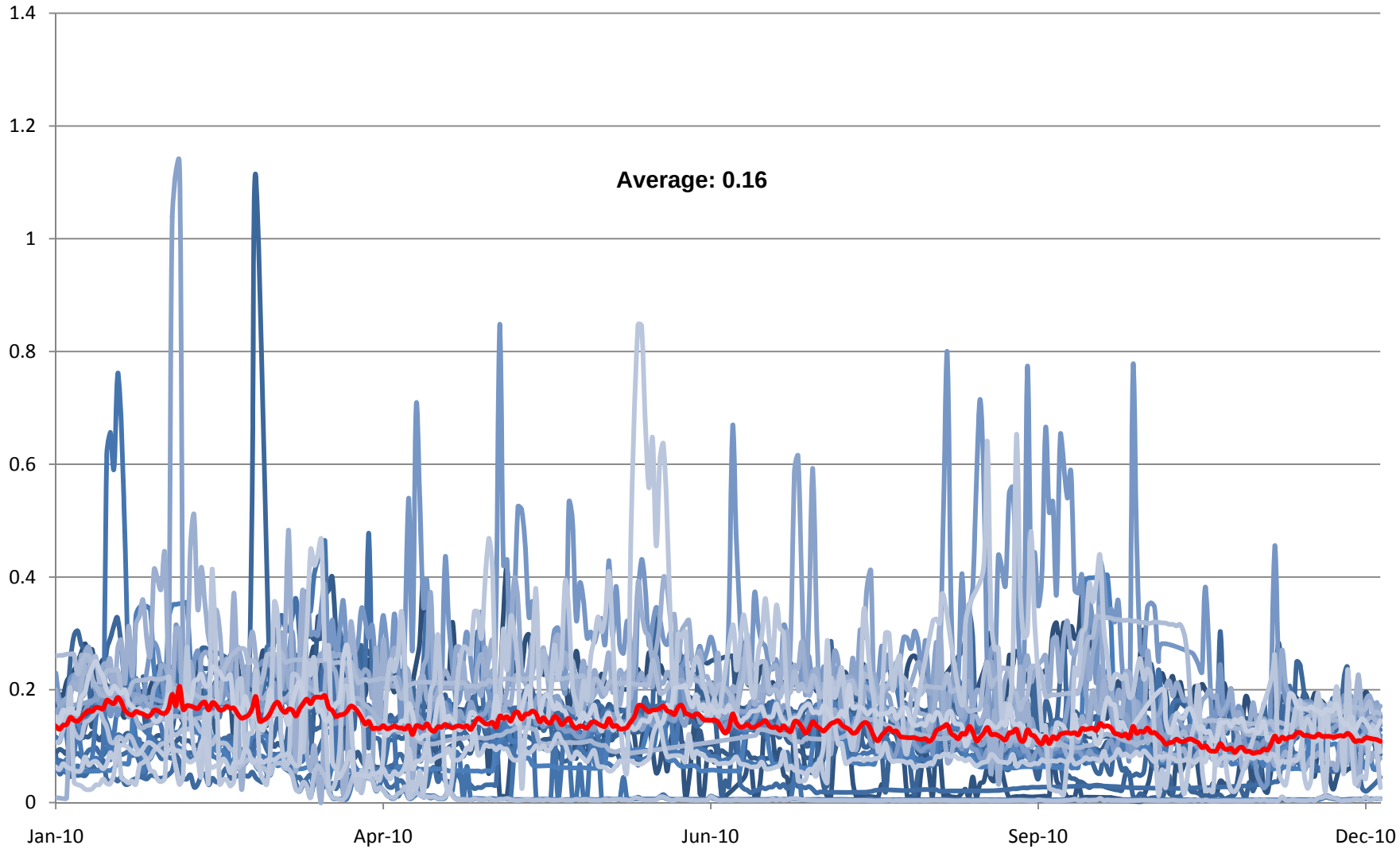
2009 Data
C4 Plus (Mole %)

Tennessee Gas Pipeline
an El Paso company



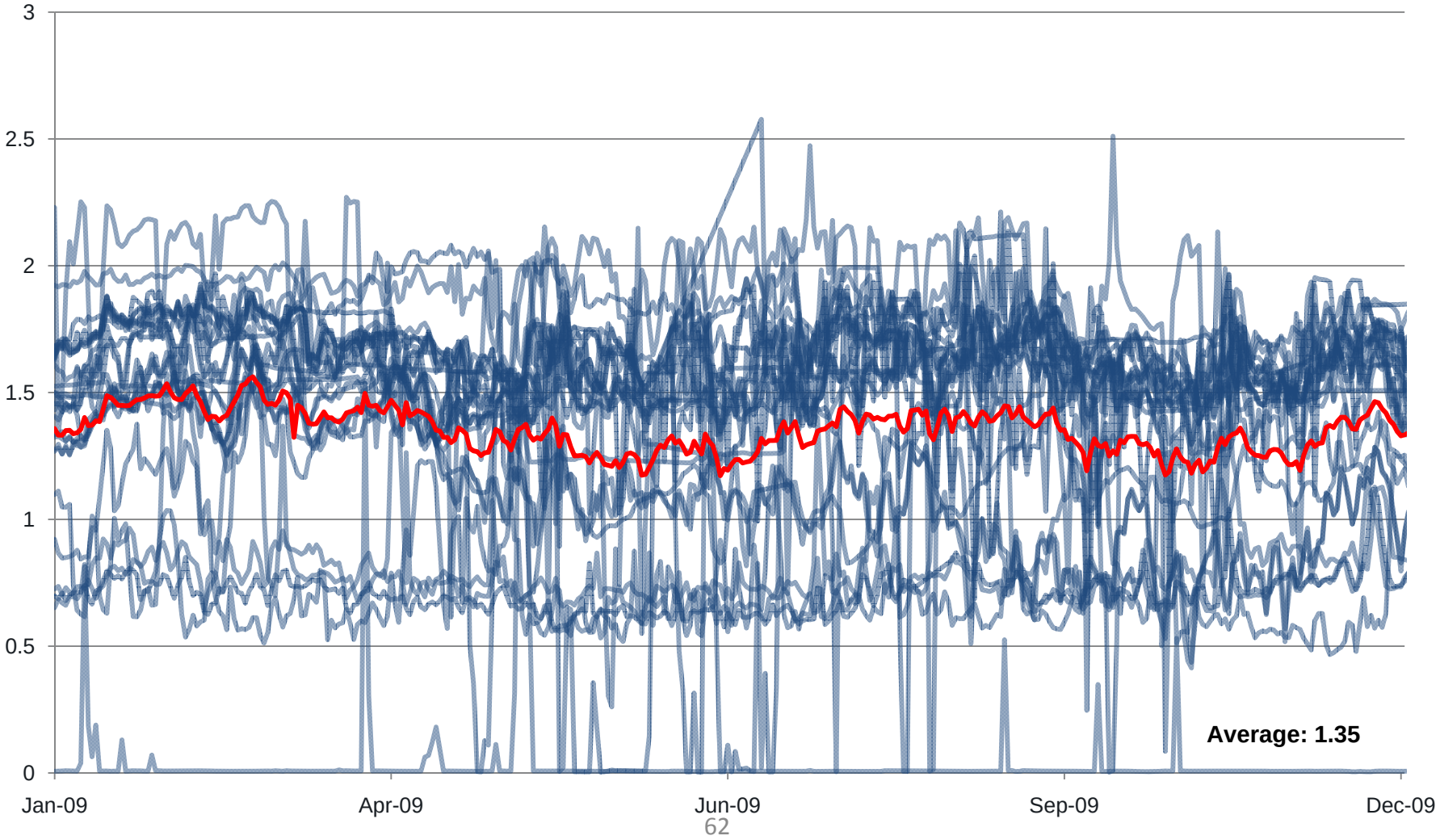
2010 Data
C4 Plus (Mole %)

Tennessee Gas Pipeline
an El Paso company



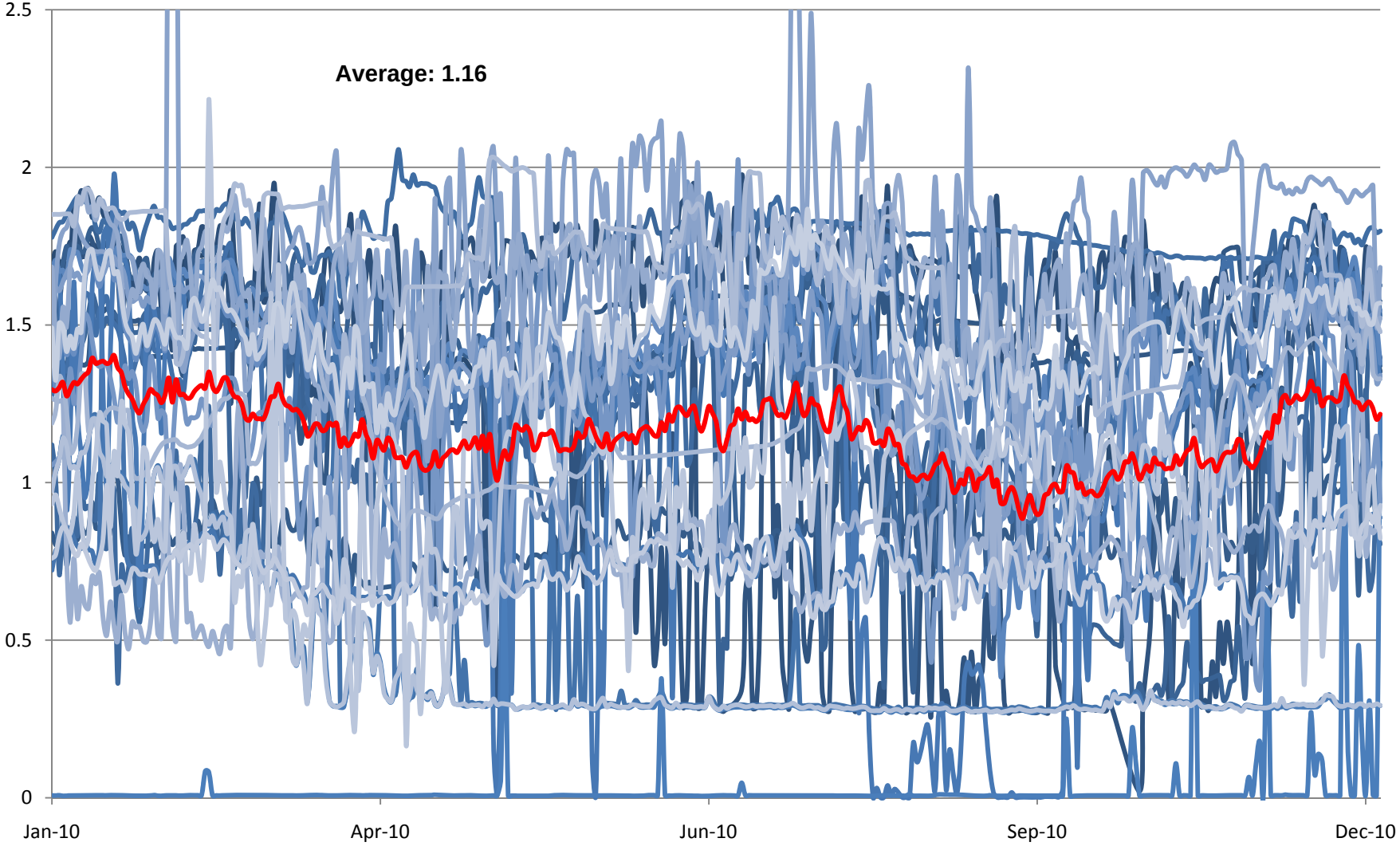
2009 Data
Total Diluents (Mole %)

Tennessee Gas Pipeline
an El Paso company



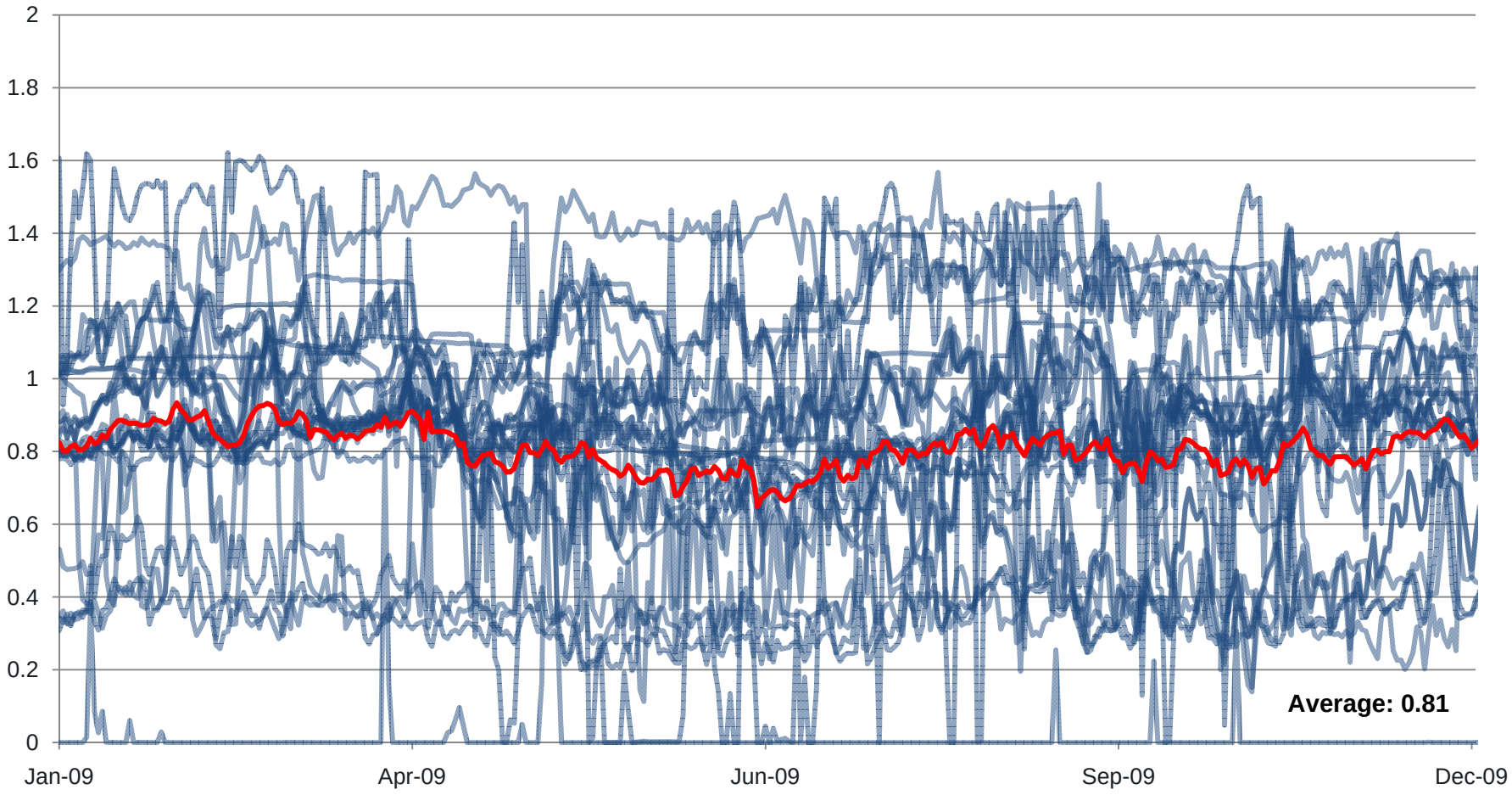
2010 Data
Total Diluents (Mole %)

Tennessee Gas Pipeline
an El Paso company



2009 Data – CO_2 (Mole %)

Tennessee Gas Pipeline
an El Paso company



2010 Data – CO_2 (Mole %)

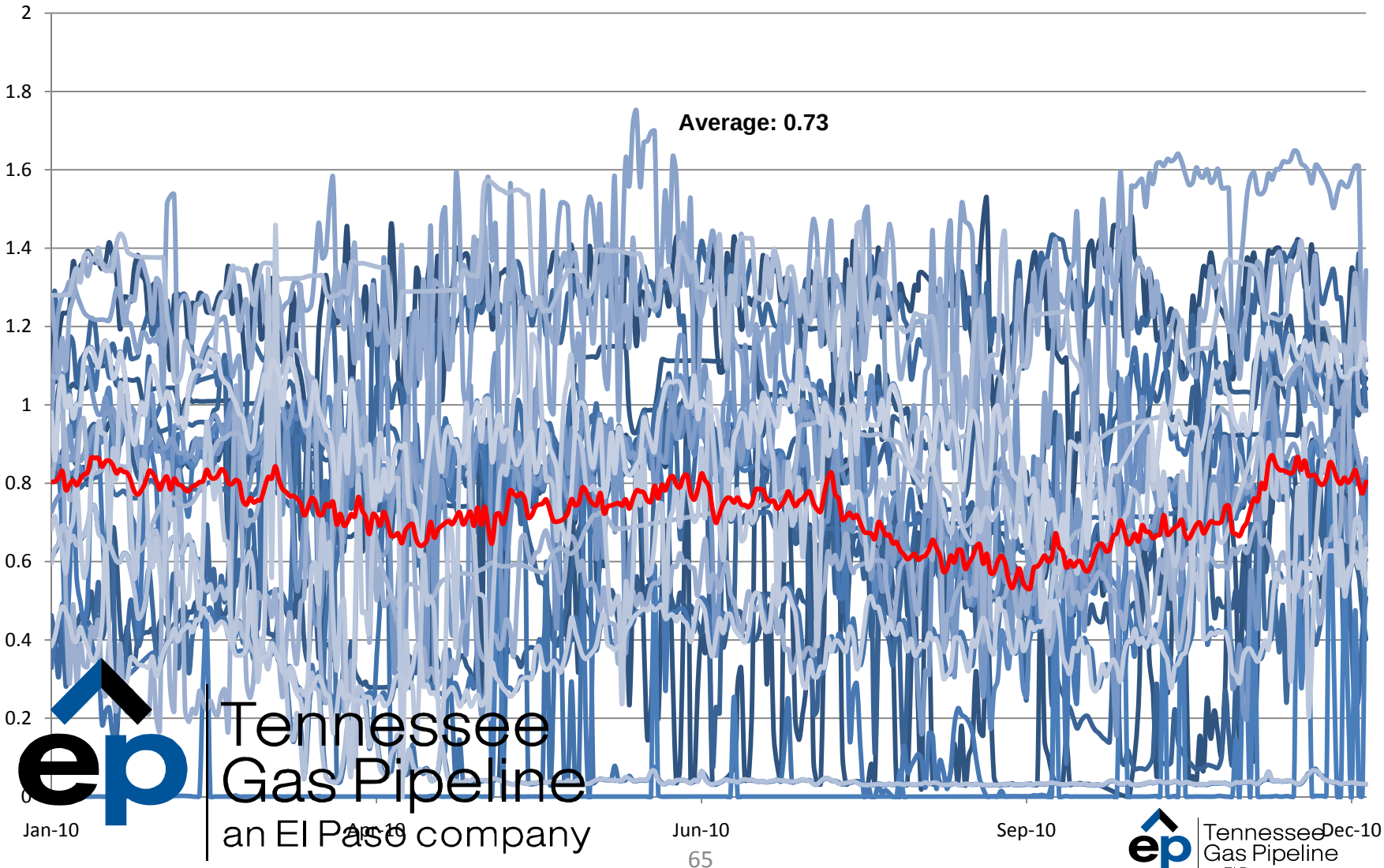


Exhibit A-2

WebEx Presentation from March 2011

INTERSTATE PIPELINES

Interchangeability

Proposed Tariff Changes & Strategy

WebEx Meeting

March 10, 2011

Tennessee Gas Pipeline
an El Paso company

Defining Our Purpose

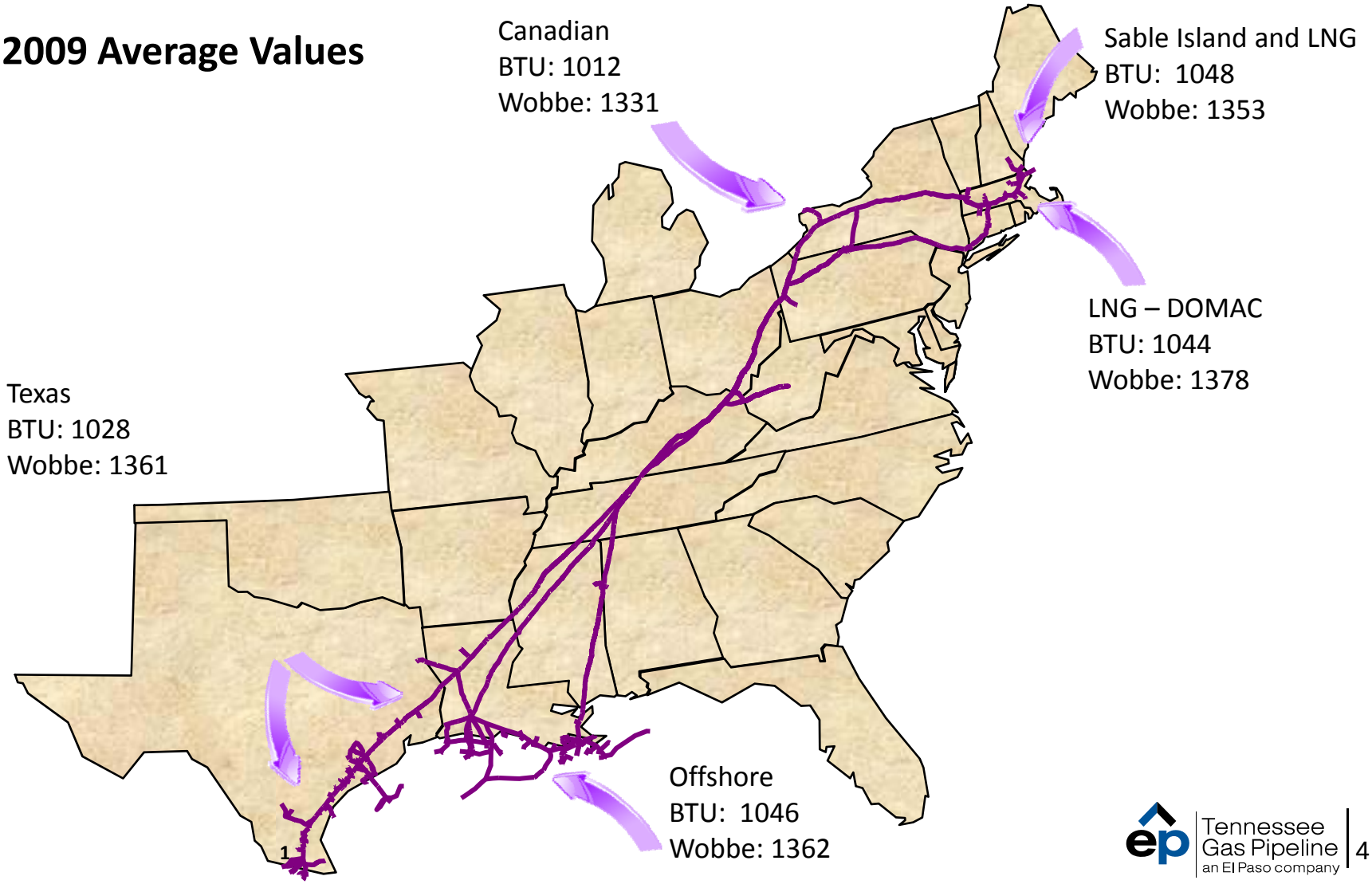
El Paso Corporation provides natural gas and related energy products in a safe, efficient, and dependable manner

