Columbia Gas of Pennsylvania, Inc.
2016 General Rate Case
Docket No. R-2016-2529660
Standard Data Request
GASCOS No. 01-21
Volume 1 of 1

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-001:

Please explain the Company's policy with regard to when customer advances and contributions in aid of construction must be made.

Response:

The Company's policy with regard to when customer advances and contributions in aid of construction must be made is defined within Tariff Pa. P.U.C. No. 9 currently on file with the Pennsylvania Public Utility Commission ("Commission"), specifically, Section 8.2 Capital Expenditure Policy. The Company may install up to 150 feet of distribution main per residential applicant(s) without charging the applicant(s) a deposit. In circumstances where a deposit is required for service, residential customers may elect to use Pilot Rider New Area Service to pay the deposit over a 20 year time period or pay the deposit up front. When applicable, Commercial and industrial customers electing service shall pay a refundable cash deposit to the Company equal to the difference between the minimum capital investment required to serve the applicant's gas requirement and the amount of capital that the Company can justify investing in the project, based on the anticipated gas requirements of the applicant(s). The minimum capital investment is the capital expenditure required to serve only the gas requirement requested by the particular applicant(s).

The maximum allowable investment is the amount of capital expenditure which the estimated revenues generated from a proposed project would support and still provide the necessary return to the company, taking into consideration the estimated additional annual volumes, rate schedule, cost of gas, operating and maintenance expense, interest and taxes.

In this rate case, the Company is proposing a change for contributions in aid of construction for large commercial and industrial ("C&I") customers. Besides paying the deposit up front, the Company proposes an alternative for C&I customers who cannot pay the deposit in a lump sum. In lieu of a deposit, the customer could enter into a flexible rate agreement with the Company. Rates

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

would be designed on a case by case basis so that, over time, the Company would be adequately compensated by the customer for the uneconomic portion of the line extension that was not paid as a contribution in aid of construction up front. This proposal is further described in Company witness Waruszewski's testimony.

Additionally, subparagraph 8.2.3 Reduction or Elimination of Deposit of Section 8.2 Capital Expenditure Policy of the Company's tariff currently on file with the PA PUC provides that in any case where a deposit is required, it may be reduced or eliminated, if in the Company's judgment, the institution of such service will benefit other customers within a reasonable period of time.

Please see Exhibit No. 14, Schedule No. 2, for a complete copy of Columbia's tariff.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-002:

Please provide a detailed explanation describing how contributions in aid of construction and customer advances are reflected in the Company's cost of service study.

Response:

Customer Advances for Construction have been classified to one of two different 252 sub-accounts. Account 252-15561 has been used as a classification for Customer Advances since January 2000. Account 252-15560 was used prior to January 2000. Use of account 252-15561 began with the adoption of a revised method of accounting for Customer Advances. A reduction to rate base has been properly included for Customer Advances pertaining to both 252 sub-accounts.

A debit is made to 101-Gas Plant in Service once plant is placed in service regardless of the accounting treatment for Customer Advances. A credit is made to 101-Gas Plant in Service in recognition of Customer Advances since January 2000. Therefore, a reduction to rate base has already been included related to account 252-15561 by including the net 101-Gas Plant in Service per books.

Prior to January 2000, there was no 101-Gas Plant in Service offset for Customer Advances. As such, rate base would not be reduced through Account 101 for Customer Advances prior to January 2000. The reduction to rate base for these Customer Advances is made by including account 252-15560 in rate base.

The following table provides a summary of the entries described above.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Entries for Customer Advances not Refunded 1/	**Prior to January 2000**		**After January 2000**	
	Debit	Credit	Debit	Credit
Record Cost of Construction	101	131	101	131
Record Billing for Customer Advance	143	252	143	101
Customer Advance Received	131	143	131	143
Record Liability for Customer Advance			186	252
Both methods show customer advances received at this point and a liability recorded in 252. However, the net entries are different	101	252	186	252
Record Customer Advances not Refunded	252	101	252	186
Once a Customer Advance is deemed non-refundable it becomes a Contribution in Aid of Construction and there are no remaining entries on the books in recognition of a liability.				
1/ Entries are not shown as running through 107–Construction Work in Progress for simplicity purposes				

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-003:

Please provide a breakdown of contributions in aid of construction by customer class and plant account number for the most recent year available.

Response:

Please see Exhibit No. 8, Schedule No. 1, for contributions in aid of construction by plant account for the historic test year. Contributions in aid of construction are not recorded on the Company's books by customer class.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-004:

Please provide a breakdown of transmission and distribution mains investment by pipe diameter.

Response:

The requested breakdown is as follows:

Diameter	Quantity (Feet)	Amount $
1/2"	3	233
3/4"	7,104	13,286
1"	71,619	237,563
1-1/8"	1,402	5,709
1-1/4"	670,639	2,946,199
1-1/2"	11,436	12,618
2"	13,323,469	144,716,318
2-1/2"	4,740	3,178
3"	3,350,022	30,632,814
3-1/4"	653	3,764
3-1/2"	8,138	27,318
4"	11,522,589	269,590,942
4-1/2"	1,458	24,094
4-7/8"	13,967	18,898
5"	46,546	51,374
5-1/4"	621	344
5-3/16"	19,365	37,805
5-1/2"	295	343
5-5/8"	21,067	22,053
6"	5,719,330	182,227,105
6-1/4"	18,188	5,811
6-5/8"	112,274	694,690
7-5/8"	2,336	12,224

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

8"	2,927,282	153,874,318
8-1/4"	282	2,429
8-5/8"	8,232	361,804
9-5/8"	1,269	7,380
10"	830,534	21,899,121
12"	432,474	30,201,024
14"	450	5,167
16"	330,022	17,576,276
20"	34,198	6,960,022
Total Pipe	**39,492,004**	**$862,172,225**
Other Costs (Valves, Castings, etc.) and 106 Unclassified		**$240,846,335**
Per Exhibit 8, Schedule 1, Page 1, Col. 8 Total Gas In Service, Lines 30 thru 33.		**$1,103,018,560**

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-005:

Please provide a breakdown of customer advances by customer class for the most recent year available.

Response:

Customer Advances are not recorded on Columbia's books by customer class.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-006

Please provide a breakdown of services investment by service line diameter, and a breakdown of services by size and customer class.

Response:

The table below summarizes the Company's investment in service lines by size, as of November 30, 2015. The company does not maintain on its books and records, the service line investment by size, by customer class. Please see Columbia Statement No. 11 for an explanation of the assignment of services to the various rate schedules for the Company's Class Cost of Service Studies.

101 - Gas Plant In Service

Size	Amount
	$
Other	93,262
Total Under 3"	408,200,156
3"	847,609
3 1/8"	5,672
3 1/2"	2,099
4"	1,864,585
4 1/2"	5,980
5"	3,062
6"	210,756
6 5/8"	2,650
8"	83,920
8 5/8"	663
10"	112
12"	742
20"	158
Total Acct 380 Services 1/	**411,321,426**

1/ The amount ties to Gas Plant In Service for Account 380 – Services for the historic test year as shown on Exh. No. 8, Sch. No. 1, Pg. 1 of 2, Col. 'Account 101.1000', Ln. 39.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost Of Service

Question GAS-COS-007:

If available, please provide a breakdown of meter investment by meter size, and a breakdown of meters by size and customer class.

Response:

The table below lists the Company's investments in meters, Account 381, by size as identified on the Company's books and records as of November 30, 2015. The amount ties to the amount included in Exhibit No. 8, Schedule No. 1, Page 2 of 2. The Company's books and records do not identify the assignment of meters to the various customer classes. Please see Columbia Statement No. 11 for an explanation of the assignment of meters to each customer rate class for the Class Cost of Service studies.

Size Cubic Feet Per Hour		**Investment $**
0 - 500		22,021,054
501 - 1000		4,998,745
1001 - 1500		1,055,432
Over 1500		6,631,688
Unknown		380,342
Total Account	381	35,087,262

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-08:

Please provide the Company's rate design models and cost of service study on an IBM PC-compatible computer disk in Lotus 1-2-3 or Quattro format. If the models consist of more than one file, please include information on all files on the disk and what they contain. If not available in Lotus 1-2-3 or Quattro format, please provide in ASCII format.

Response:

Please see the enclosed CD containing Excel files of the Company's rate design and allocated cost of service studies.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-09:

Please provide a copy of the Company's current customer extension policy. Provide a representative sample of the analyses conducted by the Company when deciding whether service to a new customer qualifies under the Company's customer extension policy.

Response:

Please see Attachment A for a sample of the analyses conducted by the Company when deciding whether service to a new customer qualifies under the Company's customer extension policy. The Company's current customer extension policy appears on pages 48-50 of its tariff as reproduced below.

8. Extensions

8.1 Service Connections

The Company will install the service line from its main to point of delivery, as defined in the Point of Delivery section of this tariff; provided, however;

(a) In the territories formerly served under Tariff Gas--Pa. P.U.C. No. 6 and Tariff Gas--Pa.P.U.C. No. 7, the Company will install at its expense the service line from its main to a convenient point approximately one-hundred fifty (150) feet inside the customer's property line, absent any abnormal underground conditions or excessive permitting requirements. (See the description of Territory section of this tariff to identify territory formerly served under Tariff Gas--Pa. P.U.C. No. 6 and Tariff Gas--Pa. P.U.C. No. 7.)

(b) In rural areas, where service is not available directly from the Company, service may be provided from a transmission or production line. It is the sole discretion of the owner of the transmission or production line to allow service from their facilities to the customer. If connection is allowed, the Company's service connection will consist of a tap on the line and a service valve.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

8.2 Capital Expenditure Policy

8.2.1 Residential Distribution Service

The Company, at its discretion, may extend its distribution mains up to a distance of one-hundred fifty (150) feet on any dedicated street or highway without cost to an applicant(s), absent any abnormal underground conditions or unusual permitting requirements. When abnormal underground conditions or unusual permitting requirements exist, as determined by the Company, the applicant(s) will be required to pay a refundable cash deposit in an amount determined by the Company.

The applicant(s) will be required to pay a cash deposit to the Company when it is necessary to extend the main line more than one-hundred fifty (150) feet per applicant. The cash deposit will be equal to the difference between the minimum capital investment required to serve the applicant(s)'s gas requirements, excluding the one-hundred fifty (150) foot main allotment per applicant, and the amount of capital that the Company can justify investing in the project, based on the anticipated gas requirements of the applicant(s). The minimum capital investment is the capital expenditure required to serve only the gas requirements requested by the particular applicant(s).

The maximum allowable investment is the amount of capital expenditure which the estimated revenues generated from a proposed project would support and still provide the necessary return to the Company, taking into consideration the estimated additional annual quantities, rate schedule, cost of gas, operating and maintenance expense, interest and taxes.

If the net present value of the project is greater than $1,000 per applicant, the Company may, at its sole discretion, provide a contribution up to $1,000 per applicant, to offset installation costs of gas piping incurred by the applicant(s).

8.2.2 Commercial and Industrial Distribution Service

The applicants will be required to provide a refundable cash deposit to the Company equal to the difference between the minimum capital investment required to serve the

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

applicant's gas requirements and the amount of capital that the Company can justify investing in the project, based on the anticipated gas requirements of the applicant(s). Minimum capital investment is the capital expenditure required to serve only the gas requirements requested by the particular applicant(s).

(a) Projects Where the Net Present Value of the Cash Flows, Using the Minimum Capital Investment, is Equal to or Greater than Zero.

Such projects are economically feasible provided that there are assurances that the applicant will use the projected quantities of gas for the minimum time period stated in the agreement. Such assurances may be provided in the form of a minimum use agreement, in which applicant contractually agrees to take delivery of certain minimum quantities of gas, and to pay the applicable distribution charges for such quantities, irrespective of applicant's actual consumption of gas. At the Company's sole discretion, a deposit may be required if the Company is not certain that the applicant will use the quantity of gas, as projected, for the entire Minimum Time Period. The maximum required deposit shall be no more than the minimum capital investment.

(b) Projects Where the Net Present Value of the Cash Flows, Using the Minimum Capital Investment, is Less than Zero.

The Company shall require a refundable deposit in the amount that the net present value is below zero. For example, if the net present value of a project is -$1,000, the Company shall require a $1,000 refundable deposit. In addition, if there is uncertainty that the applicant will use the projected quantity of gas for the minimum time period stated in the agreement, the Company may, in its sole discretion, (1) require the Applicant to pay an additional refundable deposit, or (2) require the applicant to enter into a minimum use agreement, in which applicant contractually agrees to take delivery of certain minimum quantities of gas, and to pay the applicable distribution charges for such quantity, irrespective of applicant's actual consumption of gas. The additional refundable deposit, if required, shall be no more than the combined total of the Company's minimum capital investment and the net present value. For example, if the Company's minimum capital investment is $10,000 and the net present value of the project is -$1,000, the applicant shall be required to provide an additional $9,000 deposit.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

For purposes of subsection (a) and (b), above, the maximum allowable investment is the amount of capital expenditure which the estimated revenues generated from a proposed project would support and still provide the necessary return to the Company, taking into consideration the estimated additional annual quantity, rate schedule, cost of gas, operating and maintenance expense, interest and taxes.

8.2.3 Reduction or Elimination of Deposit

In any case where a deposit is required, it may be reduced or eliminated, if in the Company's judgment, the institution of such service will benefit other customers within a reasonable period of time.

8.2.4 Taxes on Deposits for Construction & Customer Advances

Any deposit, advance or other like amounts received from the applicant which shall constitute taxable income as defined by the Internal Revenue Service will have the income taxes segregated in a deferred account for inclusion in rate base in a future rate case proceeding. Such income taxes associated with a deposit or advance will not be charged to the specific depositor of the capital.

Project Summary: A 180 foot main line extension to serve two residential customers located on an existing street. New growth tariff provisions and rates in effect 12/15, and 2016 50% bonus depreciation.

Project Name	3357 Deininger Rd. Conversion
WMS Project ID	WMS1531018
Company	7-Columbia Gas of Pennsylvania, Inc.
Location	2421- York

Project Summary	Minimum	Recommended
Max Term of cash Flow Analysis (Years)	40	
Total Added Connect Load (Dth/Hr)	0.06	
Total Added Max Hour (Dth/Hr)	.12	
Total Added Max Day (Dth)	1.30	
Total Annual Load Increase (Dth)	130.00	
Services Count	2	
Meters/Regulators Count	2	
Service and M/R Costs	$0.00	$7,560.00
Extension Costs	$0.00	$10,972.00
Betterment Costs	$0.00	$0.00
Relocation Costs	$0.00	$0.00
Total Plant Investment	$0.00	$18,532.00
Net Present Value (NPV) Cash Flow		($3,842.00)
Required Deposit	$0.00	$3,842.00
Required Deposit with Gross Up	***	***
NASR Amount	$0.00	
Actual Deposit	$0.00	
IRR without Deposit		4.88%
IRR with Deposit		7.81%
Discounted Payback Years		71
Total Annual Revenue Addition	$1,000.00	$1,000.00
Cost of Capital %	7.81%	7.81%

Investment Description

Customers will need (2) AC-250 meters. They will also need (2) 1/14" B-42 IMR regulators with a brown spring and a 3/16" orifice.
Customers will need (2) 1" service lines.
Install 180' of 2" plastic main.

Data Sheet Details

Type	Residential
Rate Number	RSS/RDGSS-Residential Sales & Distribution Sale Service

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-10:

Please provide a detailed supply and requirement schedule for the Company's three most recent annual peak days and for design day. The schedules should include deliveries by source and requirements by rate schedule. Identify sources and requirements for transportation customers separately. Also include the Company's daily sendout sheet for each peak day and applicable weather data.

Response:

Attachment A to this response provides the actual peak day requirements and associated supplies by source for the Company's peak day each winter for the 2012/13 through 2014/15 heating seasons. The requirements shown represent the Company's total throughput. The breakdown by class is an estimate since actual daily-metered volumes are not available for all customers and are based on an analysis of both daily and monthly billing data for the Company's customers. Also shown for each day are the actual weather conditions of most significance (current day average temperature, prior day average temperature, and current day average wind speed).

Attachment B to this response separately provides the estimated requirements of the Company's Gas Distribution Service customers by rate schedule and their associated supply for the Company's actual peak days each winter for the 2012/13 through 2014/15 heating seasons.

Attachment C to this response provides the peak day requirements, as contained on COS-10 Attachment A, segregated by rate schedule and service type (Sales, Choice, and Gas Distribution Service). The allocation of requirements by rate schedule and service type is estimated based on actual monthly billing information.

Attachment D to this response provides by revenue class the peak day requirements for Winter 2015/16 as expected at the Company's design day conditions. Also shown are the supply sources required by the Company to meet its design peak day firm service obligations.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Attachment E to this response provides the winter 2015/16 forecasted design peak day requirements, as contained on COS-10 Attachment D, segregated by rate schedule and service type.

Columbia Gas of Pennsylvania

Historical Peak Day

Units are in MDth/Day

	Historical Winter Season		
	2012 / 13	**2013 / 14**	**2014 / 15**
Day of Week	Tue	Tue	Thu
Date	Jan. 22	Jan. 07	Feb. 19
Current Day Average Temp	9° F	5° F	1° F
Prior Day Average Temp	17° F	4° F	12° F
Current Day Average Wind Speed	11 mph	10 mph	14 mph
Requirements [1]			
Residential	353.0	407.1	405.3
Commercial	198.5	229.0	248.4
Industrial	79.7	96.0	85.6
Total Retail:	**631.2**	**732.1**	**739.3**
Company Use:	0.4	0.5	0.5
Unaccounted For:	0.8	0.7	0.5
Total Requirements:	**632.4**	**733.3**	**740.3**
Supply [2]			
Columbia Gas Transmission Corp.	548.2	616.5	616.1
Dominion	7.9	13.1	24.0
Equitrans	9.7	18.9	9.1
National Fuel Gas Supply Corp.	5.1	5.9	6.0
Tennessee Gas Pipeline	21.7	24.6	27.3
Texas Eastern Transmission	35.1	49.0	48.5
Direct Local	4.7	5.3	5.0
Blackhawk Storage	0.0	0.0	4.3
Total Supply:	**632.4**	**733.3**	**740.3**

[1] Total actual throughput; breakdown by category/class is an estimate.
[2] Actual supplies via identified sources.

Columbia Gas of Pennsylvania

Historical Peak Day Requirements of Delivery Service Customers by Rate Schedule and Associated Supply by Source [1]

Units are in MDth

	Historical Winter Season		
	2012 / 13	**2013 / 14**	**2014 / 15**
Day of Week	Tue	Tue	Thu
Date	Jan. 22	Jan. 07	Feb. 19
Current Day Average Temp	9° F	5° F	1° F
Prior Day Average Temp	17° F	4° F	12° F
Current Day Average Wind Speed	11 mph	10 mph	14 mph
Requirements [2]			
Commercial			
SGDS	31.7	29.5	32.7
LDS	18.9	17.3	18.5
MLDS	0.7	0.8	0.8
NCS	0.0	0.3	0.0
SDS	30.0	34.7	40.9
Total Commercial	**81.3**	**82.6**	**92.9**
Industrial			
SGDS	0.7	0.6	0.8
LDS	35.8	51.5	41.7
MLDS	17.0	18.9	17.9
NCS	15.2	13.8	13.6
SDS	10.3	10.6	10.8
Total Industrial	**79.0**	**95.4**	**84.8**
Requirements	**160.3**	**178.0**	**177.7**
Supply [3]			
Columbia Gas Transmission Corp.	149.3	163.1	150.9
Dominion Transmission Inc.	1.0	6.0	6.0
Equitrans	0.0	0.0	12.8
National Fuel Gas Supply Corp.	0.1	0.5	0.1
Tennessee Gas Pipeline	4.8	2.6	2.7
Texas Eastern Transmission	0.4	0.5	0.4
Direct Local	4.7	5.3	4.7
Total Supply:	**160.3**	**178.0**	**177.7**

[1] Excludes Choice quantities (SCD).
[2] Allocation of daily rate schedule requirement based on actual rate schedule demand for month.
[3] Transportation supplies via identified sources.

