Docket No. R-01XXX
Item 53.64 (c)(9)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 53.64(c) Thirty days prior to the filing of a tariff reflecting an increase or decrease in natural gas costs, each Section 1307(f) gas utility seeking recovery of purchased gas costs under that section shall provide notice to the public, under § 53.68 (relating to notice requirements), and shall file the following supporting information with the Commission, with a copy to the Consumer Advocate, Small Business Advocate and to intervenors upon request:

(9) A schedule depicting historic monthly end-user transportation through-put by customer. Each customer or account shall be identified solely by a unique alphanumeric code, the key to which may be provided subject to § 5.423 (relating to orders to limit availability of proprietary information).

Response:

Please see the attached schedule depicting the monthly end-user transportation through-put by customer.

The Philadelphia Gas Works
1307(f) - 2000
Apr-2000 - Mar-2001 (dth)

No. (1)	Service (2)	Apr-00 (3)	May-00 (4)	Jun-00 (5)	Jul-00 (6)	Aug-00 (7)	Sep-00 (8)	Oct-00 (9)	Nov-00 (10)	Dec-00 (11)	Jan-01 (12)	Feb-01 (13)	Mar-01 (14)
1	GTS-I	12,598	10,307	12,500	15,557	18,990	16,682	21,511	22,878	23,640	12,158	8,458	13,065
2	GTS-I	163,178	307	923	5,791	153,204	13,901	81,493	90,510	0	167	1,312	10
3	GTS-F	8,556	9,552	7,448	8,524	9,016	8,820	10,349	9,867	9,775	9,587	9,151	10,424
4	GTS-I	0	0	0	0	0	0	0	0	0	0	0	0
5	GTS-I	154,810	141,543	137,058	141,863	36,232	0	0	112,689	0	0	0	0
6	GTS-F	0	0	0	0	0	0	2,686	0	0	0	0	1,345
7	GTS-F	1,026,563	841,316	968,253	967,800	986,804	833,684	321,458	686,312	718,653	120,125	372,429	799,996
8	GTS-I	8,604	7,585	3,091	10,897	9,919	7,437	5,898	7,874	7,011	94	1	0

Docket No. R-01XXX
Item 53.64 (c)(10)

Philadelphia Gas Works

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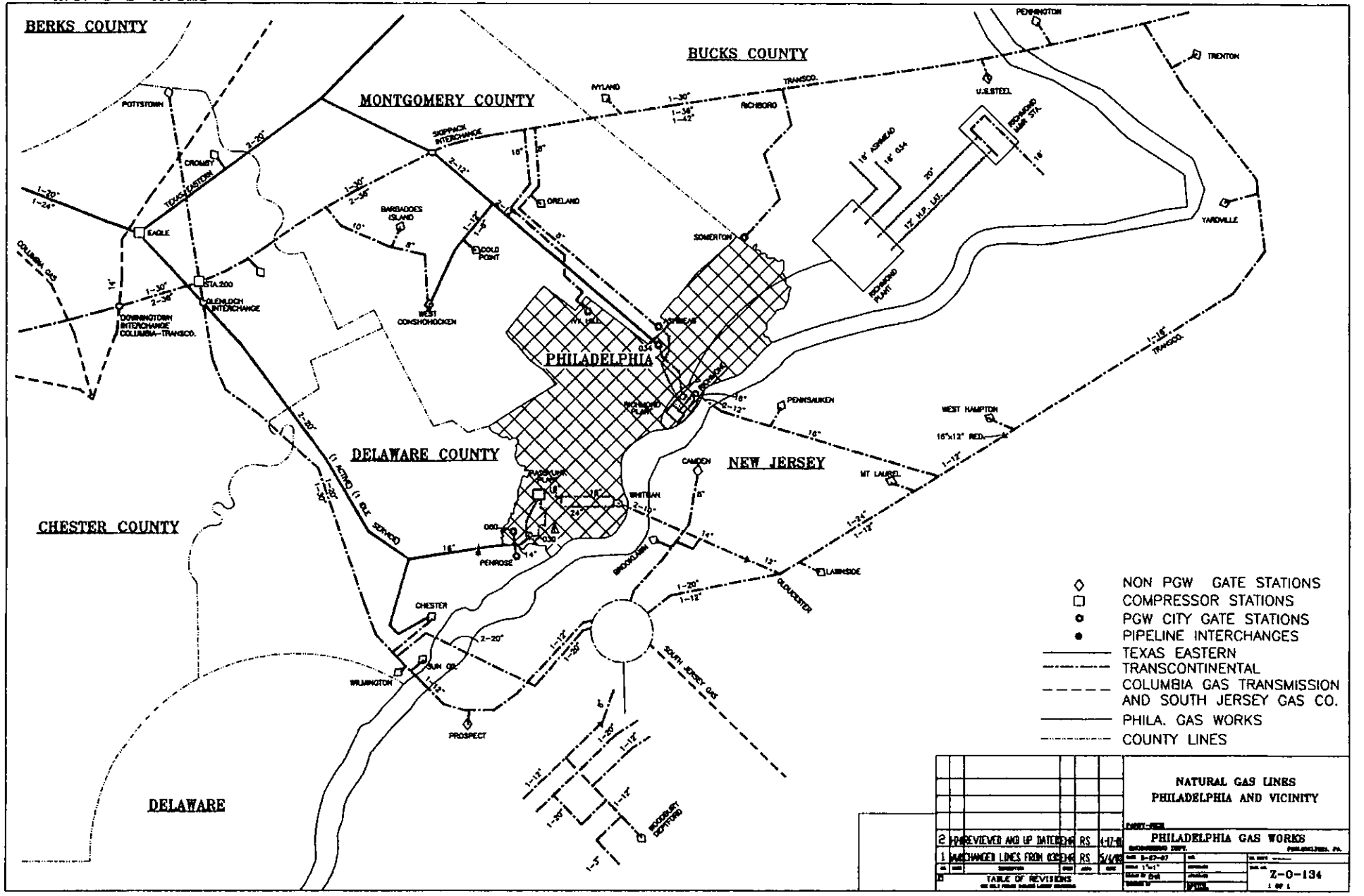
(10) A schematic system map, locating and identifying by name, the pressure and capacity of all interstate or intrastate transmission pipeline connections, compressor stations, utility transmission or distribution mains 6 inches or larger in size, storage facilities, including maximum daily injection and withdrawal rates, production fields, and each individual supply or transportation customer which represents 5% or more of total system throughput in a month. Each customer or account shall be identified solely by a unique alphanumeric code, the key to which may be provided subject to § 5.423.

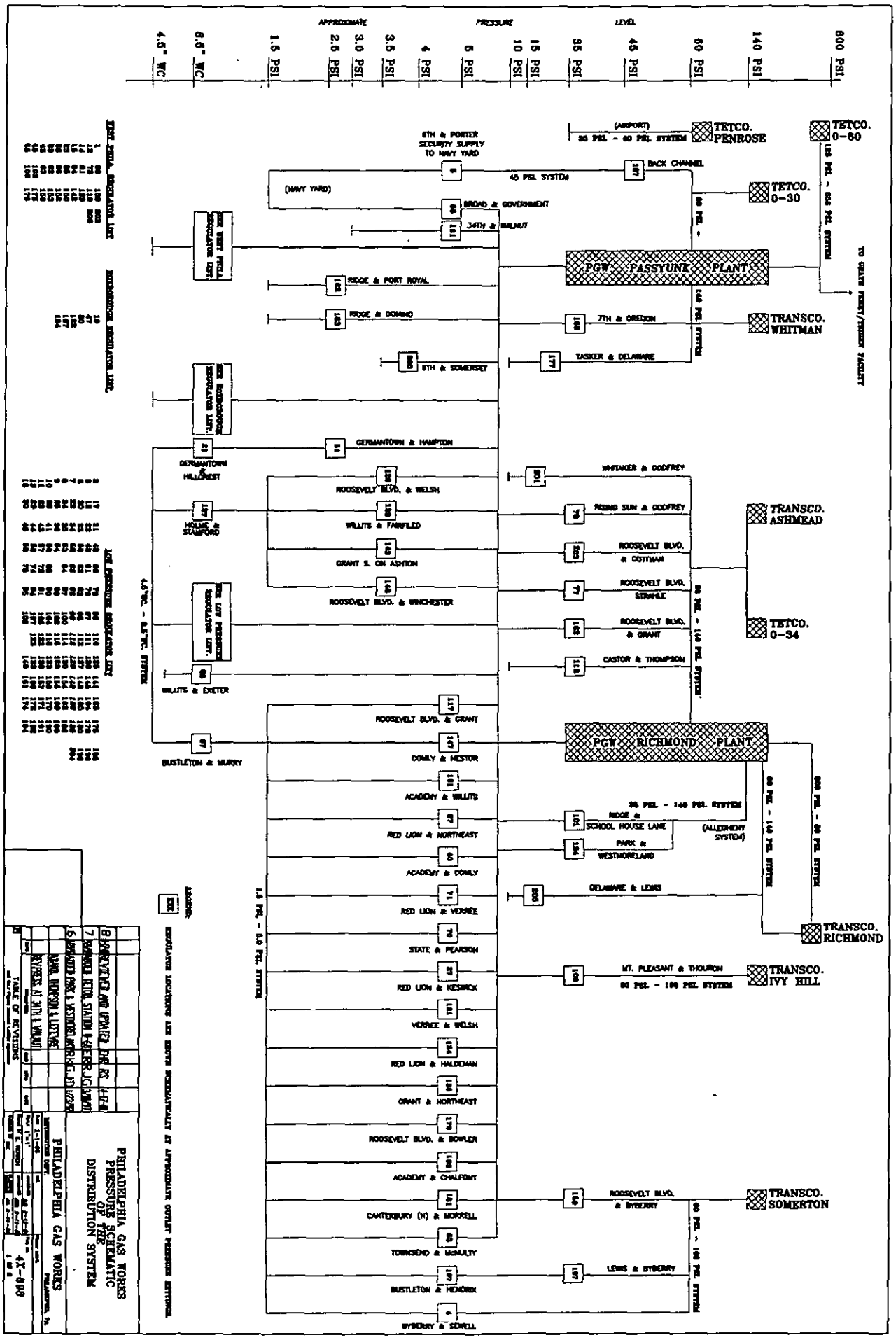
Response:

Please note that PGW's service territory is confined solely to the city/county of Philadelphia, PA. The city has an extensive low pressure system to provide service to its predominantly residential customer base. Much of the low pressure system is comprised of distribution mains that are six (6) inches or greater in diameter. The number of maps that would need to be produced to identify all of these facilities is significant. PGW will make these maps available for inspection at its location upon reasonable requests.