Meeting Agenda

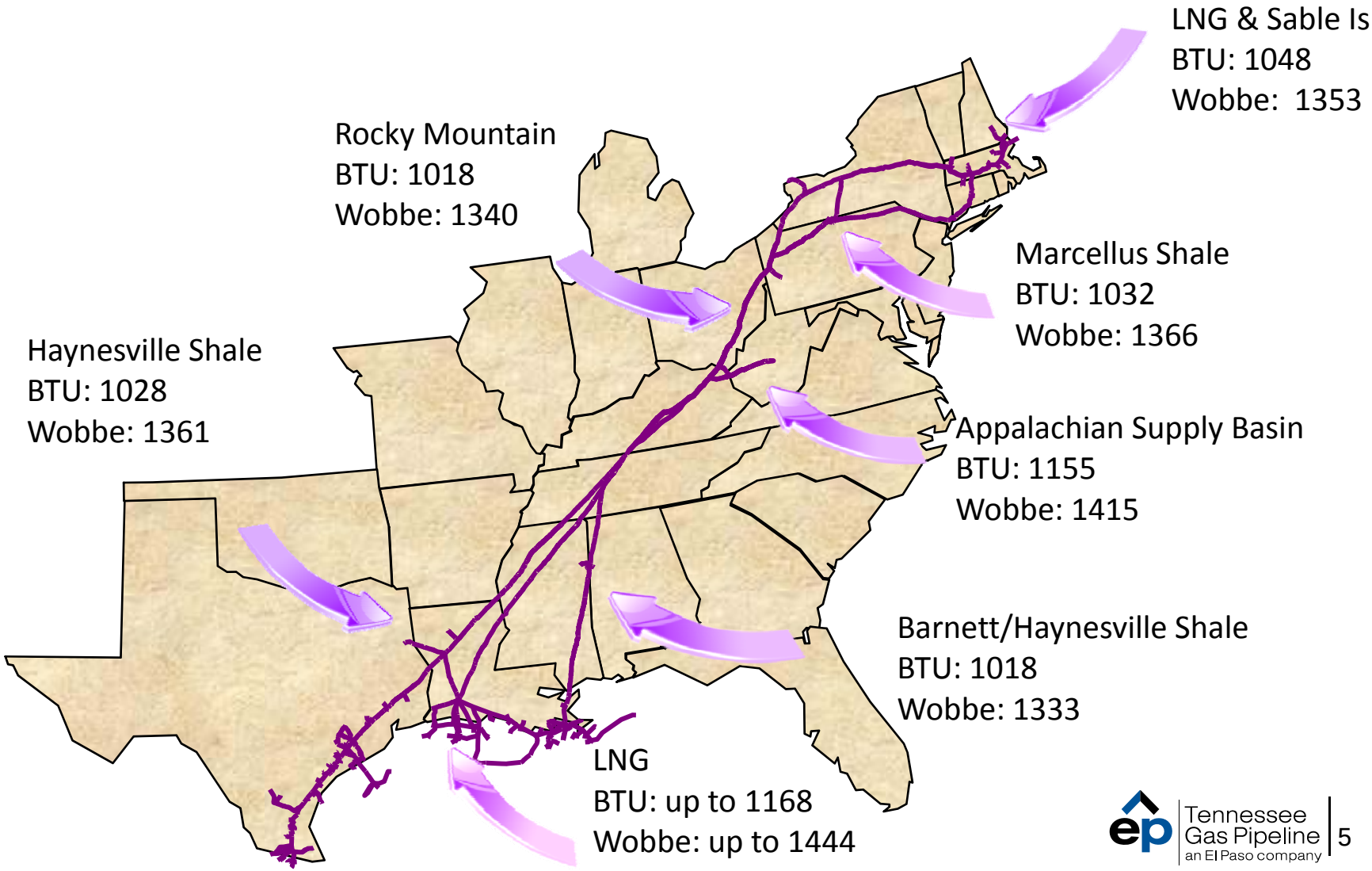
- Opening Remarks
- Proposed Tariff Specifications
- Interchangeability Points of Interest
- Tariff Revisions based on Comments
- Next Steps
- Questions

Historical System Supplies

2009 Average Values



New System Supplies



Proposed Tariff Specifications

- Safe Harbor
- Same methodology as employed with HDP in current Tennessee Tariff.

  - Safe Harbor approach
    - Will allow for maximizing system supply
    - Will allow for maintaining delivery expectations

  - Existing or expected delivery of gas exceeding delivery specifications would result in shut-in or restriction of receipts

Proposed Tariff Specifications

- Wobbe (HHV/SG $^{0.5)}$
  - Delivery – ~~1293~~ 1314 to 1400
    - Historical average is 1348
    - Historical average + 4% would result in a Wobbe of 1402, exceeding the 1400 NGC+ recommended upper limit.
  - Receipt
    - 1400 High Safe Harbor
    - ~~1293~~ 1314 Low Safe Harbor
- BTU
  - Delivery – 1110 Max, 967 Min
  - Receipt
    - 1110 High Safe Harbor
    - 967 Low Safe Harbor

Proposed Tariff Specifications

- C2+ (Ethane and heavier hydrocarbons)
  - Delivery – 12 mole percent max
  - Receipt – 12 mole percent max (Safe Harbor)

- C4+ (Butane and heavier hydrocarbons)
  - Delivery - 1.5 mole percent max
  - Receipt – 1.5 mole percent max (Safe Harbor)

- ~~H2~~
  - ~~Receipt – 3 mole percent~~

- Nitrogen – see total diluents
  - ~~Delivery – 2.75 mole percent max~~
  - ~~Receipt – 2.75 mole percent max (Safe Harbor)~~

Proposed Tariff Specifications

- CO2
  - Delivery – 2 mole percent
  - Receipt
    - 3 mole percent max
    - 2 mole percent (Safe Harbor)
- Total Sulfur
  - Receipt – 10 grains (reduced from 20)
- Non-Conventional (non-conforming) Gas
  - Free from bacteria, pathogens, and any other substances injurious to utility facilities or would cause the gas to be unmarketable

Proposed Tariff Specifications

- Total Diluents – combined N2, CO2, O2
  - Delivery
    - 4 mole % ~~- no change~~
      - CO2 not to exceed 2%
      - N2+O2 not to exceed 2.75%
  - Receipt – Safe Harbor
    - 4 mole %
      - CO2 not to exceed 3%
      - N2+O2 not to exceed 2.75%
      - O2 not to exceed 0.2%

Proposed Tariff Specifications

- O2
  - 0.2 mole % - no change
- H2S
  - 0.25 grain per 100 cf - no change
- Water Vapor
  - 7.0 lbs/mmscf - no change

Gas Quality Tariff Comparison

			Delivery		Receipt	
	Units	Limit Type	Current	Proposed	Current	Proposed
Heating Value	BTU	Minimum	967	967	967	967 (Safe Harbor)
		Maximum	1100 (citygate only)	1110	1100	1110 (Safe Harbor)
Objectionable matter			Commercially free	Commercially free	Commercially free	Commercially free
Total Sulphur	grains/100 cf	Maximum	20	10	20	10
Hydrogen Sulfide	grains/100 cf	Maximum	1	0.25	0.25	0.25
Oxygen	% by volume	Maximum	-	0.2	0.2	0.2
Carbon Dioxide	% by volume	Maximum	-	2	3	3 (Max) 2 (Safe Harbor)
Carbon Dioxide + Nitrogen	% by volume	Maximum	-	4	4	4
Temperature	°F	Maximum	-	-	120	120
Water Vapor	#/MMCF	Maximum	-	-	7	7
[(1)]Cricondentherm Hydrocarbon Dewpoint	°F	Safe Harbor	-	-	15	15
Nitrogen	% by volume	Maximum	-	2.75	-	2.75 (Safe Harbor)
Wobbe	HHV/SG 0.5	Minimum	-	1293	-	1293 (Safe Harbor)
		Maximum	-	1400	-	1400 (Safe Harbor)
Hydrogen	% by volume	Maximum	-	-	-	3
C2+ (Ethane & heavier)	% by volume	Maximum	-	12	-	12 (Safe Harbor)
C4+ (Butane & heavier)	% by volume	Maximum	-	1.5	-	1.5 (Safe Harbor)
Microbes, bacteria, pathogens, etc.			-	Free from	-	Free from

(1) <500 dth/d or upstream of processing or storage withdrawal exempt to extent that it does not create undue risk.

Gas Quality Tariff Comparison

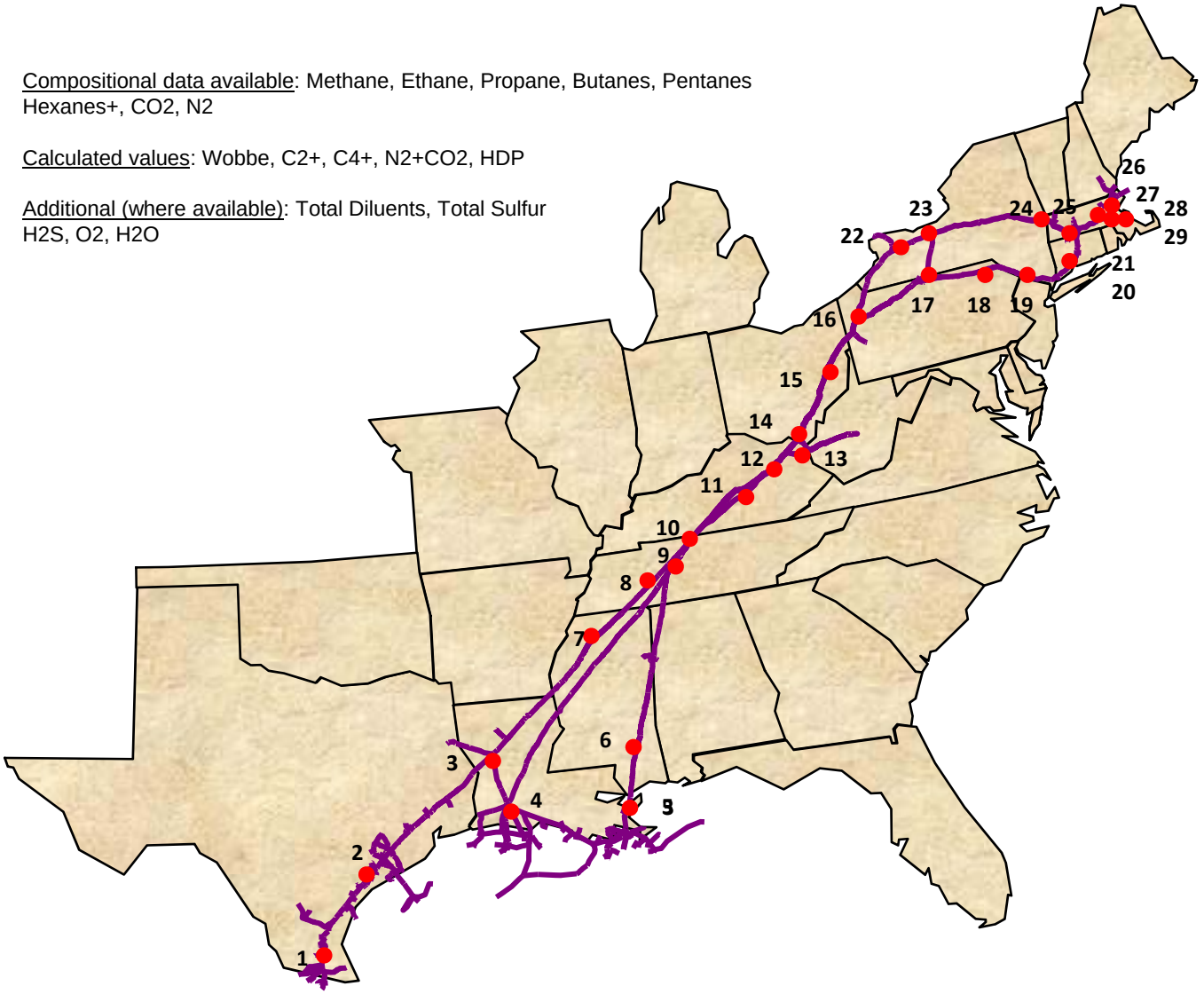
Gas Quality Specification	TGP Current	TGP Proposed	AGT	Columbia Gas [1]	Dominion	NFG	TETPL [2]	Transco	NGC+ Guidelines
Wobbe	-	1293 - 1400	1314 - 1400	1295- 1400	-	-	1314 - 1400	-	1400
Heating Value - BTU/SCF -Min Heating Value - BTU/SCF – Max	967 1100	967 Safe Harbor 1110 Safe Harbor	967 1110	967 1110	967 1100	967 -	967 1110	980 1100	967 1110
C2+ Mole %	-	12% Max Delivery 12% Safe Harbor Receipt	12%	-	-	-	12%	-	-
C4+ Mole %	-	1.5 % Max Delivery 1.5 % Safe Harbor Receipt	1.5%	-	-	-	1.5%	-	1.5%
Oxygen Mole %	0.20%	0.20%	0.20%	0.02%	0.20%	0.20%	0.10%	-	
Total Diluents Mole %	4.0%	no change	4.0% 2.75%(O2+N2)	4.0%	5.0%	4.0%	4.0% (CO2+N2) 2.75% (N2+O2)	-	4.0%
Carbon Dioxide Mole %	3.0%	3.0 Mole % Max Receipt 2.0 Mole % Safe Harbor Receipt	2.00%	1.25%	3.0%	2.0%	2.0%	-	-
Nitrogen Mole %	-	-	(See Total Diluents)	-	4.0%	-	(See Total Diluents)	-	-
Hydrogen Sulfide - Grain/100 scf	0.25	no change	0.50	0.25	0.25	0.30	.5	0.30	-
Total Sulphur - Grain/100 scf	20	10	10	2	20	20	5	20	-
Liquefiable Hydrocarbons (Cricondentherm)	15 Deg F Safe Harbor	no change	-	25 Deg F	Free at flowing conditions	Free	0.32 GPM C6+ Safe Harbor Correlated 15 Deg F	-	-
Temperature - Deg F	120 Max		-	125 Max	-		120 Max	120 Max	-
Water Vapor - #/mmscf	7	no change	7	7	7	7	7	7	-
Microbial Agents	-	Free	-	Free	Free	-	Free	-	-

Interchangeability Points of Interest

Compositional data available: Methane, Ethane, Propane, Butanes, Pentanes Hexanes+, CO2, N2

Calculated values: Wobbe, C2+, C4+, N2+CO2, HDP

Additional (where available): Total Diluents, Total Sulfur H2S, O2, H2O



1- Rio Bravo, TX	RIO1
2- Aqua Dulce, TX	VAY1
3 - Kinder , LA	CTO2
4-Yscloskey, LA	YSA2
5- Natchitoches, LA	NAT 1
6- Heidelburg, MS	HEI 2
7- Batesville, MS	BAT 1
8- Centerville, TN	CEN 1
9-TVA, TN	TVA 1
10- Portland, TN	PTD 1
11- Dry Creek,KY	TET 1
12- North Means, KY	NMN 1
13- Catlettburg, KY	CAT 1
14- Greenup, KY	GNP1
15- Petersburg, OH	PET 1
16- Mercer, PA	MER 1
17- Coudersport, PA	COU 1
18- Union Dale, PA	UND 1
19- Mahwah, NJ	MAH 1
20– Greenwich, CT	GRW1
21- Bloomfield, CT	BLO 1
22-East Aurora, NY	EAS 2
23- Clifton Springs, NY	CLI 1
24- Niagara Mohawk, NY	NIM 2
25- Agawam, MA	AGM 1
26- Mendon, MA	MEN 1
27- Hopkinton, MA	HOP 2
28- Dracut, MA	DRA1
29- Maldon, MA	MAL 1

Proposed Tariff Revisions

- Add definition of Interchangeability Problem similar to HDP Problem
- Failure to conform (Article II, Section 4)
  - Delete: If Shipper does not notify Transporter of any deficiency, Shipper shall be deemed to accept such nonconforming gas…
- Receipt Specifications (Article II, Section 5)
  - To the extent Transporter is able to meet delivery specifications set forth in Article II, Section 3 and to the extent that all other gas quality specifications are met, Transporter shall ~~may elect to~~ receive gas …outside the Safe Harbor standards.

Proposed Tariff Revisions

- Conform Interchangeability procedures for posting limitations to HDP procedures (Article II, Section 6)
- Waiver for Transporter acceptance of non-conforming gas – add back HDP Problem and include Interchangeability Problem (Article II , Section 9)
- Clarify PTR Transportation (Article II, Section 12)
  - Any Shipper transporting PTR shall be required to enter into a PTR Transportation Agreement with Transporter for the transportation of any PTR quantities or a Transportation Contract under Rate Schedule IT for the transportation of PTR make-up quantities

Next Steps

- Comments on tariff due February 18 - complete
- Follow up WebEx if needed March 4 – complete 3/10
- Draft filing circulated March 21
- File no later than March 31

Questions

Exhibit A-3

WebEx Presentation from February 2011

INTERSTATE PIPELINES

Interchangeability

Proposed Tariff Changes & Strategy

WebEx Meeting

February 11, 2011

Tennessee Gas Pipeline
an El Paso company

Defining Our Purpose

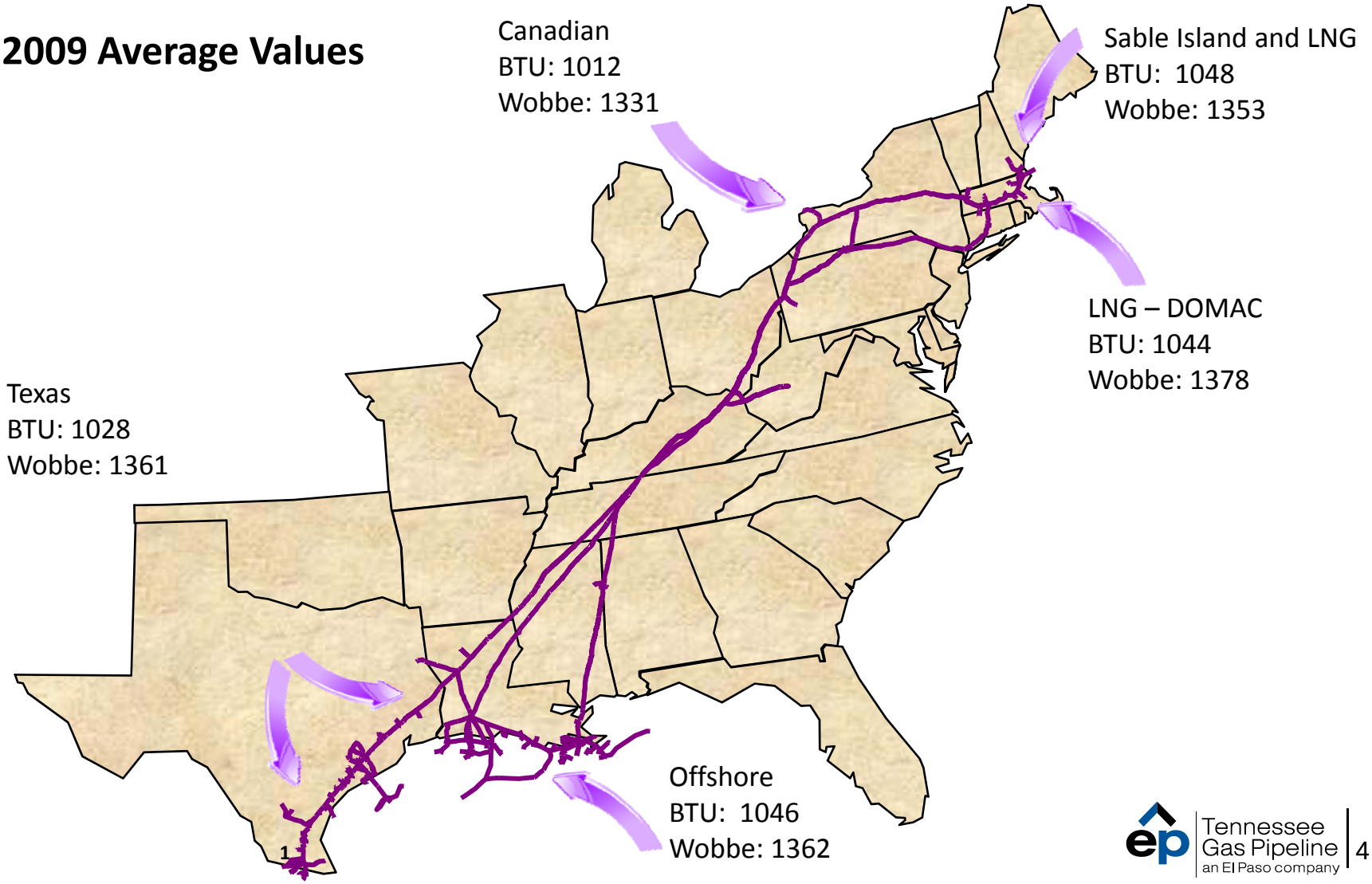
El Paso Corporation provides natural gas and related energy products in a safe, efficient, and dependable manner

Meeting Agenda

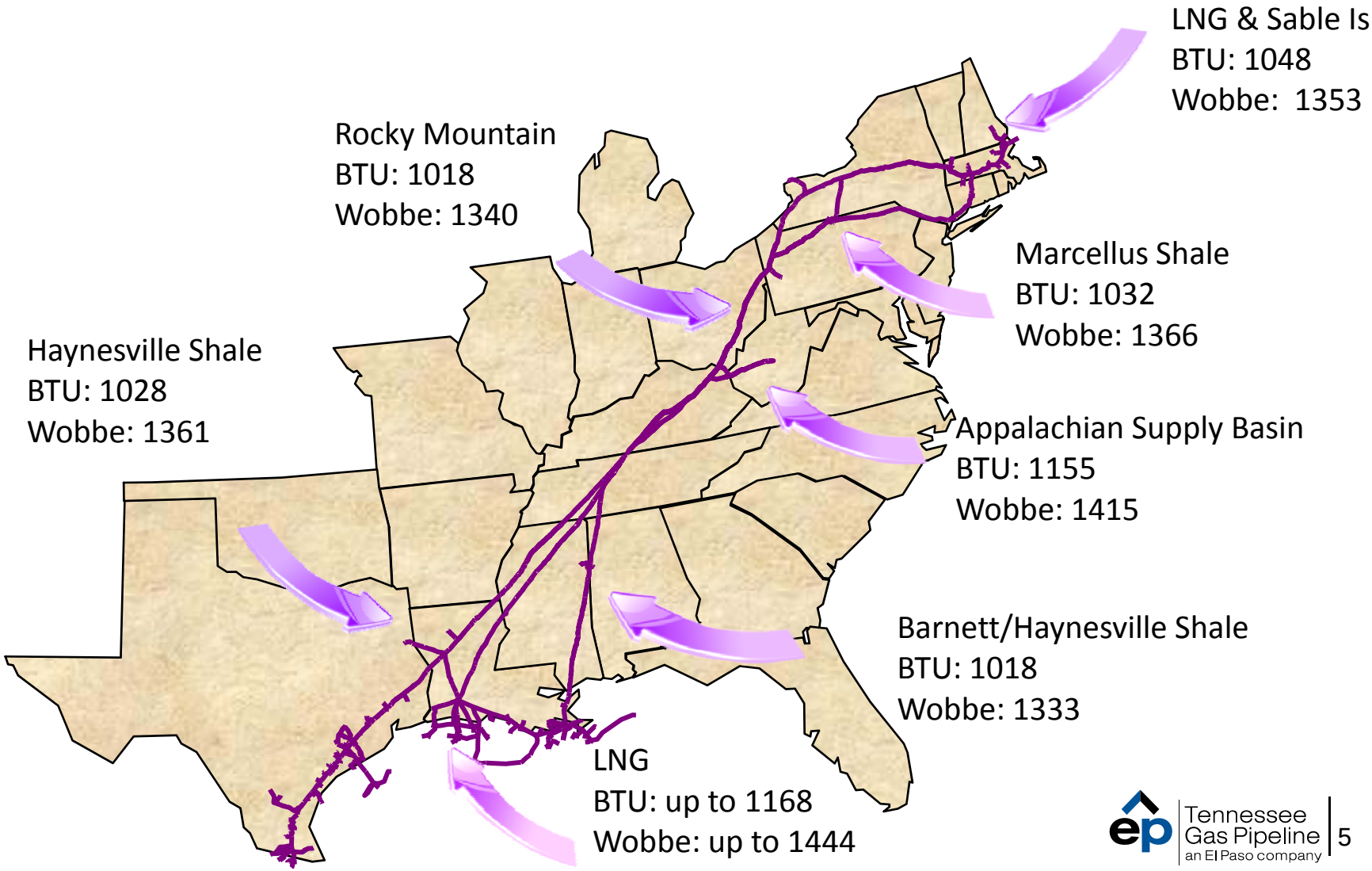
- Opening Remarks
- Changing System Supplies
- Proposed Tariff Specifications
- Interchangeability Points of Interest
- Tariff Sheet Review
- Next Steps
- Questions

Historical System Supplies

2009 Average Values



New System Supplies



Proposed Tariff Specifications

- Safe Harbor
- Same methodology as employed with HDP in current Tennessee Tariff.