Columbia Gas Of Pennsylvania

Historical Peak Day Requirements by Rate Schedule
Volume in MDth/Day

	Jan. 22, 2013 Total Demand			Jan. 7, 2014 Total Demand			Feb. 19, 2015 Total Demand		
	Tariff	Choice/GDS	Total Throughput	Tariff	Choice/GDS	Total Throughput	Tariff	Choice/GDS	Total Throughput
Residential									
RSS	249.4	0.0	249.4	295.1	0.0	295.1	323.0	0.0	323.0
RDGSS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PPS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAP	0.0	24.0	24.0	0.0	25.3	25.3	0.0	20.6	20.6
RDS	0.0	79.6	79.6	0.0	86.7	86.7	0.0	61.7	61.7
RDGDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residential Total	**249.4**	**103.6**	**353.0**	**295.1**	**112.0**	**407.1**	**323.0**	**82.3**	**405.3**
Commercial									
SGSS	92.8	0.0	92.8	113.5	0.0	113.5	111.9	0.0	111.9
LGSS	6.2	0.0	6.2	8.7	0.0	8.7	11.8	0.0	11.8
NSS	0.5	0.0	0.5	0.6	0.0	0.6	0.3	0.0	0.3
SDSS	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	7.5
PS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MLSS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NGV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PPS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SGDS	0.0	36.1	36.1	0.0	39.0	39.0	0.0	32.7	32.7
LDS	0.0	18.9	18.9	0.0	17.3	17.3	0.0	18.5	18.5
MLDS	0.0	0.7	0.7	0.0	0.8	0.8	0.0	0.8	0.8
SCD	0.0	13.3	13.3	0.0	14.1	14.1	0.0	24.0	24.0
NCS	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0
SDS	0.0	30.0	30.0	0.0	34.7	34.7	0.0	40.9	40.9
EBS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Commercial	**99.5**	**99.0**	**198.5**	**122.8**	**106.2**	**229.0**	**131.5**	**116.9**	**248.4**
Industrial									
SGSS	0.3	0.0	0.3	0.4	0.0	0.4	0.5	0.0	0.5
LGSS	0.3	0.0	0.3	0.2	0.0	0.2	0.3	0.0	0.3
NSS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SDSS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MLSS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NGV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PPS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SGDS	0.0	0.8	0.8	0.0	0.6	0.6	0.0	0.8	0.8
LDS	0.0	35.8	35.8	0.0	51.5	51.5	0.0	41.7	41.7
MLDS	0.0	17.0	17.0	0.0	18.9	18.9	0.0	17.9	17.9
SCD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NCS	0.0	15.2	15.2	0.0	13.8	13.8	0.0	13.6	13.6
SDS	0.0	10.3	10.3	0.0	10.6	10.6	0.0	10.8	10.8
EBS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Industrial	**0.6**	**79.1**	**79.7**	**0.6**	**95.4**	**96.0**	**0.8**	**84.8**	**85.6**
Other	**1.2**	**0.0**	**1.2**	**1.2**	**0.0**	**1.2**	**1.0**	**0.0**	**1.0**
Historical Peak	**350.7**	**281.7**	**632.4**	**419.7**	**313.6**	**733.3**	**456.3**	**284.0**	**740.3**

Note: Allocation based on monthly billing information.

Columbia Gas of Pennsylvania

Forecasted Design Day Requirements and Supply
For 2015/16 Heating Season
Units are in MDth/Day

	Total Design Day Demand
	2015 / 16
Day of Week	Weekday
Current Day Average Temp	-5° F
Prior Day Average Temp	6° F
Current Day Average Wind Speed	11mph
Requirements [1]	
Firm : Residential	436.7
Commercial [2]	169.7
Industrial [2]	0.6
Company Use	0.5
Unaccounted For Gas	0.5
Total Firm:	**608.0**
Non-Firm: Residential	0.0
Commercial	93.3
Industrial	82.7
Total Non-Firm:	**176.0**
Total Requirements:	**784.0**
Supply [3]	
Columbia Gas Transmission Corp.	534.0
Dominion	33.8
Equitrans	14.3
National Fuel Gas Supply Corp.	4.3
Tennessee Gas Pipeline	19.3
Texas Eastern Transmission	19.3
Direct Local	0.7
Blackhawk Storage	0.0
Total Supply:	**625.7**
Imbalance [4]	**158.3**

[1] Per CPA's "2015 Design Day Forecast."
[2] Includes Standby Service and Elective Balancing Service quantities.
[3] Supply provided by CPA and Natural Gas Suppliers.
[4] Represents customer demand of a non-firm nature, for which the Company has no dedicated supply/capacity assets, that would have to be accounted for by customers or suppliers acting on their behalf.

Columbia Gas Of Pennsylvania

2015 Peak Day Forecast, 2015/16 - 2019/20

2015/16 Peak Day Requirements by Rate Schedule
Volume in MDth/Day

	Total Demand			Firm Demand			Non-Firm Demand			Additional Firm	Total Firm
	Tariff	GTS	Total Throughput	Tariff	GTS	Total Throughput	Tariff	GTS	Total Throughput	Obligation	Obligation
Residential											
RS	348.3	0.0	348.3	348.3	0.0	348.3	0.0	0.0	0.0	0.0	348.3
RGS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RCC	0.0	22.1	22.1	0.0	22.1	22.1	0.0	0.0	0.0	0.0	22.1
RTC	0.0	66.3	66.3	0.0	66.3	66.3	0.0	0.0	0.0	0.0	66.3
RGC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Residential Total	348.3	88.4	436.7	348.3	88.4	436.7	0.0	0.0	0.0	0.0	436.7
Commercial											
LG1	5.3	0.0	5.3	5.3	0.0	5.3	0.0	0.0	0.0	0.0	5.3
LG2	6.1	0.0	6.1	6.1	0.0	6.1	0.0	0.0	0.0	0.0	6.1
LG3	1.6	0.0	1.6	1.6	0.0	1.6	0.0	0.0	0.0	0.0	1.6
NSI	0.7	0.0	0.7	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.7
SGS	59.2	0.0	59.2	59.2	0.0	59.2	0.0	0.0	0.0	0.0	59.2
SGT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SG2	62.3	0.0	62.3	62.3	0.0	62.3	0.0	0.0	0.0	0.0	62.3
SG3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SG4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SGDS Firm	8.0	0.0	8.0	8.0	0.0	8.0	0.0	0.0	0.0	0.0	8.0
SCC	0.0	17.2	17.2	0.0	17.2	17.2	0.0	0.0	0.0	0.0	17.2
SC2	0.0	9.3	9.3	0.0	9.3	9.3	0.0	0.0	0.0	0.0	9.3
NCS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LDS Flex	0.0	14.6	14.6	0.0	0.0	0.0	0.0	14.6	14.6	0.0	0.0
LDS	0.0	8.4	8.4	0.0	0.0	0.0	0.0	8.4	8.4	0.0	0.0
SGDS Flex	0.0	27.9	27.9	0.0	0.0	0.0	0.0	27.9	27.9	0.0	0.0
SGDS	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0
TMA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TM2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TM3	0.0	0.8	0.8	0.0	0.0	0.0	0.0	0.8	0.8	0.0	0.0
MLDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TIB	0.0	25.8	25.8	0.0	0.0	0.0	0.0	25.8	25.8	0.0	0.0
TI4	0.0	14.3	14.3	0.0	0.0	0.0	0.0	14.3	14.3	0.0	0.0
SDS	0.0	1.2	1.2	0.0	0.0	0.0	0.0	1.2	1.2	6.6	6.6
EBS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	4.4
Total Commercial	143.2	119.8	263.0	143.2	26.5	169.7	0.0	93.3	93.3	11.0	180.7
Industrial											
LG1	0.2	0.0	0.2	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.2
LG2	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
LG3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SGS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SGT	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
SG2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SG3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SG4	0.2	0.0	0.2	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.2
SGDS Firm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SCC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SC2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NCS	0.0	14.0	14.0	0.0	0.0	0.0	0.0	14.0	14.0	0.0	0.0
LDS Flex	0.0	28.3	28.3	0.0	0.0	0.0	0.0	28.3	28.3	0.0	0.0
LDS	0.0	10.0	10.0	0.0	0.0	0.0	0.0	10.0	10.0	0.0	0.0
SGDS Flex	0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.7	0.7	0.0	0.0
SGDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TMA	0.0	0.9	0.9	0.0	0.0	0.0	0.0	0.9	0.9	0.0	0.0
TM2	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
TM3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MLDS	0.0	18.8	18.8	0.0	0.0	0.0	0.0	18.8	18.8	0.0	0.0
TIB	0.0	8.7	8.7	0.0	0.0	0.0	0.0	8.7	8.7	0.0	0.0
TI4	0.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0
SDS	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0
EBS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	6.7
Total Industrial	0.6	82.7	83.3	0.6	0.0	0.6	0.0	82.7	82.7	6.7	7.3
Other	1.0	0.0	1.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0
2015/16 Design Day	**493.1**	**290.9**	**784.0**	**493.1**	**114.9**	**608.0**	**0.0**	**176.0**	**176.0**	**17.7**	**625.7**

(1) Standby and Elective Balancing Service Quantities

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-11:

Please provide copies of the Company's daily sendout sheets for November through March of the most recent heating season.

Response:

Please see GAS-COS-11 Attachment A showing the actual daily Dth sendout during the period November 1, 2014 through March 31, 2015.

Columbia Gas of Pennsylvania
Heating Season November 2014 Through March 2015
Daily Dth Sendout

Date	Dth
11/01/14	282,449
11/02/14	294,516
11/03/14	237,596
11/04/14	167,558
11/05/14	202,704
11/06/14	233,534
11/07/14	313,690
11/08/14	237,677
11/09/14	234,296
11/10/14	200,651
11/11/14	165,564
11/12/14	291,646
11/13/14	376,063
11/14/14	390,233
11/15/14	348,588
11/16/14	324,630
11/17/14	434,801
11/18/14	543,630
11/19/14	441,227
11/20/14	462,816
11/21/14	477,304
11/22/14	328,982
11/23/14	187,947
11/24/14	202,558
11/25/14	308,390
11/26/14	346,145
11/27/14	354,425
11/28/14	391,634
11/29/14	268,645
11/30/14	195,605
12/01/14	339,112
12/02/14	362,241
12/03/14	383,210
12/04/14	383,062
12/05/14	307,944
12/06/14	332,034
12/07/14	371,136
12/08/14	395,765
12/09/14	325,942
12/10/14	415,435
12/11/14	434,300
12/12/14	407,149
12/13/14	360,603
12/14/14	294,671
12/15/14	305,250

Columbia Gas of Pennsylvania
Heating Season November 2014 Through March 2015
Daily Dth Sendout

Date	Dth
12/16/14	295,385
12/17/14	394,837
12/18/14	429,086
12/19/14	411,947
12/20/14	392,520
12/21/14	417,721
12/22/14	355,236
12/23/14	230,419
12/24/14	195,440
12/25/14	281,953
12/26/14	275,424
12/27/14	211,928
12/28/14	301,957
12/29/14	379,413
12/30/14	429,457
12/31/14	450,667
01/01/15	391,491
01/02/15	384,873
01/03/15	287,739
01/04/15	329,317
01/05/15	531,939
01/06/15	560,226
01/07/15	671,140
01/08/15	616,060
01/09/15	599,229
01/10/15	580,280
01/11/15	418,420
01/12/15	448,246
01/13/15	526,185
01/14/15	520,558
01/15/15	453,957
01/16/15	465,523
01/17/15	360,870
01/18/15	369,590
01/19/15	395,065
01/20/15	402,486
01/21/15	414,241
01/22/15	427,573
01/23/15	376,490
01/24/15	383,342
01/25/15	392,133
01/26/15	488,230
01/27/15	526,755
01/28/15	515,637
01/29/15	445,958
01/30/15	558,908
01/31/15	463,317
02/01/15	392,400
02/02/15	562,511
02/03/15	492,046

Columbia Gas of Pennsylvania
Heating Season November 2014 Through March 2015
Daily Dth Sendout

Date	Dth
02/04/15	428,625
02/05/15	587,714
02/06/15	484,454
02/07/15	335,009
02/08/15	308,252
02/09/15	465,948
02/10/15	471,012
02/11/15	406,874
02/12/15	574,764
02/13/15	537,213
02/14/15	611,062
02/15/15	714,883
02/16/15	668,189
02/17/15	568,485
02/18/15	617,841
02/19/15	740,299
02/20/15	638,205
02/21/15	467,149
02/22/15	463,298
02/23/15	641,371
02/24/15	542,760
02/25/15	466,563
02/26/15	532,084
02/27/15	576,932
02/28/15	482,473
03/01/15	433,302
03/02/15	481,204
03/03/15	413,857
03/04/15	429,796
03/05/15	606,641
03/06/15	536,044
03/07/15	366,108
03/08/15	320,953
03/09/15	303,460
03/10/15	309,559
03/11/15	320,494
03/12/15	322,739
03/13/15	272,681
03/14/15	267,113
03/15/15	344,796
03/16/15	217,085
03/17/15	359,732
03/18/15	377,104
03/19/15	325,118
03/20/15	335,601
03/21/15	286,100
03/22/15	372,750
03/23/15	379,097
03/24/15	354,420
03/25/15	287,050
03/26/15	288,607
03/27/15	403,189
03/28/15	468,405
03/29/15	333,890
03/30/15	293,533
03/31/15	324,542

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-12:

Please provide a copy of the load duration curve used by the Company for capacity planning purposes. Please also identify the numerical data points shown for each day on the curve.

Response:

The Company's basic supply and capacity analysis tool is the SENDOUT® Gas Planning System provided by ABB Enterprise Software of Atlanta, Georgia. SENDOUT® determines the "optimum," time-dependent levels of pipeline transportation service and storage service to be utilized to meet the Company's prospective demand under various weather-related scenarios and meets that demand with a least cost mix of supplies. SENDOUT® recognizes specific demand regions within the Company's service territory and the pipeline capacity and supply sources available to each region. The Company updates supply prices, storage balances, and other input data in SENDOUT® on an ongoing basis from a variety of published and private sources. The Company utilizes SENDOUT® for both long-range and short term operational planning. The Normal Weather Firm Demands are shown in GAS-COS-12 Attachment A. The attachment shows the Normal Weather Firm Demands as follows:

Page 1. Chronological order for the 12 months ending November 2016,
Page 2. Graphically for the 12 months ending November 2016,
Page 3. Sorted high to low for the 12 months ending November 2016,
Page 4. Graphically for the 12 months ending November 2016.

Normal Weather Firm Demand - Chronological - 12 Months Ending November 2016

Date	Firm Demand (MDth)
1-Dec-2015	222.1
2-Dec-2015	264.3
3-Dec-2015	229.1
4-Dec-2015	215.1
5-Dec-2015	299.5
6-Dec-2015	313.6
7-Dec-2015	327.7
8-Dec-2015	306.5
9-Dec-2015	165.8
10-Dec-2015	179.9
11-Dec-2015	243.2
12-Dec-2015	271.4
13-Dec-2015	306.5
14-Dec-2015	208.0
15-Dec-2015	130.6
16-Dec-2015	271.4
17-Dec-2015	236.2
18-Dec-2015	243.2
19-Dec-2015	215.1
20-Dec-2015	292.5
21-Dec-2015	299.5
22-Dec-2015	405.1
23-Dec-2015	327.7
24-Dec-2015	179.9
25-Dec-2015	264.3
26-Dec-2015	229.1
27-Dec-2015	102.5
28-Dec-2015	130.6
29-Dec-2015	215.1
30-Dec-2015	229.1
31-Dec-2015	285.4
1-Jan-2016	386.9
2-Jan-2016	386.9
3-Jan-2016	304.1
4-Jan-2016	409.5
5-Jan-2016	462.3
6-Jan-2016	371.9
7-Jan-2016	371.9
8-Jan-2016	334.2
9-Jan-2016	326.7
10-Jan-2016	394.5
11-Jan-2016	409.5
12-Jan-2016	236.2
13-Jan-2016	266.4
14-Jan-2016	334.2
15-Jan-2016	356.8
16-Jan-2016	273.9
17-Jan-2016	243.8
18-Jan-2016	221.2
19-Jan-2016	243.8
20-Jan-2016	251.3
21-Jan-2016	251.3
22-Jan-2016	160.9
23-Jan-2016	115.7
24-Jan-2016	206.1
25-Jan-2016	251.3
26-Jan-2016	258.8
27-Jan-2016	198.6
28-Jan-2016	168.4
29-Jan-2016	266.4
30-Jan-2016	289.0
31-Jan-2016	296.5

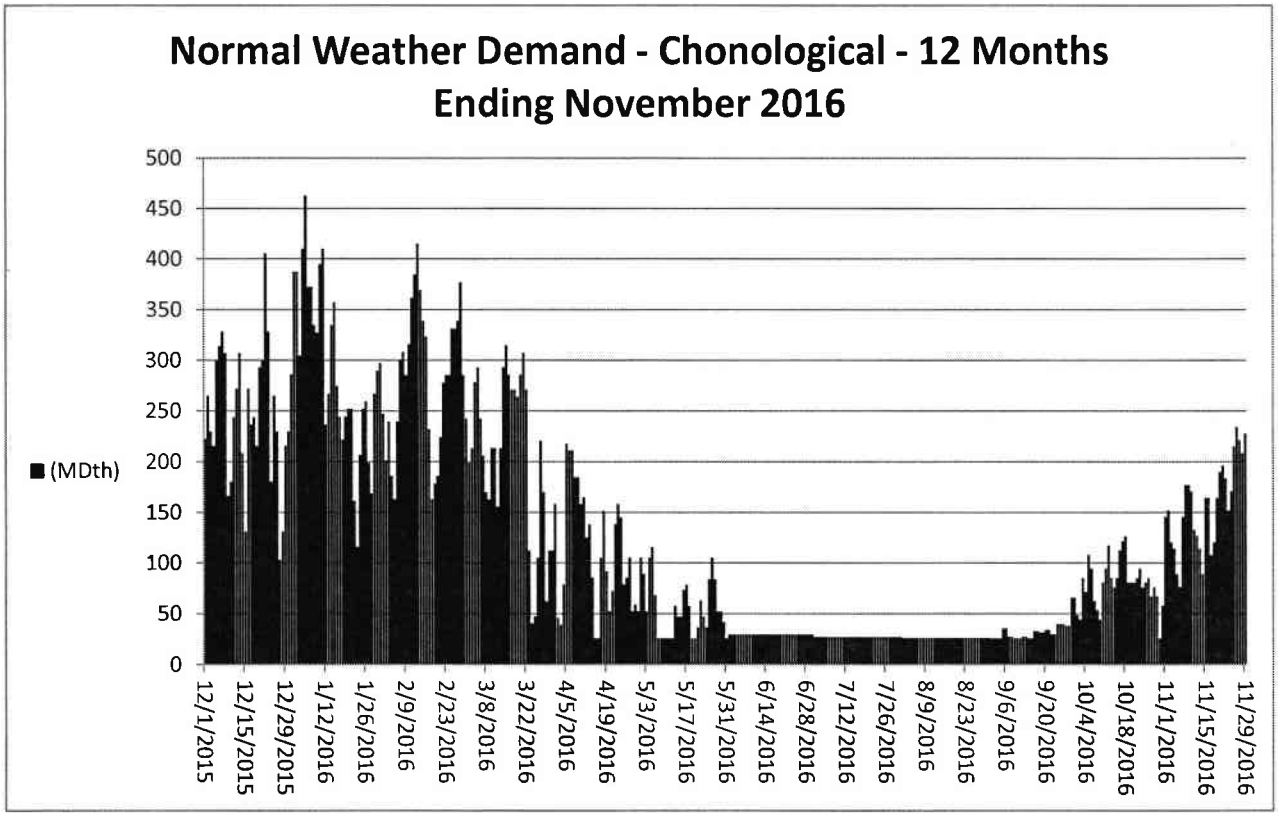
Date	Firm Demand (MDth)
1-Feb-2016	246.6
2-Feb-2016	200.8
3-Feb-2016	238.9
4-Feb-2016	185.5
5-Feb-2016	162.6
6-Feb-2016	238.9
7-Feb-2016	300.0
8-Feb-2016	307.6
9-Feb-2016	284.7
10-Feb-2016	315.3
11-Feb-2016	361.0
12-Feb-2016	383.9
13-Feb-2016	414.5
14-Feb-2016	368.7
15-Feb-2016	338.1
16-Feb-2016	322.9
17-Feb-2016	231.3
18-Feb-2016	162.6
19-Feb-2016	177.9
20-Feb-2016	185.5
21-Feb-2016	223.7
22-Feb-2016	277.1
23-Feb-2016	284.7
24-Feb-2016	284.7
25-Feb-2016	330.5
26-Feb-2016	330.5
27-Feb-2016	338.1
28-Feb-2016	376.3
29-Feb-2016	284.7
1-Mar-2016	241.8
2-Mar-2016	198.5
3-Mar-2016	212.9
4-Mar-2016	277.8
5-Mar-2016	292.3
6-Mar-2016	241.8
7-Mar-2016	205.7
8-Mar-2016	169.6
9-Mar-2016	162.4
10-Mar-2016	212.9
11-Mar-2016	212.9
12-Mar-2016	155.2
13-Mar-2016	212.9
14-Mar-2016	292.3
15-Mar-2016	313.9
16-Mar-2016	285.1
17-Mar-2016	270.6
18-Mar-2016	270.6
19-Mar-2016	263.4
20-Mar-2016	285.1
21-Mar-2016	306.7
22-Mar-2016	270.6
23-Mar-2016	111.9
24-Mar-2016	39.7
25-Mar-2016	46.9
26-Mar-2016	104.7
27-Mar-2016	220.1
28-Mar-2016	169.6
29-Mar-2016	61.4
30-Mar-2016	111.9
31-Mar-2016	111.9