Schedule 1 – Map of interstate pipelines that provide service to PGW.
Schedule 2 – Detailed flow diagram of PGW's system.
Schedule 3 – Detailed listing of PGW gate stations including pressure and capacity information.
Schedule 4 - PGW plant capacities.

DWG.NO. Z-O-134X




APPROXIMATE PRESSURE LEVEL
4.5" W.C.
8.5" W.C.
1.5 PSI
2.5 PSI
3.0 PSI
3.5 PSI
4 PSI
9 PSI
10 PSI
15 PSI
35 PSI
45 PSI
60 PSI
140 PSI
800 PSI
PHILADELPHIA GAS WORKS
PRESSURE SCHEMATIC
OF THE
DISTRIBUTION SYSTEM
PGW PASSYUNK PLANT
PGW RICHMOND PLANT
TETCO. PENROSE
TETCO. 0-60
TETCO. 0-30
TETCO. 0-34
TRANSCO. WHITMAN
TRANSCO. ASHMEAD
TRANSCO. IVY HILL
TRANSCO. SOMERTON
TRANSCO. RICHMOND
8TH & PORTER SECURITY SUPPLY TO NAVY YARD
(NAVY YARD)
BROAD & GOVERNMENT
34TH & WALNUT
RIDGE & PORT ROYAL
RIDGE & DOMINO
8TH & SOMERSET
7TH & OREGON
TASKER & DELAWARE
GERMANTOWN & HAMPTON
GERMANTOWN & HILLCREST
ROOSEVELT BLVD. & WELSH
WILLITS & FAIRFIELD
GRANT S. ON ASHTON
ROOSEVELT BLVD. & WINCHESTER
HOLME & STANFORD
WILLITS & EXETER
BUSTLETON & MURRY
ROOSEVELT BLVD. & GRANT
COMLY & NESTOR
ACADEMY & WILLITS
RED LION & NORTHEAST
ACADEMY & COMLY
RED LION & VERREE
STATE & PEARSON
RED LION & KESWICK
VERREE & WELSH
RED LION & HALDEMAN
GRANT & NORTHEAST
ROOSEVELT BLVD. & BOWLER
ACADEMY & CHALFONT
CANTERBURY (N) & MORRELL
TOWNSEND & McNULTY
BUSTLETON & HENDRIX
BYBERRY & SOWELL
WHITAKER & GODFREY
RISING SUN & GODFREY
ROOSEVELT BLVD. & COTTMAN
ROOSEVELT BLVD. STRAHLE
ROOSEVELT BLVD. & GRANT
CASTOR & THOMPSON
RIDGE & SCHOOL HOUSE LANE
PARK & WESTMORELAND
DELAWARE & LEWIS
MT. PLEASANT & THOURON
ROOSEVELT BLVD. & BYBERRY
LEWIS & BYBERRY
BACK CHANNEL
45 PSI SYSTEM
(AIRPORT)
35 PSI - 60 PSI SYSTEM
60 PSI - 150 PSI SYSTEM
150 PSI - 800 PSI SYSTEM
140 PSI SYSTEM
TO CROWN FERRY/TRENTON FACILITY
35 PSI - 140 PSI SYSTEM
(ALLEGHENY SYSTEM)
90 PSI - 140 PSI SYSTEM
800 PSI - 60 PSI SYSTEM
80 PSI - 100 PSI SYSTEM
1.5 PSI - 8.5 PSI SYSTEM
4.5" W.C. - 8.5" W.C. SYSTEM
LOW PRESSURE REGULATOR LINE
INTERMEDIATE REGULATOR LINE
HIGH PRESSURE REGULATOR LINE
REGULATOR LOCATIONS ARE SHOWN SCHEMATICALLY AT APPROXIMATE OUTLET PRESSURE SETTINGS.
LEGEND
TABLE OF REVISIONS
DRAWN BY
CHECKED BY
APPROVED BY
DATE
47-000

PGW GATE STATIONS

	0-30	0-60	0-34	PENROSE	WHITMAN	RICHMOND	ASHMEAD	IVY HILL	SOMERTON
MAX. WINTER FLOW (MMSCFD)	92	92	137	5.00	104	126	40	34	36
MAX SUMMER FLOW (MMSCFD)	107	107	137	5.00	60	70	41	45	42
MAX INLET PRESSURE (PSIG)	800	800	800	800	800	800	800	800	800
MAX OUTLET PRESSURE (PSIG)	140	656	140	60	140	140	140	100	100

NOTES: THE COMBINED FLOW FROM RICHMOND AND WHITMAN CANNOT EXCEED 130 MMSCFD DURING THE SUMMER PERIOD (TARIFF)
THE COMBINED FLOW FROM RICHMOND AND WHITMAN CANNOT EXCEED 142 MMSCFD DURING THE WINTER PERIOD (TARIFF)
THE COMBINED FLOW FROM ASHMEAD AND IVY HILL CANNOT EXCEED 64 MMSCFD DURING THE WINTER PERIOD (TARIFF)
THE COMBINED FLOW FROM ASHMEAD AND IVY HILL CANNOT EXCEED 60 MMSCFD DURING THE SUMMER PERIOD (TARIFF)
THE COMBINED FLOW FROM 0-30 AND 0-60 CANNOT EXCEED 133 MMSCFD
DO NOT EXPECT MAX OUTLET PRESSURE AT MAX FLOW.
WINTER PERIOD: OCTOBER THTOUGH APRIL (TARIFF)
SUMMER PERIOD: MAY THROUGH SEPTEMBER (TARIFF)

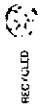
FLOW DATA GATHERED FROM: PGW DESIGN HOUR LOAD REQUIREMENTS, HIGH PRESSURE DISTRIBUTION SYSTEM 2000-2001
GROUND RULES SPREADSHEET.
TRANSCO TARIFF, THIRD REVISED VOLUME NO. 1, SECOND REVISED SHEET NO. 320, EFFECTIVE 11-1-1998

			PHILADELPHIA GAS WORKS GATE STATIONS MAX FLOWS, INLET, OUTLET, SUMMER & WINTER PERIODS
1	4-17-01	REVISED PRESSURES	PHILADELPHIA GAS WORKS
TABLE OF REVISIONS			4X-698

Plant Capacities

Maximum LNG Storage	4,299,000 MCF	
Usable LNG Storage	3,934,000 MCF	
LNG Liquefaction Rate		
Plant Rates Capacity	23,500 MCFD	
Plant Lifetime Average	17,931 MCFD	
Plant 2000 Rate	21,685 MCFD	
Vaporization Capacity*	Planned Usage	Maximum
Richmond	350,000 MCFD	450,000 MCFD
Passyunk	45,000 MCFD	90,000 MCFD

*Note: LNG plant vaporization capacity is stated independent of distribution system dynamics and system pressure requirements. Depending on distribution system pressures, flow and total load requirements , it may not be possible or prudent to achieve the above stated vaporization rates under various conditions.


RECYCLED

Docket No. R-01XXX
Item 53.64 (c)(11)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
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For the Twelve Months Ending August 31, 2001

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(11) If any rate structure or rate allocation changes are to be proposed, a detailed explanation of each proposal, reasons therefore, number of customers affected, net effect on each customer class, and how the change relates to or is justified by changes in gas costs proposed in the Section 1307(f) tariff filing. Explain how gas supply, transportation and storage capacity costs are allocated to customers which are primarily nonheating, interruptible or transportation customers.

Response:

PGW is not proposing any rate structure or rate allocation changes in the instant proceeding, therefore, no testimony has been provided in this May 1, filing. However, PGW would like to reserve its right to file testimony regarding gas procurement strategies in its June 1 final filing. PGW avers that the filing of testimony related to future gas procurement strategies in the June 1 filing will not prejudice any party to this proceeding.

Docket No. R-01XXX
Item 53.64 (c)(12)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

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(12) A schedule depicting the most recent 5-year consecutive 3-day peak data by customer class (or other historic peak day data used for system planning), daily volumetric throughput by customer class (including end-user transportation throughput), gas interruptions and high, low and average temperature during each day.