  - Safe Harbor approach
    - Will allow for maximizing system supply
    - Will allow for maintaining delivery expectations

  - Existing or expected delivery of gas exceeding delivery specifications would result in shut-in or restriction of receipts

Proposed Tariff Specifications

- Wobbe (HHV/SG $^{0.5)}$
  - Delivery – 1293 to 1400
    - Historical average is 1348
    - Historical average + 4% would result in a Wobbe of 1402, exceeding the 1400 NGC+ recommended upper limit.
  - Receipt
    - 1400 High Safe Harbor
    - 1293 Low Safe Harbor
- BTU
  - Delivery – 1110 Max, 967 Min
  - Receipt
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- Wobbe (HHV/SG $^{0.5)}$
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  - Delivery – 1110 Max, 967 Min
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Proposed Tariff Specifications

- CO2
  - Delivery – 2 mole percent
  - Receipt
    - 3 mole percent max
    - 2 mole percent (Safe Harbor)
- Total Sulfur
  - Receipt – 10 grains (reduced from 20)
- Non-Conventional Gas
  - Free from bacteria, pathogens, and any other substances injurious to utility facilities or would cause the gas to be unmarketable

Proposed Tariff Specifications

- Total Diluents
  - ⇢ 4 mole % - no change
- O2
  - ⇢ 0.2 mole % - no change
- H2S
  - ⇢ 0.25 grain per 100 cf - no change
- Water Vapor
  - ⇢ 7.0 lbs/mmscf - no change

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	Units	Limit Type	Current	Proposed	Current	Proposed
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Total Sulphur	grains/100 cf	Maximum	20	10	20	10
Hydrogen Sulfide	grains/100 cf	Maximum	1	0.25	0.25	0.25
Oxygen	% by volume	Maximum	-	0.2	0.2	0.2
Carbon Dioxide	% by volume	Maximum	-	2	3	3 (Max) 2 (Safe Harbor)
Carbon Dioxide + Nitrogen	% by volume	Maximum	-	4	4	4
Temperature	°F	Maximum	-	-	120	120
Water Vapor	#/MMCF	Maximum	-	-	7	7
[(1)]Cricondentherm Hydrocarbon Dewpoint	°F	Safe Harbor	-	-	15	15
Nitrogen	% by volume	Maximum	-	2.75	-	2.75 (Safe Harbor)
Wobbe	HHV/SG 0.5	Minimum	-	1293	-	1293 (Safe Harbor)
		Maximum	-	1400	-	1400 (Safe Harbor)
Hydrogen	% by volume	Maximum	-	-	-	3
C2+ (Ethane & heavier)	% by volume	Maximum	-	12	-	12 (Safe Harbor)
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Microbes, bacteria, pathogens, etc.			-	Free from	-	Free from

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Oxygen Mole %	0.20%	0.20%	0.20%	0.02%	0.20%	0.20%	0.10%	-	
Total Diluents Mole %	4.0%	no change	4.0% 2.75%(O2+N2)	4.0%	5.0%	4.0%	4.0% (CO2+N2) 2.75% (N2+O2)	-	4.0%
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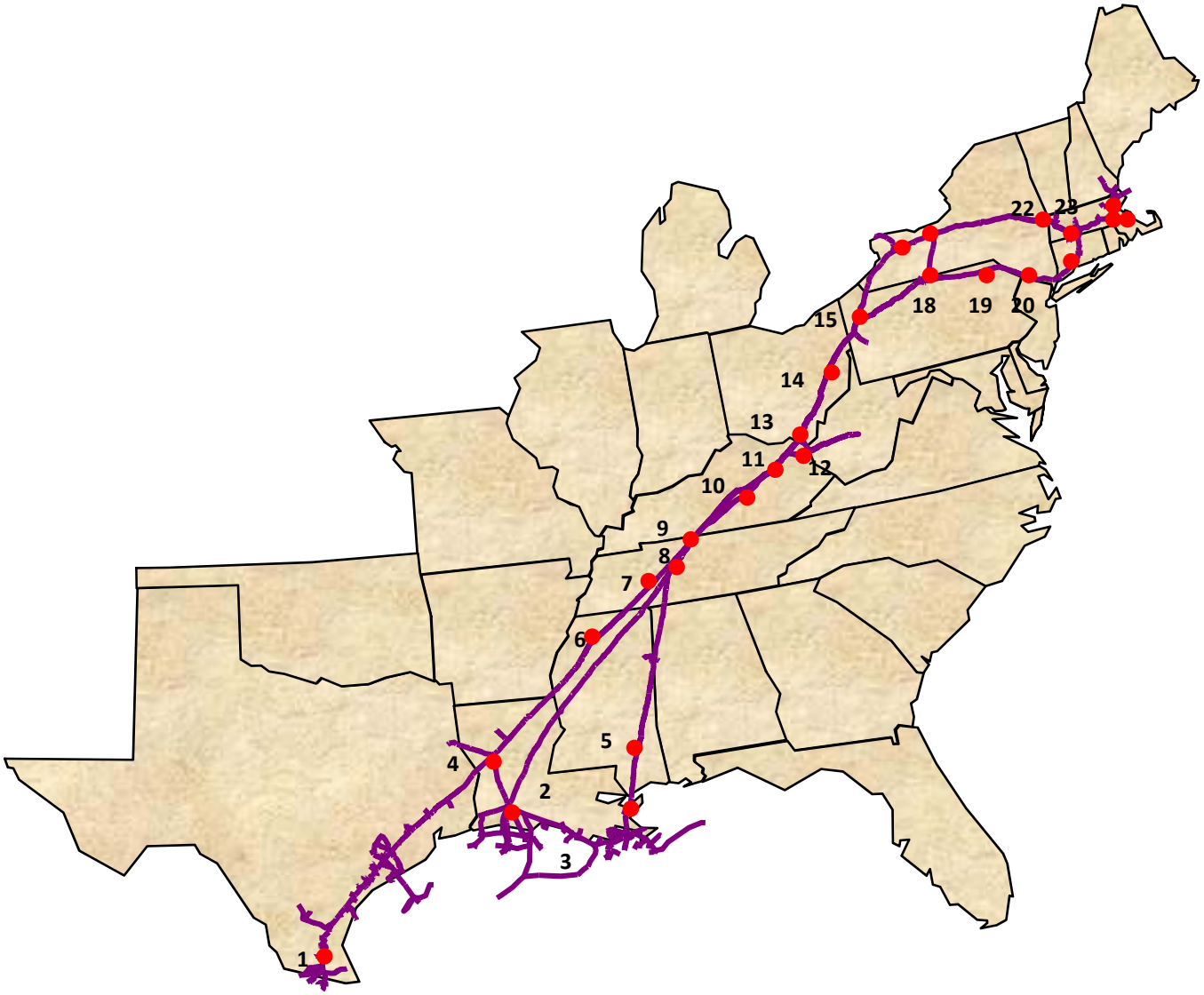
Total Sulphur - Grain/100 scf	20	10	10	2	20	20	5	20	-
Liquefiable Hydrocarbons (Cricondentherm)	15 Deg F Safe Harbor	no change	-	25 Deg F	Free at flowing conditions	Free	0.32 GPM C6+ Safe Harbor Correlated 15 Deg F	-	-
Temperature - Deg F	120 Max		-	125 Max	-		120 Max	120 Max	-
Water Vapor - #/mmscf	7	no change	7	7	7	7	7	7	-
Microbial Agents	-	Free	-	Free	Free	-	Free	-	-

Interchangeability Points of Interest



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23- Agawam, MA	AGM 1
24- Maldon, MA	MAL 1
25- Hopkinton, MA	HOP 2
26- Mendon, MA	MEN 1

Next Steps

- Comments on tariff due February 18
- Follow up WebEx if needed March 4
- Draft filing circulated March 15
- File no later than March 31

Questions

Exhibit A-4

WebEx Presentation from October 2010 used at WebEx Presentations in the Fa11 of 2010

Tennessee Gas Pipeline Company

Interchangeability

Proposed Tariff Changes and Strategy

October 2010

Defining Our Purpose

Tennessee Gas Pipeline
an El Paso company

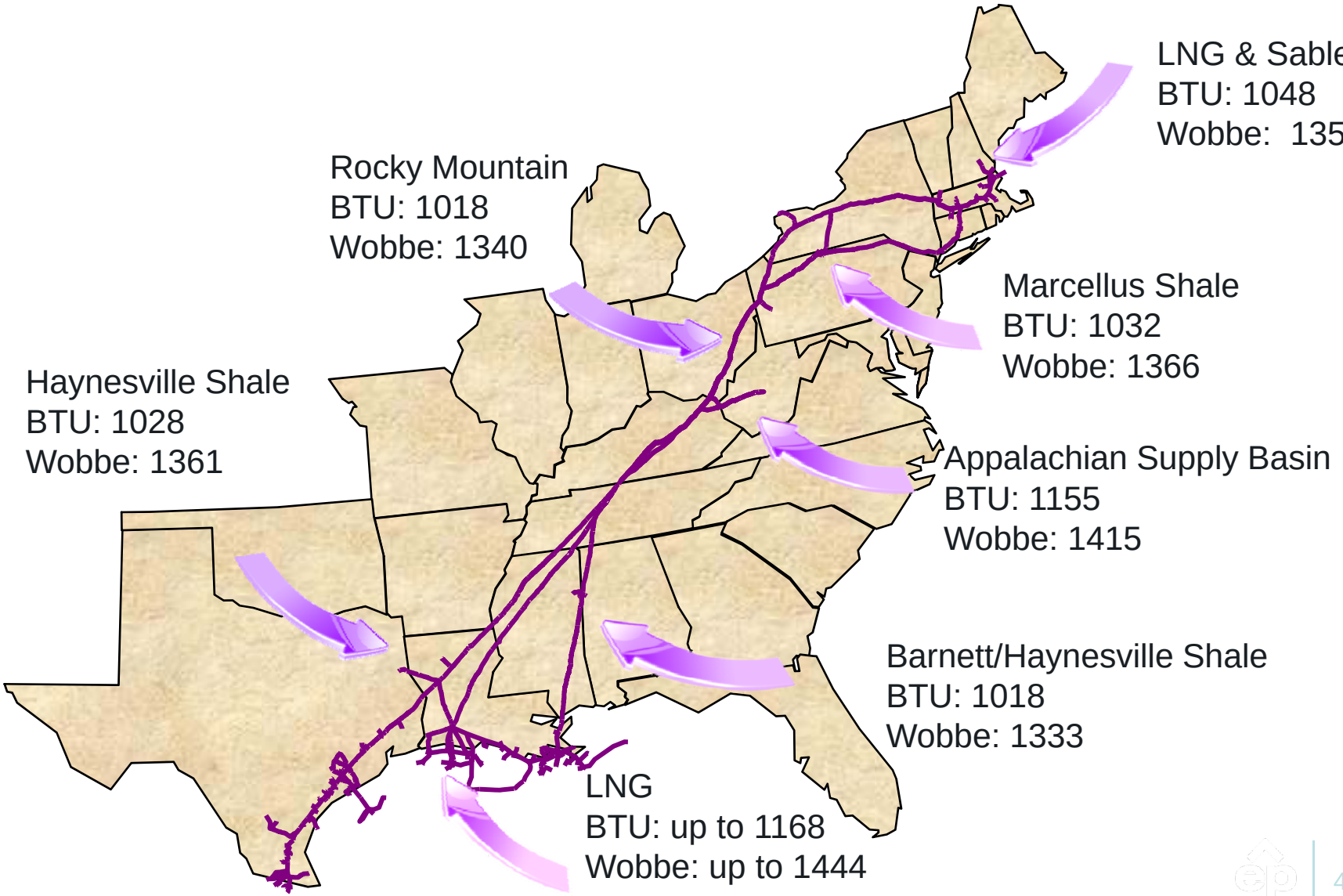
El Paso Corporation provides natural gas and related energy products in a safe, efficient, and dependable manner

Meeting Agenda

- Opening Remarks
- Changing System Supplies
- Interchangeability Tariff Specification Considerations
- Flow Studies
- Interchangeability Points of Interest
- Q&A and Discussion

New System Supplies

Tennessee Gas Pipeline
an El Paso company



Proposed Tariff Specifications

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    - Will allow for maintaining delivery expectations
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    - 1400 High Safe Harbor
    - 1293 Low Safe Harbor
- BTU
  - Delivery – 1110 Max, 967 Min
  - Receipt
    - 1110 High Safe Harbor
    - 967 Low Safe Harbor

Proposed Tariff Specifications

- C2+ (Ethane and heavier hydrocarbons)
  - Delivery – 12 mole percent max
  - Receipt – 12 mole percent max (Safe Harbor)
- C4+ (Butane and heavier hydrocarbons)
  - Delivery - 1.5 mole percent max
  - Receipt – 1.5 mole percent max (Safe Harbor)
- H2
  - Receipt – 3 mole percent

Proposed Tariff Specifications

- CO2
  - Delivery – 2 mole percent
  - Receipt
    - 3 mole percent max
    - 2 mole percent (Safe Harbor)
- Total Sulfur
  - Receipt – 10 grains (reduced from 20)
- Non-Conventional Gas
  - Free from bacteria, pathogens, and any other substances injurious to utility facilities or would cause the gas to be unmarketable

Proposed Tariff Specifications

- Total Diluents
  - 4 mole % - no change
- O2
  - 0.2 mole % - no change
- H2S
  - 0.25 grain per 100 cf - no change
- Water Vapor
  - 7.0 lbs/mmscf - no change

Gas Quality Tariff Comparison

Tennessee Gas Pipeline
an El Paso company

Gas Quality Specification	TGP Current	TGP Proposed	AGT	Columbia Gas [1]	Dominion	NFG	TETPL [2]	Transco	NGC+ Guidelines
Wobbe	-	1293 - 1400	1314 - 1400	1295-1400	-	-	1314 - 1400	-	1400
Heating Value - BTU/SCF -Min Heating Value - BTU/SCF - Max	967 1100	967 Safe Harbor 1110 Safe Harbor	967 1110	967 1110	967 1100	967 -	967 1110	980 1100	967 1110
C2+ Mole %	-	12% Max Delivery 12% Safe Harbor Receipt	12%	-	-	-	12%	-	-
C4+ Mole %	-	1.5 % Max Delivery 1.5 % Safe Harbor Receipt	1.5%	-	-	-	1.5%	-	1.5%
Oxygen Mole %	0.20%	0.20%	0.20%	0.02%	0.20%	0.20%	0.10%	-	
Total Diluents Mole %	4.0%	no change	4.0% 2.75%(O2+N2)	4.0%	5.0%	4.0%	4.0% (CO2+N2) 2.75% (N2+O2)	-	4.0%
Carbon Dioxide Mole %	3.0%	3.0 Mole % Max Receipt 2.0 Mole % Safe Harbor Receipt	2.00%	1.25%	3.0%	2.0%	2.0%	-	-
Nitrogen Mole %	-	-	(See Total Diluents)	-	4.0%	-	(See Total Diluents)	-	-
Hydrogen Sulfide - Grain/100 scf	0.25	no change	0.50	0.25	0.25	0.30	.5	0.30	-
Total Sulphur - Grain/100 scf	20	10	10	2	20	20	5	20	-
Liquefiable Hydrocarbons (Cricondentherm)	15 Deg F Safe Harbor	no change	-	25 Deg F	Free at flowing conditions	Free	0.32 GPM C6+ Safe Harbor Correlated 15 Deg F	-	-
Temperature - Deg F	120 Max		-	125 Max	-		120 Max	120 Max	-
Water Vapor - #/mmscf	7	no change	7	7	7	7	7	7	-
Microbial Agents	-	Free	-	Free	Free	-	Free	-	-

[1] Updated 10/21/2010 [2]Updated 10/25/2010

Flow Studies - Assumptions

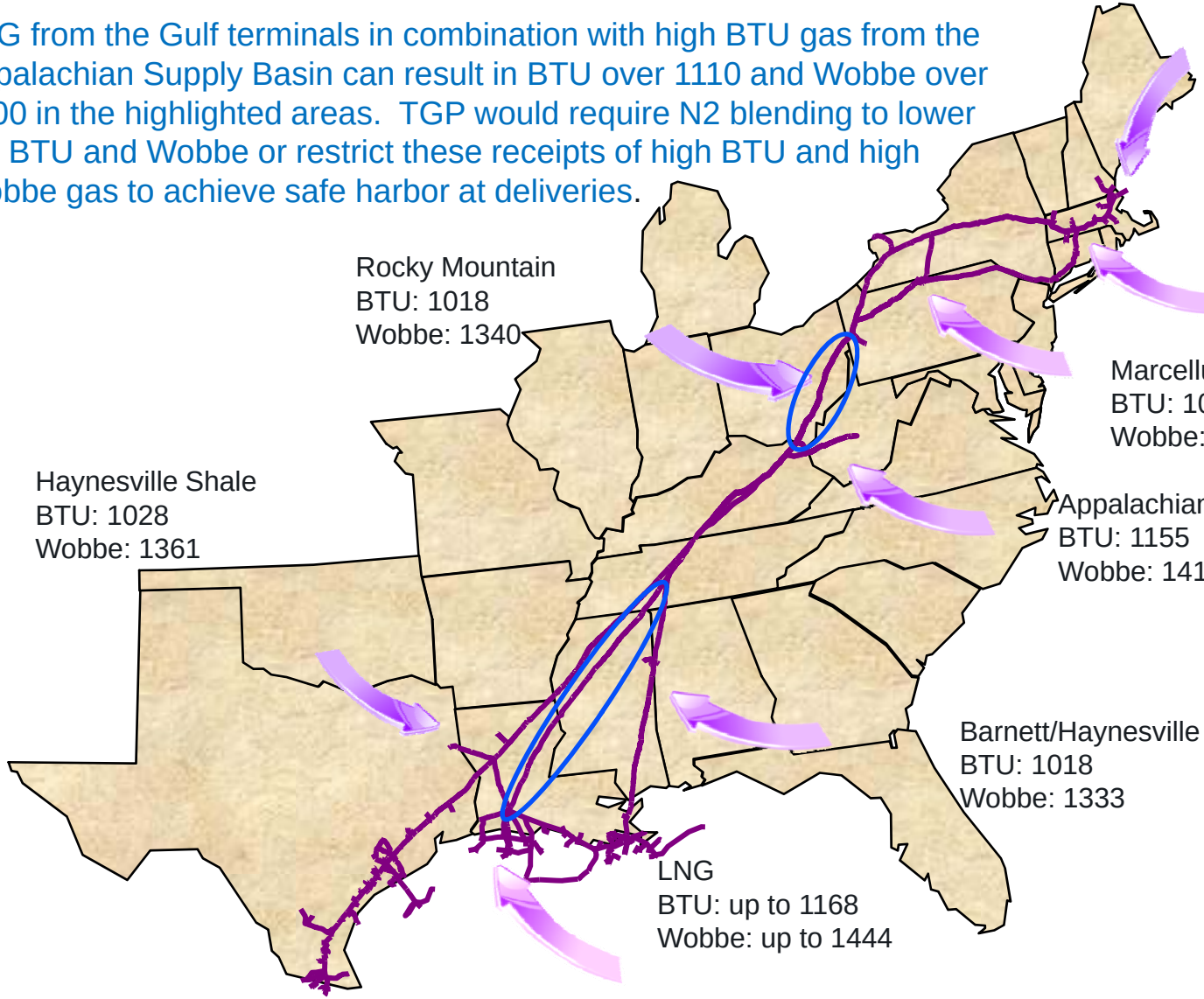
- Summer 2009 Average Day and Winter 2009 Peak Day were used for system demand
- Assumed LNG receipts at Trunkline Lake Charles, Golden Pass, Chenier Sabine Pass and Sempra Cameron displaces traditional GOM Supplies (disproportionate high BTU supplies)
- 500 line impact of LNG mitigated by processing at Yscloskey Plant
- Average and high BTU receipts from Appalachian Supply Basin
- High and zero volumes of Rocky Mountain gas
- Assumed decreased volumes of Canadian gas
- LNG at DOMAC and Dracut remains constant

Flow Studies - Volumes

Source	Summer Average (mmscf/d)	Winter Peak (mmscf/d)
LNG from Gulf Terminals	850	850
Haynesville	310	310
Appalachian Supply Basin	90 -300 (processed and unprocessed)	90 - 300 (processed and unprocessed)
Rocky Mountain	0 - 500	0 - 500
Marcellus Shale	1,000	1,000
Canadian	0	0

Flow Study Results

LNG from the Gulf terminals in combination with high BTU gas from the Appalachian Supply Basin can result in BTU over 1110 and Wobbe over 1400 in the highlighted areas. TGP would require N2 blending to lower the BTU and Wobbe or restrict these receipts of high BTU and high Wobbe gas to achieve safe harbor at deliveries.