Date	Firm Demand (MDth)
1-Apr-2016	157.8
2-Apr-2016	45.2
3-Apr-2016	38.5
4-Apr-2016	78.3
5-Apr-2016	217.4
6-Apr-2016	210.7
7-Apr-2016	210.7
8-Apr-2016	184.2
9-Apr-2016	184.2
10-Apr-2016	157.8
11-Apr-2016	164.4
12-Apr-2016	124.6
13-Apr-2016	137.9
14-Apr-2016	84.9
15-Apr-2016	25.3
16-Apr-2016	25.3
17-Apr-2016	104.8
18-Apr-2016	151.1
19-Apr-2016	91.5
20-Apr-2016	51.8
21-Apr-2016	71.6
22-Apr-2016	137.9
23-Apr-2016	157.8
24-Apr-2016	144.5
25-Apr-2016	78.3
26-Apr-2016	84.9
27-Apr-2016	104.8
28-Apr-2016	51.8
29-Apr-2016	58.4
30-Apr-2016	51.8
1-May-2016	104.6
2-May-2016	88.7
3-May-2016	51.7
4-May-2016	104.6
5-May-2016	115.1
6-May-2016	67.6
7-May-2016	25.3
8-May-2016	25.3
9-May-2016	25.3
10-May-2016	25.3
11-May-2016	25.3
12-May-2016	25.3
13-May-2016	57.0
14-May-2016	46.4
15-May-2016	46.4
16-May-2016	72.9
17-May-2016	78.1
18-May-2016	57.0
19-May-2016	25.3
20-May-2016	25.3
21-May-2016	35.9
22-May-2016	62.3
23-May-2016	46.4
24-May-2016	35.9
25-May-2016	83.4
26-May-2016	104.6
27-May-2016	83.4
28-May-2016	51.7
29-May-2016	51.7
30-May-2016	41.1
31-May-2016	25.3

Date	Firm Demand (MDth)
1-Jun-2016	29.0
2-Jun-2016	29.0
3-Jun-2016	29.0
4-Jun-2016	29.0
5-Jun-2016	29.0
6-Jun-2016	29.0
7-Jun-2016	29.0
8-Jun-2016	29.0
9-Jun-2016	29.0
10-Jun-2016	29.0
11-Jun-2016	29.0
12-Jun-2016	29.0
13-Jun-2016	29.0
14-Jun-2016	29.0
15-Jun-2016	29.0
16-Jun-2016	29.0
17-Jun-2016	29.0
18-Jun-2016	29.0
19-Jun-2016	29.0
20-Jun-2016	29.0
21-Jun-2016	29.0
22-Jun-2016	29.0
23-Jun-2016	29.0
24-Jun-2016	29.0
25-Jun-2016	29.0
26-Jun-2016	29.0
27-Jun-2016	29.0
28-Jun-2016	29.0
29-Jun-2016	29.0
30-Jun-2016	29.0
1-Jul-2016	26.4
2-Jul-2016	26.4
3-Jul-2016	26.4
4-Jul-2016	26.4
5-Jul-2016	26.4
6-Jul-2016	26.4
7-Jul-2016	26.4
8-Jul-2016	26.4
9-Jul-2016	26.4
10-Jul-2016	26.4
11-Jul-2016	26.4
12-Jul-2016	26.4
13-Jul-2016	26.4
14-Jul-2016	26.4
15-Jul-2016	26.4
16-Jul-2016	26.4
17-Jul-2016	26.4
18-Jul-2016	26.4
19-Jul-2016	26.4
20-Jul-2016	26.4
21-Jul-2016	26.4
22-Jul-2016	26.4
23-Jul-2016	26.4
24-Jul-2016	26.4
25-Jul-2016	26.4
26-Jul-2016	26.4
27-Jul-2016	26.4
28-Jul-2016	26.4
29-Jul-2016	26.4
30-Jul-2016	26.4
31-Jul-2016	26.4

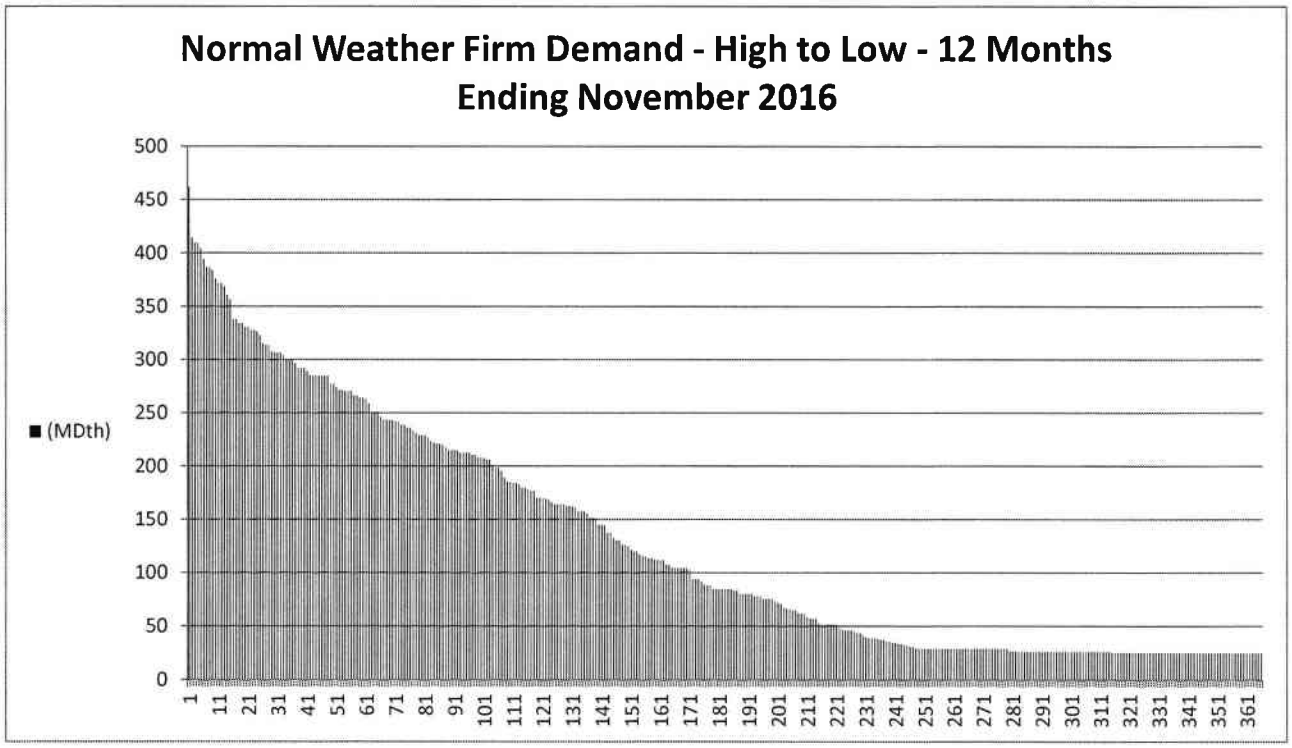
Date	Firm Demand (MDth)
1-Aug-2016	25.5
2-Aug-2016	25.5
3-Aug-2016	25.5
4-Aug-2016	25.5
5-Aug-2016	25.5
6-Aug-2016	25.5
7-Aug-2016	25.5
8-Aug-2016	25.5
9-Aug-2016	25.5
10-Aug-2016	25.5
11-Aug-2016	25.5
12-Aug-2016	25.5
13-Aug-2016	25.5
14-Aug-2016	25.5
15-Aug-2016	25.5
16-Aug-2016	25.5
17-Aug-2016	25.5
18-Aug-2016	25.5
19-Aug-2016	25.5
20-Aug-2016	25.5
21-Aug-2016	25.5
22-Aug-2016	25.5
23-Aug-2016	25.5
24-Aug-2016	25.5
25-Aug-2016	25.5
26-Aug-2016	25.5
27-Aug-2016	25.5
28-Aug-2016	25.5
29-Aug-2016	25.5
30-Aug-2016	25.5
31-Aug-2016	25.5
1-Sep-2016	25.3
2-Sep-2016	25.3
3-Sep-2016	25.3
4-Sep-2016	25.3
5-Sep-2016	34.9
6-Sep-2016	34.9
7-Sep-2016	26.7
8-Sep-2016	26.7
9-Sep-2016	25.3
10-Sep-2016	25.3
11-Sep-2016	25.3
12-Sep-2016	26.7
13-Sep-2016	26.7
14-Sep-2016	25.3
15-Sep-2016	25.3
16-Sep-2016	32.2
17-Sep-2016	32.2
18-Sep-2016	30.8
19-Sep-2016	30.8
20-Sep-2016	33.6
21-Sep-2016	33.6
22-Sep-2016	29.4
23-Sep-2016	29.4
24-Sep-2016	39.1
25-Sep-2016	39.1
26-Sep-2016	39.1
27-Sep-2016	37.7
28-Sep-2016	37.7
29-Sep-2016	65.3
30-Sep-2016	65.3

Date	Firm Demand (MDth)
1-Oct-2016	48.1
2-Oct-2016	43.6
3-Oct-2016	84.7
4-Oct-2016	71.0
5-Oct-2016	107.6
6-Oct-2016	93.9
7-Oct-2016	61.9
8-Oct-2016	52.7
9-Oct-2016	43.6
10-Oct-2016	80.2
11-Oct-2016	93.9
12-Oct-2016	116.8
13-Oct-2016	84.7
14-Oct-2016	75.6
15-Oct-2016	84.7
16-Oct-2016	112.2
17-Oct-2016	121.3
18-Oct-2016	125.9
19-Oct-2016	80.2
20-Oct-2016	80.2
21-Oct-2016	80.2
22-Oct-2016	84.7
23-Oct-2016	93.9
24-Oct-2016	75.6
25-Oct-2016	80.2
26-Oct-2016	84.7
27-Oct-2016	66.4
28-Oct-2016	75.6
29-Oct-2016	66.4
30-Oct-2016	25.3
31-Oct-2016	57.3
1-Nov-2016	145.1
2-Nov-2016	151.4
3-Nov-2016	119.9
4-Nov-2016	113.6
5-Nov-2016	88.4
6-Nov-2016	75.7
7-Nov-2016	145.1
8-Nov-2016	176.7
9-Nov-2016	176.7
10-Nov-2016	170.4
11-Nov-2016	132.5
12-Nov-2016	126.2
13-Nov-2016	113.6
14-Nov-2016	88.4
15-Nov-2016	164.1
16-Nov-2016	164.1
17-Nov-2016	107.3
18-Nov-2016	119.9
19-Nov-2016	164.1
20-Nov-2016	189.3
21-Nov-2016	195.6
22-Nov-2016	183.0
23-Nov-2016	151.4
24-Nov-2016	170.4
25-Nov-2016	214.5
26-Nov-2016	233.4
27-Nov-2016	220.8
28-Nov-2016	208.2
29-Nov-2016	227.1
30-Nov-2016	208.2


Normal Weather Demand - Chonological - 12 Months Ending November 2016
(MDth)
500
450
400
350
300
250
200
150
100
50
0
12/1/2015
12/15/2015
12/29/2015
1/12/2016
1/26/2016
2/9/2016
2/23/2016
3/8/2016
3/22/2016
4/5/2016
4/19/2016
5/3/2016
5/17/2016
5/31/2016
6/14/2016
6/28/2016
7/12/2016
7/26/2016
8/9/2016
8/23/2016
9/6/2016
9/20/2016
10/4/2016
10/18/2016
11/1/2016
11/15/2016
11/29/2016

Normal Weather Firm Demand - High to Low - 12 Months Ending November 2016

Day #	Firm Demand (MDth)	Day #	Firm Demand (MDth)	Day #	Firm Demand (MDth)	Day #	Firm Demand (MDth)	Day #	Firm Demand (MDth)	Day #	Firm Demand (MDth)
1	462.3	62	258.8	123	168.4	184	84.7	245	32.2	306	26.4
2	414.5	63	251.3	124	165.8	185	84.7	246	30.8	307	26.4
3	409.5	64	251.3	125	164.4	186	83.4	247	30.8	308	26.4
4	409.5	65	251.3	126	164.1	187	83.4	248	29.4	309	26.4
5	405.1	66	246.6	127	164.1	188	80.2	249	29.4	310	26.4
6	394.5	67	243.8	128	164.1	189	80.2	250	29.0	311	26.4
7	386.9	68	243.8	129	162.6	190	80.2	251	29.0	312	26.4
8	386.9	69	243.2	130	162.6	191	80.2	252	29.0	313	26.4
9	383.9	70	243.2	131	162.4	192	80.2	253	29.0	314	26.4
10	376.3	71	241.8	132	160.9	193	78.3	254	29.0	315	25.5
11	371.9	72	241.8	133	157.8	194	78.3	255	29.0	316	25.5
12	371.9	73	238.9	134	157.8	195	78.1	256	29.0	317	25.5
13	368.7	74	238.9	135	157.8	196	75.7	257	29.0	318	25.5
14	361.0	75	236.2	136	155.2	197	75.6	258	29.0	319	25.5
15	356.8	76	236.2	137	151.4	198	75.6	259	29.0	320	25.5
16	338.1	77	233.4	138	151.4	199	75.6	260	29.0	321	25.5
17	338.1	78	231.3	139	151.1	200	72.9	261	29.0	322	25.5
18	334.2	79	229.1	140	145.1	201	71.6	262	29.0	323	25.5
19	334.2	80	229.1	141	145.1	202	71.0	263	29.0	324	25.5
20	330.5	81	229.1	142	144.5	203	67.6	264	29.0	325	25.5
21	330.5	82	227.1	143	137.9	204	66.4	265	29.0	326	25.5
22	327.7	83	223.7	144	137.9	205	66.4	266	29.0	327	25.5
23	327.7	84	222.1	145	132.5	206	65.3	267	29.0	328	25.5
24	326.7	85	221.2	146	130.6	207	65.3	268	29.0	329	25.5
25	322.9	86	220.8	147	130.6	208	62.3	269	29.0	330	25.5
26	315.3	87	220.1	148	126.2	209	61.9	270	29.0	331	25.5
27	313.9	88	217.4	149	125.9	210	61.4	271	29.0	332	25.5
28	313.6	89	215.1	150	124.6	211	58.4	272	29.0	333	25.5
29	307.6	90	215.1	151	121.3	212	57.3	273	29.0	334	25.5
30	306.7	91	215.1	152	119.9	213	57.0	274	29.0	335	25.5
31	306.5	92	214.5	153	119.9	214	57.0	275	29.0	336	25.5
32	306.5	93	212.9	154	116.8	215	52.7	276	29.0	337	25.5
33	304.1	94	212.9	155	115.7	216	51.8	277	29.0	338	25.5
34	300.0	95	212.9	156	115.1	217	51.8	278	29.0	339	25.5
35	299.5	96	212.9	157	113.6	218	51.8	279	29.0	340	25.5
36	299.5	97	210.7	158	113.6	219	51.7	280	26.7	341	25.5
37	296.5	98	210.7	159	112.2	220	51.7	281	26.7	342	25.5
38	292.5	99	208.2	160	111.9	221	51.7	282	26.7	343	25.5
39	292.3	100	208.2	161	111.9	222	48.1	283	26.7	344	25.5
40	292.3	101	208.0	162	111.9	223	46.9	284	26.4	345	25.5
41	289.0	102	206.1	163	107.6	224	46.4	285	26.4	346	25.3
42	285.4	103	205.7	164	107.3	225	46.4	286	26.4	347	25.3
43	285.1	104	200.8	165	104.8	226	46.4	287	26.4	348	25.3
44	285.1	105	198.6	166	104.8	227	45.2	288	26.4	349	25.3
45	284.7	106	198.5	167	104.7	228	43.6	289	26.4	350	25.3
46	284.7	107	195.6	168	104.6	229	43.6	290	26.4	351	25.3
47	284.7	108	189.3	169	104.6	230	41.1	291	26.4	352	25.3
48	284.7	109	185.5	170	104.6	231	39.7	292	26.4	353	25.3
49	277.8	110	185.5	171	102.5	232	39.1	293	26.4	354	25.3
50	277.1	111	184.2	172	93.9	233	39.1	294	26.4	355	25.3
51	273.9	112	184.2	173	93.9	234	39.1	295	26.4	356	25.3
52	271.4	113	183.0	174	93.9	235	38.5	296	26.4	357	25.3
53	271.4	114	179.9	175	91.5	236	37.7	297	26.4	358	25.3
54	270.6	115	179.9	176	88.7	237	37.7	298	26.4	359	25.3
55	270.6	116	177.9	177	88.4	238	35.9	299	26.4	360	25.3
56	270.6	117	176.7	178	88.4	239	35.9	300	26.4	361	25.3
57	266.4	118	176.7	179	84.9	240	34.9	301	26.4	362	25.3
58	266.4	119	170.4	180	84.9	241	34.9	302	26.4	363	25.3
59	264.3	120	170.4	181	84.7	242	33.6	303	26.4	364	25.3
60	264.3	121	169.6	182	84.7	243	33.6	304	26.4	365	25.3
61	263.4	122	169.6	183	84.7	244	32.2	305	26.4	366	25.3


Normal Weather Firm Demand - High to Low - 12 Months Ending November 2016
■ (MDth)
500
450
400
350
300
250
200
150
100
50
0
1
11
21
31
41
51
61
71
81
91
101
111
121
131
141
151
161
171
181
191
201
211
221
231
241
251
261
271
281
291
301
311
321
331
341
351
361

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-13:

Please provide the following for the Company's ten largest transportation customers during peak month of the most recent heating season:

a. actual consumption

b. volume delivered to the Company on their behalf, if applicable

c. daily nomination

Response:

Please see GAS-COS-013 Attachment A.