Response:

Schedule 1 – Three-day peak for FY 96-97 through 00-01.
Please note that PGW performs its three-day peak analysis by total sendout and does not identify Residential, Commercial or Industrial usage. However, PGW does perform a peak day analysis provided in 53.64(c)(13) which addresses firm sendout requirements.

Schedule 2 – Identifies a listing of gas interruptions, their duration and the high, low and average temperatures for each day that the interruption was in effect.

GAS PROCESSING DEPARTMENT'S
3 DAY PEAK ANALYSIS

Prepared for William Munzter, Marketing Department

Winter Peak Season	Date	Average Temperature	Hi Temperature	Low Temperature	Total Sendout (mcfs)	Firm Sendout (mcfs)	Cogen Sendout (mcfs)	LBS Sendout (mcfs)	BPS Sendout (mcfs)	GTS Sendout (mcfs)
1995-1996	Jan 6	16	19	10	610,315	555,869	21	20,604	20,098	13,723
1995-1996	Jan 7	18	24	12	602,358	546,913	21	20,370	18,900	16,154
1995-1996	Jan 8	22	26	19	584,150	529,180	116	19,773	19,412	15,669
1996-1997	Jan 17	13	16	10	632,069	588,114	0	14,388	25,163	4,404
1996-1997	Jan 18	12	17	8	661,715	618,675	0	13,420	25,843	3,777
1996-1997	Jan 19	19	22	9	604,543	566,643	0	12,624	23,275	2,001
1997-1998	Dec 30	33	37	28	414,689	381,376	250	14,053	18,158	853
1997-1998	Dec 31	25	36	18	482,106	448,857	190	11,959	20,361	739
1997-1998	Jan 1	30	39	23	458,461	424,927	265	12,338	20,077	854
1998-1999	Jan 4	23	31	13	513,894	475,659	270	12,350	22,455	3,160
1998-1999	Jan 5	23	30	17	541,880	502,667	280	12,946	22,961	3,026
1998-1999	Jan 6	33	37	23	492,533	451,307	280	14,124	22,983	3,839
1999-2000	Jan 26	25	33	15	524,100	481,941	340	17,370	20,518	3,931
1999-2000	Jan 27	16	21	12	629,033	582,621	350	18,791	23,258	4,013
1999-2000	Jan 28	21	25	16	602,336	556,101	355	18,340	23,722	3,818
2000-2001	Dec 24	29	37	21	444,640	421,627	0	19,800	2,550	663
2000-2001	Dec 25	20	26	17	520,086	515,045	0	1,376	2,831	834
2000-2001	Dec 26	25	30	22	486,331	478,958	0	1,673	4,682	1,018

Interruptions Over 5 Year Period (Sept. 1, 1996 through August 31, 2001)

Temperature Information

Date	High	Low	Average
12/24/96	62	30	47
12/25/96	37	28	32
12/26/96	36	28	34
12/27/96	52	35	42
12/28/96	53	40	48
12/29/96	56	45	51
12/30/96	48	35	41
12/31/96	38	15	27
1/1/97	35	15	28
1/2/97	48	35	43
1/3/97	60	47	52
1/4/97	52	44	47
1/5/97	62	44	54
1/6/97	52	30	41
1/7/97	37	26	30
1/8/97	39	27	32
1/9/97	35	26	31
1/10/97	41	26	34
12/20/00	32	23	26
12/21/00	36	29	32
12/22/00	34	12	21
12/23/00	31	19	25
12/24/00	37	21	29
12/25/00	26	17	20
12/26/00	30	22	25
12/27/00	34	23	29
12/28/00	28	17	22
12/29/00	34	23	28
12/30/00	31	23	26
12/31/00	37	24	29

Date	High	Low	Average
1/1/01	36	25	30
1/2/01	29	20	24
1/3/01	37	26	30
1/4/01	38	24	31
1/5/01	38	29	32
1/6/01	40	28	34
1/7/01	47	35	39
1/8/01	42	31	37
1/9/01	34	26	30
1/10/01	40	28	34
1/11/01	51	31	41
1/12/01	48	28	35
1/13/01	47	29	37
1/14/01	44	35	40
1/15/01	44	37	39
1/16/01	46	36	40
1/17/01	45	32	38
1/18/01	39	35	37
1/19/01	42	36	39
1/20/01	36	23	31
1/21/01	32	22	27
1/22/01	39	23	29
1/23/01	41	29	34
1/24/01	47	32	38
1/25/01	40	24	31
1/26/01	39	28	33
1/27/01	42	21	37
1/28/01	40	28	34
1/29/01	42	34	37
1/30/01	58	36	47
1/31/01	53	39	44

Interruptions Over 5 Year Period (Sept. 1, 1996 through August 31, 2001)

Date	BPS-S	BPS-H /1	BPS-L	LBS-S	LBS-L	LBS - XL
12/24/96				X	X	X
12/25/96				X	X	X
12/26/96				X	X	X
12/27/96				X	X	X
12/28/96				X	X	X
12/29/96				X	X	X
12/30/96				X	X	X
12/31/96				X	X	X
1/1/97				X	X	X
1/2/97				X	X	X
1/3/97				X	X	X
1/4/97				X	X	X
1/5/97				X	X	X
1/6/97				X	X	X
1/7/97				X	X	X
1/8/97				X	X	X
1/9/97				X	X	X
1/10/97				X	X	X
12/20/00	X	X	X	X	X	X
12/21/00	X	X	X	X	X	X
12/22/00	X	X	X	X	X	X
12/23/00	X	X	X	X	X	X
12/24/00	X	X	X	X	X	X
12/25/00	X	X	X	X	X	X
12/26/00	X	X	X	X	X	X
12/27/00	X	X	X	X	X	X
12/28/00	X	X	X	X	X	X
12/29/00	X	X	X	X	X	X
12/30/00	X	X	X	X	X	X
12/31/00	X	X	X	X	X	X

BPS-S	BPS-H /1	BPS-L	LBS-S	LBS-L	LBS - XL	
1/1/01	X	X	X	X	X	X
1/2/01	X	X	X	X	X	X
1/3/01	X	X	X	X	X	X
1/4/01	X	X	X	X	X	X
1/5/01	X	X	X	X	X	X
1/6/01	X	X	X	X	X	X
1/7/01	X	X	X	X	X	X
1/8/01	X	X	X	X	X	X
1/9/01	X	X	X	X	X	X
1/10/01	X	X	X	X	X	X
1/11/01	X	X	X	X	X	X
1/12/01	X	X	X	X	X	X
1/13/01	X	X	X	X	X	X
1/14/01	X	X	X	X	X	X
1/15/01	X	X	X	X	X	X
1/16/01	X	X	X	X	X	X
1/17/01	X	X	X	X	X	X
1/18/01	X	X	X	X	X	X
1/19/01	X	X	X	X	X	X
1/20/01	X	X	X	X	X	X
1/21/01	X	X	X	X	X	X
1/22/01	X	X	X	X	X	X
1/23/01	X	X	X	X	X	X
1/24/01	X	X	X	X	X	X
1/25/01	X	X	X	X	X	X
1/26/01	X	X	X	X	X	X
1/27/01	X	X	X	X	X	X
1/28/01	X	X	X	X	X	X
1/29/01	X	X	X	X	X	X
1/30/01	X	X	X	X	X	X
1/31/01	X	X	X	X	X	X

Notes: X - Denotes that service to this rate schedule was interrupted on the specified date.
/1 BPS-H was not in existence until June 2000.

Docket No. R-01XXX
Item 53.64 (c)(13)

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(13) Identification and support for any peak day methodology used to project future gas demands and studies supporting the validity of the methodology.

Response:

Please see the attached Peak Day analysis and discussion. Additionally, in 1997, ICF Kaiser prepared a *Gas Supply Study* on PGW's behalf. The final study is attached as PGW's response to Item 53.64(c)(14). In addition to that study, ICF Kaiser was also asked to review PGW's peak day methodology as a supplemental study. The results of that study are attached. PGW's analysis methodology has not changed since the study was completed.

Peak Day Analysis

PGW performs a peak day analysis on an annual basis to determine its projected sendout requirements during peak conditions. Essentially this process is completed by collecting sendout and average temperature data for all days where the temperature is below 32 degrees Fahrenheit, excluding holidays and weekends. All transportation and interruptible volumes are removed from total sendout to arrive at firm sendout on a daily basis.

Generally, the company would elect to utilize current year data, however, common statistical practices warrant that no less than thirty (30) data points be utilized in the analysis to ensure its integrity. Therefore, it is often desirable to use data from multiple consecutive years. PGW attempts to limit the population of data points to three (3) where possible to reflect the most current consumption behaviors. For this analysis, PGW has utilized data for the three (3) year period September 1, 1998 through March 31, 2001. This period yielded 53 data points where the average temperature was at or below 32 degrees Fahrenheit.

Degree days are calculated by subtracting the average daily temperature from sixty five (65).

A standard linear regression was performed on the data using the calculated degree days and the actual firm daily sendout information. Additionally, in order to confirm the accuracy of the analysis, and to smooth the charting of the data, a quadratic and a cubic regression analysis were also completed.