Sable Island and LNG
BTU: 1048
Wobbe: 1353

LNG
BTU: 1044
Wobbe: 1378

Rocky Mountain
BTU: 1018
Wobbe: 1340

Marcellus Shale
BTU: 1032
Wobbe: 1366

Haynesville Shale
BTU: 1028
Wobbe: 1361

Appalachian Supply Basin
BTU: 1155
Wobbe: 1415

Barnett/Haynesville Shale
BTU: 1018
Wobbe: 1333

LNG
BTU: up to 1168
Wobbe: up to 1444

Interchangeability Points of Interest

- Tennessee analyzed and graphed data at 26 mainline locations and determined:
  - 2009 data and averages for the Interchangeability gas quality specs
  - 2006 – 2009 statistical data - minimums, maximums and averages
  - Historical average for Wobbe per NGC+ White Paper determined from 2006 – 2009 data
  - This data is available upon request

Historical System Supplies

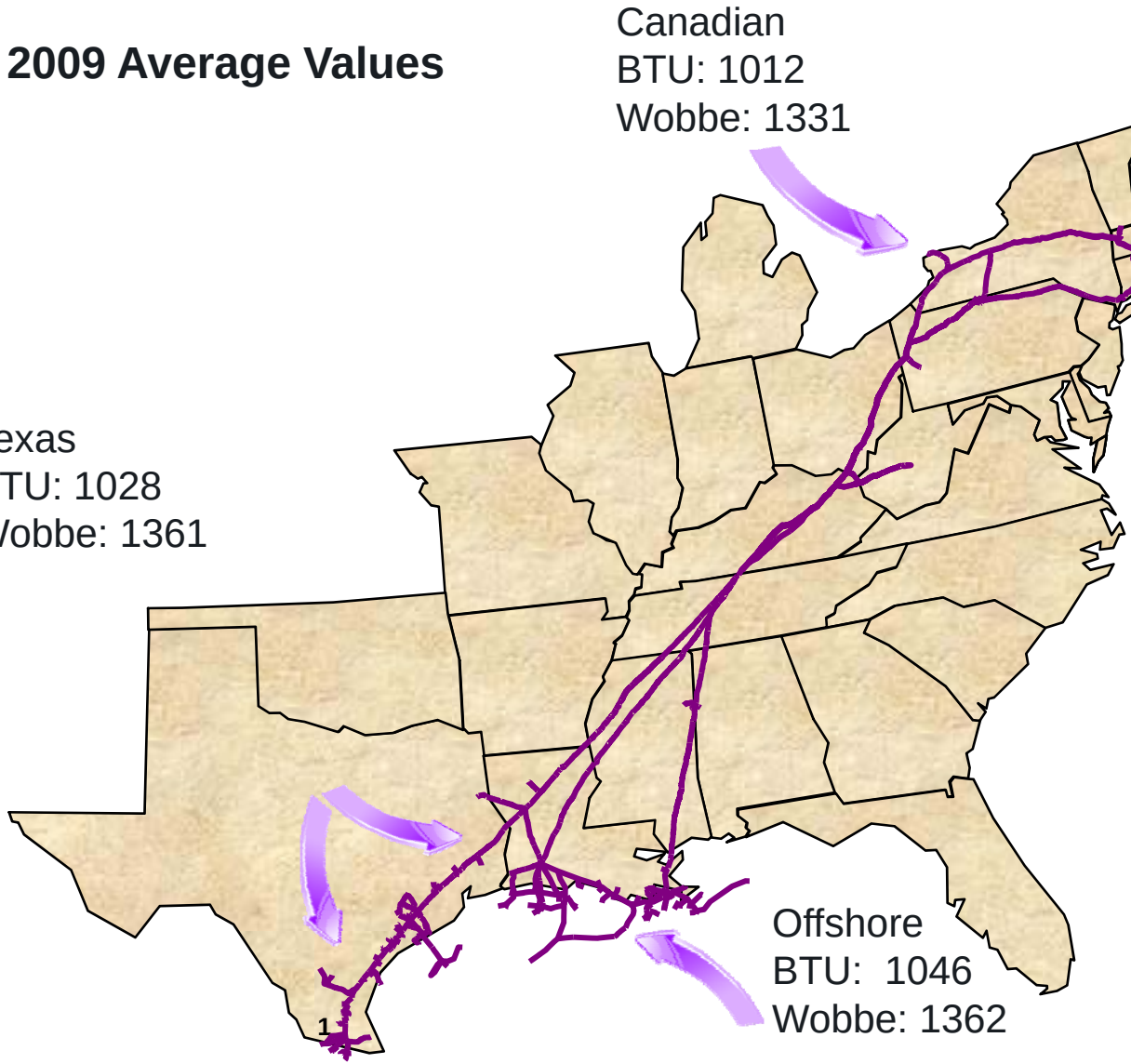
2009 Average Values

Canadian
BTU: 1012
Wobbe: 1331

Sable Island and LNG
BTU: 1048
Wobbe: 1353

LNG – DOMAC
BTU: 1044
Wobbe: 1378

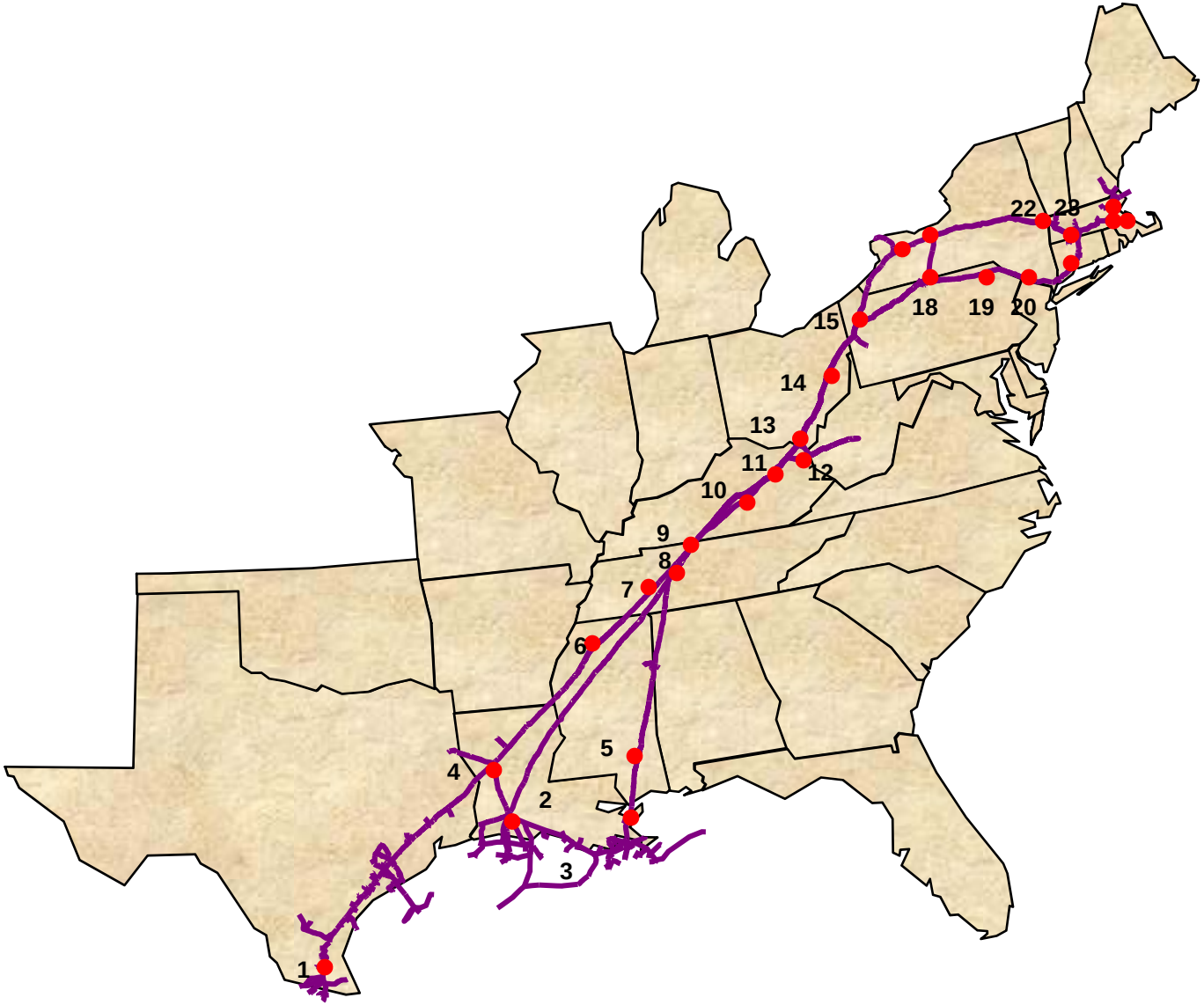
Texas
BTU: 1028
Wobbe: 1361



Offshore
BTU: 1046
Wobbe: 1362

Interchangeability Points of Interest

Tennessee Gas Pipeline
an El Paso company



1- Rio Bravo, TX	RIO1
2- Kinder , LA	CTO2
3-Yscloskey, LA	YSA2
4- Natchitoches, LA	NAT 1
5- Heidelburg, MS	HEI 2
6- Batesville, MS	BAT 1
7- Centerville, TN	CEN 1
8-TVA, TN	TVA 1
9- Portland, TN	PTD 1
10- Dry Creek,KY	TET 1
11- North Means, KY	NMN 1
12- Catlettburg, KY	CAT 1
13- Greenup, KY	GNP1
14- Gilmore, OH	GIL 1
15- Mercer, PA	MER 1
16-East Aurora, NY	EAS 2
17- Clifton Springs, NY	CLI 1
18- Coudersport, PA	COU 1
19- Union Dale, PA	UND 1
20- Mahwah, NJ	MAH 1
21- Bloomfield, CT	BLO 1
22- Niagara Mohawk, NY	NIM 2
23- Agawam, MA	AGM 1
24- Maldon, MA	MAL 1
25- Hopkinton, MA	HOP 2
26- Mendon, MA	MEN 1

Q & A and Discussion

Exhibit A-5

July 2010 Customers Presentation

Tennessee Gas Pipeline Company

Interchangeability

Proposed Tariff Changes and Strategy

July 2010

Defining Our Purpose

Tennessee Gas Pipeline
an El Paso company

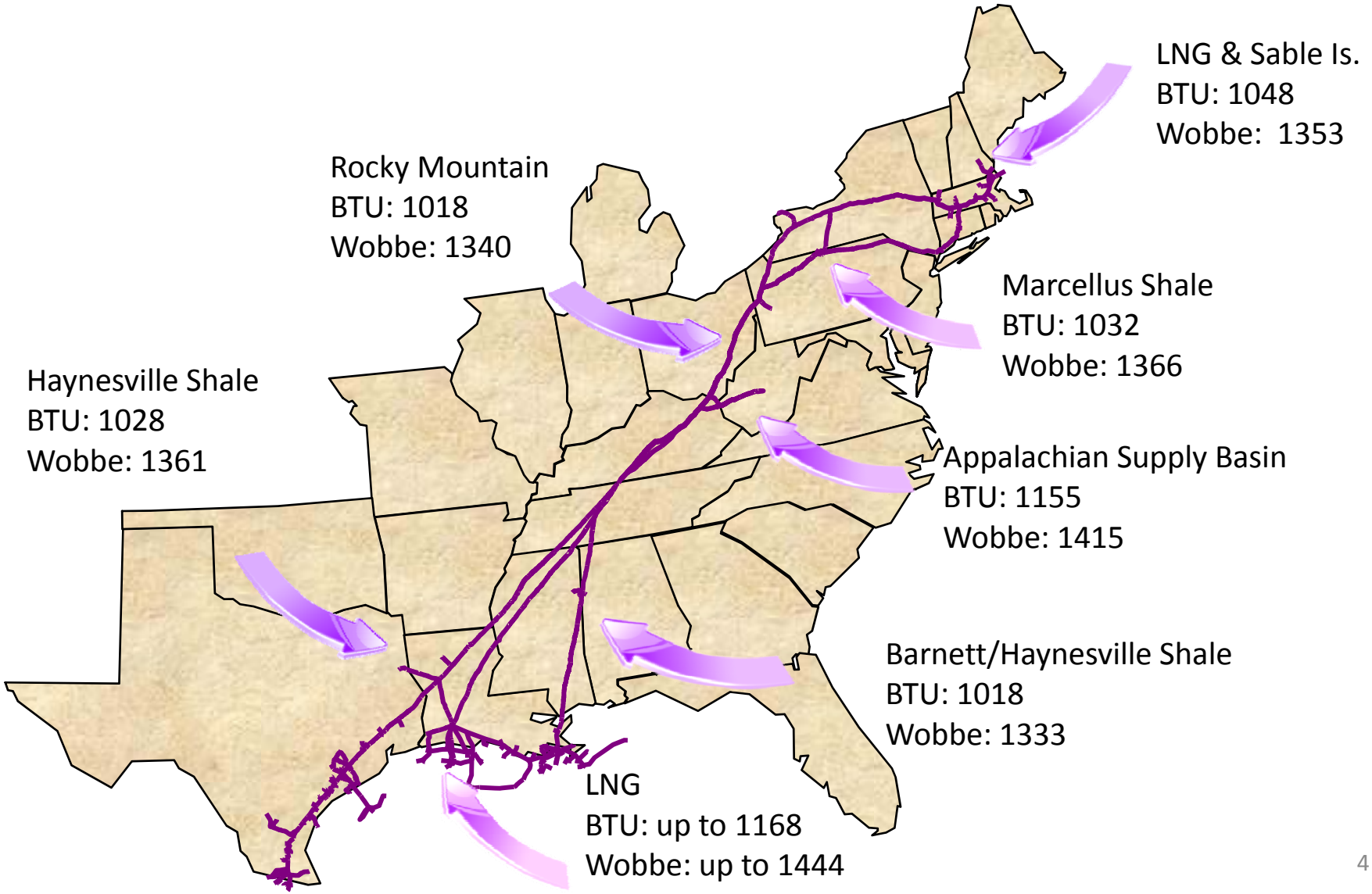
El Paso Corporation provides natural gas and related energy products in a safe, efficient, and dependable manner

Meeting Agenda

- Opening Remarks
- Changing System Supplies
- Interchangeability Tariff Specification Considerations
- Flow Studies
- Interchangeability Points of Interest
- Q&A and Discussion

New System Supplies

Tennessee Gas Pipeline
an El Paso company



Proposed Tariff Specifications

- Safe Harbor
- Same methodology as employed with HDP in current Tennessee Tariff.
  - Safe Harbor approach
    - Will allow for maximizing system supply
    - Will allow for maintaining delivery expectations
  - Existing or expected delivery of gas exceeding delivery specifications would result in shut-in or restriction of receipts

Proposed Tariff Specifications

Tennessee Gas Pipeline
an El Paso company

- Wobbe (HHV/SG $^{0.5)}$
  - Delivery – 1293 to 1400
    - Historical average is 1348
    - Historical average + 4% would result in a Wobbe of 1402, exceeding the 1400 NGC+ recommended upper limit.
  - Receipt
    - 1400 High Safe Harbor
    - 1293 Low Safe Harbor
- BTU
  - Delivery – 1110 Max, 967 Min
  - Receipt
    - 1110 High Safe Harbor
    - 967 Low Safe Harbor

Proposed Tariff Specifications

Tennessee Gas Pipeline
an El Paso company

- C2+ (Ethane and heavier hydrocarbons)
  - Delivery – 12 mole percent max
  - Receipt – 12 mole percent max (Safe Harbor)

- C4+ (Butane and heavier hydrocarbons)
  - Delivery - 1.5 mole percent max
  - Receipt – 1.5 mole percent max (Safe Harbor)

- H2
  - Receipt – 3 mole percent

Proposed Tariff Specifications

- CO2
  - Delivery – 2 mole percent
  - Receipt
    - 3 mole percent max
    - 2 mole percent (Safe Harbor)
- Total Sulfur
  - Receipt – 10 grains (reduced from 20)
- Non-Conventional Gas
  - Free from bacteria, pathogens, and any other substances injurious to utility facilities or would cause the gas to be unmarketable

Proposed Tariff Specifications

Tennessee Gas Pipeline
an El Paso company

- Total Diluents
  - 4 mole % - no change
- O2
  - 0.2 mole % - no change
- H2S
  - 0.25 grain per 100 cf - no change
- Water Vapor
  - 7.0 lbs/mmscf - no change

Gas Quality Tariff Comparison

Tennessee Gas Pipeline
an El Paso company

Gas Quality Specification	TGP Current	TGP Proposed	AGT	Columbia Gas	Dominion	NFG	TETPL Proposed	Transco	NGC+ Guidelines
Wobbe	-	1400	1314 - 1400	1350 - 1400	-	-	1314 - 1400	-	1400
Heating Value - BTU/SCF -Min Heating Value - BTU/SCF - Max	967 1100	967 Safe Harbor 1110 Safe Harbor	967 1110	967 1110	967 1100	967 -	967 1110	980 1100	967 1110
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C4+ Mole %	-	1.5 % Max Delivery 1.5 % Safe Harbor Receipt	1.5%	-	-	-	1.5%	-	1.5%
Oxygen Mole %	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.10%	-	
Total Diluents Mole %	4.0%	no change	4.0% 2.75%(O2+N2)	4.0%	5.0%	4.0%	4.0%	-	4.0%
Carbon Dioxide Mole %	3.0%	3.0 Mole % Max Receipt 2.0 Mole % Safe Harbor Receipt	2.00%	1.25%	3.0%	2.0%	2.0%	-	-
Nitrogen Mole %	-	-	-	-	4.0%	-	-	-	-
Hydrogen Sulfide - Grain/100 scf	0.25	no change	0.50	0.25	0.25	0.30	0.25	0.30	-
Total Sulphur - Grain/100 scf	20	10	10	2	20	20	5	20	-
Liquefiable Hydrocarbons (Cricondentherm)	15 Deg F Safe Harbor	no change	-	25 Deg F	Free at flowing conditions	Free	0.32 GPM C6+ Correlated 15 Deg F	-	-
Temperature - Deg F	120 Max		-	125 Max	-		120 Max	120 Max	-
Water Vapor - #/mmscf	7	no change	7	7	7	7	7	7	-
Microbial Agents	-	Free	-	Free	Free	-	Free	-	-

Flow Studies - Assumptions

Tennessee Gas Pipeline
an El Paso company

- Summer 2009 Average Day and Winter 2009 Peak Day were used for system demand
- Assumed LNG receipts at Trunkline Lake Charles, Golden Pass, Chenier Sabine Pass and Sempra Cameron displaces traditional GOM Supplies (disproportionate high BTU supplies)
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Tennessee Gas Pipeline
an El Paso company

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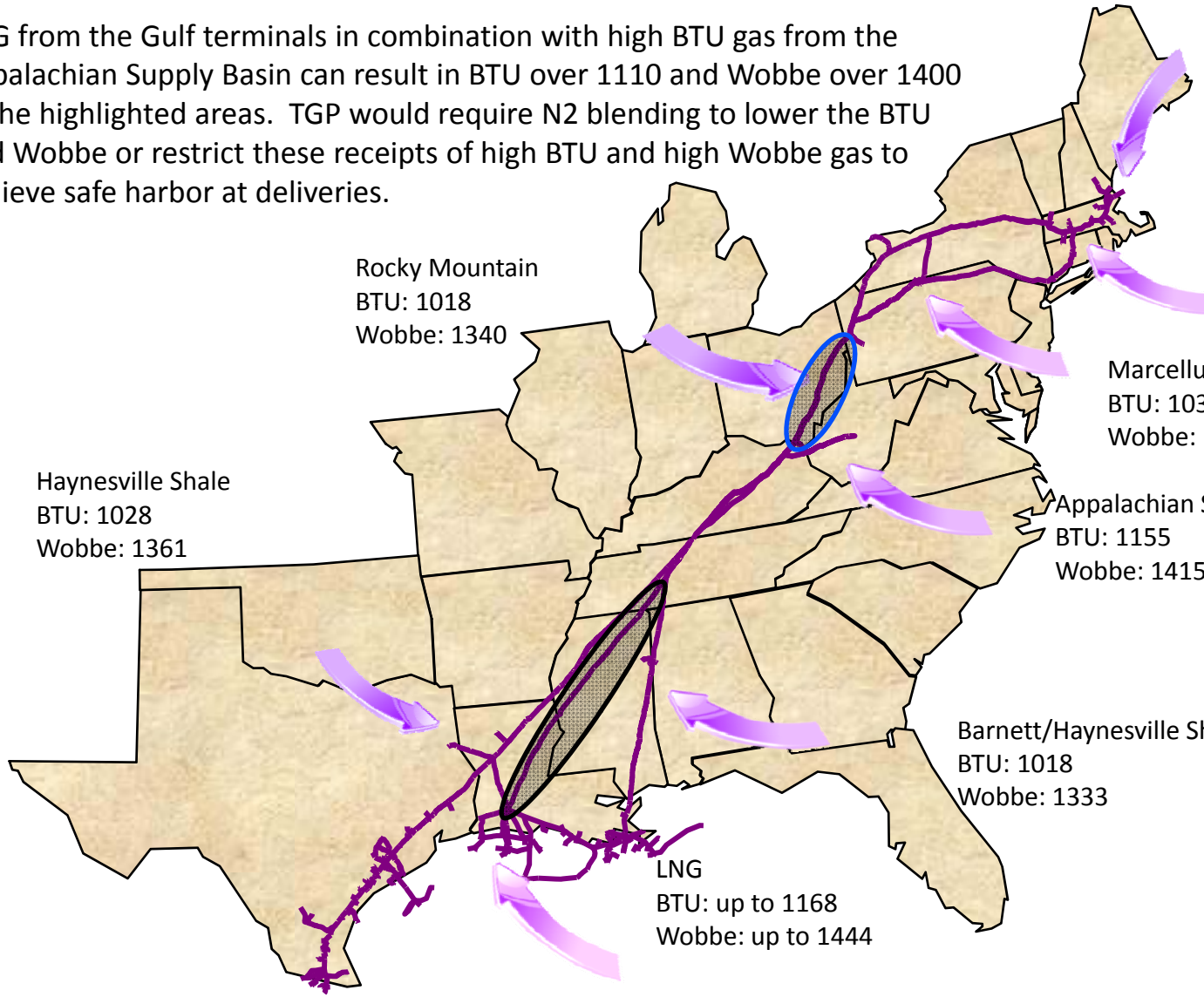
Flow Study Results

Tennessee Gas Pipeline
an El Paso company

LNG from the Gulf terminals in combination with high BTU gas from the Appalachian Supply Basin can result in BTU over 1110 and Wobbe over 1400 in the highlighted areas. TGP would require N2 blending to lower the BTU and Wobbe or restrict these receipts of high BTU and high Wobbe gas to achieve safe harbor at deliveries.