Daily Nominations for 1/2015 in Dth

Customer	Usage 01/15 (Dth)	Nominations 01/15 (Dth)	01/01/15 Day 1 (Dth)	01/02/15 Day 2 (Dth)	01/03/15 Day 3 (Dth)	01/04/15 Day 4 (Dth)	01/05/15 Day 5 (Dth)	01/06/15 Day 6 (Dth)	01/07/15 Day 7 (Dth)	01/08/15 Day 8 (Dth)	01/09/15 Day 9 (Dth)	01/10/15 Day 10 (Dth)	01/11/15 Day 11 (Dth)	01/12/15 Day 12 (Dth)	01/13/15 Day 13 (Dth)	01/14/15 Day 14 (Dth)	01/15/15 Day 15 (Dth)	01/16/15 Day 16 (Dth)
A	245,866	245,500	8,200	8,200	8,200	8,200	8,200	8,200	8,873	9,000	9,000	8,200	8,200	8,200	8,200	8,200	6,770	6,770
B	135,612	**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C	105,585	103,539	3,387	3,387	3,387	3,387	3,387	3,387	3,387	3,387	3,387	3,387	3,387	3,387	3,387	3,387	3,387	3,387
D	71,132	*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
E	64,203	62,613	2,000	2,000	2,000	2,000	2,000	2,000	2,200	2,200	2,200	2,000	2,000	2,000	2,000	2,000	2,000	2,000
F	62,368	63,235	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
G	59,613	AGG	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
H	54,352	54,300	1,848	1,848	1,848	1,848	1,848	1,848	1,848	1,848	1,848	1,848	1,848	1,848	1,848	1,848	1,848	1,848
I	50,969	*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
J	48,549	**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Customer	01/17/15 Day 17 (Dth)	01/18/15 Day 18 (Dth)	01/19/15 Day 19 (Dth)	01/20/15 Day 20 (Dth)	01/21/15 Day 21 (Dth)	01/22/15 Day 22 (Dth)	01/23/15 Day 23 (Dth)	01/24/15 Day 24 (Dth)	01/25/15 Day 25 (Dth)	01/26/15 Day 26 (Dth)	01/27/15 Day 27 (Dth)	01/28/15 Day 28 (Dth)	01/29/15 Day 29 (Dth)	01/30/15 Day 30 (Dth)	01/31/15 Day 31 (Dth)
A	6,770	6,770	6,770	6,770	6,770	6,770	6,770	9,000	9,000	9,000	8,957	9,000	9,000	6,770	6,770
B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C	3,387	2,700	3,387	3,387	2,839	3,387	3,387	3,387	3,164	3,387	3,387	3,387	3,387	3,387	3,387
D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
E	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,013
F	2,000	2,687	2,000	2,000	2,548	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
G	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
H	1,648	1,648	1,648	1,648	1,648	1,648	1,648	1,648	1,648	1,648	1,648	1,648	1,648	1,654	1,654
I	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
J	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note:

* Customer account within Aggregation Group

** Multiple customer accounts within Stand Alone Nomination Group

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-14:

Please provide a summary identifying the salient features of each of the following. Salient features include contract party, effective term and applicable contract quantities (daily, annual, seasonal, etc.).

a. All firm transportation agreements by type greater than one month in length. Indicate whether the capacity is available at the Company's citygate to meet design day requirements or is upstream capacity. Identify the downstream pipeline for each upstream arrangement.

b. All firm storage, gathering and exchange agreements. Indicate if each agreement provides design day capacity at the citygate or requires separate transportation (identify) service to effectuate delivery. Include on-system storage and peak shaving facilities used by the Company and identify all ratcheting provisions applicable to the Company's contractual and on-system storage arrangements.

Response:

Please see GAS-COS-014 Attachment A for the requested information.

COLUMBIA GAS OF PENNSYLVANIA, INC.

FIRM CITY GATE TRANSPORTATION AGREEMENTS

TRANSPORTER	CONTRACT NUMBER	RATE SCHEDULE	EFFECTIVE DATE	PRIMARY TERMINATION DATE		CONTRACT QUANTITY DTH/D	RECEIPT POINT	REC POINT QUANTITY DTH/D	CITY GATE DELIVERY POINT	DEL POINT QUANTITY DTH/D
COLUMBIA GAS	80136	FTS	11/01/14	10/31/16		90,788	A05 DELMONT AGG	8,641	CPA CITY GATE	90,788
							A06 MCCLELL AGG	21,596		
							LEACH	39,496		
							B15 UNIONVILLE	12,283		
							C16 DELMONT	8,772		
			11/01/16	10/31/19		60,551	LEACH	39,496	CPA CITY GATE	60,551
							B15 UNIONVILLE	12,283		
							C16 DELMONT	8,772		
			11/01/19	10/31/22		21,055	B15 UNIONVILLE	12,283	CPA CITY GATE	21,055
							C16 DELMONT	8,772		
COLUMBIA GAS	50675	FTS	11/01/97	10/31/16		18,334	DELMONT-TETCO	5,000	CPA CITY GATE	18,334
							BROADRUN	13,334		
COLUMBIA GAS	56741	FTS	11/01/98	10/31/17		11,666	GRANT STATION	10,000	CPA CITY GATE	11,666
							BROADRUN	1,666		
COLUMBIA GAS	56742	FTS	11/01/99	10/31/16		10,000	LEACH	10,000	CPA CITY GATE	10,000
COLUMBIA GAS	80264	FTS	11/01/04	10/31/19		1,800	LEACH	1,800	CPA CITY GATE	1,800
COLUMBIA GAS (4)	82610	SST	04/01/05	03/31/20	OCT-MAR	456,876	STORAGE O-M	456,876	CPA CITY GATE	456,876
					APR-SEPT	228,438	STORAGE A-S	228,438		
DOMINION TRANSMISSION	700034	FTNN-GSS	06/01/05	03/31/18(1)	NOV-MAR	6,000	GSS STORAGE	6,000	CPA @ WARRENDALE	6,000
									CPA @ DARLINGTON	6,000
DOMINION TRANSMISSION	200539	FT	11/01/09	10/31/19(1)	NOV-MAR	3,000	OAKFORD	3,000	CPA @ WARRENDALE	3,000
					APR-OCT	2,000				
DOMINION TRANSMISSION	100121	FTNN-GSS	04/01/14	3/31/24(1)		4,800	GSS STORAGE	4,800	PLEASANT GAP	4,800
DOMINION TRANSMISSION	100122	FTNN	05/01/15	03/31/30(1)		15,000	GSS STORAGE	15,000	PLEASANT GAP	15,000
DOMINION TRANSMISSION	200687	FT	05/01/15	03/31/30(1)		5,000	TRANSCO LEIDY	5,000	PLEASANT GAP	5,000
EQUITRANS	EQTR10375-391	FTS	04/01/14	03/31/17(1)	NOV-MAR	14,348	STORAGE	14,348	CPA @ GROVETON	14,348
					APR-OCT	7,500	RHINEHART	7,500		
NATIONAL FUEL (3)	F02091	FT	11/01/98	10/31/04(2)		4,304	TRANSCO LEIDY	4,304	CPA @ WARREN	4,304
TENNESSEE GAS	30920	FT-A	11/01/00	10/31/19		16,000	500 LINE	7,600	CPA @ NEW CASTLE	16,000
							800 LINE	8,400		
TENNESSEE GAS	63409	FT-A	11/01/12	10/31/17		7,600	ZONE 4 POOL	7,600	CPA @ PITT TERMINAL	7,600
TEXAS EASTERN	800387R2	CDS	11/01/06	10/31/08(1)		2,342	VENICE	941	CPA @ ROCKWOOD	287
							ST LANDRY	1,401	CPA @ ST COLLEGE	2,342
									CPA @ EMIGSVILLE	2,342
									CPA @ CHAMBERSBURG	219
									COL GAS @ EAGLE (6)	2,342
TEXAS EASTERN	910464R1	CDS	11/01/06	10/31/12(1)		5,000	MRPL	5,000	CPA @ ROCKWOOD	2,758
									CPA @ CHAMBERSBURG	2,242
TEXAS EASTERN	910463R1	CDS	11/01/06	10/31/12(1)		158	MRPL	158	CPA @ CHAMBERSBURG	158
TEXAS EASTERN	910951R1	FT-I	11/01/12	10/31/17(1)		11,753	WLA, ELA, STX	11,753	CPA @ UNIONTOWN (5)	11,753
TEXAS EASTERN (4)	830049R1	FT	12/01/98	03/31/02(1)	DEC-MAR	10,000	COL GAS @ EAGLE	10,000	CPA @ ST COLLEGE	1,658
									CPA @ ROCKWOOD	8,242
									CPA @ CHAMBERSBURG	100

(1) YEAR TO YEAR THEREAFTER

(2) MONTH TO MONTH THEREAFTER

(3) NET CITY GATE DELIVERY IS 4,281 DTH/D

(4) CPA HAS THE ABILITY TO DELIVER 10,000 DTH PER DAY TO TEXAS EASTERN AT EAGLE UNDER COLUMBIA GAS CONTRACT NO. 82610 WHICH IS THEN DELIVERED BY TEXAS EASTERN UNDER CONTRACT NO. 830049R1 TO THE CPA CITY GATE.

COLUMBIA GAS OF PENNSYLVANIA, INC.

FIRM UPSTREAM TRANSPORTATION AGREEMENTS

TRANSPORTER	CONTRACT NUMBER	RATE SCHEDULE	EFFECTIVE DATE	PRIMARY TERMINATION DATE	CONTRACT QUANTITY DTH/D	RECEIPT POINT	REC POINT QUANTITY DTH/D	DELIVERY POINT INTO DOWNSTREAM PIPELINE	DEL POINT QUANTITY DTH/D
COLUMBIA GULF	79919	FTS-1	11/01/04	10/31/19	43,632	RAYNE	43,632	COL GAS @ LEACH	43,632
TENNESSEE GAS	63408	FT-A	11/01/12	10/31/16	12,500	ZONE 4 POOL	12,500	COL GAS @ UNIONVILLE	12,500
TEXAS EASTERN	910951R1	FT-1	11/01/12	10/31/17(1)	3,082	WLA, ELA, STX	3,082	COL GAS @ DELMONT	3,082

(1) YEAR TO YEAR THEREAFTER

STORAGE

COUNTERPARTY	CONTRACT NUMBER	RATE SCHEDULE	EFFECTIVE DATE	PRIMARY TERMINATION DATE		CONTRACT QUANTITY DTH/D	
COLUMBIA GAS	82512	FSS	04/01/05	03/31/20	MDQ SCQ	456,876 25,341,126	REQUIRES COLUMBIA GAS SST FOR DELIVERY TO THE CITY GATE
DOMINION TRANSMISSION	600037	GSS	06/01/05	03/31/18(1)	MDQ SCQ	9,000 941,176	REQUIRES DTI FTNN-GSS AND FT FOR DELIVERY TO THE CITY GATE
DOMINION TRANSMISSION	300195	GSS	04/04/14	03/31/24 (1)	MDQ SCQ	4,800 240,000	REQUIRES DTI FTNN-GSS FOR DELIVERY TO THE CITY GATE
DOMINION TRANSMISSION	300206	GSS	05/01/15	03/31/30 (1)	MDQ SCQ	15,000 930,000	REQUIRES DTI FTNN-GSS FOR DELIVERY TO THE CITY GATE
EQUITRANS	EQTR10379-390	115SS	04/01/14	03/31/17(1)	INJ WTH ANN	7,500 14,348 1,500,000	REQUIRES EQUITRANS FTS FOR DELIVERY TO THE CITY GATE
BLACKHAWK					MDQ SCQ	10,000 30,000	ON SYSTEM STORAGE

(1) YEAR TO YEAR THEREAFTER

EXCHANGES

COUNTERPARTY	EFFECTIVE DATE	PRIMARY TERMINATION DATE	CONTRACT QUANTITY DTH/D	
PEOPLES NATURAL	10/08/93	10/07/03(1)	NOT SPEC	CITY GATE EXCHANGE
NATIONAL FUEL DIST	12/02/74	(2)	NOT SPEC	CITY GATE EXCHANGE

(1) YEAR TO YEAR THEREAFTER (2) THEREAFTER UNTIL TERMINATED

STORAGE RATCHET PROVISIONS

COLUMBIA FSS

SCQ LEVEL	MDQ
100% TO 30%	100 % OF MDQ
<30% TO 20%	80% OF MDQ
<20% TO 10%	65% OF MDQ
<10% TO 0%	50% OF MDQ

DTI GSS

SCQ LEVEL	MDQ
100% TO 35%	100 % OF MDQ
<35% TO 16%	92% OF MDQ
<16% TO 10%	70% OF MDQ
<10% TO 0%	63% OF MDQ

LIMITED ON A MONTHLY BASIS TO 87.5% OF THE TOTAL MONTHLY WITHDRAWAL CAPABILITY.

EQUITRANS 115SS

SCQ LEVEL	MDQ
100% TO 35%	100 % OF MDQ
<35% TO 16%	92% OF MDQ
<16% TO 10%	70% OF MDQ
<10% TO 0%	63% OF MDQ

BLACKHAWK RATCHETS DO NOT APPLY

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-015:

For the most recent annual period available, please identify the applicable monthly volumes and revenues under each rate schedule which were:

a. Sold under a negotiated or market-based rate

b. Transported under a negotiated or market based rate

c. Transported at full margin transportation rates

Response:

a. Please see the attached spreadsheet (GAS-COS-015 Attachment A) showing actual billed (invoiced) quantities and revenue sold under a negotiated or market-based rate for the 12 Months Ended November 30, 2015.

b. Please see the attached spreadsheet (GAS-COS-015 Attachment B) showing actual billed (invoiced) quantities and revenue transported under a negotiated or market based rate for the 12 Months Ended November 30, 2015.

c. Please see the attached spreadsheet (GAS-COS-015 Attachment C) showing actual billed (invoiced) quantities and revenue transported at full margin transportation rates for the 12 Months Ended November 30, 2015.

Columbia Gas of Pennsylvania, Inc.

Actual Billed Volumes and Revenues Billed - Sold Under a Negotiated or Market Based Rate

For the 12 Months Ending November 30, 2015

	Volumes											
	Dec-14 DTH	Jan-15 DTH	Feb-15 DTH	Mar-15 DTH	Apr-15 DTH	May-15 DTH	Jun-15 DTH	Jul-15 DTH	Aug-15 DTH	Sep-15 DTH	Oct-15 DTH	Nov-15 DTH
NSS	9,558.0	11,098.0	10,000.0	11,446.0	7,714.0	5,584.0	2,515.0	2,313.0	2,246.0	2,211.0	4,916.0	5,832.0

	Revenues											
	Dec-14 $	Jan-15 $	Feb-15 $	Mar-15 $	Apr-15 $	May-15 $	Jun-15 $	Jul-15 $	Aug-15 $	Sep-15 $	Oct-15 $	Nov-15 $
NSS	54,792.84	103,303.46	(8,431.73)	49,557.12	33,381.74	22,808.39	14,003.39	12,567.94	11,827.28	11,290.89	20,422.36	20,746.79

Columbia Gas of Pennsylvania, Inc.

Actual Billed Volumes and Revenues Billed - Transported Under a Negotiated or Market Based Rate

For the 12 Months Ending November 30, 2015

Volumes

	Dec-14 DTH	Jan-15 DTH	Feb-15 DTH	Mar-15 DTH	Apr-15 DTH	May-15 DTH	Jun-15 DTH	Jul-15 DTH	Aug-15 DTH	Sep-15 DTH	Oct-15 DTH	Nov-15 DTH
LDS FLEX	772,515.0	786,624.0	740,169.0	694,313.0	578,461.0	655,585.0	516,297.0	511,360.0	587,100.0	530,420.0	600,613.0	727,901.0
MLDS I FLEX	245,866.0	253,795.0	212,825.0	212,547.0	178,410.0	148,950.0	163,707.0	157,340.0	161,033.0	155,485.0	149,083.0	220,206.0
MLDS II FLEX	225,169.0	230,406.0	227,734.0	217,806.0	197,401.0	199,437.0	155,150.0	167,931.0	152,781.0	167,745.0	176,713.0	197,303.0
SDS FLEX	21,921.0	26,967.0	21,723.0	14,919.0	9,645.0	8,066.0	6,744.0	7,180.0	8,718.0	9,872.0	12,557.0	16,245.0
SGDS FLEX	3,783.0	4,139.0	3,866.0	1,924.0	802.0	400.0	353.0	278.0	312.0	383.0	1,036.0	3,076.0

Revenues

	Dec-14 $	Jan-15 $	Feb-15 $	Mar-15 $	Apr-15 $	May-15 $	Jun-15 $	Jul-15 $	Aug-15 $	Sep-15 $	Oct-15 $	Nov-15 $
LDS FLEX	301,055.04	322,991.06	300,745.80	284,340.22	254,645.92	296,072.88	258,243.29	262,258.13	253,152.38	229,036.10	258,956.30	295,900.06
MLDS I FLEX	30,310.47	31,051.83	27,221.14	27,195.14	24,003.34	21,248.83	22,628.60	22,033.29	22,378.59	21,859.85	21,261.26	27,911.26
MLDS II FLEX	84,360.50	85,295.55	86,149.14	83,367.84	78,546.59	79,133.35	66,414.05	71,401.90	67,899.79	70,575.80	70,969.25	72,340.78
SDS FLEX	24,533.04	29,166.89	23,111.60	16,470.51	11,494.73	10,015.06	9,472.59	9,472.95	10,161.44	11,898.57	14,905.40	18,859.99
SGDS FLEX	5,119.66	5,637.98	5,491.66	2,865.41	1,514.76	994.07	943.63	825.52	896.30	985.36	1,837.51	4,207.49

Columbia Gas of Pennsylvania, Inc.

Actual Billed Volumes and Revenues Billed - Transported at Full Margin Transportation Rates

For the 12 Months Ending November 30, 2015

Volumes

	Dec-14 DTH	Jan-15 DTH	Feb-15 DTH	Mar-15 DTH	Apr-15 DTH	May-15 DTH	Jun-15 DTH	Jul-15 DTH	Aug-15 DTH	Sep-15 DTH	Oct-15 DTH	Nov-15 DTH
LDS	932,190.0	942,804.0	1,026,643.0	1,014,661.0	881,820.0	778,097.0	772,548.0	730,375.0	764,360.0	782,548.0	845,471.0	868,869.0
MLDS I	16,717.0	19,513.0	22,263.0	18,273.0	13,587.0	10,674.0	10,021.0	8,843.0	8,741.0	9,503.0	11,337.0	12,191.0
MLDS II	21,724.0	23,080.0	22,848.0	20,120.0	23,713.0	9,356.0	4,322.0	4,078.0	243.0	0.0	15.0	655.0
RDGDS	87.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RDS	1,174,230.4	1,494,787.9	1,604,458.6	1,562,692.5	833,087.5	344,044.7	169,438.3	133,073.2	114,838.3	120,603.7	195,166.2	419,681.7
CAP	381,397.4	485,280.9	535,602.2	529,545.3	292,465.7	125,367.0	56,748.5	39,431.9	34,770.0	36,922.7	71,346.9	152,492.4
SCD	305,119.0	401,170.3	444,257.2	439,806.9	227,318.3	94,033.9	53,404.6	43,342.1	42,746.1	45,766.6	64,935.4	115,729.8
SDS	693,640.0	920,057.0	1,046,981.0	906,496.0	589,448.0	392,877.0	298,864.0	268,161.0	282,202.0	281,529.0	348,403.0	462,284.0
SGDS	556,733.0	633,772.0	694,009.0	679,980.0	379,791.0	181,331.0	104,387.0	89,605.0	84,832.0	89,286.0	124,313.0	214,972.0

Revenues

	Dec-14 $	Jan-15 $	Feb-15 $	Mar-15 $	Apr-15 $	May-15 $	Jun-15 $	Jul-15 $	Aug-15 $	Sep-15 $	Oct-15 $	Nov-15 $
LDS	941,081.86	1,157,756.37	1,196,561.22	1,118,403.67	981,189.99	868,356.68	865,001.44	825,269.71	860,720.28	880,638.86	944,315.54	976,295.35
MLDS I	5,012.79	5,025.42	5,282.82	4,909.35	4,470.74	4,198.09	4,136.97	4,026.71	4,017.16	4,088.48	4,260.14	4,340.08
MLDS II	11,769.97	12,375.99	12,272.20	11,051.69	12,659.20	6,235.87	3,983.66	3,874.50	2,955.99	2,050.00	2,103.82	4,315.16
RDGDS	545.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RDS	7,840,453.63	10,915,039.70	11,603,905.53	11,332,846.57	6,536,175.04	3,513,484.64	2,442,525.21	2,217,172.23	2,093,496.22	2,121,244.97	2,441,946.99	3,669,676.02
CAP	2,170,267.91	2,667,915.12	2,914,142.63	2,890,212.01	1,756,343.53	958,466.23	634,297.88	549,085.39	525,123.71	531,478.66	694,422.24	1,079,096.92
SCD	1,257,991.94	1,714,712.38	1,911,209.10	1,892,754.05	1,066,048.29	550,454.09	396,821.09	361,677.48	361,502.97	373,754.31	443,207.39	632,577.23
SDS	1,210,813.51	1,716,442.99	1,944,531.30	1,702,401.70	1,176,559.75	842,077.63	684,078.58	632,402.97	656,232.86	655,322.48	768,893.57	961,181.74
SGDS	1,607,905.75	1,905,170.25	2,092,564.53	2,049,185.72	1,185,354.36	613,568.66	392,519.07	350,664.43	337,131.01	349,904.75	450,938.33	713,546.78

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-16:

Please provide the following for each curtailment during the last three years:

a. Dates of curtailment

b. Type of curtailment (firm service, interruptible service, both)

c. Whether curtailment was related to amount of capacity on the Company's system, other capacity or supply related

d. Rate schedule that curtailed volumes would have been billed under

e. Curtailed volumes by rate schedule

f. Actual volumes moved by rate schedule

Response:

a.) As described in the Gas Emergency Rules section of the Company's tariff, curtailment is an action the Company may take regarding Company provided services in the event of an "emergency." As further defined in the Company's tariff, an emergency is a situation wherein the aggregate customer demand on the Company's system, or confined segment of the system, exceeds or threatens to exceed the gas supply or capacity that is actually and lawfully available to the Company to meet the demands, and the actual or threatened excess in demand creates an immediate threat to the Company's system operating integrity with respect to Priority 1 customers. While the Company has asked several customers to voluntarily reduce their load on cold days in the past to avoid the necessity of a curtailment, there have been no incidents during the last three years requiring the Company to curtail its services or customers.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-17:

Please identify the Company's design day planning criteria and the probability of design day occurrence. Include any available documentation supporting the Company's claimed probability of occurrence.