A resulting R^2 (Correlation Coefficient) indicates that there is an 81.44% correlation between firm sendout and degree days. Since PGW's General Service rate schedule includes some commercial and industrial process load, the 81% correlation is acceptable. If the commercial and industrial load were removed from the firm sendout, it is expected that the correlation coefficient would be closer to 100% correlation. Historically, prior period analyses indicated a 79% to 85% correlation. The multiple regression correlation coefficient, R2, is a measure of the proportion of variability explained by, or due to the regression (linear relationship) in a sample of paired data. It is a number between zero and one and a value close to zero suggests a poor model.

To verify the level of confidence we can ascribe to the model, we developed the attached Linear Regression Confidence Level Table. Essentially, this table compares the actual versus projected sendout to determine the level of variance expressed as a standard deviation. A standard deviation represents the positive square root of the variance where the variance simply represents the dispersion about the mean. In this analysis the sample standard deviation is 22,708 Mcf.

To determine the level where the relationship between consumption and degree days is "significant" it is necessary to incorporate Degrees of Freedom and the Student's T Statistic. Degrees of freedom refer to how many cases in the sample are free to vary.

The sample looses one degree of freedom for each estimated parameter. Thus, with a sample of 100 paired values and two estimated parameters (one for the constant and one for the coefficient of "degree days"), there are 100 – 2 = 98 degrees of freedom. In this analysis, we had 53 data points, therefore, there were 51 Degrees of Freedom.

The critical value is the value the Student's T statistic must equal or exceed to conclude that there is a 97.5% chance that the relationship between consumption and degree days is not 0. A Student's T statistic of 2.00 is required for a sample with 98 degrees of freedom.

The Student's T statistic is the distribution of the (mean/standard deviation) of a sample of normal distributed values with unknown variance. In this case, it is a measure of the likelihood that the estimated coefficient for "degree days" is actually zero. The farther the statistic is from 0, the greater the likelihood that the sample pairs are related. The Student-T distribution varies with the number of independent values (Degrees of Freedom) from which the variance is calculated. For this example, the T-statistic is calculated as SQRT((R2*(degrees of freedom)/(1- R2)) = 14.95942789. The calculated Student's T statistic of 14.95942789exceeds the critical value of 2.00. Thus, we can conclude that the relationship between consumption and degree days is "significant" at the 97.5% level.

Finally, based upon the models developed, it can be determined that the company's projected peak day sendout should be set at 768,086 Mcf per day at 0 degrees Fahrenheit. This calculation is performed using the X Coefficient (i.e. slope) multiplied by the number of degree days and adding the Constant (Y Intercept). In this case the calculation was performed at a temperature of 0 degrees Fahrenheit and at 15 degrees Fahrenheit.

Winter 98-99 Through 00-01 Data for Daily Temperatures <= 32 Degrees Fahrenheit

W/O Holidays, Weekends

Day	Date	Month	Fiscal Year	Daily Temp	Degree Days X	X^2	X^3	Actual Firm Sendout (Mcf)	Linear Projected Firm Sendout (Mcf)	Quadratic Projected Firm Sendout (Mcf)	Cubic Projected Firm Sendout (Mcf)
Friday	17	Mar.	99/00	32	33	1,089	35,937	326,961	393,926	396,661	393,447
Wednesday	1	Dec.	99/00	32	33	1,089	35,937	404,239	393,926	396,661	393,447
Wednesday	26	Jan.	99/00	25	40	1,600	64,000	481,932	475,774	473,249	473,122
Tuesday	1	Feb.	99/00	31	34	1,156	39,304	441,275	405,619	406,844	406,836
Monday	31	Jan.	99/00	32	33	1,089	35,937	436,322	393,926	396,661	393,447
Thursday	3	Feb.	99/00	31	34	1,156	39,304	437,969	405,619	406,844	406,836
Thursday	20	Jan.	99/00	25	40	1,600	64,000	477,350	475,774	473,249	473,122
Thursday	13	Jan.	99/00	28	37	1,369	50,653	432,575	440,696	438,910	441,857
Tuesday	8	Feb.	99/00	30	35	1,225	42,875	428,508	417,311	417,280	419,241
Friday	14	Jan.	99/00	24	41	1,681	68,921	496,742	487,466	485,201	483,588
Tuesday	28	Dec.	99/00	31	34	1,156	39,304	416,603	405,619	406,844	406,836
Wednesday	2	Feb.	99/00	28	37	1,369	50,653	466,785	440,696	438,910	441,857
Tuesday	18	Jan.	99/00	20	45	2,025	91,125	559,262	534,236	535,533	530,707
Friday	28	Jan.	99/00	21	44	1,936	85,184	556,101	522,544	522,571	517,762
Tuesday	25	Jan.	99/00	28	37	1,369	50,653	459,964	440,696	438,910	441,857
Thursday	27	Jan.	99/00	16	49	2,401	117,649	582,621	581,006	589,908	595,280
Friday	21	Jan.	99/00	16	49	2,401	117,649	595,717	581,006	589,908	595,280
Friday	8	Jan.	98/99	31	34	1,156	39,304	432,594	405,619	406,844	406,836
Tuesday	23	Feb.	98/99	29	36	1,296	46,656	458,972	429,004	427,969	430,852
Friday	15	Jan.	98/99	30	35	1,225	42,875	431,805	417,311	417,280	419,241
Thursday	7	Jan.	98/99	28	37	1,369	50,653	434,310	440,696	438,910	441,857
Wednesday	23	Dec.	98/99	25	40	1,600	64,000	439,124	475,774	473,249	473,122
Monday	4	Jan.	98/99	23	42	1,764	74,088	475,235	499,159	497,405	494,391
Monday	11	Jan.	98/99	29	36	1,296	46,656	460,371	429,004	427,969	430,852
Thursday	31	Dec.	98/99	26	39	1,521	59,319	476,401	464,081	461,550	462,804
Monday	8	Mar.	98/99	25	40	1,600	64,000	444,632	475,774	473,249	473,122
Wednesday	30	Dec.	98/99	24	41	1,681	68,921	460,360	487,466	485,201	483,588
Monday	22	Feb.	98/99	24	41	1,681	68,921	480,589	487,466	485,201	483,588
Tuesday	22	Dec.	98/99	30	35	1,225	42,875	357,135	417,311	417,280	419,241
Thursday	14	Jan.	98/99	28	37	1,369	50,653	472,871	440,696	438,910	441,857
Thursday	24	Dec.	98/99	29	36	1,296	46,656	411,314	429,004	427,969	430,852
Tuesday	5	Jan.	98/99	23	42	1,764	74,088	502,157	499,159	497,405	494,391
Thursday	25	Jan.	00/01	31	34	1,156	39,304	399,075	405,619	406,844	406,836
Monday	18	Dec.	00/01	30	35	1,225	42,875	397,489	417,311	417,280	419,241
Wednesday	21	Feb.	00/01	32	33	1,089	35,937	369,974	393,926	396,661	393,447
Thursday	23	Nov.	00/01	32	33	1,089	35,937	372,786	393,926	396,661	393,447
Wednesday	6	Dec.	00/01	32	33	1,089	35,937	387,999	393,926	396,661	393,447
Wednesday	22	Nov.	00/01	31	34	1,156	39,304	396,409	405,619	406,844	406,836
Thursday	21	Dec.	00/01	32	33	1,089	35,937	392,478	393,926	396,661	393,447
Thursday	4	Jan.	00/01	31	34	1,156	39,304	416,936	405,619	406,844	406,836
Friday	5	Jan.	00/01	32	33	1,089	35,937	399,081	393,926	396,661	393,447
Tuesday	9	Jan.	00/01	30	35	1,225	42,875	415,039	417,311	417,280	419,241
Tuesday	2	Jan.	00/01	24	41	1,681	68,921	482,801	487,466	485,201	483,588
Tuesday	26	Dec.	00/01	25	40	1,600	64,000	479,001	475,774	473,249	473,122
Wednesday	20	Dec.	00/01	26	39	1,521	59,319	446,239	464,081	461,550	462,804
Wednesday	3	Jan.	00/01	30	35	1,225	42,875	437,794	417,311	417,280	419,241
Monday	1	Jan.	00/01	30	35	1,225	42,875	421,003	417,311	417,280	419,241
Friday	29	Dec.	00/01	28	37	1,369	50,653	426,519	440,696	438,910	441,857
Friday	22	Dec.	00/01	21	44	1,936	85,184	510,670	522,544	522,571	517,762
Thursday	28	Dec.	00/01	22	43	1,849	79,507	498,294	510,851	509,862	505,720
Monday	22	Jan.	00/01	29	36	1,296	46,656	417,590	429,004	427,969	430,852
Wednesday	27	Dec.	00/01	29	36	1,296	46,656	416,465	429,004	427,969	430,852
Thursday	22	Feb.	00/01	24	41	1,681	68,921	473,537	487,466	485,201	483,588

Count 53

Firm Sendout Projection Based Data From 09-99 Through 00-01
Data for Daily Temperatures <= 32 Degrees Fahrenheit

R Squared	Increase	Student's T	Degrees of Freedom	Critical Value	@ 97.5% Significant
0.814400	0.81440000	14.95942789	51	2.00	Yes
0.816658	0.00225800	0.78472229	50	2.02	No
0.819253	0.00259500	0.83874737	49	2.02	No