Interchangeability Points of Interest

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Historical System Supplies

Tennessee Gas Pipeline
an El Paso company

2009 Average Values

Canadian
BTU: 1012
Wobbe: 1331

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BTU: 1048
Wobbe: 1353

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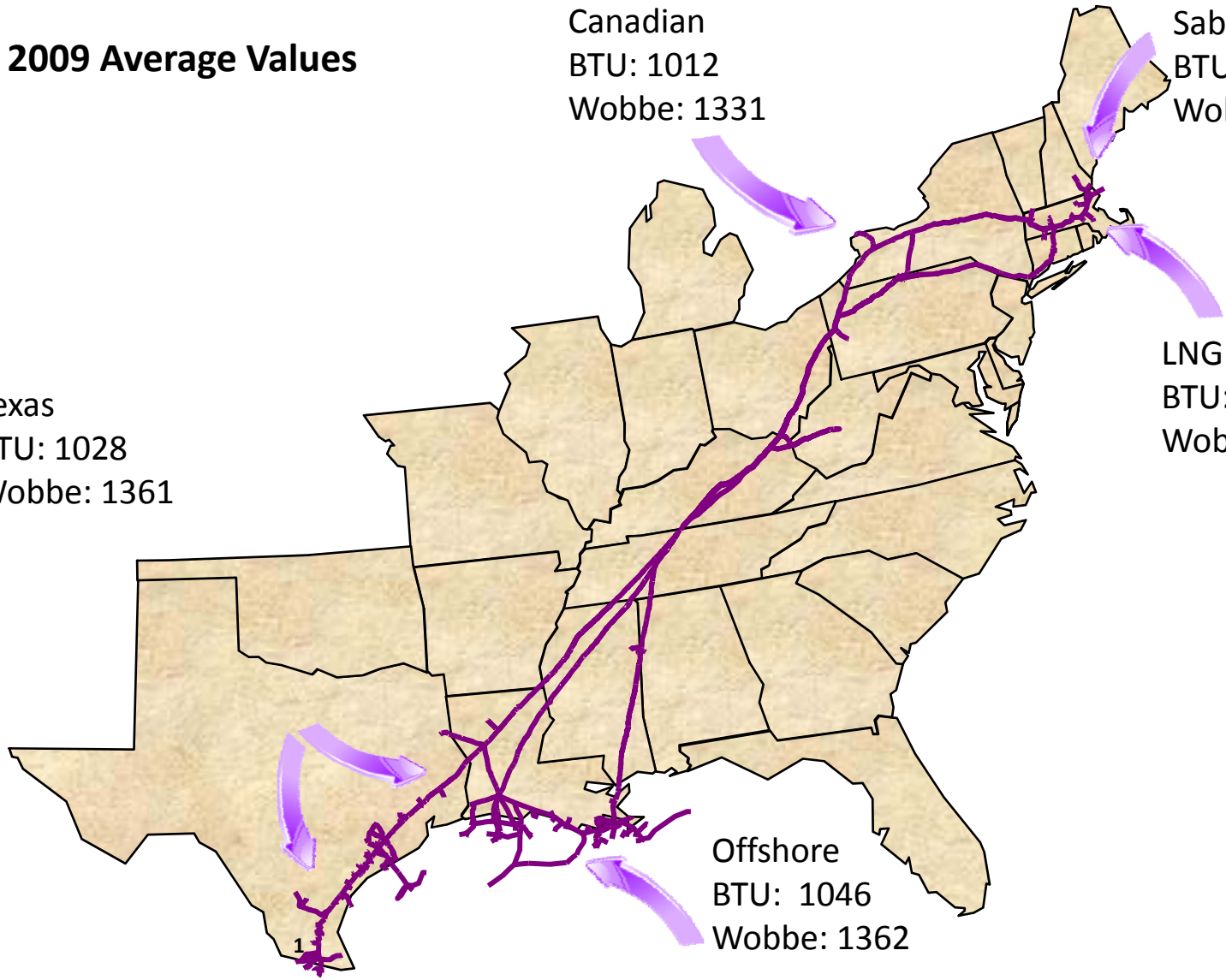
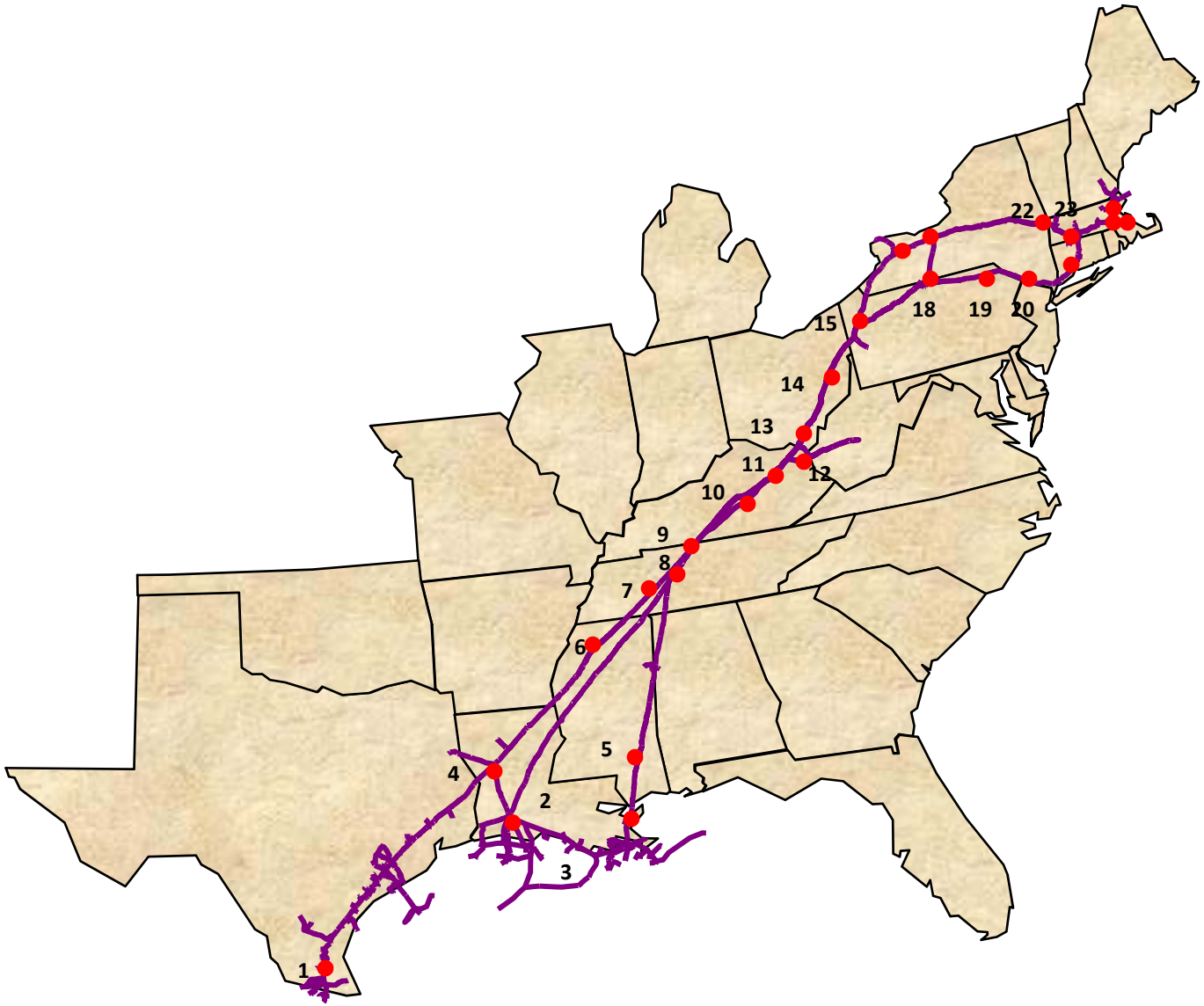


Offshore
BTU: 1046
Wobbe: 1362

Interchangeability Points of Interest

Tennessee Gas Pipeline
an El Paso company



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23- Agawam, MA	AGM 1
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Q & A and Discussion

Exhibit A-6

Supplement Accompanying July 2010 Presentation - Statistical Data

Tennessee Gas Pipeline Company

Interchangeability

Proposed Tariff Changes and Strategy

July 2010

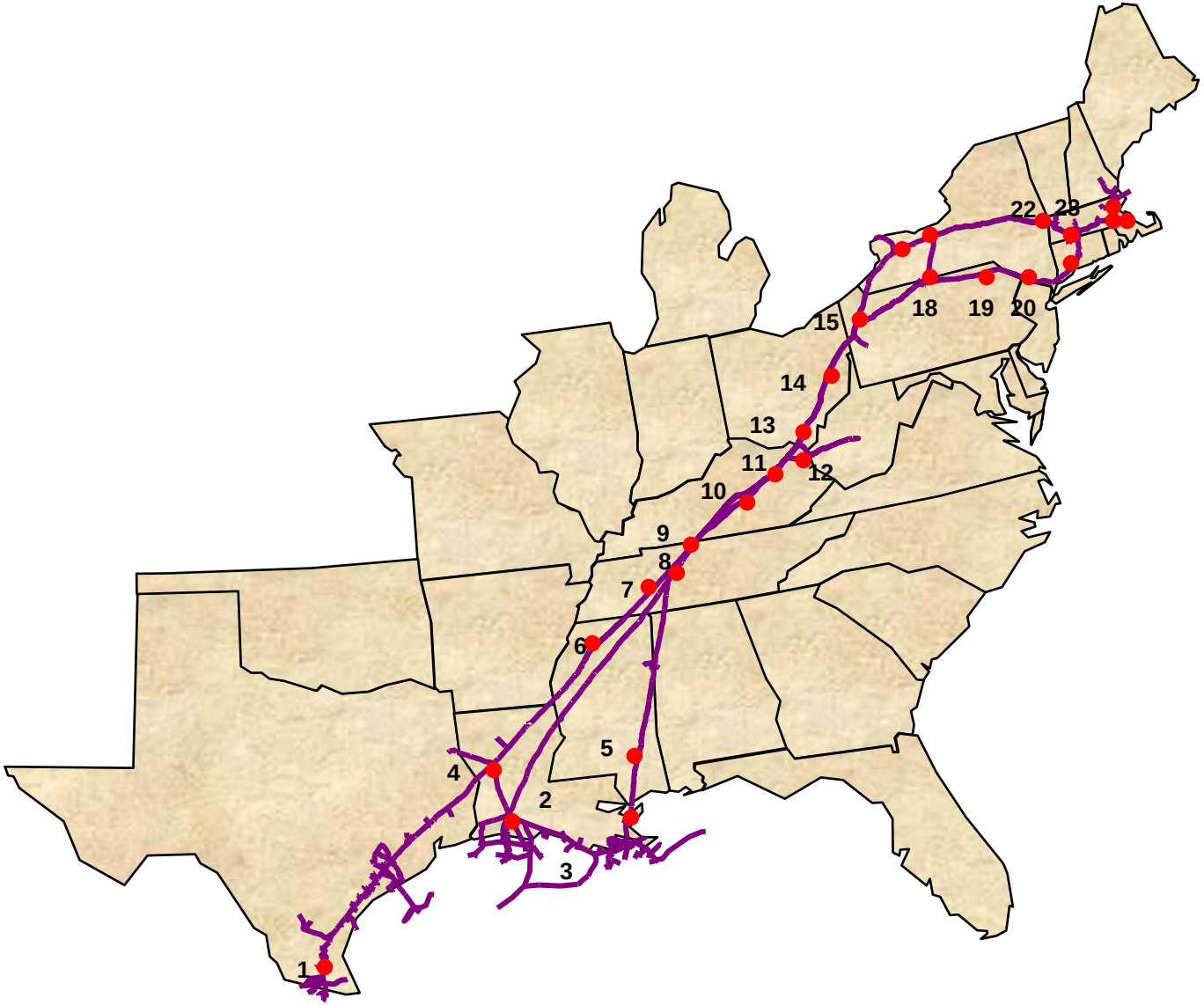
Defining Our Purpose

Tennessee Gas Pipeline
an El Paso company

El Paso Corporation provides natural gas and related energy products in a safe, efficient, and dependable manner

Interchangeability Points of Interest

Tennessee Gas Pipeline
an El Paso company



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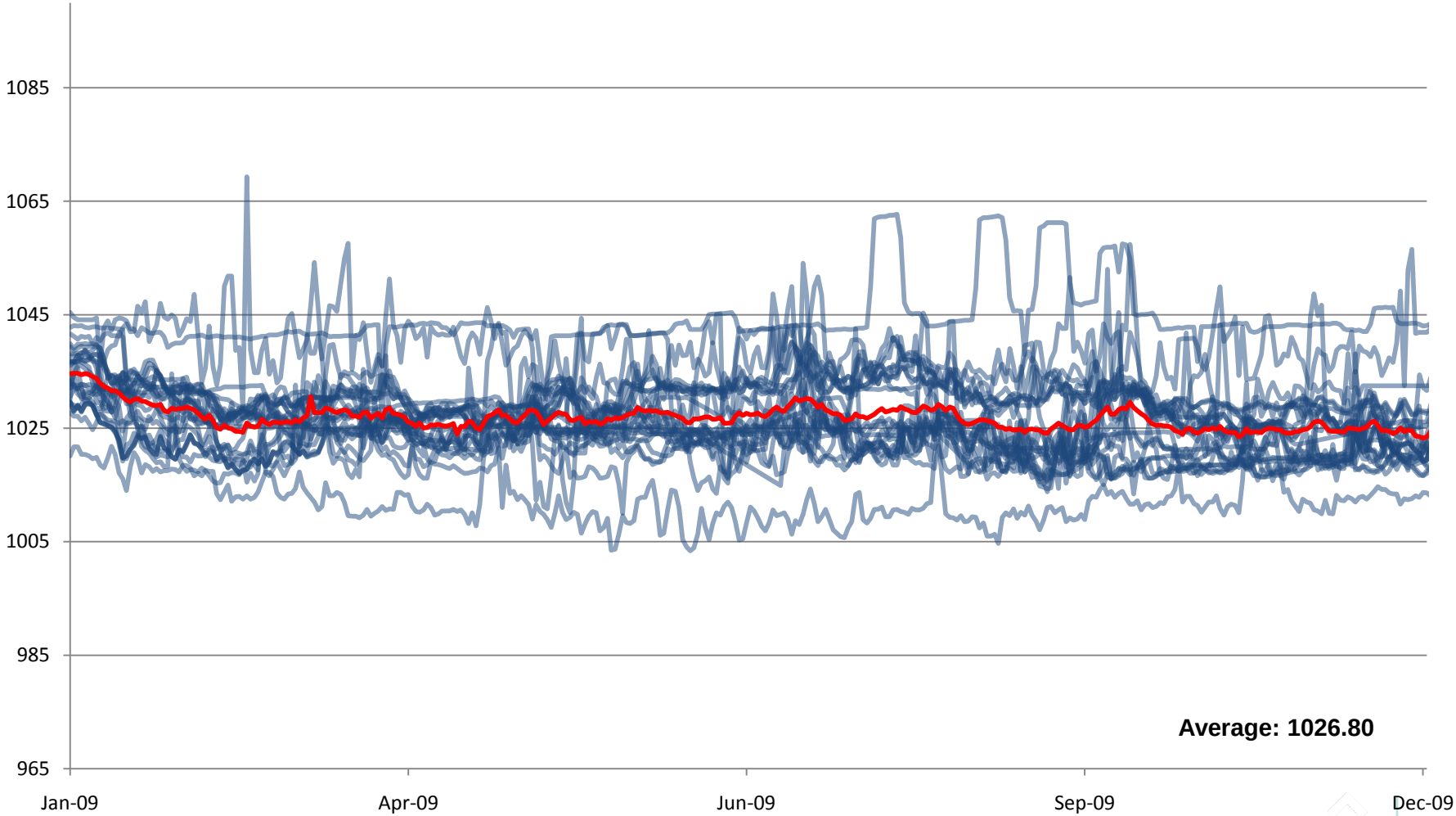
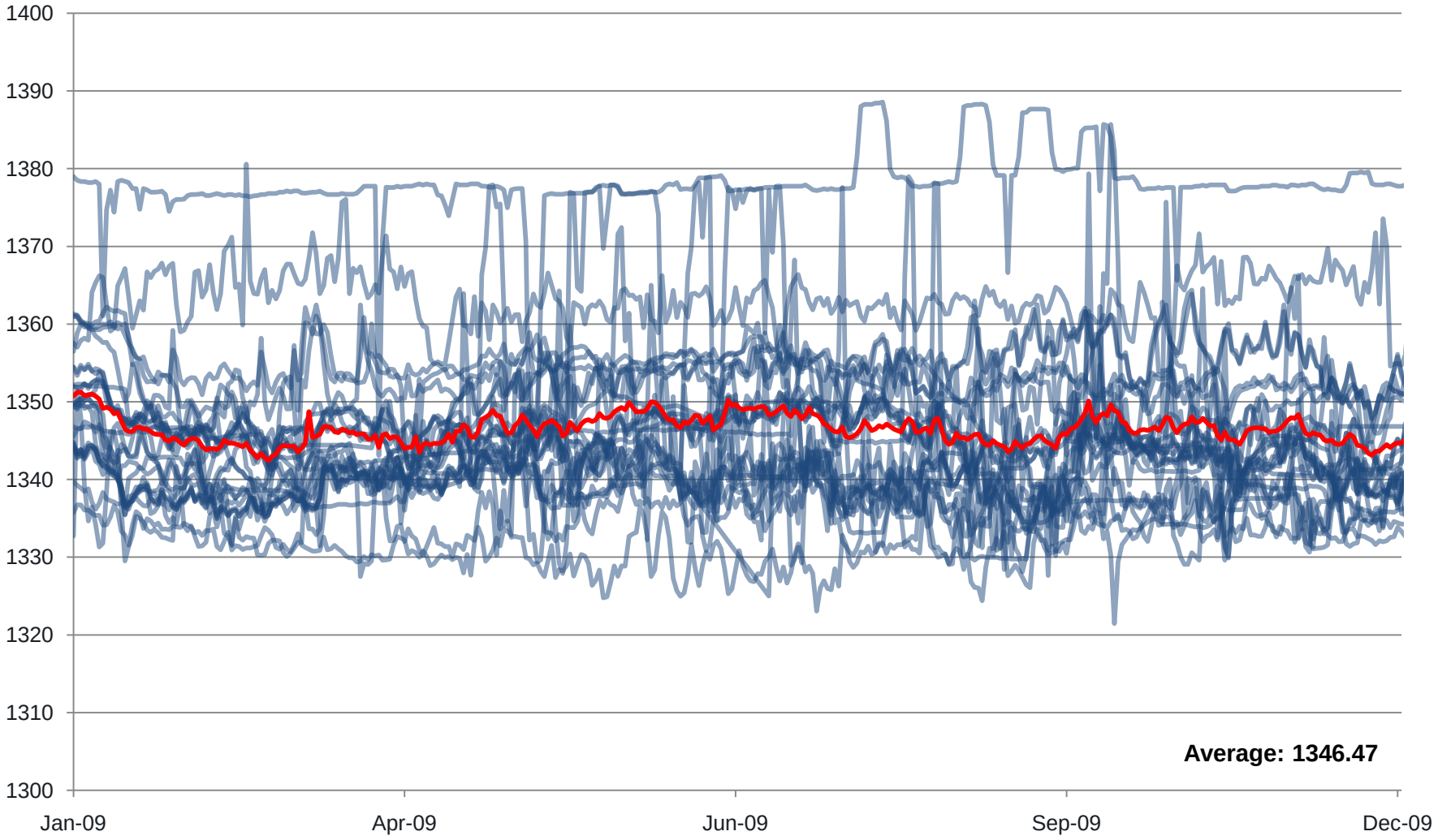
2009 Data
Heating Value (BTU/SCF)

Tennessee Gas Pipeline
an El Paso company



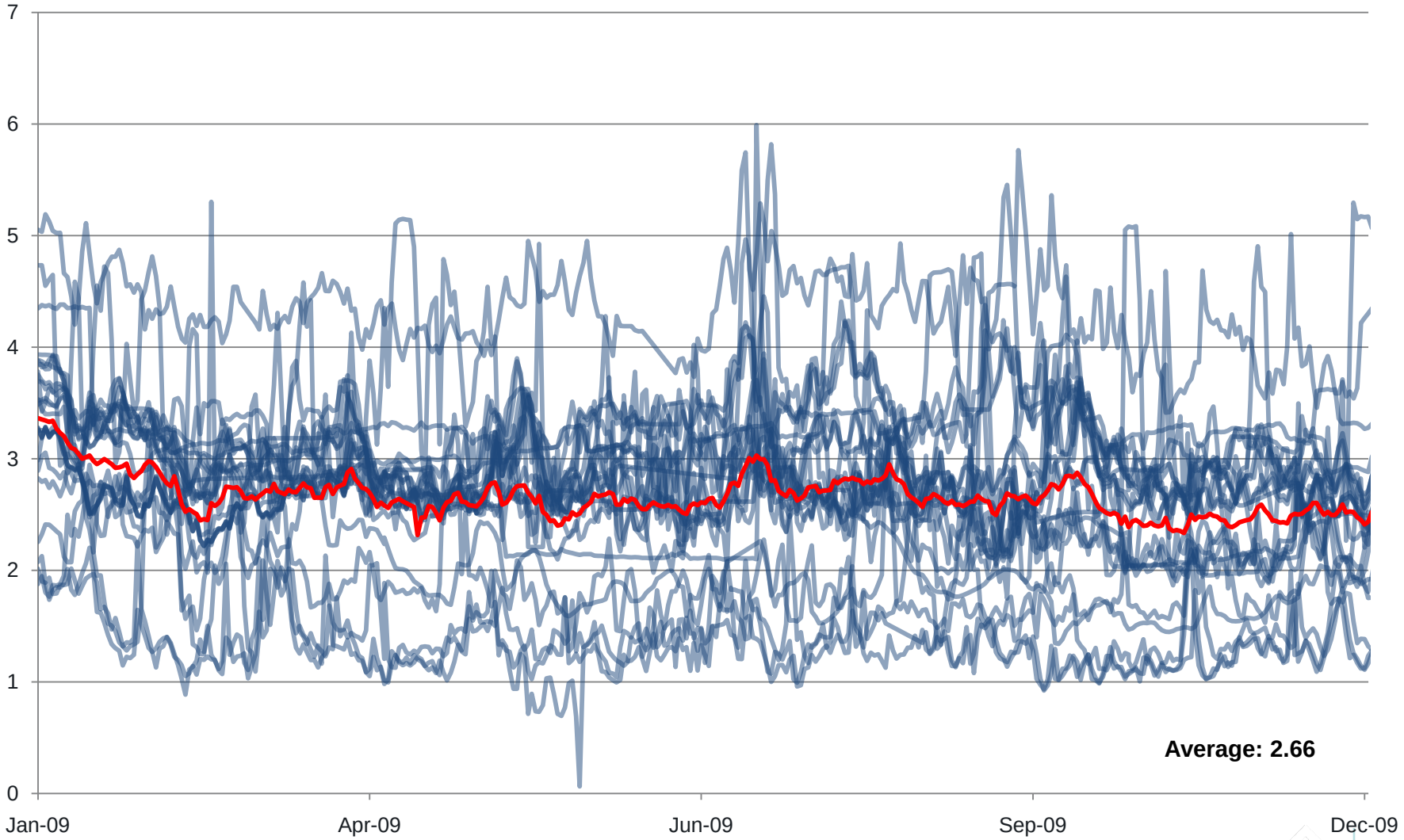
2009 Data
Wobbe Number (BTU/SG $^{0.5}$)

Tennessee Gas Pipeline
an El Paso company



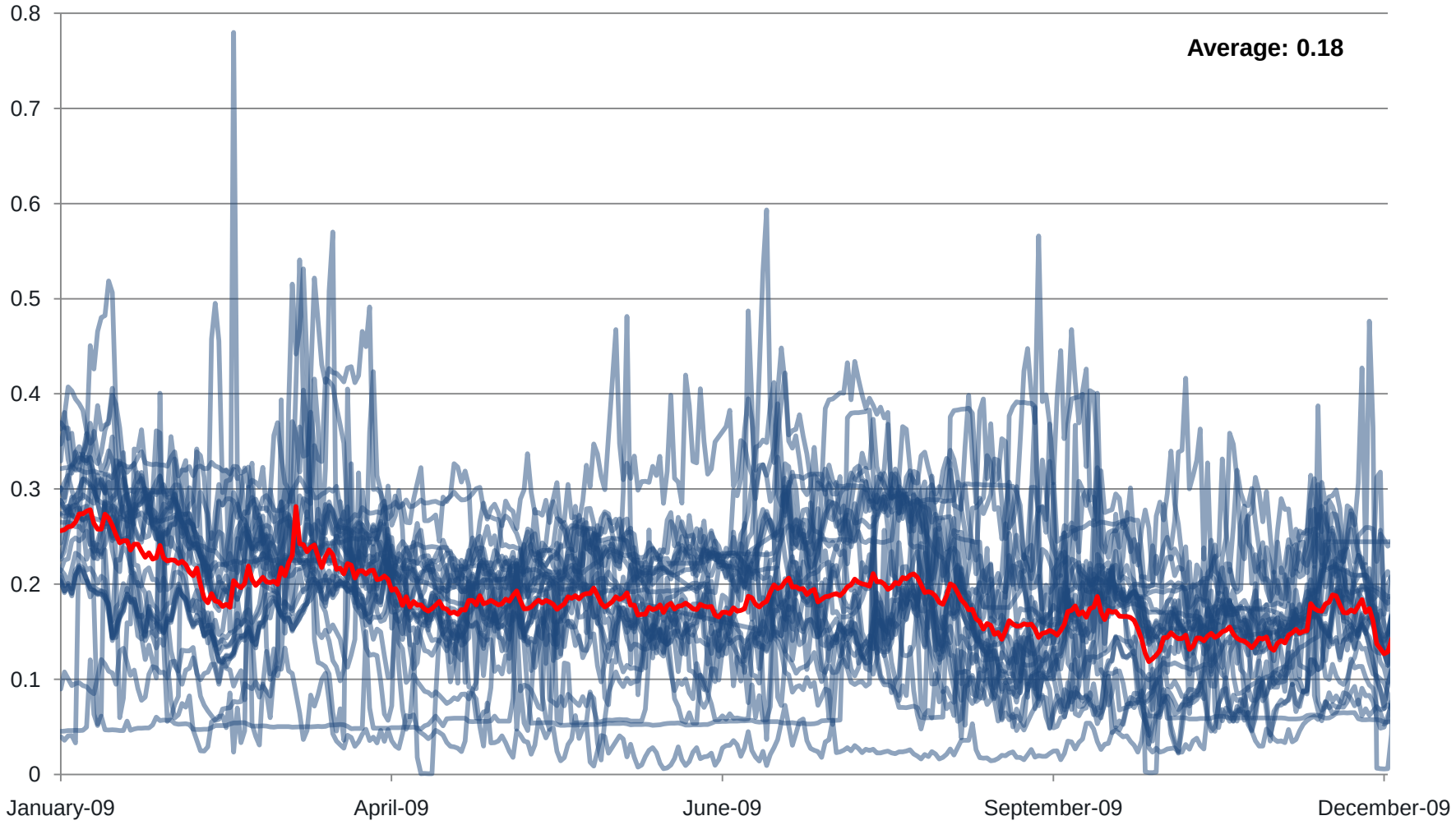
2009 Data
C2 Plus (Mole %)