Response:

Columbia's design day planning criteria are based on Design Current Day Temperature, Design Prior Day Temperature, Design Current Day Wind Speed, and assume occurrence on a weekday.

The aforementioned design day weather conditions are premised upon all available historical weather data through the winter of 2014/15. COS-17 Attachment A shows the Design Temperatures, Design Wind Speed, the historical temperature period considered and the weights of the National Weather Service locations used to arrive at the Design Weather Conditions for each of Columbia's market areas. The weather stations used for this determination are those located at Hagerstown, Maryland, Morgantown, West Virginia, and Harrisburg, Pittsburgh, and Bradford, Pennsylvania. These weather stations are used because of length of available, consistent weather history and their proximity to Columbia's customers. The following paragraphs provide detail on the development of GAS-COS-17 Attachment A.

Columbia's Design Current Day Temperature is that temperature having a 1 in 15 probability or a 6.7 percent risk level. That is, the probability is 1 in 15, or 6.7 percent that any given winter will have one or more days with an average daily temperature equal to or colder than the Design Temperature. Columbia uses the Gumbel, or double exponential, distribution to calculate the probabilities. This skewed distribution is selected because the distribution of historical coldest temperatures is skewed.

Columbia has developed temperature probability distributions for eight Pipeline Scheduling Points (PSP) in Pennsylvania. These PSPs correspond to

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

geographically defined markets in Columbia Gas Transmission's (TCO) FERC-approved Tariff. The development of a Design PSP Temperature is a two-step process. First, for each weather station within the PSP, all available history is used to develop an associated design temperature. Next, the design temperatures for each weather station are weighted based on the firm demand associated with each weather station. The weighted temperatures are then summed to arrive at the PSP design average temperature. Columbia's system wide Design Current Day Temperature is minus 5 degrees Fahrenheit. The same method is used to develop design prior day temperature and design current day wind speed by PSP and for Columbia in total.

GAS-COS-17 Attachment B is the supporting probability of occurrence analyses for the weather station Design Temperatures. For each analysis, the heating season's days are ranked coldest to warmest. Shown are the twenty coldest days of each season. The coldest day of each season, denoted by "Rank 1" on the "20 Coldest" Report, is used in the Gumbel Analysis. Provided for each analysis are the Gumbel Curve parameters and probabilities considered.

The condition of Design Prior Day Temperature results from the mean temperature difference between historical "cold days" and their associated prior days. A "Cold Day" is defined as a day as cold as or colder than the Design Current Day Temperature, plus 5 degrees Fahrenheit. Using the Pittsburgh, Pennsylvania Design Current Day Temperature of minus 7 degrees Fahrenheit as an example, a "Cold Day" would be any day having an average temperature of minus 2 degrees Fahrenheit or colder. The average difference, prior day temperature less current day temperature, is added to the Design Current Day Temperature to provide Design Prior Day Temperature. The Pittsburgh, Pennsylvania average difference is 12 degrees Fahrenheit, so the Design Prior Day Temperature is -7 + 12 = 5 degrees Fahrenheit. To obtain the total company Design Prior Day Temperature, weather station weighting is then applied to each weather station's Design Prior Day Temperature and summed for a total company design. Columbia's system wide Design Prior Day Temperature is 6 degrees Fahrenheit.

Consistent with the Prior Day Design Temperature methodology, the approach to use an average of "Cold Days" is used to establish Design Wind Speed. However, because Wind Speed data has only been available since 1991/92, a "Cold Day" is

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

defined as Design Current Day Temperature plus 15 degrees Fahrenheit. Again, the design is developed at the weather station level, and then weighted for the total company design. Columbia's system wide Design Wind speed is 11 mph.

Columbia Gas of Pennsylvania

Company Winter Monthly Design Day Conditions [1]

TCO Market Area	Pipeline Area	Location	2015 Station Weighting	Company (Gumbel 1-in-15) Historical Period	Current Day Temp	Prior Day Temp [2]	Wind Speed [2]
25	Lancaster	Harrisburg, PA	95.1311	1925-2015	2	10	12
		Hagerstown, MD	4.8689	1925-2015	0	10	12
		Total	**100.0000**		**2**	**10**	**12**
26	Bedford	Morgantown, WV	**100.0000**	1949-2015	**-6**	**5**	**7**
29	Downingtown	Harrisburg, PA	**100.0000**	1925-2015	**2**	**10**	**12**
35	Pittsburgh	Pittsburgh, PA	74.9116	1925-2015	-7	5	11
		Morgantown, WV	25.0884	1949-2015	-6	5	7
		Total	**100.0000**		**-7**	**5**	**10**
36	Olean	Pittsburgh, PA	2.8939	1925-2015	-7	5	11
		Bradford, PA	97.1061	1941-2015	-15	-2	11
		Total	**100.0000**		**-15**	**-2**	**11**
38	Rimersburg	Pittsburgh, PA	56.1941	1925-2015	-7	5	11
		Bradford, PA	43.8059	1941-2015	-15	-2	7
		Total	**100.0000**		**-11**	**2**	**9**
39	New Castle	Pittsburgh, PA	**100.0000**	1925-2015	**-7**	**5**	**11**
40	PA/WV Misc.	Pittsburgh, PA	3.1982	1925-2015	-7	5	11
		Morgantown, WV	96.8018	1949-2015	-6	5	7
		Total	**100.0000**		**-6**	**5**	**7**
CPA Total		Harrisburg	24.9422	1925-2015	2	10	12
		Pittsburgh	51.3767	1925-2015	-7	5	11
		Hagerstown	1.2765	1925-2015	0	10	12
		Bradford	6.5920	1941-2015	-15	-2	11
		Morgantown	15.8126	1949-2015	-6	5	7
			100.0000	**Total Co**	**-5**	**6**	**11**

(1) Using all available temperature data through March 2015 and weather station weights based on actual firm customer demand from December 2014 through February 2015.

(2) In the 2015 Study, Prior Day Temperature was developed using a 5 degree range for Cold Days; Wind Speed was developed using 15 degree range for Cold Days.

Gumbel Analysis — Table 1 — January 6, 2016

Weather Station 37-BRADFORD, PA. Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1941 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1941	151	-8	0	0	2	5	5	6	9	9	9	11	12	13	14	15	15	17	17	17	18
1942	151	-13	-4	1	1	5	6	6	7	9	9	11	11	11	12	13	13	14	15	15	15
1943	152	-1	2	5	6	8	9	9	9	10	10	10	12	13	13	14	14	15	15	16	17
1944	151	-10	-3	0	1	3	4	8	8	8	8	9	9	9	11	12	12	13	13	13	14
1945	151	4	5	6	6	7	8	8	9	9	10	11	11	12	12	13	14	15	15	15	16
1946	151	2	6	6	9	10	10	13	13	13	14	14	14	15	15	15	15	15	17	17	18
1947	152	-5	-3	-2	-2	1	1	1	2	5	5	6	6	7	8	9	10	10	11	12	13
1948	151	2	11	11	15	16	17	18	19	19	19	20	20	20	20	21	22	22	22	22	22
1949	151	5	7	7	8	8	8	11	13	13	14	15	15	16	17	17	18	18	19	19	19
1950	151	-1	1	3	3	6	9	10	11	11	11	11	12	13	13	14	16	16	17	17	18
1951	152	3	4	4	7	8	9	10	12	12	12	13	13	13	14	15	15	16	16	17	17
1952	151	7	11	13	14	15	17	19	19	19	20	20	20	20	20	20	20	20	21	21	21
1953	151	4	4	6	9	10	10	11	12	12	12	12	13	14	14	15	16	16	17	18	18
1954	151	-2	-1	0	0	3	4	5	7	8	8	8	10	12	13	14	14	14	14	14	15
1955	152	2	9	9	10	10	11	11	13	13	13	13	13	13	13	14	14	14	15	15	15
1956	151	-7	-5	-3	-1	5	9	11	11	14	15	15	15	16	16	16	16	18	18	18	18
1957	151	-4	0	1	1	2	3	3	4	4	6	6	7	9	9	9	10	11	11	12	13
1958	151	0	3	3	4	4	4	4	4	4	5	5	6	7	7	8	8	8	8	8	9
1959	152	6	6	7	8	8	9	9	10	10	10	11	11	12	12	12	12	12	13	14	14
1960	151	-3	-2	0	1	1	2	2	2	3	3	3	4	4	4	4	5	6	7	8	10
1961	151	-1	3	4	4	4	5	7	7	7	8	8	9	9	9	10	10	12	12	13	13
1962	151	-13	-4	-2	-2	-1	0	0	0	0	1	2	2	3	4	4	6	7	7	7	7
1963	152	1	2	5	5	6	6	7	8	8	8	10	10	11	11	11	11	12	12	12	12
1964	151	-3	-1	-1	0	0	0	2	2	6	6	6	7	7	9	10	10	12	12	12	12
1965	151	-3	0	1	4	5	5	6	7	8	10	11	11	11	12	12	13	14	14	14	15
1966	151	2	2	3	3	3	4	6	7	8	8	8	9	10	10	11	14	15	15	16	16
1967	152	-1	-1	0	0	2	2	4	5	5	6	7	7	7	8	8	8	8	9	9	10
1968	151	-2	1	2	5	5	6	6	6	8	9	9	9	10	10	11	11	11	12	12	12
1969	151	-4	-2	1	1	2	2	3	4	4	4	8	8	9	9	10	10	10	10	12	13
1970	151	-4	-4	-2	0	3	4	4	5	6	7	8	8	9	9	9	10	11	11	12	12
1971	152	-4	0	1	3	3	4	5	6	7	7	7	9	9	9	9	10	10	10	10	11
1972	151	-2	2	3	4	4	4	5	6	7	8	9	9	10	10	11	11	12	12	14	14
1973	151	2	6	7	10	10	11	11	11	12	13	13	13	13	14	14	14	15	15	16	16
1974	151	1	6	7	7	8	8	9	12	13	14	14	16	16	16	16	16	16	16	17	17
1975	152	-5	-3	0	0	2	3	6	6	6	7	8	9	10	11	11	12	13	13	13	13
1976	151	-15	-15	-9	-7	-4	-3	-3	-3	-3	-3	-2	-1	1	2	2	3	4	4	4	4

Gumbel Analysis — Table 1 — January 6, 2016

Weather Station 37-BRADFORD, PA. Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1941 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1977	151	-2	0	3	3	3	4	4	5	5	5	5	6	6	6	6	6	6	7	7	8
1978	151	-12	-11	-10	-9	-8	-6	-4	-4	-3	-2	0	0	1	2	2	2	3	3	6	7
1979	152	-6	-6	-5	3	3	5	5	6	6	7	7	9	9	9	9	10	10	11	11	12
1980	151	-9	-8	-5	-4	-4	-1	-1	0	0	0	1	1	2	2	3	4	4	4	6	7
1981	151	-21	-7	-7	-6	3	4	5	5	5	6	7	7	7	8	8	9	9	9	9	10
1982	151	5	5	6	7	10	12	12	13	14	14	15	15	15	15	15	16	16	16	16	18
1983	152	-11	-7	-3	0	0	0	2	2	2	3	3	4	5	5	5	6	6	6	6	6
1984	151	-10	-9	4	5	5	6	8	8	10	11	11	12	12	12	13	13	13	13	14	15
1985	151	1	2	3	4	4	6	7	7	8	8	9	9	10	10	11	11	11	11	12	12
1986	151	-2	-1	3	7	7	9	9	11	11	12	15	15	16	17	17	17	18	18	19	19
1987	152	-1	0	1	2	2	4	6	8	10	10	11	11	12	12	12	13	13	14	15	15
1988	151	-4	5	8	8	10	10	10	11	11	12	13	13	13	14	14	14	14	15	15	15
1989	151	0	1	2	2	4	4	6	6	7	7	8	9	9	10	10	11	12	12	13	14
1990	151	0	5	7	9	11	12	13	15	15	15	16	16	16	17	17	18	18	18	19	19
1991	152	2	5	7	8	8	8	11	12	13	13	13	14	14	14	14	14	15	15	15	15
1992	151	1	6	6	7	9	9	10	10	11	11	12	12	13	13	14	14	15	15	15	16
1993	151	-15	-8	-5	-3	-3	-2	2	4	4	6	6	7	7	7	8	8	8	8	9	10
1994	151	-1	0	2	3	6	7	8	8	11	11	13	13	13	14	14	14	15	15	15	16
1995	152	-5	-1	-1	1	3	4	4	4	4	5	6	6	7	7	7	8	8	8	8	10
1996	151	-3	-2	4	6	7	8	10	11	11	12	12	14	14	16	16	17	17	17	17	18
1997	151	11	13	15	15	17	20	21	21	21	21	21	21	22	22	23	23	23	23	23	23
1998	151	3	6	7	8	8	9	9	10	11	11	11	11	11	12	13	14	14	14	15	15
1999	152	1	3	4	5	7	9	9	11	12	13	13	13	14	14	14	15	15	17	17	17
2000	151	8	9	12	12	12	13	13	13	13	14	14	15	15	15	15	15	16	16	16	16
2001	151	14	14	14	15	16	17	17	17	17	18	18	18	19	19	19	20	20	20	21	21
2002	151	1	1	2	3	4	5	6	6	6	7	7	7	7	9	9	9	9	10	10	10
2003	152	-5	0	2	2	2	3	4	5	6	7	8	9	9	10	12	12	12	12	13	13
2004	151	-1	0	0	2	4	5	5	5	8	9	9	11	11	13	14	14	14	15	15	15
2005	151	5	7	8	10	10	12	13	13	15	15	15	15	15	15	15	16	17	17	17	17
2006	151	-2	0	0	3	4	5	7	7	7	8	9	10	10	10	10	10	11	11	11	12
2007	152	0	4	5	8	9	9	10	11	11	12	12	13	13	13	13	14	15	15	16	16
2008	151	-5	0	2	3	6	6	6	7	8	8	8	9	9	10	10	11	12	13	13	13
2009	151	4	5	6	7	7	10	11	11	12	13	13	13	15	15	15	15	16	16	16	16
2010	151	3	3	4	7	9	10	10	11	12	12	12	13	13	13	13	14	14	14	14	14
2011	152	4	7	13	14	16	16	17	19	19	19	19	20	21	22	22	23	23	23	24	24
2012	151	4	4	5	6	12	12	13	15	15	15	15	16	17	17	18	19	20	20	20	20

Gumbel Analysis | Table 1 | January 6, 2016

Weather Station 37-BRADFORD, PA. Using Temperature Variable MID_MID_AVG_TMP

20 Coldest Daily Temperatures Per Period, Ranked

Overall Range Beginning Years: 1941 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2013	151	-8	-3	-1	0	1	2	3	3	3	4	5	5	5	6	7	9	9	10	10	10
2014	151	-9	-4	-4	-3	-1	3	4	4	4	5	5	6	7	8	8	8	9	10	10	10

Gumbel Analysis | Table 2 | January 6, 2016

Weather Station 37-BRADFORD, PA. Using Temperature Variable MID_MID_AVG_TMP
Temperature with the Indicated Probability of Occurrence for each period, per the Gumbel Distribution
Overall Range Beginning Years: 1941 to 2014; Period Range: 11-01 to 03-31

	Gumbel Curve parameters and probabilities							
Rank	Alpha	Gamma	1/1.25	1/2.0	1/5.0	1/10.0	1/15.0	1/20.0
1	0.78139	0.1715996	3.6	-1.4	-8.1	-12.3	-14.9	-16.5
2	2.92184	0.1341198	6.0	1.6	-3.8	-7.0	-8.8	-10.0
3	4.25546	0.1146846	7.4	3.3	-1.7	-4.5	-6.1	-7.1
4	5.40643	0.0999519	8.7	4.6	-0.2	-2.9	-4.4	-5.3
5	6.60261	0.0918836	9.9	5.9	1.3	-1.2	-2.6	-3.5
6	7.52662	0.0823387	10.9	6.8	2.2	-0.3	-1.7	-2.6
7	8.43413	0.0769368	11.9	7.8	3.3	0.8	-0.5	-1.4
8	9.16230	0.0709217	12.7	8.6	4.0	1.5	0.2	-0.7
9	9.74853	0.0689490	13.2	9.2	4.8	2.4	1.1	0.3
10	10.24749	0.0667739	13.7	9.7	5.4	3.1	1.9	1.1

Normal Analysis | Table 3 | January 6, 2016

Weather Station 37-BRADFORD, PA. Using Temperature Variable MID_MID_AVG_TMP
Temperature with the Indicated Probability of Occurrence for each period, per the Normal Distribution
Overall Range Beginning Years: 1941 to 2014; Period Range: 11-01 to 03-31

	Normal Curve parameters and probabilities							
Rank	Mean	Std Dev	1/5.0	1/7.0	1/10.0	1/13.0	1/15.0	1/20.0
1	-1.8	6.2	-7.0	-8.4	-9.7	-10.6	-11.1	-12.0
2	1.1	5.4	-3.5	-4.7	-5.9	-6.6	-7.0	-7.8
3	2.9	5.0	-1.4	-2.5	-3.6	-4.3	-4.7	-5.4
4	4.2	5.0	-0.0	-1.2	-2.2	-3.0	-3.3	-4.1
5	5.5	4.8	1.5	0.4	-0.6	-1.3	-1.7	-2.4
6	6.6	4.8	2.5	1.4	0.4	-0.3	-0.7	-1.4
7	7.5	4.8	3.5	2.4	1.4	0.7	0.4	-0.3
8	8.3	4.9	4.2	3.0	2.0	1.3	0.9	0.2
9	8.9	4.9	4.9	3.8	2.7	2.0	1.7	1.0
10	9.5	4.8	5.5	4.4	3.4	2.7	2.3	1.7
11	10.1	4.6	6.2	5.2	4.2	3.5	3.2	2.5
12	10.6	4.5	6.8	5.8	4.8	4.2	3.8	3.2
13	11.2	4.5	7.4	6.4	5.5	4.8	4.5	3.9
14	11.7	4.4	8.0	7.0	6.1	5.4	5.1	4.5
15	12.1	4.4	8.4	7.4	6.5	5.8	5.5	4.9
16	12.6	4.3	9.0	8.0	7.1	6.4	6.1	5.5
17	13.1	4.3	9.5	8.5	7.6	7.0	6.7	6.0
18	13.5	4.3	9.8	8.9	7.9	7.3	7.0	6.4
19	13.9	4.2	10.4	9.4	8.5	7.9	7.6	7.0
20	14.3	4.0	10.9	10.0	9.2	8.6	8.3	7.7