Degrees of Freedom	51	50	49
97.5% Significance Level	2.00	2.02	2.02
95.0% Significance Level	1.67	1.68	1.68

Linear Projection at Zero Degrees Fahrenheit	768,086	Mcf
Linear Projection at 15 Degrees Fahrenheit	592,699	Mcf

*Student's T = Square Root[(Increase * Degrees of Freedom)/(1 - R Squared)]*

*Linear SO = Constant + (X * X Coefficient)*

*Quadratic SO = Constant + (X * X Coeff) + (X 1u2 * X 1u2 Coeff)*

*Cubic SO = Constant + (X * X Coeff) + (X 1u2 * X 1u2 Coeff) + (X 1u3 * X 1u3 Coeff)*

Regression Results
Winter 98-99 Through 00-01

Based On Data for Daily Temperatures <= 32 Degrees Fahrenheit

Linear			**Quadratic**			**Cubic**			
Regression Output:			Regression Output:			Regression Output:			
Constant		8073.729	Constant		202323.2	Constant		-1833982	
Std Err of Y Est		23148.62	Std Err of Y Est		23236.31	Std Err of Y Est		23305.52	
R Squared		0.814400	R Squared		0.816658	R Squared		0.819253	
No. of Observations		53	No. of Observations		53	No. of Observations		53	
Degrees of Freedom		51	Degrees of Freedom		50	Degrees of Freedom		49	
X Coefficient(s)	11692.5	126.3043	X Coefficient(s)	1720.98	126.3043	X Coefficient(s)	155274.6	-3696.93	31.4252
Std Err of Coef.	781.6144	160.9563	Std Err of Coef.	12731.44	160.9563	Std Err of Coef.	183524.3	4561.242	37.46776

Linear Regression Utilizing FY 00-01 Data Only

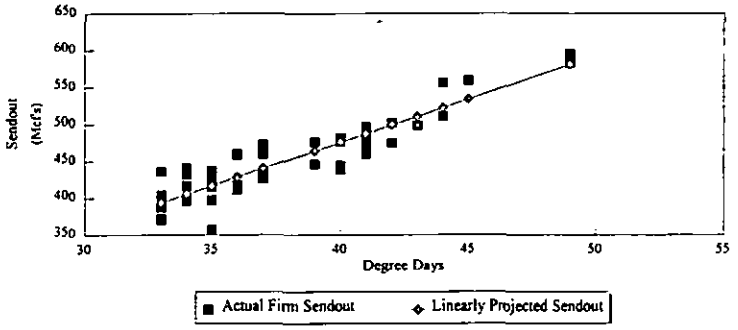
Regression Output:		
Constant		19786.99
Std Err of Y Est		11311.42
R Squared		0.926995
No. of Observations		21
Degrees of Freedom		19
X Coefficient(s)	11180.17	
Std Err of Coef.	719.7976	

Regression Chart Analysis

Based Upon Data For Temperatures Of <= 32 Degrees F.

Winter 99-99 Through 00-01

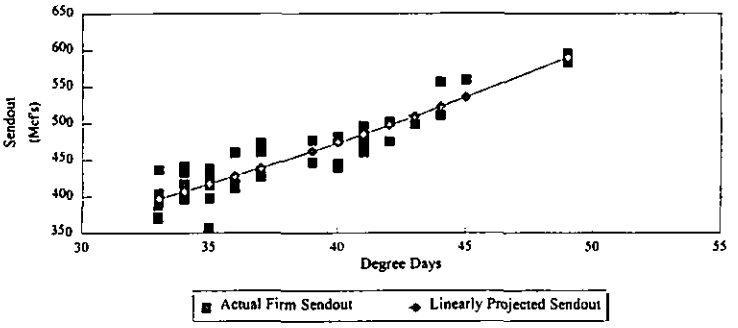
Linear Regression vs. Actual



Linear Regression Output:

Constant		8,073.73
Std. Error Of Y Estimate		23,148.62
R Squared		0.814400
Number of Observations		53
Degrees of Freedom		51
	X	
X Coefficient	11.692	
Std. Err. Of Coefficient	782	

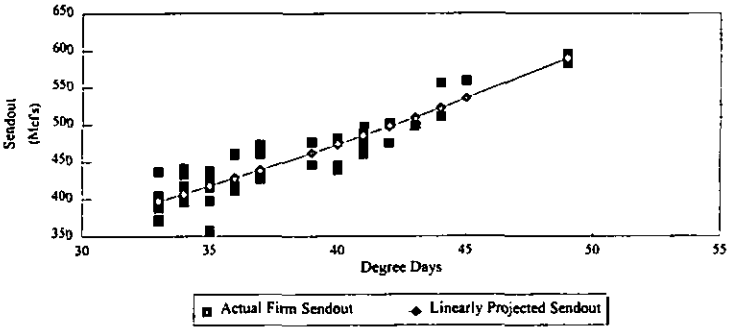
Quadratic Regression vs. Actual



Quadratic Regression Output:

Constant	202.323	
Std. Error Of Y Estimate	23.236	
R Squared	0.816658	
Number of Observations	53	
Degrees of Freedom	50	
	X	X^2
X Coefficient	1.721	126
Std. Err. Of Coefficient	*12.731*	*161*

Cubic Regression vs. Actual



Cubic Regression Output:

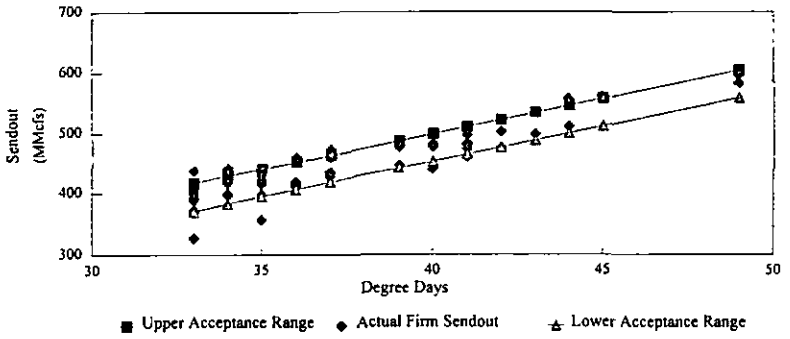
Constant	(1,833.982)		
Std. Error Of Y Estimate	23,306		
R Squared	0.819253		
Number of Observations	53		
Degrees of Freedom	49		
	X	X^2	X^3
X Coefficient	155.275	(3.697)	31
Std. Err. Of Coefficient	183.524	4.561	37

Deviation Analysis

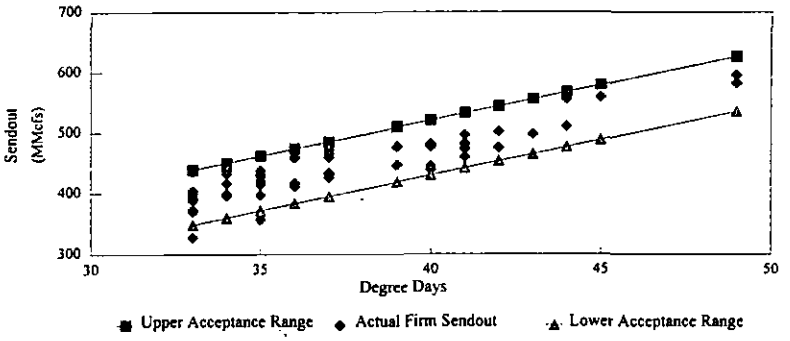
Based Upon Data For Temperatures Of <= 32 Degrees F.