Tennessee Gas Pipeline
an El Paso company



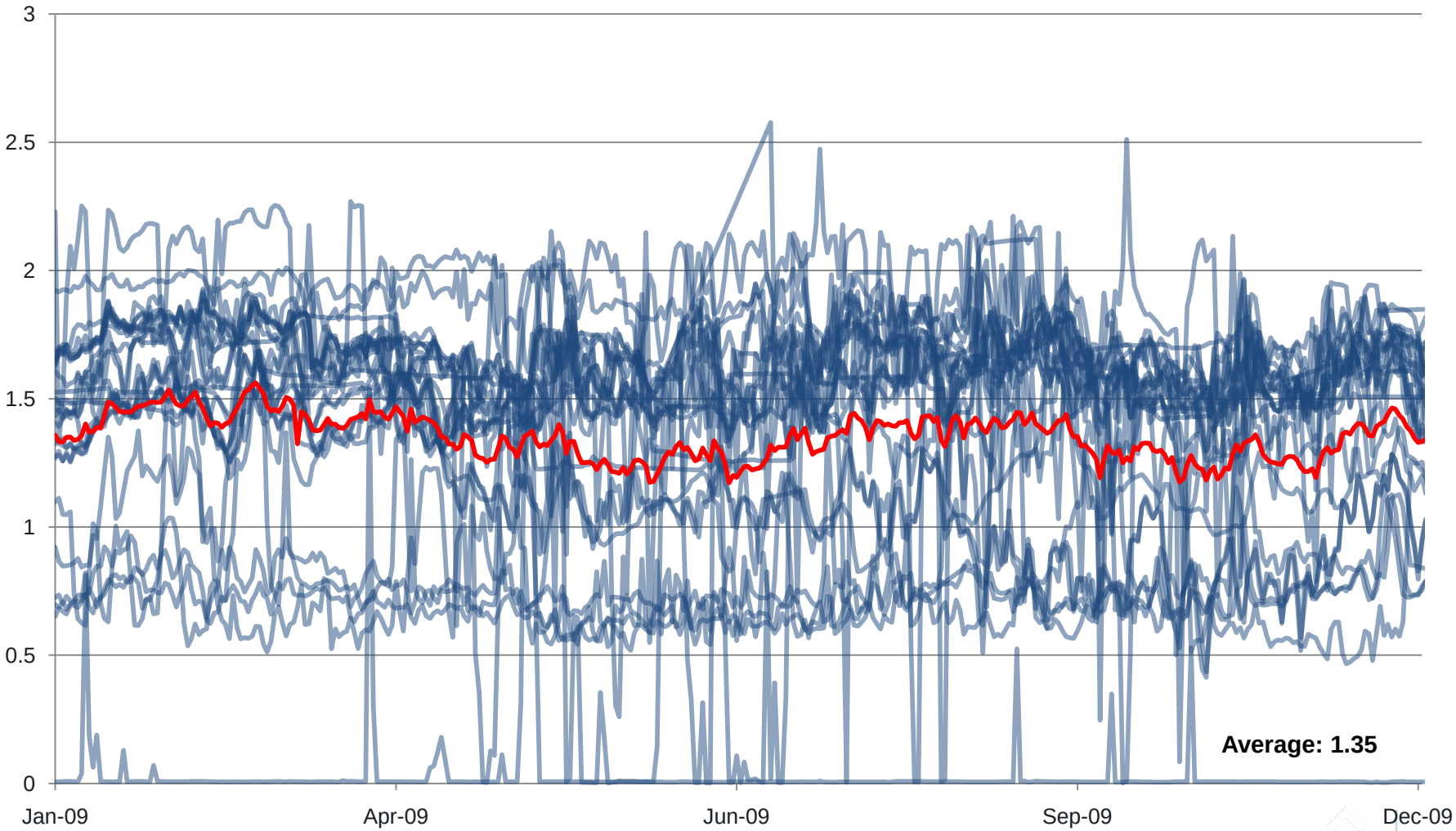
2009 Data
C4 Plus (Mole %)

Tennessee Gas Pipeline
an El Paso company



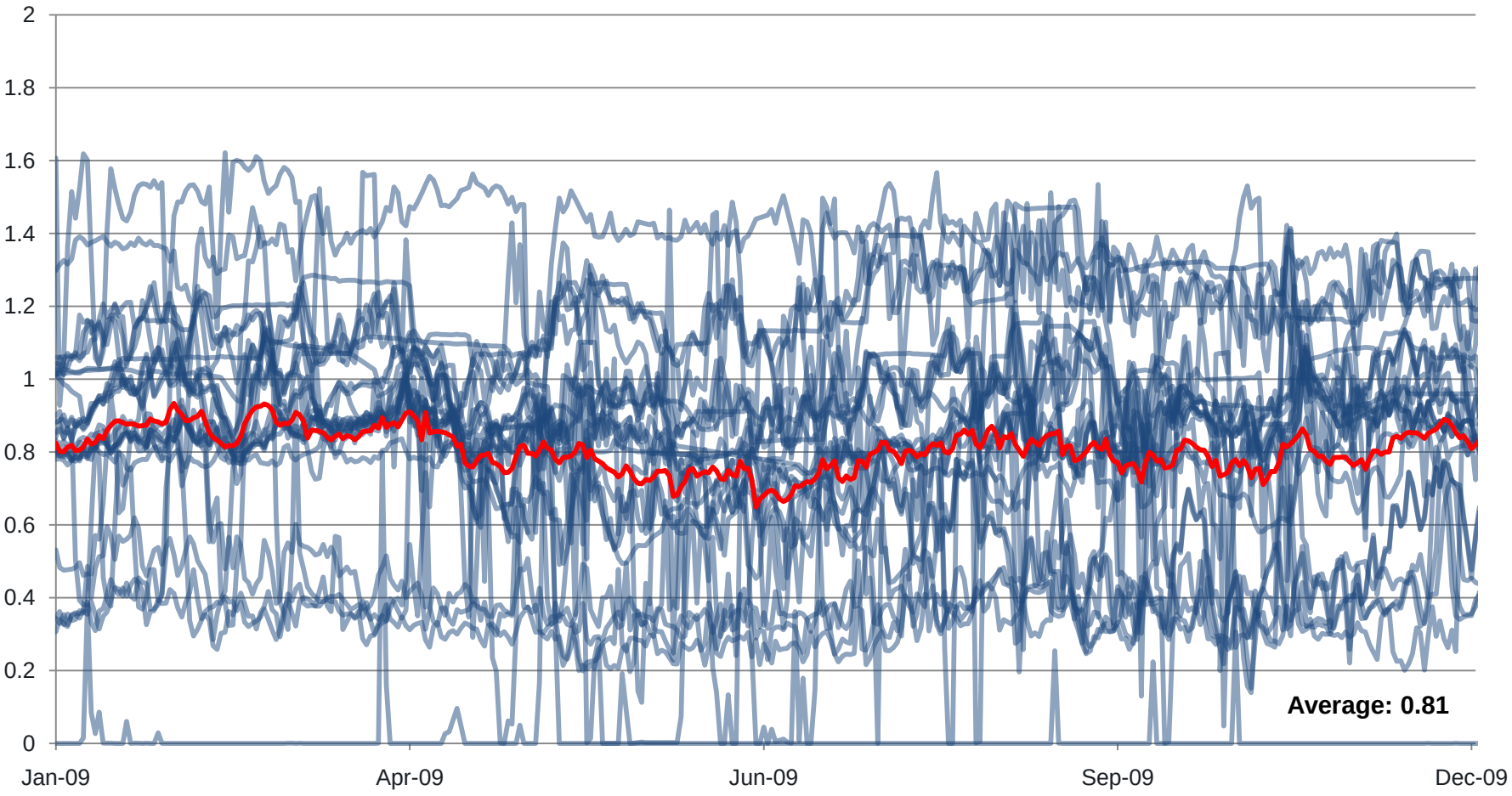
2009 Data
Total Diluents – CO_2 + N_2 (Mole %)

Tennessee Gas Pipeline
an El Paso company



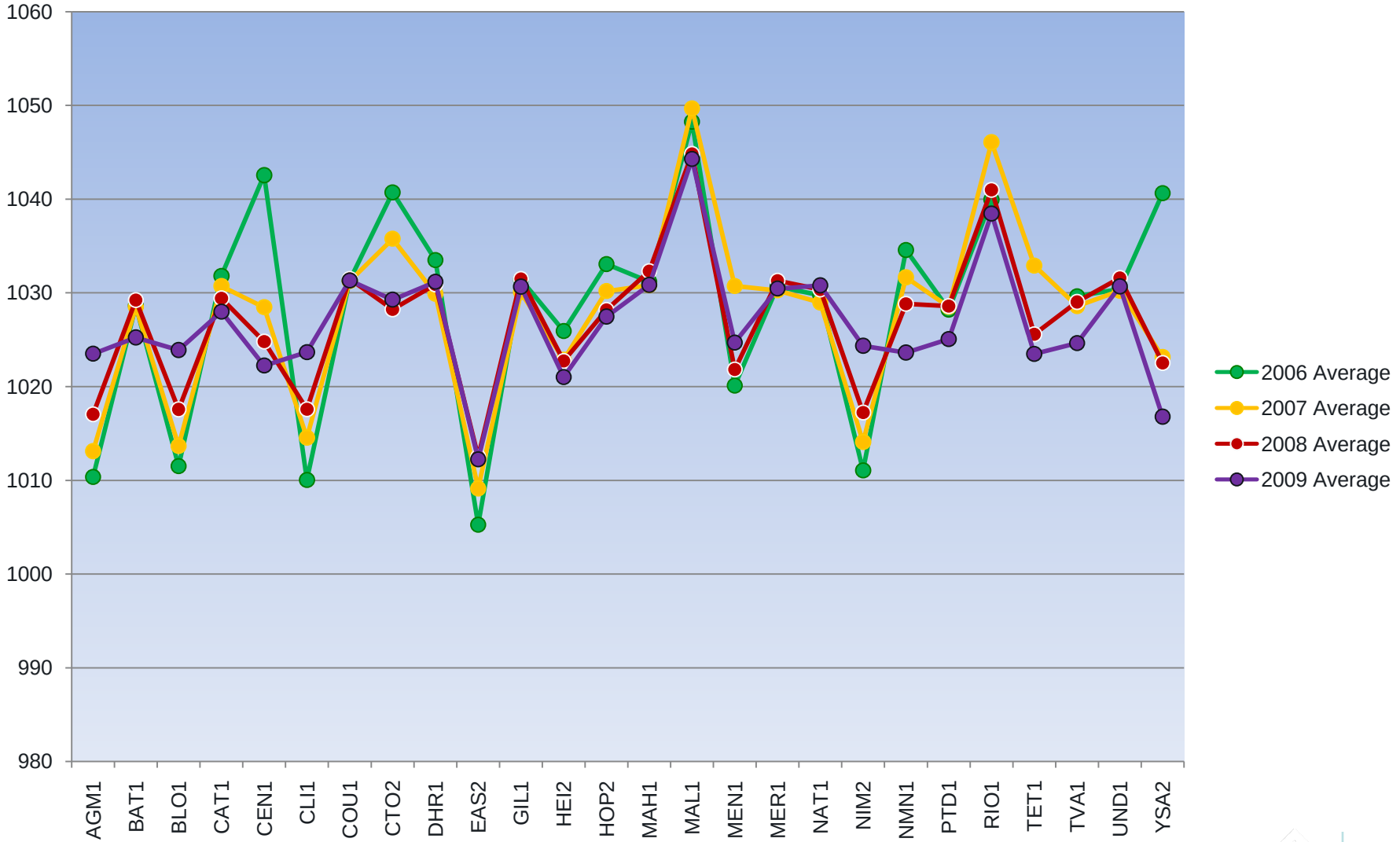
2009 Data – CO_2 (Mole %)

Tennessee Gas Pipeline
an El Paso company



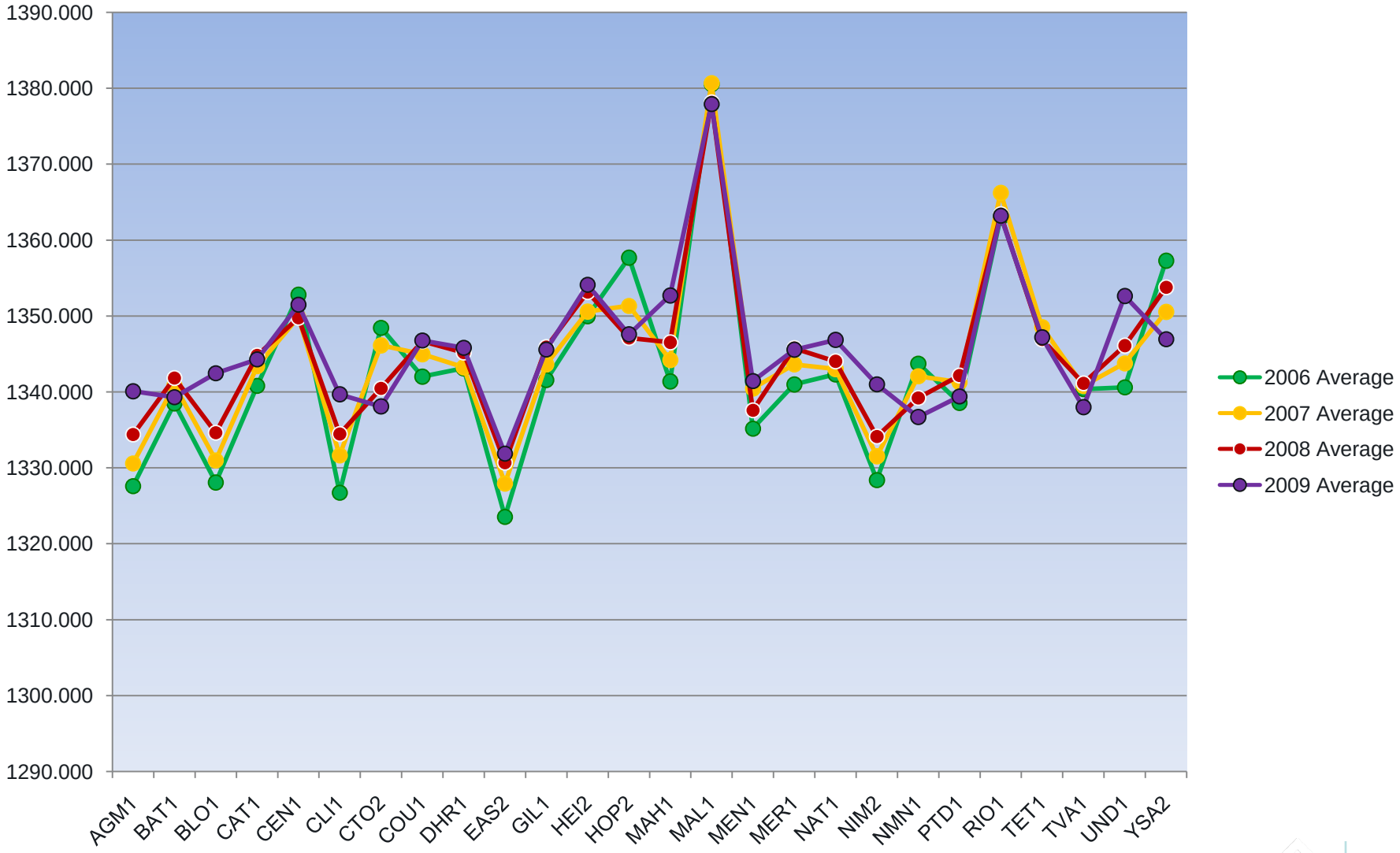
Historical Data
Heating Value (BTU/SCF)

Tennessee Gas Pipeline
an El Paso company

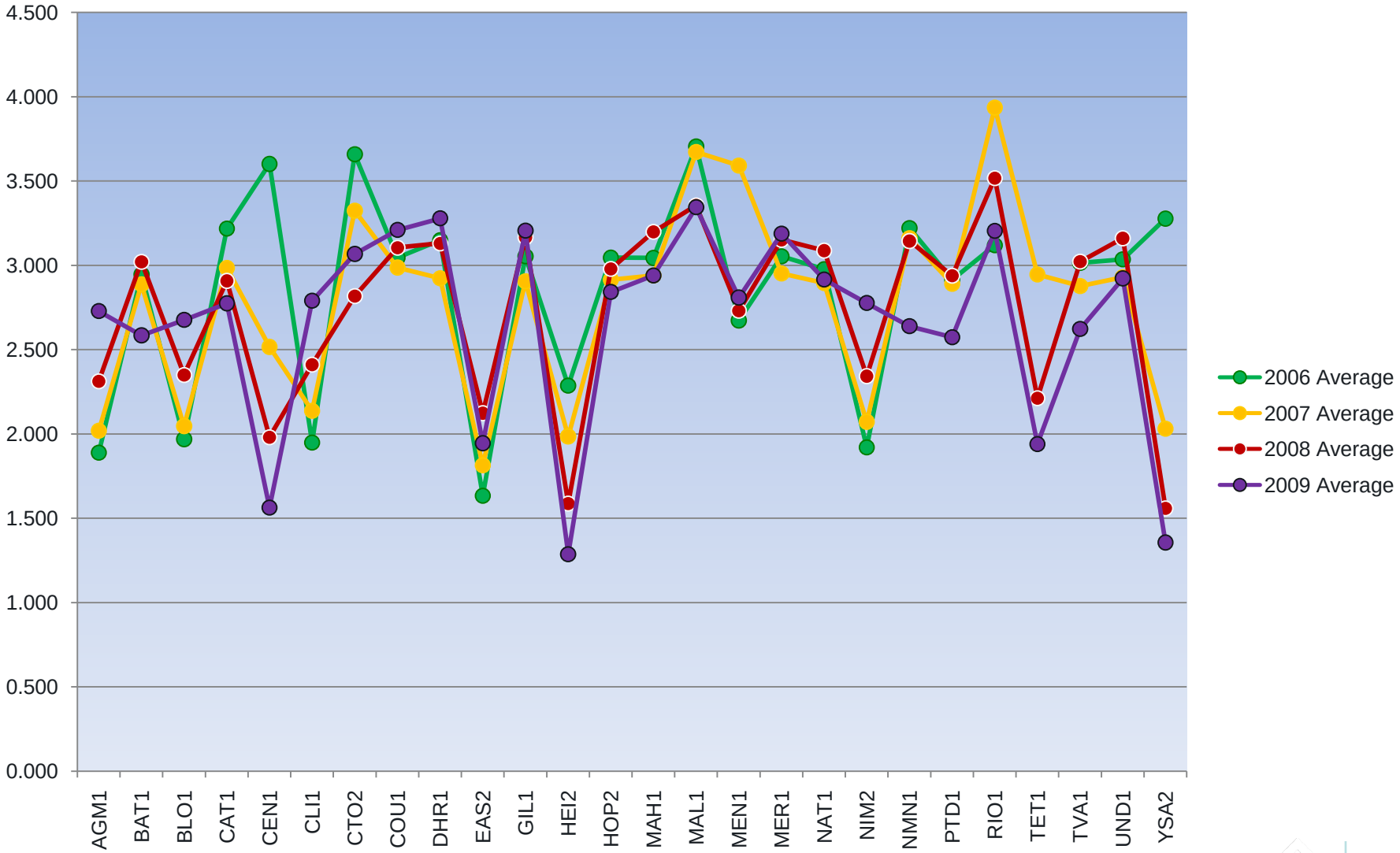


Historical Data
Wobbe Number(HHV/SG $^{0.5}$)

Tennessee Gas Pipeline
an El Paso company

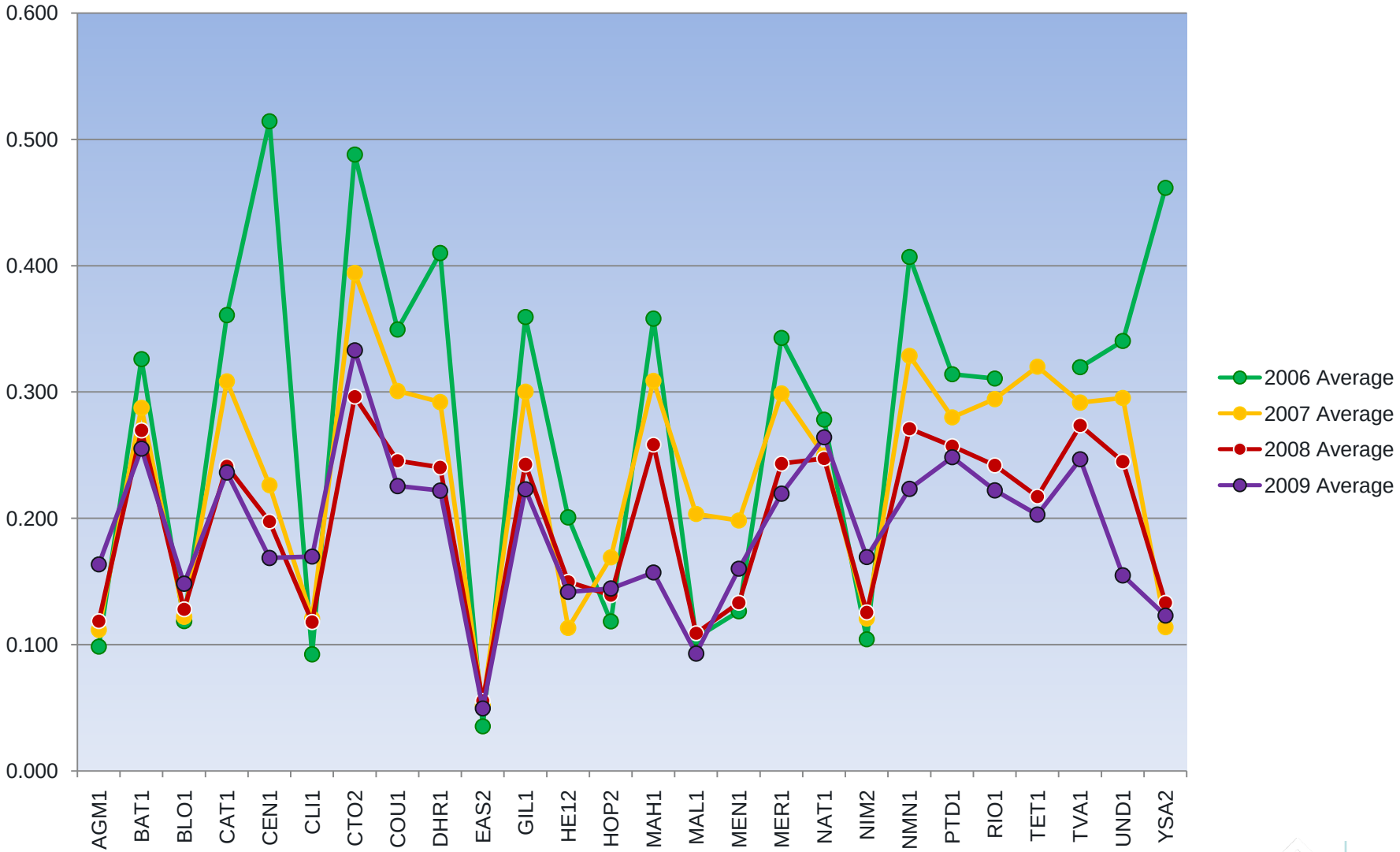


Historical Data– C2 + (Mole %)