Gumbel Analysis — Table 1 — January 6, 2016

Weather Station 44-HAGERSTOWN, MD Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1925	151	11	17	17	19	20	20	20	21	21	21	21	21	22	22	22	23	23	24	25	25
1926	151	14	14	17	19	20	20	20	20	22	23	24	24	24	25	25	25	25	26	26	26
1927	152	13	15	15	15	17	17	18	18	20	20	21	22	23	23	23	24	24	25	25	26
1928	151	17	18	19	20	21	21	21	21	22	23	23	23	24	24	24	25	25	25	25	25
1929	151	10	10	14	14	15	18	19	19	19	20	20	20	21	22	22	22	23	24	24	24
1930	151	17	18	21	21	21	21	22	22	22	22	23	23	23	23	24	25	26	26	26	26
1931	152	18	20	22	22	22	25	26	26	27	27	28	30	30	30	30	31	31	33	33	33
1932	151	14	16	17	18	18	20	22	24	24	24	24	25	26	27	27	27	28	28	29	29
1933	151	4	5	12	12	14	15	16	16	16	17	18	18	19	19	20	20	20	21	21	21
1934	151	4	11	11	11	15	17	17	18	18	19	20	20	21	24	25	25	26	26	26	26
1935	152	6	6	7	10	10	12	12	13	13	13	13	15	16	16	16	16	17	18	18	18
1936	151	21	24	24	25	25	25	26	26	27	27	27	28	28	28	29	29	29	30	30	30
1937	151	20	20	20	20	21	22	23	23	23	23	23	24	24	24	24	24	24	25	25	25
1938	151	17	19	20	20	20	20	23	23	23	23	24	24	25	26	26	26	27	27	27	27
1939	152	7	11	12	15	16	16	17	17	17	17	18	19	20	20	20	20	20	21	21	21
1940	151	20	21	21	22	22	23	23	23	24	24	24	24	25	26	26	26	26	26	26	26
1941	151	5	10	12	13	15	16	16	18	21	22	23	24	25	25	26	26	27	28	28	28
1942	151	7	9	12	17	17	21	21	21	21	22	22	22	23	24	24	24	24	25	26	27
1943	152	13	18	19	20	22	22	22	23	23	23	23	23	24	24	24	25	25	26	26	26
1944	151	13	13	15	16	16	17	18	18	18	19	19	19	19	19	20	21	21	21	21	22
1945	151	13	13	13	17	17	18	18	18	20	20	20	20	20	21	21	22	22	22	22	22
1946	151	8	14	16	17	20	20	21	21	21	21	22	22	23	23	24	24	24	24	24	25
1947	152	6	8	8	10	10	12	12	12	14	15	15	16	17	17	18	20	20	21	21	22
1948	151	17	19	20	21	21	22	24	25	25	25	26	27	27	27	27	28	28	28	29	29
1949	151	19	20	21	22	24	24	25	25	25	26	26	26	26	26	26	26	27	27	28	28
1950	151	10	12	14	15	15	16	17	17	18	19	19	21	21	21	22	22	22	23	24	24
1951	152	8	10	15	16	18	18	22	23	23	23	23	24	24	24	25	26	26	26	26	26
1952	151	23	23	24	25	25	25	25	26	26	27	27	28	28	28	29	29	29	29	30	30
1953	151	15	16	17	17	18	19	19	19	20	21	22	22	24	25	25	26	26	26	26	26
1954	151	11	11	12	16	16	17	19	19	20	20	21	22	22	22	23	23	24	24	25	25
1955	152	17	18	18	18	20	20	20	21	21	21	22	23	23	24	24	24	24	24	25	25
1956	151	6	7	10	18	18	21	21	22	22	23	23	23	24	24	26	27	27	28	28	28
1957	151	4	10	12	12	15	16	17	18	18	18	20	20	22	22	22	22	22	23	23	23
1958	151	10	12	14	14	16	16	16	17	17	17	18	18	19	19	20	20	21	21	22	22
1959	152	15	16	16	16	19	19	20	20	21	21	22	22	22	22	23	23	23	24	24	24
1960	151	3	3	3	8	8	8	9	10	11	11	12	12	13	13	14	14	15	15	15	17

Gumbel Analysis — Table 1 — January 6, 2016

Weather Station 44-HAGERSTOWN, MD Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1961	151	11	13	14	15	16	16	17	17	18	18	19	21	22	22	22	23	23	23	23	24
1962	151	6	7	8	9	11	13	13	13	14	16	16	18	18	18	18	18	19	19	19	19
1963	152	9	13	14	14	15	15	17	17	18	18	19	19	20	20	20	20	20	21	21	21
1964	151	7	10	12	13	14	15	16	16	17	18	20	20	20	20	21	22	22	23	23	23
1965	151	3	10	10	15	16	16	18	19	19	20	21	22	22	22	23	24	24	24	25	25
1966	151	10	13	14	15	15	17	19	19	19	20	21	22	22	23	23	23	23	23	24	24
1967	152	2	2	6	8	9	9	11	12	13	15	16	16	17	19	19	19	20	20	20	21
1968	151	15	16	16	17	19	20	21	21	21	21	21	22	22	22	22	23	23	23	23	24
1969	151	4	5	9	11	13	13	14	14	14	15	17	18	18	18	19	19	20	21	21	21
1970	151	9	10	11	11	12	13	15	15	16	16	17	18	19	19	19	20	20	20	21	21
1971	152	6	15	18	18	20	20	21	21	22	23	24	24	24	24	24	25	25	26	26	26
1972	151	15	17	19	20	20	21	21	21	21	22	23	23	23	24	24	26	26	26	27	27
1973	151	17	24	24	24	24	25	25	26	26	27	27	27	27	28	28	28	28	29	29	29
1974	151	11	17	20	23	25	25	26	27	27	27	27	28	28	28	28	29	29	29	29	29
1975	152	14	16	17	18	20	20	21	21	21	22	23	23	23	24	25	25	25	25	26	26
1976	151	4	11	11	12	13	14	15	15	16	17	17	18	18	18	19	19	19	19	19	20
1977	151	12	15	15	15	15	16	16	16	18	19	19	19	19	20	20	20	20	20	20	21
1978	151	3	8	9	10	11	14	16	16	16	16	17	18	18	18	19	19	19	20	20	20
1979	152	12	13	17	19	20	20	21	22	23	23	23	24	24	24	25	25	25	26	26	27
1980	151	6	7	7	9	12	12	13	13	13	13	14	14	14	14	15	16	18	18	20	20
1981	151	-6	2	4	8	10	13	14	15	15	15	16	17	18	19	19	19	20	22	22	23
1982	151	15	15	17	17	19	20	23	23	23	23	23	24	24	25	25	26	26	26	26	26
1983	152	-3	6	6	7	7	11	12	13	15	16	16	16	16	17	17	18	18	18	19	19
1984	151	0	3	13	17	17	18	19	19	19	20	21	21	22	22	22	23	23	23	23	24
1985	151	11	12	13	14	14	18	18	19	19	19	20	20	20	21	21	21	22	23	23	23
1986	151	9	10	10	12	19	19	20	22	23	23	23	25	25	26	26	27	27	27	27	27
1987	152	10	12	14	14	15	16	16	17	18	19	19	19	19	20	21	22	23	23	24	24
1988	151	12	13	18	20	21	22	22	22	22	22	23	23	24	24	24	24	24	24	26	27
1989	151	7	12	12	12	13	13	13	13	15	16	17	17	18	19	20	21	21	22	22	22
1990	151	17	17	20	21	21	23	23	25	25	25	25	26	27	28	28	28	29	30	30	30
1991	152	14	18	21	23	23	24	24	24	25	25	25	25	25	26	26	26	26	26	27	27
1992	151	15	18	18	19	20	20	21	21	21	21	23	23	23	24	25	25	25	25	26	26
1993	151	-5	2	3	5	6	9	16	16	17	18	18	18	18	19	19	19	19	19	20	22
1994	151	11	14	15	15	18	19	20	22	22	25	25	25	25	26	26	26	27	27	27	27
1995	152	8	9	14	14	15	17	17	18	19	19	20	20	21	21	21	21	21	22	22	23
1996	151	12	12	13	17	19	19	20	21	24	26	26	26	27	27	28	28	28	28	29	29

Gumbel Analysis — Table 1 — January 6, 2016

Weather Station 44-HAGERSTOWN, MD Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1997	151	21	25	25	26	29	29	30	30	30	31	31	32	32	32	32	33	33	33	33	33
1998	151	17	17	20	20	21	22	23	23	23	24	24	24	25	25	25	25	26	26	26	27
1999	152	17	17	18	18	21	23	23	23	23	24	24	25	25	25	25	27	28	28	28	28
2000	151	15	18	18	18	18	18	19	19	19	21	21	22	22	22	23	23	23	23	23	24
2001	151	21	22	22	23	24	25	26	26	27	27	27	28	28	28	28	29	29	29	30	30
2002	151	10	11	12	13	14	18	18	18	19	19	20	20	21	21	21	21	22	22	22	22
2003	152	10	10	13	14	14	15	16	16	17	18	18	18	20	20	20	20	20	21	21	22
2004	151	13	14	14	16	16	17	17	17	19	20	20	22	22	22	23	24	24	24	25	25
2005	151	16	18	19	21	23	23	24	24	25	25	26	27	27	27	27	27	27	28	28	28
2006	151	9	12	14	17	17	18	18	19	20	20	21	21	21	21	21	22	22	23	23	23
2007	152	16	17	18	20	21	21	21	22	22	23	25	26	27	27	27	27	28	28	29	30
2008	151	9	13	17	17	17	20	21	21	21	21	23	24	24	25	25	25	25	25	25	26
2009	151	19	19	19	21	21	23	23	24	25	25	25	25	26	26	26	26	26	26	27	27
2010	151	15	18	19	19	20	22	22	22	23	23	23	23	23	23	24	25	25	25	25	25
2011	152	20	22	23	25	26	26	26	27	28	29	30	30	30	30	31	32	32	32	33	33
2012	151	15	16	17	18	20	22	23	24	26	27	27	27	27	28	28	28	28	29	29	30
2013	151	7	7	8	11	12	13	15	15	16	17	18	19	19	19	20	21	21	22	22	23
2014	151	9	9	10	11	13	14	16	16	17	18	18	20	21	21	22	22	23	23	24	24

Gumbel Analysis | Table 2 | January 6, 2016

Weather Station 44-HAGERSTOWN, MD Using Temperature Variable MID_MID_AVG_TMP
Temperature with the Indicated Probability of Occurrence for each period, per the Gumbel Distribution
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

	Gumbel Curve parameters and probabilities							
Rank	Alpha	Gamma	1/1.25	1/2.0	1/5.0	1/10.0	1/15.0	1/20.0
1	13.79763	0.1909110	16.3	11.9	5.8	2.0	-0.3	-1.8
2	15.23799	0.1390350	18.2	14.0	8.8	5.7	4.0	2.8
3	16.37314	0.1235248	19.3	15.4	10.9	8.3	6.8	5.8
4	17.45952	0.1129160	20.3	16.7	12.5	10.1	8.8	7.9
5	18.44741	0.1022099	21.4	17.8	13.7	11.4	10.1	9.3
6	19.32566	0.0997233	22.1	18.8	14.9	12.9	11.7	11.0
7	20.10729	0.0957619	22.9	19.6	16.0	14.0	12.9	12.2
8	20.49003	0.0884509	23.3	20.0	16.3	14.4	13.3	12.6
9	21.06014	0.0860543	23.8	20.6	17.1	15.2	14.2	13.5
10	21.57533	0.0823038	24.3	21.2	17.7	15.8	14.8	14.1

Normal Analysis | Table 3 | January 6, 2016

Weather Station 44-HAGERSTOWN, MD Using Temperature Variable MID_MID_AVG_TMP
Temperature with the Indicated Probability of Occurrence for each period, per the Normal Distribution
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

	Normal Curve parameters and probabilities							
Rank	Mean	Std Dev	1/5.0	1/7.0	1/10.0	1/13.0	1/15.0	1/20.0
1	11.1	5.9	6.1	4.7	3.5	2.6	2.2	1.3
2	13.4	5.3	9.0	7.8	6.6	5.9	5.5	4.7
3	15.0	4.9	10.8	9.7	8.6	7.9	7.6	6.8
4	16.3	4.6	12.5	11.5	10.5	9.8	9.5	8.8
5	17.5	4.5	13.7	12.7	11.7	11.0	10.7	10.1
6	18.5	4.2	14.9	14.0	13.1	12.5	12.2	11.6
7	19.4	4.0	16.0	15.1	14.2	13.6	13.3	12.7
8	19.8	4.1	16.4	15.4	14.6	14.0	13.7	13.1
9	20.4	3.9	17.1	16.2	15.4	14.8	14.5	14.0
10	21.0	3.9	17.7	16.8	16.0	15.4	15.1	14.6
11	21.5	3.7	18.4	17.6	16.8	16.2	15.9	15.4
12	22.1	3.8	18.9	18.1	17.3	16.7	16.4	15.9
13	22.5	3.6	19.5	18.6	17.9	17.3	17.1	16.6
14	22.9	3.6	19.8	19.0	18.2	17.7	17.4	16.9
15	23.3	3.5	20.3	19.5	18.7	18.2	18.0	17.4
16	23.7	3.6	20.7	19.9	19.1	18.6	18.3	17.8
17	24.0	3.5	21.1	20.3	19.5	19.0	18.8	18.2
18	24.4	3.5	21.5	20.7	20.0	19.5	19.2	18.7
19	24.8	3.5	21.8	21.0	20.3	19.8	19.5	19.0
20	25.0	3.4	22.2	21.5	20.7	20.3	20.0	19.5

Gumbel Analysis — Table 1 — January 6, 2016

Weather Station 06-HARRISBURG, PA. Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1925	151	13	15	15	17	19	19	20	20	21	21	21	22	23	23	23	23	24	24	24	24
1926	151	14	14	14	18	18	19	19	19	20	20	21	21	22	24	24	25	25	25	26	26
1927	152	14	16	17	17	18	19	19	20	21	22	22	22	23	23	23	24	24	24	25	26
1928	151	13	17	18	22	22	23	23	23	23	24	24	24	24	25	25	25	25	25	25	26
1929	151	13	14	15	16	18	19	19	20	20	20	20	21	21	21	21	22	23	24	24	24
1930	151	18	19	20	21	21	21	23	23	23	24	24	24	25	26	27	27	27	27	27	28
1931	152	17	20	21	22	22	25	25	26	26	26	27	29	29	30	30	30	31	31	31	31
1932	151	14	15	15	16	18	18	19	22	22	23	23	23	23	25	25	25	25	26	26	26
1933	151	1	7	10	10	11	11	11	14	16	16	16	17	17	17	18	18	18	19	19	19
1934	151	9	11	11	12	13	13	13	14	15	19	19	19	21	22	22	23	23	23	24	24
1935	152	2	7	8	10	11	11	12	12	12	14	14	14	14	14	14	16	17	17	18	18
1936	151	20	23	24	24	24	25	26	26	26	26	27	27	27	28	29	29	29	29	29	30
1937	151	13	17	20	20	20	22	22	22	22	22	23	23	23	24	24	25	25	26	26	26
1938	151	12	18	18	19	21	21	21	21	22	24	24	24	25	25	25	25	25	25	25	26
1939	152	10	10	14	14	16	16	17	19	19	19	20	20	20	20	20	20	21	21	21	21
1940	151	20	21	21	22	22	23	23	24	24	24	24	25	25	26	26	26	26	26	27	27
1941	151	7	9	10	11	11	15	17	19	20	20	21	23	23	24	25	25	25	26	26	26
1942	151	8	9	13	14	15	19	19	19	20	22	22	23	23	23	23	23	24	24	24	24
1943	152	16	19	19	20	20	20	20	20	22	23	23	23	24	24	24	24	24	24	25	25
1944	151	11	13	14	15	15	17	18	18	20	20	21	21	21	21	21	22	22	22	22	22
1945	151	15	16	17	17	18	19	20	20	21	21	21	22	22	22	22	22	23	23	23	23
1946	151	8	15	17	18	18	21	22	22	22	22	23	23	24	24	25	25	26	26	26	26
1947	152	11	11	12	13	13	13	13	14	14	15	15	15	15	17	18	19	19	20	21	21
1948	151	15	19	20	22	22	23	26	26	26	27	27	28	28	29	29	29	29	29	29	30
1949	151	18	19	19	20	21	22	24	24	25	25	25	26	26	27	27	27	27	27	28	28
1950	151	13	14	14	14	15	19	19	20	20	21	22	22	23	23	23	23	23	24	24	24
1951	152	11	12	18	19	20	21	23	23	23	24	25	25	25	26	27	27	27	28	28	28
1952	151	22	25	25	26	28	28	28	29	29	29	29	29	29	29	30	30	30	30	31	31
1953	151	16	18	18	19	19	19	20	21	21	21	23	24	24	25	25	25	26	26	27	28
1954	151	10	14	14	17	18	19	19	19	20	20	21	21	23	24	24	25	26	26	26	26
1955	152	16	17	19	21	22	22	23	23	23	24	24	24	24	25	26	26	26	26	26	26
1956	151	7	10	11	16	19	21	22	22	23	23	24	25	25	26	26	26	27	27	27	28
1957	151	7	12	13	13	16	16	16	17	17	19	20	22	23	23	23	23	23	24	24	24
1958	151	14	14	15	15	16	16	16	17	18	18	19	20	20	20	21	21	21	21	22	22
1959	152	17	18	20	21	21	22	22	22	22	23	23	24	25	26	26	26	26	26	26	26
1960	151	5	6	7	9	10	10	10	10	11	11	12	13	13	15	15	16	16	16	17	18

Gumbel Analysis — Table 1 — January 6, 2016

Weather Station 06-HARRISBURG, PA. Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1961	151	10	14	14	15	16	16	17	18	19	19	19	20	20	21	21	22	22	23	23	23
1962	151	5	9	10	11	12	14	14	14	16	17	17	17	18	18	18	18	19	19	20	20
1963	152	9	11	14	14	15	17	17	18	18	18	19	19	19	19	20	21	21	22	22	22
1964	151	7	8	15	15	15	16	17	18	19	19	21	21	21	21	21	22	22	24	24	24
1965	151	6	7	12	14	16	18	18	18	19	20	20	20	21	23	23	23	23	23	23	24
1966	151	10	12	13	14	16	17	18	19	20	20	21	21	22	22	23	23	24	24	24	24
1967	152	6	8	10	10	11	11	13	14	15	16	18	18	18	18	19	19	20	20	20	21
1968	151	17	17	18	18	19	20	20	20	22	22	22	23	23	24	24	25	25	25	25	25
1969	151	5	7	11	12	13	13	14	14	15	15	16	18	18	18	19	19	19	19	21	22
1970	151	11	12	16	16	17	17	18	18	19	20	20	22	22	23	24	24	25	25	25	25
1971	152	13	18	20	20	21	22	22	23	24	24	25	25	25	27	27	27	27	27	28	28
1972	151	13	17	19	20	21	23	23	23	24	24	24	24	25	25	26	26	26	27	27	27
1973	151	20	21	22	23	23	24	24	24	24	24	25	25	25	26	27	27	27	27	28	28
1974	151	14	16	22	23	23	24	25	25	25	26	26	26	27	27	27	27	27	28	28	28
1975	152	14	15	17	19	19	21	21	22	22	22	23	23	23	24	25	25	25	25	26	26
1976	151	4	8	8	11	13	14	14	14	15	16	16	17	17	18	19	19	20	20	20	20
1977	151	13	14	15	15	17	18	18	18	18	19	19	19	19	19	19	20	20	20	20	20
1978	151	2	8	8	8	9	10	11	15	16	16	17	18	18	19	19	19	20	20	20	20
1979	152	15	18	19	20	20	21	22	22	22	22	22	23	23	24	24	25	25	25	25	26
1980	151	7	8	8	9	10	12	12	13	15	16	16	16	16	17	17	17	17	18	19	19
1981	151	0	6	7	11	12	17	17	18	18	18	18	19	19	19	19	21	21	21	22	23
1982	151	19	21	22	22	22	22	22	23	25	25	25	26	27	27	27	28	29	29	30	30
1983	152	2	5	6	8	10	10	13	14	15	15	16	17	17	18	18	19	19	19	19	21
1984	151	0	7	18	18	20	20	20	21	21	22	22	22	23	24	24	25	25	26	26	26
1985	151	12	13	15	18	19	19	19	19	20	20	20	21	21	21	22	22	22	22	22	23
1986	151	13	15	16	17	17	19	20	21	24	25	26	26	26	27	27	27	27	28	28	28
1987	152	12	13	13	14	14	14	15	15	16	17	18	18	19	20	20	20	20	21	21	22
1988	151	13	17	17	18	18	18	20	21	21	22	22	23	24	24	24	25	25	27	27	27
1989	151	11	12	12	14	14	15	16	16	17	17	17	18	19	19	21	21	21	23	23	25
1990	151	17	21	21	21	22	23	24	25	25	26	26	27	27	28	28	28	28	28	29	29
1991	152	14	17	22	22	22	23	23	23	24	24	24	24	25	25	26	26	27	27	27	27
1992	151	13	17	19	19	19	20	20	21	21	21	21	23	23	24	25	26	26	26	26	26
1993	151	-6	-2	0	5	6	9	12	14	15	15	16	17	17	17	17	18	18	18	19	19
1994	151	13	15	16	18	18	19	19	23	23	24	24	25	25	25	26	26	26	27	27	27
1995	152	9	10	14	15	15	15	16	16	17	17	17	18	19	19	19	19	20	20	21	21
1996	151	11	12	13	19	20	21	21	22	23	24	24	25	25	26	26	26	27	28	29	29