Winter 99-99 Through 00-01

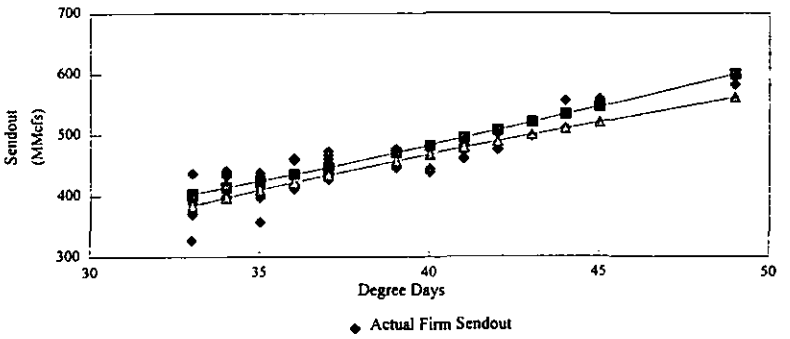
Acceptance Range @ 1 Std Deviation



Acceptance Range @ 2 Std Deviations



97.5% Confidence Interval



Linear Regression Confidence Level Table

Count	Degree Days X	Actual Firm *Sendout* (Mcf) Y	Projected Linear Firm Sendout (Mcf) Y dc	Difference Actual Versus Projected Y - Yc	Actual Versus Projected Squared $(Y - Yc)^2$	(Degree Days - Xm) X - Xm	(Degree Days - Xm) Squared $(X - Xm)^2$	s dyc	t*s dyc	Y dc - t*s dyc	dc + t*s dy d	Y dc - s dy dc	Y dc + s dy dc	Y dc - 2s dy dc	Y dc + 2s dy dc
1	33	326,961	393,926	(66,965)	4,484,324,481	(5)	21	4,678	9,356	384,570	403,282	371,218	416,634	348,511	439,341
2	33	404,239	393,926	10,313	106,355,927	(5)	21	4,678	9,356	384,570	403,282	371,218	416,634	348,511	439,341
3	33	392,478	393,926	(1,448)	2,096,991	(5)	21	4,678	9,356	384,570	403,282	371,218	416,634	348,511	439,341
4	33	387,999	393,926	(5,927)	35,130,502	(5)	21	4,678	9,356	384,570	403,282	371,218	416,634	348,511	439,341
5	33	372,786	393,926	(21,140)	446,903,785	(5)	21	4,678	9,356	384,570	403,282	371,218	416,634	348,511	439,341
6	33	369,974	393,926	(23,952)	573,703,046	(5)	21	4,678	9,356	384,570	403,282	371,218	416,634	348,511	439,341
7	33	399,081	393,926	5,155	26,573,005	(5)	21	4,678	9,356	384,570	403,282	371,218	416,634	348,511	439,341
8	33	436,322	393,926	42,396	1,797,412,423	(5)	21	4,678	9,356	384,570	403,282	371,218	416,634	348,511	439,341
9	34	432,594	405,619	26,975	727,672,472	(4)	13	4,138	8,277	397,342	413,895	382,911	428,326	360,203	451,034
10	34	399,075	405,619	(6,544)	42,818,636	(4)	13	4,138	8,277	397,342	413,895	382,911	428,326	360,203	451,034
11	34	396,409	405,619	(9,210)	84,816,641	(4)	13	4,138	8,277	397,342	413,895	382,911	428,326	360,203	451,034
12	34	441,275	405,619	35,656	1,271,379,214	(4)	13	4,138	8,277	397,342	413,895	382,911	428,326	360,203	451,034
13	34	416,936	405,619	11,317	128,083,655	(4)	13	4,138	8,277	397,342	413,895	382,911	428,326	360,203	451,034
14	34	416,603	405,619	10,984	120,657,152	(4)	13	4,138	8,277	397,342	413,895	382,911	428,326	360,203	451,034
15	34	437,969	405,619	32,350	1,046,548,700	(4)	13	4,138	8,277	397,342	413,895	382,911	428,326	360,203	451,034
16	35	421,003	417,311	3,692	13,630,191	(3)	6	3,680	7,360	409,951	424,671	394,603	440,019	371,896	462,726
17	35	437,794	417,311	20,483	419,549,556	(3)	6	3,680	7,360	409,951	424,671	394,603	440,019	371,896	462,726
18	35	428,508	417,311	11,197	125,370,768	(3)	6	3,680	7,360	409,951	424,671	394,603	440,019	371,896	462,726
19	35	397,489	417,311	(19,822)	392,915,297	(3)	6	3,680	7,360	409,951	424,671	394,603	440,019	371,896	462,726
20	35	431,805	417,311	14,494	210,073,394	(3)	6	3,680	7,360	409,951	424,671	394,603	440,019	371,896	462,726
21	35	415,039	417,311	(2,272)	5,162,398	(3)	6	3,680	7,360	409,951	424,671	394,603	440,019	371,896	462,726
22	35	357,135	417,311	(60,176)	3,621,161,944	(3)	6	3,680	7,360	409,951	424,671	394,603	440,019	371,896	462,726
23	36	411,314	429,004	(17,690)	312,921,495	(2)	2	3,337	6,674	422,329	435,678	406,296	451,711	383,588	474,419
24	36	460,371	429,004	31,367	983,914,585	(2)	2	3,337	6,674	422,329	435,678	406,296	451,711	383,588	474,419
25	36	458,972	429,004	29,968	898,089,583	(2)	2	3,337	6,674	422,329	435,678	406,296	451,711	383,588	474,419
26	36	417,590	429,004	(11,414)	130,269,973	(2)	2	3,337	6,674	422,329	435,678	406,296	451,711	383,588	474,419
27	36	416,465	429,004	(12,539)	157,216,169	(2)	2	3,337	6,674	422,329	435,678	406,296	451,711	383,588	474,419
28	37	472,871	440,696	32,175	1,035,225,266	(1)	0	3,147	6,294	434,402	446,991	417,988	463,404	395,281	486,111
29	37	432,575	440,696	(8,121)	65,951,994	(1)	0	3,147	6,294	434,402	446,991	417,988	463,404	395,281	486,111
30	37	434,310	440,696	(6,386)	40,782,060	(1)	0	3,147	6,294	434,402	446,991	417,988	463,404	395,281	486,111
31	37	459,964	440,696	19,268	371,252,615	(1)	0	3,147	6,294	434,402	446,991	417,988	463,404	395,281	486,111
32	37	466,785	440,696	26,089	680,631,576	(1)	0	3,147	6,294	434,402	446,991	417,988	463,404	395,281	486,111
33	37	426,519	440,696	(14,177)	200,989,690	(1)	0	3,147	6,294	434,402	446,991	417,988	463,404	395,281	486,111
34	39	446,239	464,081	(17,842)	318,339,656	1	2	3,312	6,624	457,457	470,705	441,373	486,789	418,666	509,496
35	39	476,401	464,081	12,320	151,780,541	1	2	3,312	6,624	457,457	470,705	441,373	486,789	418,666	509,496
36	40	477,350	475,774	1,576	2,485,127	2	6	3,642	7,284	468,489	483,058	453,066	498,481	430,358	521,189
37	40	439,124	475,774	(36,650)	1,343,191,091	2	6	3,642	7,284	468,489	483,058	453,066	498,481	430,358	521,189
38	40	444,632	475,774	(31,141)	969,788,756	2	6	3,642	7,284	468,489	483,058	453,066	498,481	430,358	521,189
39	40	481,932	475,774	6,158	37,926,242	2	6	3,642	7,284	468,489	483,058	453,066	498,481	430,358	521,189

Linear Regression Confidence Level Table

Count	Degree Days X	Actual Firm Sendout (Mcf) Y	Projected Linear Firm Sendout (Mcf) Y dc	Difference Actual Versus Projected Y - Yc	Actual Versus Projected Squared $(Y - Yc)^2$	(Degree Days - Xm) X - Xm	(Degree Days - Xm) Squared $(X - Xm)^2$	s dyc	t*s dyc	Y dc - t*s dyc	dc + t*s dy d	Y dc - s dy dc	Y dc + s dy dc	Y dc - 2s dy dc	Y dc + 2s dy dc
40	40	479,001	475,774	3,227	10,416,295	2	6	3,642	7,284	468,489	483,058	453,066	498,481	430,358	521,189
41	41	482,801	487,466	(4,665)	21,762,856	3	12	4,091	8,182	479,284	495,648	464,758	510,174	442,051	532,881
42	41	460,360	487,466	(27,106)	734,738,900	3	12	4,091	8,182	479,284	495,648	464,758	510,174	442,051	532,881
43	41	473,537	487,466	(13,929)	194,018,924	3	12	4,091	8,182	479,284	495,648	464,758	510,174	442,051	532,881
44	41	480,589	487,466	(6,877)	47,295,021	3	12	4,091	8,182	479,284	495,648	464,758	510,174	442,051	532,881
45	41	496,742	487,466	9,276	86,042,922	3	12	4,091	8,182	479,284	495,648	464,758	510,174	442,051	532,881
46	42	502,157	499,159	2,998	8,990,621	4	20	4,624	9,249	489,910	508,407	476,451	521,866	453,743	544,574
47	42	475,235	499,159	(23,924)	572,336,898	4	20	4,624	9,249	489,910	508,407	476,451	521,866	453,743	544,574
48	43	498,294	510,851	(12,557)	157,679,749	5	30	5,216	10,432	500,419	521,283	488,143	533,559	465,436	556,266
49	44	510,670	522,544	(11,874)	140,981,327	6	42	5,849	11,697	510,846	534,241	499,836	545,251	477,128	567,959
50	44	556,101	522,544	33,557	1,126,102,061	6	42	5,849	11,697	510,846	534,241	499,836	545,251	477,128	567,959
51	45	559,262	534,236	25,026	626,298,079	7	56	6,510	13,020	521,216	547,256	511,528	556,944	488,821	579,651
52	49	582,621	581,006	1,615	2,608,108	11	131	9,319	18,637	562,369	599,643	558,298	603,714	535,591	626,421
53	49	595,717	581,006	14,711	216,412,457	11	131	9,319	18,637	562,369	599,643	558,298	603,714	535,591	626,421
Tot/Avg	38	447,094	447,094		27,328,780,813		877								

t = 2.00

Xm = 37.547

Population Standard Deviation of Regression Squared = 515,637,372

Population Standard Deviation of Regression = 22,708

	Upper Range	Lower Range
1s	469,802	424,386
2s	492,509	401,679

MEMORANDUM

May 2, 1997

To: B.Z. Karachiwala, PGW
Craig White, PGW

From: ICF Kaiser

Subject: Design Weather Conditions for Supply Planning at PGW

As part of ICF Kaiser's assignment to assist PGW in assessing its optimal supply planning configuration, we were asked to assess PGW's design day and design winter planning methodologies. To the extent that the approach to defining the design day or design winter leads to an overly conservative estimation of design conditions (that is, the estimated design conditions are higher than requirements), PGW could be over-investing in capacity or not using its existing capacity optimally.

ICF evaluated the design winter gas demand estimation methodology currently used by PGW. As a first step, we reviewed the design winter and design day demand estimation methodologies and evaluated the critical assumptions underlying the methodologies using historical data and statistical tools.