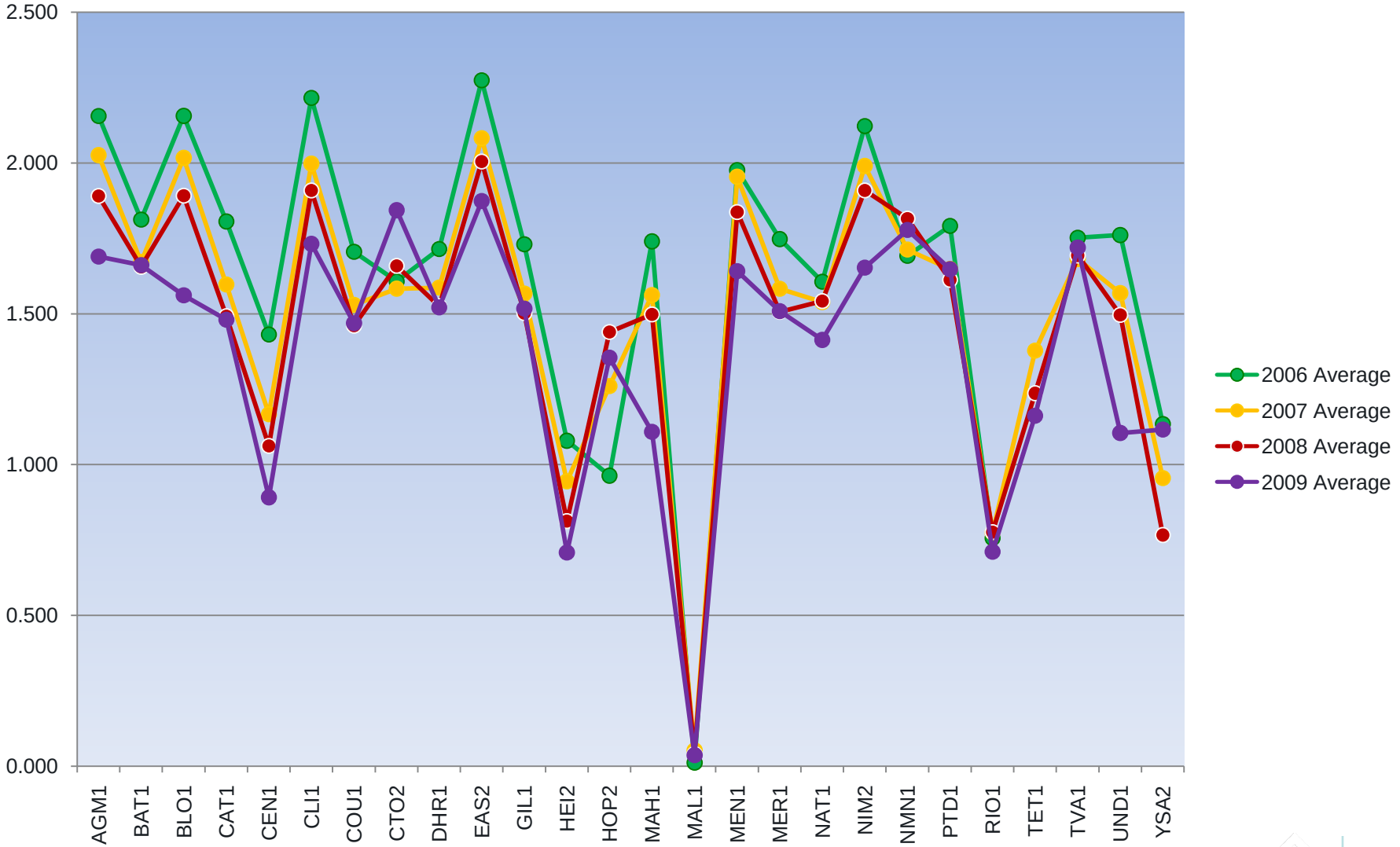
Historical Data
C4 + (Mole %)

Tennessee Gas Pipeline
an El Paso company



Historical Data
Total Diluents – $CO_2 + N_2$ (Mole %)

Tennessee Gas Pipeline
an El Paso company



Historical Data
CO_2 (Mole %)

Tennessee Gas Pipeline
an El Paso company

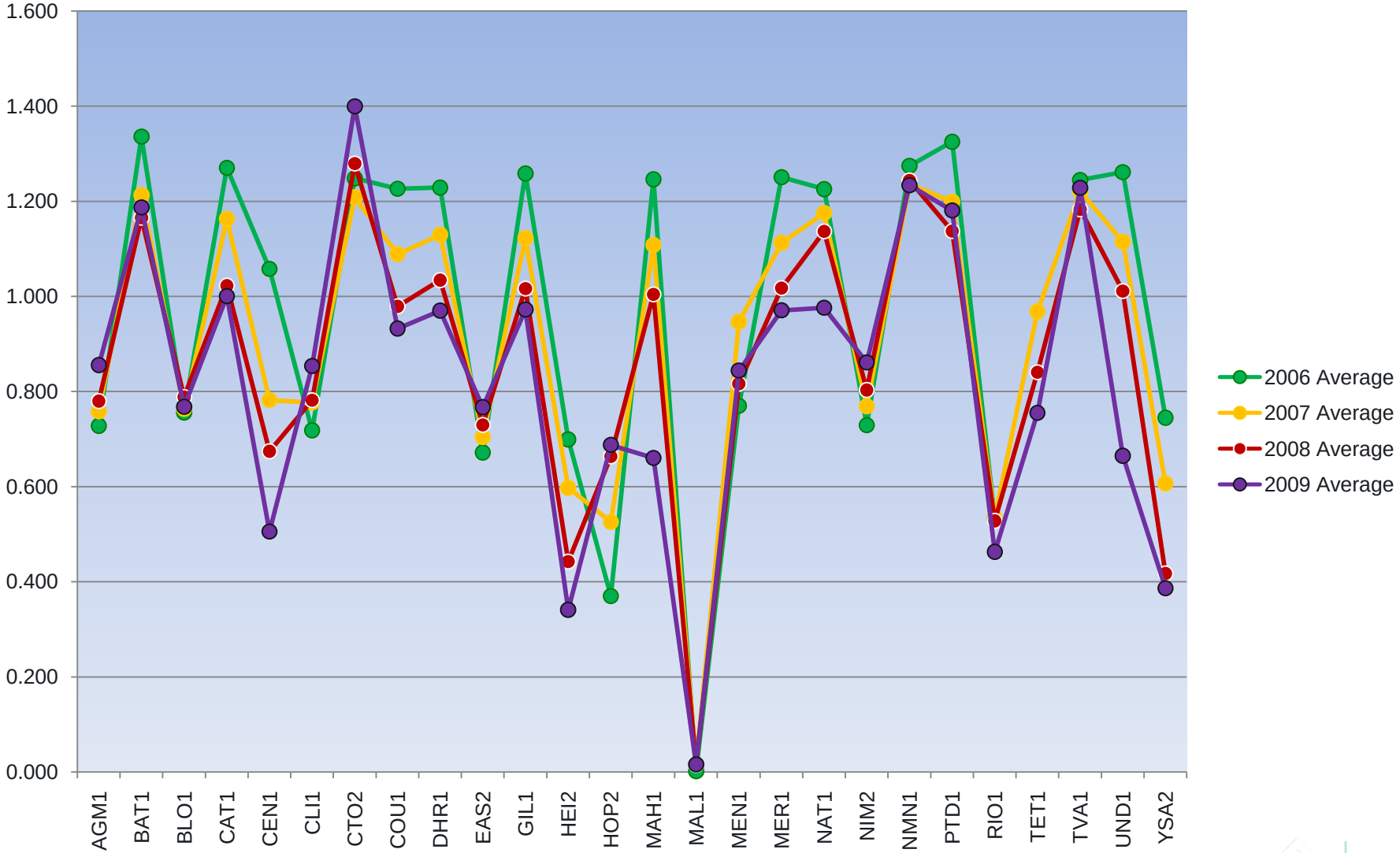


Exhibit B

Affidavit

Jody L. Bertini

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Tennessee Gas Pipeline Company) Docket No. RP11-

AFFIDAVIT
OF
JODY L. BERTINI

1. My name is Jody L. Bertini. My business address is 1001 Louisiana, Houston, Texas 77002.

2. I am Manager of Gas Quality for Tennessee Gas Pipeline Company ("Tennessee"). I am responsible for the day-to-day management of gas quality for the El Paso Pipeline Group, including the Tennessee pipeline system. I hold an Associate of Applied Science degree in Petroleum Engineering from Muskingum Area Technical College. I have been employed by El Paso Corporation for 29 years and my experience includes 5 years of experience in field operations and 24 years in gas measurement, which includes 3 years in my current role of managing gas quality for the El Paso Pipeline Group.

3. The purpose of my Affidavit is to explain how the supplies of natural gas entering the Tennessee system have changed and how this change in supply has necessitated the need for Tennessee to revise the gas quality and interchangeability specifications in its Tariff. To provide support and justification for the gas quality and interchangeability Tariff revisions that Tennessee is proposing in this filing, I will describe historical operating conditions on Tennessee and flow studies that Tennessee prepared to demonstrate its

ability, under normal operating conditions, to receive gas from new sources of supply and meet the delivery specifications proposed in this filing.

The Tennessee Pipeline System

4. The Tennessee pipeline system consists of approximately 13,700 miles of pipeline with a forward haul design capacity of approximately 7.2 Bcf/d. Tennessee's system includes segments with multiple lines and begins in the natural gas producing regions of Louisiana, the Gulf of Mexico and South Texas and extends to the Northeast United States, including the metropolitan areas of New York City and Boston. Our system also has 3 interconnects at the U.S.-Mexico border and the U.S.-Canada border. TGP provides service to a variety of customers, including natural gas distribution and industrial companies, electric generation companies, natural gas producers, other natural gas pipelines and natural gas marketing and trading companies.

Changing Supply

Traditional Sources

5. Historically, the majority of the transportation on Tennessee had been from the supply areas in the south to the major demand centers in the north. This basic flow pattern has recently undergone significant changes. Tennessee is experiencing a major shift in supply sources. Production from conventional sources, such as from the Gulf of Mexico and South Texas, is declining while production from unconventional sources, such as shale, is rapidly increasing. These shifts are changing the supply patterns and flows on Tennessee.

6. Gulf of Mexico supplies have diminished over the past 5 years. Production levels have been declining at existing production platforms. In addition, many Gulf of Mexico production platforms were damaged beyond repair during hurricanes Katrina, Rita and Ike in 2005 and 2008. Hurricane Ike also resulted in extensive damage to offshore pipelines. One of Tennessee's major offshore receipt points, Independence Hub, has seen production fall from a high of 1 Bcf/d to current levels of less than 500 MMcf/d. In 2009, Gulf of Mexico supply received into Tennessee had an average heating value of 1046 British thermal units ("Btu") and average Wobbe Number of 1362, as measured downstream of available processing plants.

7. Another change in the supply patterns is the reduction in imports from Canada. The reduction in Canadian imports is a function of increased demand for gas within Canada and declining production. The reduction in Canadian supplies has led to increased demand for domestic supplies and related transportation services, but has been offset in part by regasified liquified natural gas ("LNG") entering Tennessee from terminals on the Gulf Coast. In 2009, Canadian supply received into Tennessee at Niagara, New York had an average Btu content of 1012 and an average Wobbe Number of 1331. Canadian supply received at Dracut, Massachusetts had an average Btu content of 1048 and an average Wobbe Number of 1353.

8. South Texas supply, which was traditionally transported to Tennessee's northeast market area, is now transported south to Mexico to supply a growing demand for natural gas for power generation. Overall production levels in South Texas have been declining, although new shale plays in South Texas, namely the Eagle Ford Shale, may result in

additional supply as associated gas (gas production associated with oil). These potentially new gas supplies will have a significantly different gas composition than traditional production, with higher Btu and Wobbe Numbers. In 2009, South Texas supply received into Tennessee had an average Btu content of 1028 and average Wobbe Number of 1361. Tennessee may see new Eagle Ford production having Btu levels over 1100 and Wobbe Numbers over 1400, without processing.

9. In 2007, when Tennessee began gas interchangeability discussions with its customers, imports of LNG at Gulf Coast terminals were expected to increase, offsetting declining domestic production. Since 2007, domestic production has increased dramatically as advances in technology have allowed exploitation of Shale plays. As a result of this increased domestic production as well as the global demand for LNG, LNG imports into the United States have either remained constant or in some areas have not developed as robustly as expected. Nonetheless, Tennessee has included in its flow studies, potential current supply sources for LNG in the Gulf Coast area, including the Golden Pass, Chenier, and Sempra terminals. Supplies of LNG originate from various supplies from around the world and often having heating values and Wobbe Numbers in excess of those traditionally seen on Tennessee's system. For example, slide 6 in Exhibit A-1, shows Btu levels and Wobbe Numbers in excess of 1100 and 1400, respectively, for five countries that are typical sources for LNG received at terminals on the Gulf Coast. Supplies of LNG from the Distrigas of Massachusetts ("DOMAC") LNG terminal in Massachusetts have remained relatively stable over recent years. In 2009, LNG received into Tennessee

from DOMAC had an average Btu content of 1044 and an average Wobbe Number of 1378.

10. Overall these traditional sources of supply on Tennessee' system have had Btu contents well within the range of 967 to 1100 Btu in Tennessee's currently-effective Tariff. The other gas constituents in these sources of supply like carbon dioxide, nitrogen, and sulfur have also been well within the limits of Tennessee's Tariff. The content of heavier hydrocarbons like ethane and propane ("C2+") and butane etc. ("C4+") in these sources of supply have also not been high enough to cause concern for end users taking gas off of Tennessee.

New Sources of Supply

11. Tennessee is connected to at least two major shale formations, the Haynesville in northern Louisiana and Texas and the Marcellus in Pennsylvania. Recently, natural gas received into Tennessee from these sources has exceeded receipts from traditional sources in South Texas and the Gulf of Mexico.

12. On the Tennessee system, Marcellus Shale volumes have and will continue to exceed receipts from traditional sources of gas in South Texas and the Gulf of Mexico. Tennessee has seen a significant increase in gas supplies received from the Marcellus Shale into the middle of its system in Pennsylvania. Marcellus producers have approximately 27 interconnects with Tennessee, representing approximately 3 Bcf/d that could potentially be delivered into its system in Zone 4. In addition, there are approximately 17 new interconnects currently under construction representing

approximately 2 Bcf/d of potential new supply. Physical receipts of Marcellus gas into Tennessee's 300 Line located in Pennsylvania have increased from zero in 2008 to over 1 Bcf/d in 2010. In 2009, Marcellus Shale gas received into Tennessee had an average Btu content of 1032 and an average Wobbe Number of 1366. Although these number are well within Tennessee's current limits on Btu content and its proposed range for Wobbe Number, gas supply from some parts of the Marcellus Shale, primarily the southwestern areas of the formation, contains Btu levels in excess of the proposed 1110 limit, Wobbe Numbers in excess of the proposed 1400 limit, C2+ levels of in excess of the proposed 12% limit, and C4+ levels in excess of the proposed 1.5% limit. In general, this rich gas in the southwestern Marcellus Shale region is processed to extract propane and heavier hydrocarbons ("C3+"), leaving the residue gas having similar composition to the Appalachian Supply Basin. However, due to a lack of infrastructure and market for ethane in this area, ethane is reinjected into the plant residue gas stream and delivered to Tennessee, resulting in an increased percentage by volume of ethane content.

13. Tennessee has also seen a significant increase in gas supplies received from the Haynesville and Barnett Shales into the southern part of its system in Zone 1. In 2009, supply from the Haynesville and Barnett Shales received into Tennessee had an average Btu content of 1018 and an average Wobbe Number of 1333. Haynesville Shale production has shown levels of carbon dioxide exceeding Tennessee's currently-effective 3% limit and hydrogen sulfide levels exceeding the 0.25 grain per 100 scf limit. Haynesville Shale supplies must be processed to meet the carbon dioxide and hydrogen sulfide tariff limits in order to be accepted into Tennessee.

14. In November of 2009, the REX-East pipeline segment of Rockies Express Pipeline, LLC ("REX"), the third and final phase of the 1.8 Bcf/d REX pipeline, commenced transportation service. The 639-mile, REX-East pipeline segment extends from Missouri to Ohio interconnecting with Tennessee in Guernsey County, Ohio. This interconnect with REX allows for up to 560,000 Dth/d of natural gas supply from the Rocky Mountains to come into Tennessee's system at an interconnection in Ohio. Throughout much of 2010, Tennessee received close to meter capacity from REX, but more recently volumes have been as low 350,000 Dth/d. These REX volumes reflect another significant shift in supply and flow patterns on Tennessee and further contribute to the displacement of supplies that were sourced traditionally from the Gulf of Mexico and South Texas as described above. In 2009, these REX supplies received into Tennessee had an average Btu content of 1018 and an average Wobbe Number of 1340.

15. Tennessee has also been receiving significant supplies from the Appalachian Basin since May of 2008. These supplies enter the Tennessee mainline at Tennessee's Station 110 in Morehead, Kentucky, from a lateral pipeline extending into central West Virginia and terminating at the Broad Run interconnection with Dominion Transmission, Inc ("Dominion"). After processing to remove propane and heavier hydrocarbons ("C3+"), this Appalachian Basin gas has typically had a much higher Btu content, Wobbe Number, and C2+ content, than other supplies flowing on Tennessee. In 2009, Appalachian gas received into Tennessee had an average Btu content of 1155 and an average Wobbe Number of 1415. After processing for C3+, the ethane (C2) content can be as high as 18%. The cricondentherm hydrocarbon dewpoint ("HDP"), however, is extremely low (-

40 degrees), allowing for blending opportunities with gas having high HDP but low ethane levels.

16. Since the middle part of the 2000's, several new LNG terminals on the Gulf Coast have also been placed into service. Although supplies of regasified LNG entering Tennessee from these terminals have not developed at the level once expected, Tennessee may receive regasified LNG into its 800 Line from ExxonMobil's Golden Pass Pipeline, Trunkline pipelines interconnecting with Tennessee at Lacassine, Cheniere Energy's Creole Trail Pipeline, Sempra's Cameron Pipeline, and Kinder Morgan's KM Louisiana Pipeline. These LNG supplies have also typically had a much higher Btu content and Wobbe Number than other supplies flowing on Tennessee. In 2010, LNG from the Gulf Coast, specifically Sempra, had a Btu content up to 1091 and a Wobbe Number up to 1399. Historical LNG supply has met all other proposed specifications, however, the gas composition of global LNG supply is dramatically varied. As such Tennessee chose to use two supply sources, Qatar and Oman,[1] with high BTU and Wobbe numbers for the flow studies (discussed in more detail below) in order to demonstrate its ability to blend new LNG supplies. Additionally, the Gulf Coast LNG supply can be diverted to existing gas processing plants, primarily Grand Chenier, where heavier hydrocarbons in the C2+ and C4+ range can be extracted from the LNG supply, lowering the Wobbe Number and Btu content to more typical supply characteristics. If a producer or terminal operator elects to lower the heating content of the regasified LNG through injection of nitrogen,

[1] *See* Exhibit A-1 at 6.

nitrogen levels can also approach the proposed specifications for diluents in Tennessee's Tariff.

Tennessee's Approach to Gas Quality and Interchangeability Tariff Revisions

17. Over the past four years, with the introduction of new sources of supply with characteristics and compositions different than the traditional sources of supply, producers and marketers desiring to get their gas into the Tennessee system and end users consuming gas delivered from the system have raised concerns with the gas quality provisions in Tennessee's Tariff. Marketers and producers desire Tariff provisions with more flexibility to increase the level of certainty that gas will get into Tennessee's system, while end users desire more stringent specifications for certain characteristics and composition specifications to accommodate desired specifications on their distribution systems and for combustion equipment.

18. In light of the change in system supplies entering Tennessee's system and the concerns of end users that gas delivered by Tennessee meet certain specifications, Tennessee initiated a collaborative process with its customers and other stakeholders to consider and discuss changes to the gas quality and interchangeability specifications in Tennessee's Tariff.

19. For Tennessee, the starting point in designing new gas quality and interchangeability Tariff provisions was to consider the specifications desired by end users for the efficient and reliable operation of distribution systems, LNG peak shaving facilities, combustion equipment and power generation facilities.

20. Tennessee recognized the concerns of its local distribution company ("LDC") customers that with changes in combustion equipment and home appliances to reduce emissions and increase fuel efficiency, there was a need to receive gas from interstate pipelines with predictable and consistent characteristics and composition.

21. Tennessee also recognized that many LDCs operate LNG peak shaving facilities and that gas with excessive quantities of C4+ can interfere with the liquefaction process. In addition, excessive quantities of C2+ and diluents such as carbon dioxide and nitrogen can affect the efficiency and reliability of peak shaving facilities.

22. Tennessee also delivers natural gas to several power generation facilities. Tennessee understands that these customers prefer to receive gas with predictable and stable characteristics and composition. Specifically, Tennessee understands that these customers operate under certain emission standards and prefer fuel with minimal quantities of sulfur and diluents like carbon dioxide and nitrogen.

23. In addition to end user concerns, in developing its Tariff proposal, Tennessee also relied on the *White Paper on Natural Gas Interchangeability and Non-Combustion End Use* ("*Interchangeability White Paper*") prepared by the NGC+ Interchangeability Working Group ("NGC+ Working Group"). In particular, Tennessee sought to follow the guidance in the Interim Guidelines contained in the *Interchangeability White Paper*.

24. With these end user concerns in mind and the guidance of the *Interchangeability White Paper*, Tennessee worked to develop revisions to the gas quality and interchangeability provisions in its Tariff. Specifically, Tennessee recognized the need to incorporate

specific delivery point specifications into its Tariff so that its end use customers could be confident that they will receive gas with certain characteristics and composition specifications.

25. Once these delivery point specifications were developed, Tennessee sought to develop appropriate receipt point specifications that would permit Tennessee to meet the delivery point specifications and also maximize the gas supplies available to its system.

26. To achieve this objective, Tennessee developed safe harbor ranges and limits for certain specifications. The safe harbor ranges are designed to provide certainty to shippers that their gas will be accepted by Tennessee so long as it falls within the safe harbor ranges and limits. Tennessee proposes to adopt safe harbor ranges for heating value and Wobbe Number and safe harbor limits for C2+, C4+, combined carbon dioxide, nitrogen and oxygen, and carbon dioxide. In addition, to these safe harbor limits, Tennessee is proposing to adopt hard limits on combined carbon dioxide and nitrogen, sulfur, hydrogen sulfide, and oxygen.