Gumbel Analysis | Table 1 | January 6, 2016

Weather Station 06-HARRISBURG, PA. Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1997	151	22	26	26	26	28	28	29	30	30	31	31	31	32	32	32	32	32	32	33	33
1998	151	15	17	18	21	21	21	21	21	21	21	22	23	23	23	25	25	25	26	26	26
1999	152	14	16	16	16	17	20	20	20	20	22	22	23	23	23	25	25	25	25	26	26
2000	151	17	19	19	19	19	20	21	21	21	21	21	22	23	23	23	23	23	24	25	25
2001	151	22	23	24	25	26	26	27	27	27	27	27	27	28	28	29	29	29	30	30	30
2002	151	13	13	14	14	16	18	19	19	20	20	20	21	21	21	21	21	22	22	22	22
2003	152	9	12	14	16	16	16	16	16	17	18	19	19	20	20	20	21	21	21	22	22
2004	151	12	14	16	16	16	17	18	18	20	22	22	22	22	24	24	25	25	25	26	26
2005	151	14	17	20	21	23	25	26	26	26	27	27	27	27	27	28	28	28	28	28	29
2006	151	11	13	16	16	18	18	19	19	19	21	21	21	22	23	23	24	24	24	25	25
2007	152	16	19	20	20	22	23	23	24	25	25	26	27	27	27	27	28	28	28	28	29
2008	151	11	13	16	18	19	19	20	20	21	21	21	22	23	23	24	24	24	24	25	25
2009	151	18	19	22	22	23	23	24	24	25	25	26	26	26	26	26	26	26	26	27	27
2010	151	14	15	16	21	22	22	22	22	23	24	24	24	24	24	24	24	25	25	25	25
2011	152	20	22	25	25	25	26	26	27	28	28	29	29	30	30	31	31	31	32	32	32
2012	151	15	16	17	19	20	21	23	25	26	26	27	27	27	28	28	28	28	28	29	29
2013	151	6	8	10	13	13	14	15	15	15	16	16	17	18	19	20	21	21	21	21	22
2014	151	6	7	8	10	12	13	14	14	15	15	16	17	17	17	18	18	19	20	21	22

Gumbel Analysis | Table 2 | January 6, 2016

Weather Station 06-HARRISBURG, PA. Using Temperature Variable MID_MID_AVG_TMP
Temperature with the Indicated Probability of Occurrence for each period, per the Gumbel Distribution
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

	Gumbel Curve parameters and probabilities							
Rank	Alpha	Gamma	1/1.25	1/2.0	1/5.0	1/10.0	1/15.0	1/20.0
1	14.21709	0.2113989	16.5	12.5	7.0	3.6	1.5	0.2
2	15.81812	0.1465967	18.6	14.6	9.7	6.8	5.1	4.0
3	17.08256	0.1264272	19.9	16.2	11.7	9.2	7.7	6.8
4	18.03365	0.1168955	20.8	17.3	13.2	10.9	9.7	8.8
5	18.74523	0.1061730	21.6	18.1	14.1	12.0	10.7	10.0
6	19.62149	0.0997581	22.4	19.1	15.2	13.2	12.0	11.3
7	20.19157	0.0927926	23.0	19.7	15.9	13.9	12.8	12.0
8	20.71034	0.0885429	23.5	20.2	16.6	14.6	13.5	12.8
9	21.30417	0.0878808	24.0	20.9	17.4	15.6	14.5	13.9
10	21.80516	0.0848169	24.5	21.4	18.0	16.2	15.2	14.6

Normal Analysis | Table 3 | January 6, 2016

Weather Station 06-HARRISBURG, PA. Using Temperature Variable MID_MID_AVG_TMP
Temperature with the Indicated Probability of Occurrence for each period, per the Normal Distribution
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

	Normal Curve parameters and probabilities							
Rank	Mean	Std Dev	1/5.0	1/7.0	1/10.0	1/13.0	1/15.0	1/20.0
1	11.8	5.4	7.2	6.0	4.8	4.1	3.7	2.9
2	14.1	5.0	9.9	8.7	7.7	6.9	6.6	5.8
3	15.7	4.8	11.7	10.6	9.5	8.8	8.5	7.8
4	16.9	4.5	13.2	12.2	11.2	10.5	10.2	9.6
5	17.8	4.3	14.1	13.2	12.2	11.6	11.3	10.6
6	18.8	4.3	15.2	14.2	13.3	12.7	12.4	11.8
7	19.4	4.2	15.9	15.0	14.1	13.5	13.1	12.5
8	20.0	4.1	16.6	15.7	14.8	14.2	13.9	13.3
9	20.7	3.9	17.4	16.5	15.7	15.2	14.9	14.3
10	21.2	3.8	18.0	17.2	16.4	15.8	15.5	15.0
11	21.6	3.7	18.5	17.7	16.9	16.3	16.0	15.5
12	22.2	3.6	19.1	18.3	17.5	17.0	16.7	16.2
13	22.6	3.7	19.5	18.7	17.9	17.3	17.1	16.5
14	23.1	3.7	20.0	19.2	18.4	17.9	17.6	17.1
15	23.5	3.7	20.4	19.6	18.8	18.2	18.0	17.4
16	23.8	3.5	20.9	20.1	19.3	18.8	18.6	18.1
17	24.1	3.4	21.2	20.4	19.7	19.2	18.9	18.4
18	24.4	3.4	21.5	20.8	20.0	19.5	19.3	18.8
19	24.8	3.4	22.0	21.2	20.5	20.0	19.8	19.3
20	25.1	3.3	22.3	21.5	20.8	20.4	20.1	19.6

Gumbel Analysis — Table 1 — January 6, 2016

Weather Station 38-MORGANTOWN, WV. Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1949 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1949	151	15	15	17	17	19	20	20	21	21	21	22	23	25	26	26	26	26	28	28	28
1950	151	7	8	8	8	13	14	14	14	15	15	17	18	18	19	19	20	21	22	22	22
1951	152	6	12	14	16	19	21	21	22	23	24	24	25	26	26	26	27	27	27	27	27
1952	151	19	21	23	23	24	24	24	24	24	24	25	25	26	26	27	27	27	28	28	29
1953	151	13	14	15	16	17	18	18	20	20	22	23	23	24	24	24	24	24	24	25	25
1954	151	5	8	11	12	12	13	14	14	16	17	19	20	20	20	20	20	21	22	22	24
1955	152	14	16	17	17	19	19	19	20	20	20	21	21	21	22	22	22	23	23	24	24
1956	151	3	11	12	14	15	16	18	19	20	21	22	23	23	25	26	26	26	26	27	27
1957	151	0	6	7	8	12	12	12	14	14	15	16	16	16	16	16	16	17	17	19	20
1958	151	5	8	9	9	10	11	11	11	13	14	14	15	16	17	17	17	17	18	18	19
1959	152	14	15	16	16	17	17	17	18	18	19	19	20	20	20	21	21	21	21	22	22
1960	151	3	7	7	8	9	9	9	10	10	14	14	15	16	17	18	18	19	19	19	20
1961	151	5	6	10	12	12	13	15	16	16	17	17	20	21	22	22	22	23	23	23	24
1962	151	-5	4	5	6	7	8	9	9	10	11	11	11	11	12	14	15	15	15	16	16
1963	152	7	9	10	11	14	14	15	15	16	16	18	18	19	19	20	20	20	20	21	21
1964	151	4	6	7	8	8	9	11	13	14	15	15	16	16	16	16	17	17	17	18	19
1965	151	3	6	12	12	17	18	18	18	19	20	20	21	21	21	21	21	21	21	22	23
1966	151	7	10	11	12	14	15	15	17	19	19	19	20	20	21	21	22	22	23	25	25
1967	152	0	3	6	6	9	10	10	13	13	14	14	14	14	15	17	17	18	18	18	18
1968	151	11	11	13	13	13	13	15	15	15	16	16	17	18	19	19	19	19	20	20	20
1969	151	-5	-3	3	5	5	7	9	12	13	13	15	17	17	17	18	18	19	19	19	20
1970	151	2	3	8	9	9	12	12	12	14	14	14	15	15	15	18	19	21	21	21	21
1971	152	-8	4	4	11	12	12	12	12	15	15	15	17	19	19	20	20	21	21	21	21
1972	151	2	10	10	10	11	12	12	12	12	12	13	14	14	16	16	16	17	18	19	21
1973	151	12	13	14	15	16	16	17	18	19	19	20	21	21	22	22	22	22	22	23	23
1974	151	11	13	17	20	20	20	21	22	22	22	23	23	23	23	24	24	25	25	25	25
1975	152	3	7	8	11	12	13	14	16	16	17	18	18	18	21	21	23	23	23	23	24
1976	151	-5	4	5	7	8	8	10	10	10	11	12	12	12	12	13	13	15	16	16	16
1977	151	6	9	10	10	11	12	13	13	13	14	14	15	15	15	15	15	15	15	16	16
1978	151	7	7	8	10	12	12	12	13	14	15	15	15	16	16	17	18	18	19	19	19
1979	152	12	14	15	16	16	17	17	17	17	18	20	21	21	22	23	23	23	24	24	26
1980	151	3	4	6	7	7	7	8	9	11	11	11	12	14	15	15	16	19	19	19	19
1981	151	-8	-1	-1	9	13	13	14	15	16	16	17	17	17	20	21	21	21	21	22	22
1982	151	13	14	15	19	20	21	22	23	23	23	24	24	26	26	26	26	27	27	27	27
1983	152	-8	-2	2	5	6	7	10	11	12	13	15	15	16	17	17	18	19	20	20	20
1984	151	-7	-6	8	10	11	13	13	14	15	17	17	17	17	17	18	18	18	19	20	21

Gumbel Analysis | Table 1 | January 6, 2016

Weather Station 38-MORGANTOWN, WV. Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1949 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1985	151	6	12	12	12	13	14	15	15	16	16	16	16	17	18	19	19	19	20	21	21
1986	151	8	11	13	16	16	17	21	22	22	23	23	23	25	26	27	28	28	28	28	29
1987	152	7	7	9	10	14	14	15	16	17	17	18	18	19	19	20	21	22	22	22	22
1988	151	12	12	16	16	18	19	21	21	21	21	22	22	22	22	23	23	23	24	24	25
1989	151	-2	4	6	6	8	12	12	13	14	15	15	16	17	18	22	23	23	23	24	24
1990	151	13	16	17	20	22	22	23	24	25	25	26	26	26	26	27	27	28	28	28	28
1991	152	12	12	17	19	20	20	21	22	22	22	23	23	23	23	24	24	24	24	25	25
1992	151	13	15	16	17	17	18	19	20	22	23	24	24	25	25	25	26	26	27	27	27
1993	151	-10	0	2	4	4	6	15	15	15	16	18	18	18	18	19	19	20	20	21	21
1994	151	9	9	11	12	15	16	16	17	20	21	22	23	24	24	24	24	25	25	25	27
1995	152	3	7	9	12	12	14	15	15	16	17	17	17	18	18	20	20	21	21	21	21
1996	151	5	7	11	12	12	13	15	18	21	21	22	22	22	23	24	25	26	26	27	27
1997	151	20	21	22	23	24	26	27	27	28	28	28	28	28	29	29	29	30	30	30	30
1998	151	11	17	18	19	20	20	20	21	21	21	21	21	22	23	23	24	24	24	25	25
1999	152	11	12	12	13	17	18	18	18	19	19	21	21	23	24	24	25	25	26	26	26
2000	151	12	12	13	13	14	16	17	18	18	18	18	19	20	21	21	21	22	22	22	22
2001	151	16	17	17	18	18	21	22	22	22	23	23	24	24	24	24	26	26	27	28	29
2002	151	9	9	9	12	14	16	17	17	17	17	18	19	19	20	20	20	20	20	21	22
2003	152	7	9	11	11	13	13	13	15	16	17	17	17	19	21	22	22	22	23	23	23
2004	151	8	9	10	12	14	16	16	19	20	20	21	22	22	22	23	24	24	24	24	25
2005	151	13	19	20	20	21	24	24	24	24	24	24	25	25	26	26	26	26	26	26	26
2006	151	5	7	13	13	14	15	15	16	16	17	17	18	19	20	21	21	22	23	23	23
2007	152	12	14	15	16	17	18	19	19	20	20	21	22	23	24	25	26	26	26	26	26
2008	151	2	9	12	13	13	16	16	16	17	17	17	19	19	20	21	22	22	22	22	23
2009	151	13	16	16	18	18	18	18	19	20	21	21	21	22	22	22	22	23	23	24	24
2010	151	13	14	17	17	18	18	18	18	19	19	19	20	20	21	22	22	22	23	23	23
2011	152	17	19	20	22	22	22	23	23	27	28	29	29	29	30	30	31	31	31	31	32
2012	151	11	13	16	17	17	19	19	22	22	24	24	25	25	26	27	27	27	27	28	28
2013	151	0	1	5	6	8	10	11	12	13	17	18	18	18	18	18	18	19	19	19	20
2014	151	4	4	4	5	8	9	11	12	13	15	15	17	17	18	18	20	20	20	20	20

Gumbel Analysis | Table 2 | January 6, 2016

Weather Station 38-MORGANTOWN, WV. Using Temperature Variable MID_MID_AVG_TMP
Temperature with the Indicated Probability of Occurrence for each period, per the Gumbel Distribution
Overall Range Beginning Years: 1949 to 2014; Period Range: 11-01 to 03-31

	Gumbel Curve parameters and probabilities							
Rank	Alpha	Gamma	1/1.25	1/2.0	1/5.0	1/10.0	1/15.0	1/20.0
1	9.65938	0.1684901	12.5	7.5	0.6	-3.7	-6.3	-8.0
2	11.34037	0.1315181	14.5	10.0	4.5	1.3	-0.6	-1.8
3	12.82886	0.1152931	16.0	11.8	6.9	4.1	2.6	1.6
4	13.93892	0.1043014	17.1	13.1	8.5	6.0	4.6	3.6
5	15.12290	0.0972773	18.2	14.4	10.1	7.7	6.4	5.5
6	16.01750	0.0896780	19.1	15.4	11.2	8.8	7.6	6.7
7	16.76460	0.0867422	19.8	16.2	12.2	10.0	8.8	8.0
8	17.53093	0.0835989	20.5	17.0	13.1	11.1	9.9	9.2
9	18.28369	0.0792378	21.3	17.8	14.0	11.9	10.8	10.1
10	18.89878	0.0785784	21.8	18.5	14.8	12.9	11.8	11.1

Normal Analysis | Table 3 | January 6, 2016

Weather Station 38-MORGANTOWN, WV. Using Temperature Variable MID_MID_AVG_TMP
Temperature with the Indicated Probability of Occurrence for each period, per the Normal Distribution
Overall Range Beginning Years: 1949 to 2014; Period Range: 11-01 to 03-31

	Normal Curve parameters and probabilities							
Rank	Mean	Std Dev	1/5.0	1/7.0	1/10.0	1/13.0	1/15.0	1/20.0
1	6.5	7.0	0.6	-1.0	-2.5	-3.5	-4.0	-5.0
2	9.4	5.7	4.6	3.3	2.1	1.2	0.8	-0.0
3	11.4	5.1	7.1	5.9	4.8	4.1	3.7	2.9
4	12.8	4.8	8.7	7.6	6.6	5.9	5.6	4.9
5	14.1	4.7	10.2	9.1	8.1	7.4	7.1	6.4
6	15.1	4.6	11.2	10.2	9.2	8.6	8.2	7.6
7	16.0	4.3	12.3	11.4	10.4	9.8	9.5	8.9
8	16.8	4.2	13.2	12.3	11.4	10.8	10.4	9.8
9	17.6	4.2	14.1	13.1	12.2	11.6	11.3	10.7
10	18.3	4.0	14.9	14.0	13.2	12.6	12.3	11.7
11	18.9	4.0	15.5	14.6	13.7	13.1	12.8	12.3
12	19.5	3.9	16.2	15.3	14.5	13.9	13.6	13.1
13	20.0	4.0	16.7	15.8	15.0	14.4	14.1	13.5
14	20.7	3.9	17.4	16.5	15.6	15.1	14.8	14.2
15	21.3	3.8	18.1	17.3	16.5	15.9	15.6	15.1
16	21.7	3.8	18.5	17.6	16.8	16.3	16.0	15.4
17	22.2	3.6	19.1	18.3	17.5	17.0	16.7	16.2
18	22.5	3.6	19.5	18.6	17.9	17.3	17.1	16.6
19	22.9	3.5	19.9	19.2	18.4	17.9	17.6	17.1
20	23.3	3.5	20.3	19.5	18.8	18.3	18.0	17.5