PGW estimates its design day demand using a valid statistical procedure. PGW's degree day estimates for a design winter and a design day are *consistent* with the historical weather data and the degree day estimates used by other utilities in the region. The following table compares PGW's design winter with the historical weather data.

Data Set (1948-1996)	Nov	Dec	Jan	Feb	Mar	Winter Season
Historical Mean Winter Degree Days	554	884	1018	869	703	4025[a]
Historical Peak Winter Degree Days	743	1219	1390	1170	997	4640[a]
Lower limit of 95% confidence level (Mean - 2 std.dev.)	395	615	717	644	504	3353[a]
Upper limit of 95% confidence level (Mean + 2 std.dev.)	705	1157	1318	1093	901	4698[a]
PGW's Design Winter Degree Days	617	994	1160	987	808	4566
Probability of PGW's Design Winter	1:5	1:4	1:6	1:7	1:7	1:16

Notes:
[a] Individual month estimates do not add up to this total, because it has been calculated independently using the historical winter season data or standard deviation for the season total.

These statistical estimates indicate the following:

- PGW's design winter is 74 degree days short of 48-year historical peak winter.
- PGW's monthly design winter conditions are 126 to 230 degree days less than 48-year historical monthly peak winter conditions.
- PGW's design winter conditions lie well within the 95 percent confidence level. This indicates that the likelihood of a winter being colder than PGW's design winter is greater

than 5 percent. This suggests that PGW's design winter conditions are not overly conservative.

- A winter that is *as cold as or colder than* PGW's design winter is likely to occur once in 16 years.

This memorandum summarizes the results of this study in two sections: (1) a summary of the methodology used by PGW to estimate design conditions; and (2) a statistical analysis of PGW's design winter. We have supplied more detail on our assessment in two attachments (Appendices A & B) to this memorandum.

Overview of PGW's Design Winter/Day Gas Demand Estimation Methodology

The design day and design winter are the periods which define the largest amount of gas that PGW must deliver to meet system requirements and to maintain system integrity. The design day is the coldest day resulting in the highest expected coincident demand on the system; the design winter is defined as the coldest experienced winter, combined with the coldest experienced January (historically, the coldest month in Philadelphia). As such, the design conditions are used to for determining annual total storage and pipeline capacity, storage injection and withdrawal patterns, and supply plans for the PGW system. Design sendout is a function of three factors: (1) weather expressed in degree days, (2) number of customers, and (3) the demand response of those customers to cold weather.

As noted above, this memorandum addresses PGW's approach to describing design weather conditions. We have not evaluated PGW's approach to estimating the demand response or the number of customers. Rather, we have focused on addressing the issue of whether the design day or winter conditions are in excess of what may be considered statistically reasonable. The technical description of each is defined as follows:

- The design day at PGW is a day when the mean temperature is zero degree F, or 65 degree days. Under these conditions, PGW plans to send 714 Mmcf of natural gas to firm (i.e., after the interruptible customers have been dropped from the system) on-system customers. Because PGW owns about 291 Mmcf of pipeline capacity from supply areas and can vaporize between 450 and 540 Mmcf of LNG on any day, design day conditions appear not to be constraining even without employing PGW's approximately 160 Mmcf per day of peak storage withdrawal capacity.

- Design *winter* describes a colder than normal winter combined with a colder than normal January. The design winter has 4,566 degree days; the design year has 5,280 degree days.

The design winter demand is estimated by summing the demands of each customer rate class over the winter period (November through March). More specifically, the following equation is used to estimate the total monthly demand for each rate class of customers.

For each customer rate class:

Monthly Demand = No. of customers * UAF * [{Domestic Load Adjustment Factor * (DOM * 12/365 * No.of days in the month)} + {(CFDD * Heating Degree Days) * Heating Adjustment Factor}]

where

DOM, domestic load factor per customer per month, is the minimum or base load requirement;
CFDD is the heating demand factor per customer per degree day; and
UAF is the unaccounted for gas adjustment factor per customer.

The Domestic Load Adjustment Factor is used to adjust the seasonal variation in the non-heating gas demand (i.e., domestic load). Heating Adjustment Factor, on the other hand, is used to adjust the seasonal variation in the gas demand for space heating (i.e., sendouts for heating), due to differences in the responsiveness of customers to changes in heating degree days between seasons.[1]

DOM factor is calculated for each customer rate class (excluding interruptible customers) by adjusting the estimated (or trial) sendouts--during the previous year's summer months, July through September--by the Domestic Load Adjustment Factor. As such the DOM factor accounts for baseload, non-weather demand by PGW's customers. CFDD is calculated for each customer rate class (excluding interruptibles) by adjusting the estimated total heating gas demand by *actual* heating degree days--during the previous year's peak winter months, December through February--and the Heating Adjustment Factor.

The design winter gas demand for each customer rate class is calculated by using PGW's design winter degree days. PGW's design winter consists of 4,566 heating degree days over the 151-day period of November through March.

Design day gas demand projections are made using a statistically estimated equation. More specifically, using linear regression analysis, a peak winter day gas demand equation is estimated by regressing the actual sendouts on those weekdays (excluding holidays) during the previous year's winter season when temperature was 32°F or below. The gas demand equation is:

$$\text{Weekday actual sendout} = a + b * \text{Degree Days} + \varepsilon$$

where
a is the intercept;
b is the slope; and
ε is the residual, not captured by the estimated demand equation.

The design day consists of 65 degree days or a day with a mean temperature of zero degree F with a design hour of -5°F. Using the regression estimates of a and b and 65 degree days, design day gas demand is calculated. An additional 5% contingency is normally added to the estimated total gas demand.

To attach a degree of confidence (e.g., 95%) to the demand estimate thus calculated, an interval of gas demand estimates are developed using (plus or minus two times) standard deviation of the weekday actual sendouts. This implies that 95% of the time actual gas demand will be within the interval of estimates thus computed. This establishes the response of the firm customers under cold weather conditions. Although this demand equation can be used to estimate the total gas

[1] For example, the gas demand for space heating in response to an increase in the number of heating degree days during September is likely to be less than the gas demand for space heating in response to a corresponding increase in the number of degree days during January.

demand on other severe winter days (ranging from 33 to 65 degree days), it will not be statistically valid to use this equation to estimate gas demand on days when the weather conditions are milder.

ICF's Assessment of Design Winter Estimation Methodology

A critical factor in estimating design winter gas demand is the number of heating degree days. ICF evaluated PGW's estimate of the design winter total (i.e., 4,566 degree days) and individual design winter monthly degree days to determine whether better estimates could be generated using purely statistical approaches. Historical winter degree days during the past 48 years (1948-95) were statistically analyzed and compared to the PGW's design winter to determine the extent to which PGW's design winter is representative of historically colder than average winters. Following are the key findings.

- PGW's design winter, as expected, *exceeds* the historical mean by about 540 degree days; however, it is about 75 degree days *lower* than the historical maximum.

- On average, once in every 16 years, a winter is likely to be *as cold as or colder than* PGW's design winter.

- PGW's ranking of design winter months are, on average, *consistent* with the ranking of historical winter months. January is the coldest month; December is the second coldest month, followed by February; March is the fourth coldest month; and November as the fewest heating degree days.

- The PGW's design winter is *consistent with* the design winters adopted by other utilities in the region.

- On average, PGW's design winter is *less likely* to occur than (1) any of its design winter month, (2) a combined design December and January, or (3) a combined design December through February. The design winter, however, is *more likely* to occur than a combined design December through March. Essentially, this indicates that design months occur randomly, independent of design winter conditions. It may be more likely that a string of colder than normal winter months will occur than a design winter; but it is less likely that these months will include March.

- There is *no correlation* between January, February, and March heating degree days. Although statistically significant relationships do exist between monthly heating degree days, these relationships are *highly sensitive* to the sample data set used. Thus, one cannot say if March will be colder or warmer than normal based on February or other winter months.

- PGW's Design Day temperature, as expected, *exceeds* the historical mean by over 10 degree days; however, it *almost equals* the historical peak.

- On average, once in every 16 years, temperature (excluding wind-chill effect) is likely to be 2°F or below on the coldest day of the year. This implies that PGW's design day is *almost as likely* to occur as its design winter.

- Historically, winter temperature (excluding wind-chill effect) of 5°F or below always occurred in January. In addition, on average, coldest day of the year is *more likely* to be a day in January than in any other month. These imply that PGW's planning for the design day to occur in January is *consistent* with the historical data.

- Historically, winter temperature (excluding wind-chill effect) in March has always been above 10°F. In addition, on average, the likelihood of the coldest day of the year occurring in March, rather than in any other month, is 4%. Therefore, it is *consistent* with the historical data to say that Design Day conditions are *not likely* to occur in March.

To evaluate if PGW's design winter estimate, we (1) estimated a set of alternative design winters based on historical weather data and simple statistical criteria, and computed associated risks of not being able to meet the gas demand due to colder than alternative design winters; (2) surveyed other utilities in the region and compiled their design winter criteria and estimates; and (3) compared these estimates to those of PGW's. Similar analysis was performed on PGW's design day estimate. The results of our analyses suggest that PGW's design winter and design day are *reasonable estimates*. Appendix B contains the statistical results of these analyses.