27. Based on historical operating conditions (discussed in more detail below), Tennessee believes that these receipt point safe harbor ranges and limits and hard limits are appropriate to ensure that Tennessee will be able to meet the delivery point specifications. Notwithstanding these parameters, based on historical operating conditions, Tennessee anticipates that it will often be able to accept gas that is outside of the proposed safe harbor ranges where blending opportunities exist such that Tennessee will be able to satisfy the delivery specifications. In such circumstances, Tennessee has

agreed that it shall accept gas that is outside of the safe harbor ranges, but is still within the hard limits for combined carbon dioxide and nitrogen, sulfur, hydrogen sulfide and oxygen.

28. In order to manage its ability to accept gas that exceeds the safe harbor ranges and limits, Tennessee is also proposing to adopt posting procedures whereby it may post a limit on Passkey (Tennessee's electronic bulletin board) for heating value, Wobbe Number, carbon dioxide, nitrogen, C2+, and/or C4+ when such a limit is necessary to correct an actual or anticipated Interchangeability Problem and protect Tennessee's ability to delivery gas that conforms to delivery point specifications. When gas is tendered for receipt above a posted limit for one of these specifications, Tennessee may refuse to accept the gas.

Proposed Specifications

Heating Value and Wobbe Number

29. Tennessee is proposing to adopt a heating value safe harbor range of 967 Btu to 1110 Btu. At delivery points, Tennessee will deliver gas with a Btu content within this same range. The upper limit of 1110 on receipts and deliveries is an increase of 10 Btu from the currently-effective limit in Tennessee's Tariff. This increase is consistent with the Interim Guidelines in the *Interchangeability White Paper*.

30. Tennessee is also proposing to add a delivery point specification for Wobbe Number. In the *Interchangeability White Paper*, the NGC+ Working Group recognized that Wobbe Number, which is based on the heating value and specific gravity of the natural gas, is an

effective and easy to use tool to measure interchangeability. Tennessee is proposing to adopt a Wobbe Number safe harbor range of 1314 to 1400. At delivery points, Tennessee will deliver gas with a Wobbe Number between 1314 and 1400.

31. In developing the heating value and Wobbe Number safe harbor ranges and delivery specifications, Tennessee developed a series of flow studies to analyze its ability to accommodate new sources of supply into Tennessee's system, some of which may have a heating value and Wobbe Number outside of the proposed receipt safe harbor and delivery point specifications. These flow studies showed that under most circumstances, Tennessee would be able to accept gas with a heating value and Wobbe Number outside of the safe harbor ranges and blend the gas with supplies flowing on the system to meet delivery specifications at most delivery points.

32. These flow studies are included in the Interchangeability Supplement to Tariff Filing presentation that is attached to this filing as Exhibit A-1.[2] These flow studies are based on certain extreme assumptions that are designed to test the system's ability to accommodate new sources of supply with characteristics and compositions that may exceed the proposed safe harbor ranges. Generally, the flow studies demonstrated that, even under extreme supply scenarios, Tennessee could accept these new sources of supply and still meet delivery point specifications at most points on its system. Restrictions on gas above the safe harbor ranges, or other mitigation measures, would only be required at isolated points on the system.

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[2] *See* Exhibit A-1 at 8-15.

33. The flow studies are based on throughput on the Tennessee system for a Summer Average Day and a Winter Peak Day.[3] For each of these throughput scenarios, Tennessee developed flow studies to show the affect of adding Production Area LNG, which assumes receipts into Tennessee of regasified LNG from Gulf Coast terminals sourced from Qatar and Oman with a heating value of 1132 and 1168, respectively, and a Wobbe Number of 1425 and 1444, respectively. This flow study also assumes that LNG receipts have completely displaced supply from the Gulf of Mexico; a scenario that Tennessee expects would be exceedingly rare. In this scenario, Tennessee would exceed the delivery point specification at the Kinder, Louisiana Monitoring Point, but would be able to meet the delivery point specification at downstream Monitoring Points like Yscloskey, Louisiana; Heidelburg, Mississippi; Centerville, Tennessee; and Tennessee Valley Authority. [4]

34. In order to meet the delivery specification at Kinder, under the proposed Interchangeability Posting provisions in Section 5(o), Tennessee could restrict LNG volumes on identified segments of the system. According to the proposed Posting Procedures, Tennessee would determine the maximum heating value or Wobbe Number[5] that it could accept and still meet delivery specifications and post this number as a limit on these characteristics, which limit shall be no lower than the safe harbor. If gas

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[3] 2009 Flow Study data and 2006-2009 historical averages were based on Monitoring Points listed in Article, II, Section 3.1(b) of the GT&C of Tennessee's currently-effective Tariff and some system delivery points. 2010 historical data was based on new Monitoring Points proposed in this filing, which are more reflective of blending points on the system and less dependent on delivery points such as Hanging Rock and Gilmore, OH, both of which currently flow intermittently.
[4] *See* Ex. A-1 at 8 and 10.
[5] The Posting Procedures would also be applicable to specifications for carbon dioxide, nitrogen, C2+, and C4+.

delivered to Tennessee does not comply with the posted limit, then Tennessee may refuse to accept the gas, or may restrict receipts which do not comply with the posted limit volumetrically on a pro rata basis as necessary to achieve a blended stream which will allow Tennessee to meet its delivered gas specifications. Volumes would remain restricted until such time as Tennessee could meet its delivery point specifications without the posted limit. Alternatively, the LNG producers could blend the regasified LNG with nitrogen to reduce the heating value and Wobbe Number and meet the safe harbor specification or posted limit.

35. The slides labeled "Summer Average Day New Sources" and "Winter Peak Day New Sources" consider the affect of the LNG from the Production Area LNG slides moving downstream into the central portion of the Tennessee system and being blended with New Sources of supply including: (1) Appalachian Basin gas with a heating value of 1155 Btu and Wobbe Number of 1415; (2) Rocky Mountain gas with a heating value of 1018 Btu and Wobbe Number of 1340; and (3) Marcellus Shale gas with a heating value of 1032 Btu and Wobbe Number of 1366.[6] In this scenario, Tennessee would be able to meet delivery specifications for heating value and Wobbe Number at all points under both throughput assumptions, with the exception of the Summer Average Day at the Hanging Rock, Ohio delivery point, where heating value would be 1124 Btu. Mainline throughput on the Average Summer Day is lower than on the Winter Peak Day, so there are less supplies flowing on the system to blend with the Appalachian Basin gas entering the mainline at Greenup, Kentucky. In order to meet the delivery specification at

[6] *See* Exhibit A-1 at 9 and 11.

Hanging Rock, Tennessee could restrict supplies from the Appalachian Basin in accordance with the Posting Procedures described above.

36. The slide labeled "Summer Average Day Production Area LNG & High BTU ABS" showing the central portion of the Tennessee system considers the effect of LNG from the Gulf Coast and high Btu gas from the Appalachian Basin moving into the system without any lower Btu Rocky Mountain gas entering at the interconnection with REX between the Hanging Rock delivery point and Mercer, Pennsylvania Monitoring Point. Based on historical operating conditions, such a scenario would be exceedingly rare. As discussed above, it would be exceedingly rare for LNG from the Gulf Coast to displace all other supply from the Gulf of Mexico. Furthermore, throughout much of 2010, Tennessee received close to meter capacity of 560,000 Dth/d from REX, but more recently volumes have been as low 350,000 Dth/d. The few days that Tennessee has received no gas from REX have been due to maintenance activity at the interconnection with REX. In this scenario, Tennessee would not be able to meet delivery point specifications for heating value and Wobbe Number at Hanging Rock and Mercer.[7] In order to meet the delivery specification at these points, Tennessee could restrict supplies from the Appalachian Basin in accordance with the Posting Procedures described above or nitrogen blending could be used by LNG and Appalachian Basin producers to reduce the heating value and Wobbe Number.

[7] *See id.* at 13.

37. When Tennessee is receiving Rocky Mountain gas from REX, as shown on the slide "Winter Peak Day New Sources & High BTU ABS," the result is that Tennessee is able to meet the delivery specification for heating value and Wobbe Number at the Mercer Monitoring Point.[8]

38. Under the proposed provisions in Section 5(o)(i) of the Tariff, Tennessee intends to accept gas that is outside of the safe harbor ranges for heating value and Wobbe Number whenever the gas meets all other specifications in the Tariff and Tennessee will still be able to meet its delivery point specifications. Tennessee expects that, in light of the heating values and Wobbe Numbers that it expects from Gulf Coast LNG and the Appalachian Basin, under most supply scenarios and operating circumstances it will be able to receive gas outside of the safe harbor ranges for heating value and Wobbe Number. When Tennessee is not able to accept such gas, it may post limits on these characteristics and restrict receipts in accordance with the Posting Procedures described in Paragraph 34 above.

39. Under more normal operating circumstances, Tennessee generally does not experience heating values or Wobbe Numbers on its system outside of the proposed receipt point safe harbor range and delivery point range. For example, slides 18 and 19 of Exhibit A-1, show the annual average heating values and Wobbe Number for the years 2006-2010 at the 29 Monitoring Points that Tennessee has proposed to adopt in this filing. Each

[8] *See id.* at 15.

yearly average at each point is well within proposed safe harbor range and delivery point range for heating value and Wobbe Number that Tennessee is proposing in this filing.

40. As indicated on Exhibit A-1, slides 29 and 33, which show maximum and minimum ranges for Wobbe Number over the course of a year at a given point, there have been isolated occasions in the past five years where Tennessee has Wobbe Numbers in excess of the proposed 1400 maximum Wobbe Number at certain Monitoring Points. In April 2006 at the Yscloskey (YSA2) Monitoring Point, Tennessee experienced Wobbe Numbers exceeding 1400 for brief periods of time. These readings, however, are anomalous because they occurred when the Yscloskey processing plant was by-passed. In 2010, Tennessee also experienced Wobbe Numbers exceeding 1400 at the Aqua Dulce, TX (VAY1) Monitoring Point.

41. This series of slides showing Wobbe Number range at the proposed 29 Monitoring Points from 2006 to 2010 also demonstrates why Tennessee does not believe it would be appropriate to adopt a maximum Wobbe Number below 1400. Some participants in the collaborative process suggested that a maximum Wobbe number of 1385 would be more appropriate. In 2010, however, slide 33 shows that Tennessee experienced a Wobbe Number in excess of 1385 at 8 out of 29 Monitoring Points. Three of the monitoring points, Malden (MAL1), Dracut, (DRA1), and Hopkinton, (HOP2), all in Massachusetts reflect periods of increased LNG supply in the Northeast to meet fluctuating demand. The high Wobbe Numbers at Greenup, Kentucky (GNP1) is reflective of temporary disruptions at processing plants in the Appalachia Basin when weather conditions prohibit the transportation of propane from the processing plant. The maximum Wobbe

Number reading at Kinder, Louisiana (CTO2), reflects occasional outages at processing plants upstream of Tennessee's Kinder Compressor Station. Even though these supply scenarios and disruptions in processing were all of a limited duration, scenarios and disruptions like these occur frequently enough to suggest that a lower Wobbe Number would make it more difficult for Tennessee to receive LNG and Appalachian Basin supplies with higher heating values and Wobbe Numbers.

42. Collectively, these flow studies demonstrate that Tennessee' proposed receipt point safe harbor range and delivery point range for heating value and Wobbe Number strike the best balance between accommodating end user concerns and maximizing supply available to the Tennessee system. The flow studies show that only under extreme supply scenarios would Tennessee not be able to meet the delivery point specifications for heating value and Wobbe Number. Under normal operating conditions, Tennessee will be able to accommodate LNG from the Gulf Coast and Appalachian Basin gas with a heating value and Wobbe Number outside of the proposed safe harbor ranges and still meet specifications for these characteristics at delivery points. Furthermore, historical data shows that 1400 is the most appropriate maximum limit.

Non-Methane Hydrocarbons – C2+ and C4+

43. Tennessee's currently-effective Tariff contains no specifications for the non-methane hydrocarbons ethane and propane (C2+) and heavier hydrocarbons like butane, etc. (C4+). Tennessee is proposing to adopt a C2+ safe harbor of 12% or less and a C4+ safe harbor or 1.5% or less. At delivery points, Tennessee will deliver gas with a C2+ content

of 12% or less and a C4+ content of 1.5% or less. Historically, excessive levels of C2+ and C4+ have not been a problem on Tennessee's system.

44. Tennessee's proposed safe harbor limits and delivery point limits for C2+ and C4+ are consistent with other pipelines serving the Northeast, including Algonquin Gas Transmission, LLC ("Algonquin") and Texas Eastern Transmission, LP ("Texas Eastern") and the limit on C4+ is consistent with the Interim Guidelines in the *Interchangeability White Paper*.

45. Tennessee's flow studies indicate that only under extreme supply scenarios would Tennessee not be able to meet the proposed C2+ delivery point specification of 12%. For example, on the "Summer Average Day New Sources" slide, the C2+ level at the Hanging Rock Monitoring Point would be 15.38%.[9] Under this flow study, C2+ levels would exceed 12% at the Hanging Rock point, due to 300 MMcf of ethane-rich gas entering the system from the Appalachian Supply Basin.[10] Similarly, in the "Summer Average Day Production Area LNG & High BTU ABS" slide, which assumes no REX gas flowing into Tennessee, C2+ levels would reach 12.22% at Hanging Rock and Mercer, just barely above the proposed maximum.[11] Tennessee would also encounter high levels of C2+ at Hanging Rock under the "Winter Peak Day New Sources and High BTU ABS" scenario.[12] Under these scenarios, in accordance with the Posting Procedures

[9] *See id.* at 9.
[10] The 300 MMcf/d of Appalachian Basin supply used in the flow studies was based on design capacity of the Appalachian Basin supply point. Tennessee expects future supply to be significantly less than the design capacity.
[11] *See* Exhibit A-1 at 13.
[12] *See id.* at 15.

described above, Tennessee could restrict gas with C2+ in excess of 12% flowing into the mainline from the Appalachian Basin.

46. These scenarios show that, even with 1.0 Bcf of Marcellus Shale Gas, some of which can contain C2+ in excess of 12% entering the system downstream of Hanging Rock, so long as Tennessee is receiving gas from REX, C2+ would not exceed 12% at any of the Monitoring Points in Pennsylvania.[13] The Rocky Mountain supplies from REX help to blend the ethane-rich Appalachian Basin and Marcellus Shale gas to meet the 12% C2+ delivery point specification.

47. Under the proposed provisions in Section 5(o)(i) of the Tariff, Tennessee intends to accept gas that is outside of the safe harbor ranges for C2+ and C4+ whenever the gas meets all other specifications in the Tariff and Tennessee will still be able to meet its delivery point specifications. Tennessee expects that, in light of the supply composition that it expects from new sources, including the Marcellus Shale and the Appalachian Basin based on historic data, under most supply scenarios and operating circumstances it will be able to receive gas outside of the safe harbor ranges for C2+ and C4+. When Tennessee is not able to accept such gas, it may post limits on these characteristics in accordance with the Posting Procedures described in Paragraph 34 above.

48. Under more normal operating circumstances, Tennessee generally does not experience C2+ or C4+ levels on its system above the proposed receipt point safe harbor and delivery point limits of 12% and 1.5%, respectively. For example, slides 20 and 21 of

[13] *See id.* at 9 (showing 5.18% C2+ at Mercer and lower levels at downstream Monitoring Points).

Exhibit A-1, show the annual average C2+ and C4+ levels for the years 2006-2010 at the 29 Monitoring Points that Tennessee has proposed to adopt in this filing. Each yearly average at each point is well within proposed safe harbor limit and delivery point limit for C2+ and C4+ that Tennessee is proposing in this filing.

49. As indicated in Exhibit A-1, slides 34 and 38 there have been isolated occasions in the past five years where Tennessee has experienced C2+ levels in excess of the proposed 12% receipt point safe harbor limit and delivery point limit at certain Monitoring Points. In April of 2006 at the Yscloskey (YSA2) Monitoring Point, Tennessee experienced C2+ levels exceeding 12% while the plant was in by-pass mode. In 2010, Tennessee also experienced C2+ levels exceeding 12% at the Greenup, Kentucky (GNP1) Monitoring Point. These levels are due to ethane-rich gas entering the system from the Appalachian Basin. The Appalachian Basin gas is processed prior to delivery to Tennessee to remove propane and heavier hydrocarbons (C3+), however due to a lack of infrastructure and market for ethane in this area, the ethane is reinjected into the plant residue gas stream and delivered to Tennessee, resulting in an increased percentage by volume of ethane content.

50. Collectively, these flow studies demonstrate that Tennessee's proposed receipt point safe harbor limit and delivery point limit for C2+ and C4+ strike the best balance between accommodating end user concerns and maximizing supply available to the Tennessee system. The flow studies show that only under extreme supply scenarios would Tennessee not be able to meet the delivery point specifications for C2+ and C4+, and even then only at one Monitoring Point. Under normal operating conditions, Tennessee

expects to be able to accommodate ethane-rich gas from the Appalachian Basin and Marcellus Shale with C2+ levels in excess of 12% and still meet specifications for these characteristics at delivery points.

Diluents – Carbon Dioxide, Nitrogen and Oxygen

51. Tennessee is proposing to adopt a safe harbor for combined carbon dioxide, nitrogen and oxygen of 4% ("total diluents"). Within this safe harbor, combined nitrogen and oxygen shall not exceed 2.75%, carbon dioxide shall not exceed 3% and oxygen shall not exceed 0.2%. Tennessee is also proposing to adopt a separate safe harbor for carbon dioxide of 2%. At receipt points, Tennessee is also proposing to adopt separate hard limits on carbon dioxide – 3%, oxygen – 0.2%, and combined nitrogen and oxygen – 2.75%. At delivery points, Tennessee shall deliver gas that shall not contain more than 4% combined carbon dioxide, nitrogen and oxygen; provided, however, that carbon dioxide shall not exceed 2% and combined nitrogen and oxygen shall not exceed 2.75%. The delivery point specifications also state that carbon dioxide shall not exceed 2% and oxygen shall not exceed 0.2%.

52. Tennessee's proposed delivery point limit on total diluents is consistent with the Interim Guidelines in the *Interchangeability White Paper* and is consistent with the tariff provisions of other pipelines serving the Northeast, including, Algonquin, Texas Eastern, Columbia Gas Transmission Corporation and National Fuel Gas Supply Corporation ("National Fuel").

53. Based on the standards for total diluents recommended in the Interim Guidelines and adopted by other pipelines, including the 2% limit on carbon dioxide at delivery points, Tennessee believes these proposed limits are appropriate for its system. To accommodate producers and LNG interests, that may on occasion need to deliver gas in excess of 2% carbon dioxide, or in excess of 2.75% nitrogen, Tennessee has included carbon dioxide and nitrogen in the Tariff language in Section 5(o) providing that Tennessee shall accept gas outside of the safe harbor range so long as all other Tariff requirements are met and Tennessee is able to meet delivery point specifications. In accordance with this provision, Tennessee will accept gas with carbon dioxide up to 3% and combined carbon dioxide and nitrogen up to 4%. Based on its operating history, Tennessee believes this flexibility on the receipt point specifications for carbon dioxide and nitrogen is appropriate, so long as the hard limits on these constituents are in place. The hard limits on carbon dioxide and oxygen are needed to protect against corrosion on the Tennessee system. The hard limits on combined nitrogen and oxygen, combined carbon dioxide and nitrogen, and carbon dioxide are also needed to protect Tennessee's ability to blend gas to meet delivery point specifications.

54. The flow studies indicate that even under the extreme assumptions of supplies entering Tennessee's system the carbon dioxide and nitrogen levels in gas flowing on its system for delivery would be well within the proposed Tariff specifications. For example, in none of the flow studies discussed above does carbon dioxide or nitrogen exceed 2% at

any point on the system.[14] The historical data showing average levels of combined carbon dioxide and nitrogen, and carbon dioxide for the last five years also shows that averages are well below the delivery point specification of 4% for total diluents and 2% for carbon dioxide.[15] The historical data by Monitoring Points also indicates that the range for total diluents at delivery points has been well below 4% and the range of carbon dioxide has been well below 2%.[16] The only exception to this trend was in 2006 at the Yscloskey Monitoring Point where carbon dioxide was at 2%. In 2006 and 2009, total diluents at the Yscloskey Monitoring Point approached 4%, but both of these occasions are anomalous. The 2009 data reflects a gas chromatograph failure from May 21 through May 25, and the 2006 data reflects a processing plant outage in early April.

55. Collectively, these flow studies and historical data and Tennessee's willingness to receive supplies in excess of the safe harbors, but below the hard limits for combined carbon dioxide and nitrogen, demonstrate that Tennessee' proposed receipt point safe harbor limits and delivery point limits for total diluents strikes the best balance between accommodating end user concerns and maximizing supply available to the Tennessee system. The flow studies show that, even under extreme supply scenarios, Tennessee would be able to meet the delivery point specifications for total diluents. Under normal operating conditions, historical data demonstrates that Tennessee has had no problems with levels of total diluents in excess of the proposed limits.

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[14] *See id.* at 8-15.
[15] *See id.* at 22 and 23.
[16] *See id.* at 44-53.

56. The flow studies and historical operating conditions also demonstrate that Tennessee expects to be able to continue to accept gas with a carbon dioxide content of up to 3%, notwithstanding the safe harbor limit of 2%. Under proposed Section 5(o)(i), Tennessee is obligated to accept gas containing between 2 and 3% carbon dioxide, assuming all other Tariff specifications are met and Tennessee will be able to meet delivery specifications, the proposed change to receipt point specifications for carbon dioxide from a limit of 3% to a safe harbor of 2% with a limit of 3% should not significantly affect any producers or shippers seeking access to Tennessee's system. Under the currently-effective Tariff language, Tennessee must accept gas with up to 3% carbon dioxide. Under the proposed language, Tennessee must accept gas with up to 3% carbon dioxide, assuming all other Tariff specifications are met and that it will be able to meet delivery point specifications. Historical operating conditions on Tennessee's system and the flow studies which considered extreme supply scenarios, show that Tennessee has never had a problem accepting gas with up to 3% carbon dioxide – the standard that is currently in place – and delivering gas with 2% or less carbon dioxide – the delivery specification Tennessee proposes to adopt in this filing. As such Tennessee submits that its proposal strikes and appropriate balance between maximizing supplies available to the system and end users' requests to limit carbon dioxide to 2% at delivery points.

Sulfur and Hydrogen Sulfide

57. Tennessee's currently-effective Tariff provides that gas delivered to Tennessee shall not contain more than 20 grains of total sulfur and no more than 0.25 grain of hydrogen sulfide. Tennessee is not proposing any change to the limit on hydrogen sulfide, but is

proposing to reduce its limit on sulfur at receipt points to 10 grains. Tennessee is proposing to reduce the limit on sulfur to 10 grains to address end user concerns and to conform to the limits on sulfur on other pipelines serving the Northeast and to which Tennessee is connected. Historically, sulfur levels on Tennessee have been below 5 grains. Tennessee appreciates that some end users would prefer a sulfur limit lower than 10 grains and the historical levels on Tennessee might support this. In light of the higher sulfur limit of 20 grains that is in effect on other pipelines in the Northeast to which Tennessee is connected, for example Dominion, National Fuel and Transcontinental Gas Pipe Line Company, LLC, Tennessee believes that the more prudent and balance approach is to lower the sulfur limit to 10 grains.

58. I, Jody L. Bertini, declare under penalty that the foregoing statements are true to the best of my knowledge and belief formed after reasonable inquiry.

Dated: March 31, 2011

/s/ Jody L. Bertini
Jody L. Bertini

Subscribed and sworn to before me this 31st day of March, 2011

/s/ Vanessa V. Lazalde
Notary Public, State of Texas

My Commission Expires:

4/1/2014