Gumbel Analysis | Table 1 | January 6, 2016

Weather Station 14-PITTSBURGH, PA. Using Temperature Variable MID_MID_AVG_TMP

20 Coldest Daily Temperatures Per Period, Ranked

Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1925	151	4	8	13	14	14	14	14	16	16	17	17	18	18	19	19	19	20	21	21	21
1926	151	10	11	13	17	18	19	19	20	21	21	21	22	22	22	23	23	23	24	25	25
1927	152	7	8	12	12	12	13	14	14	15	17	17	17	18	18	19	20	20	21	23	23
1928	151	13	15	16	17	17	17	18	19	20	20	20	21	22	22	23	23	23	23	23	24
1929	151	8	8	8	11	13	15	16	16	16	17	17	17	18	18	18	18	19	19	20	21
1930	151	13	13	16	17	19	19	19	21	22	22	23	23	23	23	24	24	24	24	25	25
1931	152	9	12	14	17	18	18	18	18	22	22	25	26	26	29	29	29	29	30	30	30
1932	151	3	7	14	14	15	16	16	18	19	20	20	21	21	21	23	24	24	24	24	25
1933	151	-1	4	5	5	5	6	9	9	10	12	14	14	15	15	15	17	17	17	18	18
1934	151	9	13	15	15	17	17	18	20	21	21	21	22	22	23	23	23	24	24	25	25
1935	152	-9	-2	-2	1	2	4	5	6	7	8	9	9	9	10	10	10	11	11	11	11
1936	151	16	18	18	20	20	20	21	21	21	22	23	23	23	24	24	24	24	25	25	26
1937	151	9	13	13	14	15	15	16	16	16	17	17	17	17	18	19	20	23	23	23	23
1938	151	14	14	15	15	15	16	18	18	19	21	21	21	21	22	22	23	24	24	24	24
1939	152	-3	5	7	8	10	11	11	11	11	12	13	13	13	14	15	16	16	17	17	17
1940	151	11	12	12	13	14	15	15	19	19	19	19	19	20	20	20	20	20	20	22	22
1941	151	-1	5	7	9	10	10	11	12	12	13	13	17	18	19	21	21	22	22	23	23
1942	151	2	5	8	8	10	11	11	12	12	14	15	16	17	17	17	18	19	19	19	19
1943	152	10	11	14	15	15	15	16	16	16	17	17	19	19	20	20	20	21	21	22	22
1944	151	6	9	9	11	13	13	14	16	17	17	17	17	18	18	19	19	19	19	20	20
1945	151	9	10	11	13	13	14	14	17	17	18	19	20	20	20	20	20	21	21	21	22
1946	151	3	4	9	10	15	16	17	17	17	18	19	19	19	21	21	21	21	21	21	22
1947	152	5	7	9	9	10	10	11	11	12	12	13	13	13	15	16	16	17	19	20	21
1948	151	14	16	18	20	20	22	23	24	24	24	25	25	25	26	26	26	26	27	27	27
1949	151	13	13	15	16	17	19	20	21	21	22	22	22	25	26	26	26	26	26	26	27
1950	151	6	8	11	12	13	14	14	14	15	16	17	18	18	18	19	20	20	21	21	21
1951	152	1	13	13	13	19	19	20	20	21	22	23	23	24	24	25	25	26	26	26	26
1952	151	18	19	21	22	22	23	23	23	24	24	25	25	25	25	25	25	25	25	26	26
1953	151	12	13	13	15	17	17	18	20	21	21	21	21	21	22	22	22	22	22	23	23
1954	151	6	7	7	8	9	10	13	13	15	17	17	17	19	19	20	20	21	21	22	22
1955	152	14	15	16	17	18	18	18	19	19	19	20	21	21	21	21	22	22	22	22	23
1956	151	3	8	12	12	14	15	17	18	18	18	19	21	21	22	23	23	23	23	23	24
1957	151	-1	7	7	8	9	9	11	12	13	14	15	16	16	17	17	17	18	18	20	20
1958	151	0	3	6	6	9	9	10	10	10	10	10	11	13	14	14	15	16	16	16	17
1959	152	13	14	14	14	15	16	16	16	16	16	17	18	18	18	18	18	18	19	19	20
1960	151	0	2	5	5	5	5	7	7	8	8	10	10	11	12	12	14	17	17	17	17

Gumbel Analysis | Table 1 | January 6, 2016

Weather Station 14-PITTSBURGH, PA. Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1961	151	3	8	8	9	9	10	12	13	13	14	14	16	16	17	17	18	18	19	19	20
1962	151	-9	0	0	2	3	3	4	5	5	5	6	7	7	8	9	10	12	13	13	13
1963	152	4	6	8	9	11	11	12	12	13	13	14	15	15	16	16	18	18	19	19	20
1964	151	5	9	10	10	11	11	12	12	12	13	14	14	15	16	17	17	17	18	18	19
1965	151	-1	0	6	10	12	12	13	14	15	15	16	16	17	18	19	19	19	19	19	20
1966	151	8	9	9	11	11	12	13	13	14	14	15	15	20	21	21	21	22	22	22	22
1967	152	1	3	4	6	6	6	11	11	12	12	12	13	14	14	14	15	15	16	17	17
1968	151	7	8	9	11	12	12	13	15	15	16	16	16	16	16	17	17	17	18	18	18
1969	151	-2	1	4	4	5	8	8	9	12	12	12	13	14	14	15	15	16	16	16	17
1970	151	0	2	3	5	9	11	11	11	12	13	13	14	14	17	17	17	18	18	18	18
1971	152	-1	6	7	10	10	11	12	12	14	14	16	17	18	19	19	19	20	20	20	21
1972	151	5	12	14	14	15	15	15	15	16	16	16	16	17	17	19	21	21	22	22	22
1973	151	15	16	16	16	18	18	19	19	20	20	20	20	21	21	21	22	22	23	23	23
1974	151	11	12	15	17	18	21	21	21	22	22	22	22	23	23	24	24	25	25	25	26
1975	152	3	5	9	9	13	14	14	16	16	16	17	17	18	18	20	20	21	21	21	22
1976	151	-9	-1	0	1	2	3	4	5	6	6	6	6	7	7	7	7	8	8	9	9
1977	151	6	8	10	11	12	12	13	13	13	13	14	14	14	15	15	15	15	15	16	16
1978	151	0	0	2	2	3	3	4	5	6	6	7	7	8	12	13	13	13	13	14	15
1979	152	8	8	9	11	12	13	13	13	15	16	16	16	16	16	17	17	17	17	17	19
1980	151	-1	3	5	5	5	6	6	6	9	9	10	10	10	11	11	11	13	14	15	15
1981	151	-10	-4	-1	6	8	9	9	10	10	10	12	14	14	15	16	16	17	18	18	18
1982	151	14	15	17	19	19	19	21	21	21	22	23	23	23	23	24	24	25	25	26	26
1983	152	-5	-4	1	3	3	5	8	9	9	11	12	12	13	14	16	16	16	17	17	17
1984	151	-8	-5	10	11	11	12	13	13	14	14	14	15	15	16	16	17	17	18	18	19
1985	151	6	10	11	12	12	13	13	13	14	15	15	15	16	16	16	16	18	18	18	19
1986	151	5	11	13	16	16	18	19	20	20	21	21	22	23	24	24	25	26	27	27	28
1987	152	4	5	5	9	11	12	13	14	15	16	17	17	17	17	18	18	19	19	20	20
1988	151	13	13	15	15	16	16	17	17	18	19	20	20	20	20	21	21	21	22	22	23
1989	151	-1	0	3	3	7	9	9	10	10	11	11	15	16	17	18	20	20	20	20	21
1990	151	13	14	15	15	15	17	18	18	19	21	22	23	23	24	24	25	26	27	27	28
1991	152	8	10	14	18	18	19	19	19	19	21	21	21	22	22	22	22	23	23	23	23
1992	151	8	11	13	13	15	17	17	19	20	20	22	22	23	23	23	24	24	24	24	25
1993	151	-12	-4	-1	1	1	5	11	12	13	13	13	14	14	15	16	16	16	16	16	17
1994	151	4	6	6	9	12	12	13	13	18	19	20	20	21	21	22	22	22	22	23	23
1995	152	1	5	8	10	10	11	11	12	13	13	14	15	15	15	15	16	16	16	16	18
1996	151	3	4	9	10	10	12	13	15	19	19	20	20	21	21	22	22	25	25	25	25

Gumbel Analysis — Table 1 — January 6, 2016

Weather Station 14-PITTSBURGH, PA. Using Temperature Variable MID_MID_AVG_TMP
20 Coldest Daily Temperatures Per Period, Ranked
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

Period Begins	N days	Rank 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1997	151	18	19	20	22	23	24	24	25	26	27	27	27	28	28	28	28	28	28	29	29
1998	151	4	11	12	14	15	15	16	17	17	17	18	18	19	19	19	20	21	21	21	22
1999	152	9	10	12	13	15	16	17	18	18	18	19	20	20	21	21	22	24	24	24	24
2000	151	10	11	12	12	15	15	16	17	18	18	18	18	19	19	19	20	20	20	20	21
2001	151	15	15	17	17	19	20	21	21	21	21	22	22	22	23	24	25	25	26	26	26
2002	151	7	8	9	11	12	14	14	15	16	16	16	16	17	18	18	18	18	18	18	18
2003	152	7	8	9	10	10	11	14	14	15	15	16	17	17	18	18	18	19	19	20	22
2004	151	7	8	9	10	11	12	14	15	15	17	18	18	18	19	19	20	21	21	21	22
2005	151	12	16	16	16	17	18	19	20	20	20	21	21	23	23	23	23	23	23	24	24
2006	151	2	4	7	9	10	11	12	13	13	14	16	16	16	17	17	18	18	19	19	20
2007	152	10	10	15	15	16	16	17	17	18	19	20	21	21	21	21	23	23	23	23	23
2008	151	0	8	8	9	10	13	13	14	14	15	15	16	16	16	17	19	20	20	21	21
2009	151	10	12	12	13	15	15	15	16	17	17	19	19	19	20	20	21	22	22	22	22
2010	151	11	13	14	14	14	16	16	17	17	17	18	18	18	20	20	20	20	21	21	21
2011	152	15	17	19	20	20	20	21	22	23	24	26	26	26	27	27	27	28	28	29	29
2012	151	8	10	15	15	15	16	18	19	20	20	20	21	21	21	22	22	24	25	26	26
2013	151	-2	1	5	7	9	10	11	12	13	14	15	15	15	15	15	15	15	16	16	18
2014	151	0	2	2	3	6	8	9	9	10	12	12	12	12	14	14	15	16	16	16	16

Gumbel Analysis | Table 2 | January 6, 2016

Weather Station 14-PITTSBURGH, PA. Using Temperature Variable MID_MID_AVG_TMP
Temperature with the Indicated Probability of Occurrence for each period, per the Gumbel Distribution
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

	Gumbel Curve parameters and probabilities							
Rank	Alpha	Gamma	1/1.25	1/2.0	1/5.0	1/10.0	1/15.0	1/20.0
1	8.45297	0.1715663	11.3	6.3	-0.4	-4.7	-7.2	-8.9
2	10.03743	0.1386572	13.0	8.8	3.5	0.5	-1.3	-2.4
3	11.59005	0.1201562	14.6	10.6	5.9	3.3	1.7	0.8
4	12.61578	0.1049150	15.7	11.8	7.2	4.7	3.3	2.4
5	13.61852	0.0971075	16.7	12.9	8.6	6.2	4.9	4.0
6	14.36702	0.0901028	17.5	13.7	9.5	7.2	6.0	5.1
7	15.18028	0.0880427	18.2	14.6	10.7	8.5	7.3	6.6
8	15.85034	0.0811926	18.9	15.3	11.3	9.2	8.0	7.3
9	16.57554	0.0772143	19.7	16.1	12.2	10.0	8.9	8.1
10	17.12359	0.0737218	20.2	16.7	12.8	10.7	9.5	8.8

Normal Analysis | Table 3 | January 6, 2016

Weather Station 14-PITTSBURGH, PA. Using Temperature Variable MID_MID_AVG_TMP
Temperature with the Indicated Probability of Occurrence for each period, per the Normal Distribution
Overall Range Beginning Years: 1925 to 2014; Period Range: 11-01 to 03-31

	Normal Curve parameters and probabilities							
Rank	Mean	Std Dev	1/5.0	1/7.0	1/10.0	1/13.0	1/15.0	1/20.0
1	5.4	6.7	-0.2	-1.7	-3.2	-4.1	-4.6	-5.6
2	8.1	5.5	3.5	2.2	1.0	0.2	-0.2	-1.0
3	10.1	5.1	5.8	4.7	3.6	2.8	2.4	1.7
4	11.4	4.9	7.2	6.1	5.1	4.4	4.0	3.3
5	12.6	4.8	8.5	7.4	6.3	5.6	5.3	4.6
6	13.4	4.7	9.5	8.4	7.4	6.7	6.4	5.7
7	14.4	4.4	10.6	9.6	8.7	8.1	7.7	7.1
8	15.1	4.5	11.3	10.3	9.3	8.7	8.3	7.7
9	15.8	4.4	12.1	11.1	10.2	9.5	9.2	8.5
10	16.4	4.4	12.7	11.7	10.8	10.1	9.8	9.2
11	17.1	4.4	13.4	12.4	11.4	10.8	10.5	9.8
12	17.6	4.3	14.0	13.0	12.1	11.4	11.1	10.5
13	18.1	4.3	14.5	13.5	12.6	12.0	11.6	11.0
14	18.8	4.2	15.3	14.3	13.4	12.8	12.5	11.9
15	19.2	4.2	15.7	14.8	13.9	13.3	13.0	12.4
16	19.7	4.1	16.2	15.3	14.5	13.9	13.6	13.0
17	20.3	4.0	16.9	16.0	15.1	14.6	14.3	13.7
18	20.6	4.0	17.3	16.4	15.5	15.0	14.7	14.1
19	21.0	4.0	17.6	16.7	15.9	15.3	15.0	14.4
20	21.4	3.9	18.1	17.2	16.4	15.8	15.5	15.0

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-018:

For each customer class contained in the cost of service study, please provide monthly throughput by class.

Response:

Please see the attached spreadsheet COS-18 Attachment A for the forecasted quantities by rate schedule by customer class by month. In addition, please see Exhibit No. 103, Schedule No. 4, Pages 7 through 9, for the monthly quantities pertaining to new customers and customer attrition. Together, the monthly quantities sum to the total fully forecasted rate year volumes shown in Exhibit No. 103, Page 15, Line 29, for the cost of service.

Columbia Gas of Pennsylvania, Inc.
Forecasted Volumes By Rate Schedule by Customer Class by Month
For the 12 Months Ending December 31, 2017

		January DTH	February DTH	March DTH	April DTH	May DTH	June DTH	July DTH	August DTH	September DTH	October DTH	November DTH	December DTH	Total
CAP	RES	474,394.7	467,556.6	407,157.8	264,135.3	148,192.0	67,263.0	38,342.0	36,943.8	39,464.1	74,408.1	188,121.0	345,815.3	2,551,793.7
LDS	COM	265,310.6	265,594.9	230,043.0	206,965.7	174,008.9	154,331.9	138,145.5	145,341.9	154,271.2	170,807.8	221,239.4	256,321.1	2,382,381.9
LDS	IND	671,501.5	693,303.7	745,832.1	710,523.5	679,051.4	649,524.0	612,364.4	624,825.2	654,471.5	693,297.6	623,108.4	635,151.1	7,992,954.4
LDS FLEX	COM	204,000.0	190,000.0	184,000.0	180,000.0	100,000.0	95,000.0	95,000.0	95,000.0	95,000.0	100,000.0	144,000.0	204,000.0	1,686,000.0
LDS FLEX	IND	584,000.0	596,000.0	565,300.0	557,100.0	566,800.0	559,200.0	529,300.0	529,200.0	562,400.0	524,600.0	580,500.0	565,600.0	6,720,000.0
LGSS	COM	160,655.2	157,283.6	123,073.2	81,052.6	46,780.9	23,307.5	15,108.5	9,891.5	12,414.2	23,568.7	67,051.9	108,496.5	828,684.3
LGSS	IND	11,703.1	12,315.2	11,114.1	10,482.5	9,187.8	9,873.8	9,182.4	9,081.6	10,779.3	9,647.0	14,230.8	11,844.7	129,442.3
MLDS I	COM	8,000.0	7,000.0	6,500.0	4,500.0	4,000.0	2,000.0	1,000.0	1,000.0	1,000.0	3,000.0	5,000.0	7,000.0	50,000.0
MLDS I	IND	4,900.0	5,400.0	4,700.0	4,500.0	4,100.0	4,000.0	3,800.0	4,100.0	3,700.0	4,000.0	4,400.0	4,400.0	52,000.0
MLDS I FLEX	IND	242,000.0	242,000.0	251,000.0	210,000.0	216,000.0	197,000.0	211,000.0	203,000.0	195,000.0	240,000.0	240,000.0	230,000.0	2,677,000.0
MLDS II	IND	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	2,000.0	24,000.0
MLDS II FLEX	IND	219,000.0	220,000.0	232,000.0	216,000.0	199,000.0	182,800.0	166,400.0	172,000.0	181,000.0	193,000.0	202,800.0	194,000.0	2,378,000.0
NSS	COM	10,000.0	10,000.0	8,000.0	6,000.0	3,500.0	2,500.0	2,500.0	2,500.0	2,500.0	3,500.0	6,000.0	8,000.0	65,000.0
PRDGDS	RES	0.0	0.0	16.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	148.8	165.4
PRDGS	RES	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.2	77.2
RDS	RES	1,442,000.0	1,405,000.0	1,211,000.0	759,000.0	405,000.0	197,000.0	125,000.0	122,000.0	127,000.0	204,000.0	519,000.0	1,037,922.8	7,553,922.8
RSS	RES	4,614,605.3	4,489,443.4	3,865,825.6	2,414,864.7	1,281,808.0	625,737.0	404,658.0	391,056.2	410,535.9	644,591.9	1,641,879.0	3,318,035.9	24,103,040.9
SCD	COM	397,997.6	399,999.8	332,997.8	232,000.1	137,980.0	91,993.3	74,008.0	72,019.7	77,020.5	99,009.8	182,997.8	301,999.5	2,400,023.9
SDS	COM	600,176.6	624,069.6	478,619.7	377,734.4	265,059.9	198,759.0	165,437.8	180,573.1	184,316.5	235,600.9	371,552.9	480,853.6	4,162,754.0
SDS	IND	167,646.9	174,883.0	161,058.4	164,017.5	157,015.1	151,304.4	157,157.7	168,274.0	162,759.3	161,370.9	164,766.8	165,005.6	1,955,259.6
SDS FLEX	COM	25,400.0	25,400.0	19,700.0	17,600.0	12,700.0	10,100.0	7,700.0	7,800.0	9,500.0	12,800.0	18,500.0	21,800.0	189,000.0
SDS FLEX	IND	3,000.0	3,500.0	4,500.0	4,000.0	3,000.0	2,500.0	2,500.0	2,500.0	2,500.0	2,500.0	2,000.0	1,500.0	34,000.0
SGDS FLEX	COM	4,350.0	4,250.0	3,250.0	2,350.0	700.0	340.0	320.0	320.0	320.0	1,000.0	2,000.0	3,000.0	22,200.0
SGDS	COM	536,765.0	541,686.3	449,887.5	332,852.8	198,531.9	128,465.9	104,403.7	111,957.0	111,597.3	141,791.3	257,709.0	416,024.5	3,331,672.2
SGDS	IND	16,451.5	16,413.4	15,609.6	9,859.3	5,033.9	3,671.8	3,477.9	3,100.9	3,169.7	3,231.8	4,924.6	12,842.9	12,842.9
SGSS	COM	1,774,333.9	1,774,695.6	1,495,933.0	881,139.3	441,681.6	218,138.8	135,408.6	91,597.0	118,091.4	201,940.7	551,961.9	1,214,467.7	8,899,389.5
SGSS	IND	10,296.5	9,685.0	10,886.0	10,517.9	9,812.5	8,126.6	8,817.6	8,918.6	8,220.8	10,352.6	6,769.1	9,155.4	111,558.6
Total		12,450,488.4	12,337,480.1	10,820,004.4	7,659,195.6	5,070,943.9	3,584,937.0	3,013,032.1	2,995,000.5	3,129,031.7	3,760,019.1	6,022,512.6	9,555,462.6	80,398,108.0

Columbia Gas of Pennsylvania, Inc.
Docket No. R-2015-2468056

Standard Data Request

Cost Of Service

Question No. GAS-COS-019:

Please provide workpapers showing the development of each allocation factor reflected in the Company's cost of service study. Include a description of each allocation factor, all calculations performed to develop the allocators and all supporting documentation, studies or other information relied upon to determine the allocators.

Response:

Statement No. 11 with related Exhibits MPB-1, MPB-2, MPB3, and MPB4 contains descriptions, calculations, and rational of the allocation factors and assignment to the various components of the Studies. Exhibit No. 111, Schedules 1, 2 & 3, contains a legend of the allocation factors.

Response to standard data request GAS-COS-008 includes a CD containing Excel files of the Company's allocated cost of service studies.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-20:

Please provide all workpapers, calculations and supporting documentation for the functionalization and classification performed for the Company's cost of service study.

Response:

Columbia Gas of Pennsylvania ("Company") follows the Federal Energy Regulatory Commission ("FERC") chart of accounts for accounting purposes. The FERC chart of accounts establishes specific functional accounts for natural gas companies, i.e., Other Gas Supply Expenses, Underground Storage Expense, Distribution Expense, Customer Accounts Expense, Customer Service & Information Expense, Sales Expense and Administrative and General Expenses. The Company's Cost of Service studies as provided in Exhibit No. 111 were prepared based on the Company's accounting records which functionalized and classified its costs consistent with the FERC chart of accounts. No specific work papers were prepared to functionalize and classify the Company's costs beyond the Company's accounting records.

Columbia Gas of Pennsylvania, Inc.

Standard Data Request

Cost of Service

Question No. GAS-COS-021:

If not provided elsewhere, please provide a detailed proof of revenues at both present and proposed rates.

Response:

Please see Exhibit No. 103, Pages 8 through 9.