Conclusion

As mentioned earlier, design sendout is a function of three factors: (1) weather expressed in degree days, (2) number of customers, and (3) the demand response of those customers to cold weather. We analyzed PGW's degree day estimates for design winter/day, using historical data, statistical tools, and degree day estimates of other utilities in the region. The results of our analysis indicate that the PGW's degree day estimates are consistent with the historical weather data and the degree day estimates of other utilities in the region. We examined the PGW's winter gas demand estimation methodologies and found them to be satisfactory.

If you have any questions or comments, please call Leonard Crook at (202)-862-2952.

APPENDIX A

PHILADELPHIA GAS WORKS' (PGW) DESIGN WINTER/DAY NATURAL GAS DEMAND ESTIMATION[1]

The design day and design winter are the periods which define the largest amount of gas that PGW must deliver to meet system requirements and to maintain system integrity. The design day is the coldest day resulting in the highest expected coincident demand on the system; the design winter is defined as the coldest experienced winter, combined with the coldest experienced January (historically, the coldest month in Philadelphia). As such, the design conditions are used to for planning annual total capacity and supply necessary for the PGW system. Following are PGW's design winter conditions.

- Design winter describes a colder than normal winter combined with a colder than normal January. The design winter consists of 4,566 degree days over the 151-day period of November through March; the design year has 5,280 degree days.

- The design day at PGW is a day when the mean temperature is 0°F, or 65 degree days, with a design hour of -5°F.

Design sendout (i.e., gas demand) is a function of three factors: (1) weather expressed in degree days, (2) number of customers, and (3) the demand response of those customers to cold weather. PGW's design sendout estimation methodologies are described below in two parts: (1) Design Winter demand and (2) Design Day demand.

I. DESIGN WINTER DEMAND ESTIMATION

Design winter demand comprises of domestic load and heating demand. Domestic load is determined by number of customers and domestic load requirement per customer. Heating demand, on the other hand, is determined by number of customers, heating degree days, and heating demand requirement per customer per degree day.

The design winter demand is estimated by summing the demands of each customer rate class over the 151-day winter period (November through March). More specifically, the following equation is used to estimate the total monthly demand for each rate class of customers.

For each customer rate class:

Monthly Demand = No. of customers * UAF * [{Domestic Load Adjustment Factor
* (DOM * 12/365 * No.of days in the month)} + {(CFDD * Heating Degree Days)
* Heating Adjustment Factor}]

[1] Our understanding of PGW's design winter/day demand estimation methodology is primarily based on our review of PGW's document "Gas Cost Rate (GCR) Fiscal Year 1995-96 for the Philadelphia Gas Works,Volume1--Gas Supply/Demand Strategy, Section A: Statistical Reference Data Schedules," submitted before the Philadelphia Gas Commission, August 1995. This document contains the methodology used by PGW to estimate (in March 1995) its annual gas demand for 1995-96 and for every planning year thereafter until 2000-01. In this appendix, we have generalized the methodology without making reference to any particular year.

where

DOM, domestic load factor per customer per month, is the minimum or base load requirement;
CFDD is the heating demand factor per customer per degree day; and
UAF *is the unaccounted for gas adjustment factor per customer.*

The methodologies used to estimate each of these components are described below in detail.

DOMESTIC DEMAND

Domestic gas demand or baseload is estimated for each customer rate class by multiplying minimum load requirement per customer (i.e., DOM) by PGW's projections of number of customers in that rate class. The methodologies for estimating DOM and the domestic load adjustment factor are explained below.

DOMESTIC LOAD FACTOR (DOM)

DOM is the per customer minimum or base load requirement, which varies across customer rate class. *It is calculated (1) by adjusting the estimated (or trial) sendouts--during the previous* year's summer months of July through September--calculated for each customer rate class (excluding interruptible customers) by the domestic load adjustment factor described below, and (2) by dividing the estimates by the number of customers in each rate class.[2]

DOMESTIC LOAD ADJUSTMENT FACTOR

The Domestic Load Adjustment Factor is used to adjust the seasonal variation in the non-heating gas demand (i.e., domestic load). This factor is calculated by adjusting (previously) estimated sendout to actual sendout, during the previous year's summer months of July through September.

Domestic Load Adjustment Factor
= 3 month-total of actual firm sendout / 3-month total estimated firm sendout

HEATING DEMAND

Heating demand is determined by the following three factors: (1) demand response of customers to cold weather; (2) number of degree days; and (3) number of customers. For each customer rate class, heating demand for a design winter is calculated by multiplying the following factors: (1) heating requirement per degree day per customer; (2) PGW's design winter degree days; and (3) PGW's projections of number of customers.[3] To this estimate a heating demand adjustment factor is applied to correct for the seasonal variation in the gas demand for space heating.

[2] We understand that trial sales were calculated based on the previous year's load calculation.
[3] Number of customers is based on projections developed by the Marketing department and historical assessments of customer attrition.

HEATING FACTOR (CFDD)

It is the heating gas demand requirement per degree day per customer. It varies by customer rate class. It is calculated as follows: first, Trial Heating Factor (Trial CFDD) is calculated; second, heating adjustment factor is calculated using DOM, Trial CFDD, and baseload estimates during peak winter months for each customer rate class; and last, Final CFDD is calculated by adjusting trial CFDD by the heating adjustment factor. The heating factor estimation methodology is described below in detail.

TRIAL HEATING FACTOR (TRIAL CFDD): It is calculated by dividing the total amount of gas demanded for heating (only) by the total degree days during the previous year's peak winter months, December through February.

Trial CFDD = Total Gas Demand for heating over previous year's peak winter months (Dec.-Feb.) / total degree days during this period

This calculation involves two steps:

(1) Calculate total heating gas demand for each of the 3 months (MCF) by subtracting the DOM factor from the actual sendout. For example, *for December*:

$$MCF_{dec} = [\{(\text{Actual Sales}_{dec}/\text{Number of Customers}_{dec}) - DOM\}/\text{Degree Days}_{dec}] * \text{Degree Days}_{dec}$$

(2) Add MCF_{dec}, MCF_{jan}, and MCF_{feb}, and divide by total degree days during this three month-period.

$$\text{Trial CFDD} = (MCF_{dec} + MCF_{jan} + MCF_{feb}) / \text{Degree Days}_{dec+jan+feb}$$

Note: Degree days vary by customer rate class. Calendar degree days are used for customer rate class 1-18; cycle degree days are used for customer rate class 37-57; and previous month's cycle degree days are used for customer rate class 36.

FINAL CFDD: Final CFDD is calculated by adjusting trial CFDD by the heating adjustment factor (which is described below) as follows:

Final CFDD = Trial CFDD * Heating Adjustment Factor.

HEATING ADJUSTMENT FACTOR

Heating Adjustment Factor is used to adjust the seasonal variation in the gas demand for space heating that arises from differences in the responsiveness of customers to changes in heating degree days between seasons. It is calculated by adjusting the (previously) estimated sendout to the actual sendout during the previous year's peak winter months.

To avoid over-or under projections of heating gas demand, PGW (1) calculates the difference between actual and estimated total gas sendouts during the previous year's peak winter months, December through February and (2) inflates (deflates) the planned sendout by adding (subtracting) the difference if the actual sendout exceeded (fell below) estimated sendout. Heating Adjustment Factor is calculated as follows:

Heating Adjustment Factor = [(Actual Sendout - Estimated Sendout)/(Estimated Sendout - Baseload)] + 1

where Estimated Sendout is calculated using trial CFDD and Baseload is calculated for the peak winter months, setting trial CFDD to zero.

Heating adjustment factor of, for example, 1.0735 implies the following: (1) actual total sendout (during the previous year's peak winter months) exceeded the estimated total sendout (as indicated by the greater than unity value of the heating adjustment factor is); (2) this difference between estimated and actual sendouts accounts for about 7.35% of the estimated heating demand; and (3) in the future, heating sendouts will be increased by 7.35% of the estimated sendout.

The heating adjustment factor remains constant across all customers and customer rate classes.

UNACCOUNTED FOR GAS FACTOR (UAF)

UAF is used to adjust the difference between actual sendout and gas consumption by customers. This difference can arise from factors, such as pipeline leaks, pressure differentials, and unmetered deliveries. For example, UAF of 1.031 indicates 103.1 Mcf of natural gas must be sent out to meet 100 Mcf of gas demand. Therefore, UAF is usually calculated by dividing actual total gas sendout by total gas consumed by customers in that month. This factor remains constant across all customers and customer classes.

PGW'S DESIGN WINTER DEGREE DAYS

PGW's design winter has 4, 566 degree days during the 151 days of a winter season. Following is the monthly spread:

617 - November
994 - December
1,160 - January
987 - February
808 - March

II. DESIGN DAY DEMAND ESTIMATION

Design day gas demand projections are made using a statistically estimated equation. More specifically, using linear regression analysis, a peak winter day gas demand equation is estimated by regressing the actual sendouts on those weekdays (excluding holidays) during the previous year's winter season when temperature is 32°F or below.

For example, design day projections for 1995-96 were developed by PGW through a demand equation, estimated by regressing the actual sendout when daily temperature was 32°F or below (during 1994-95 winter weekdays, i.e., excluding weekends and holidays) on a constant and degree days during the same period. The 5% contingency normally applied to the baseload was not used, because, the near design conditions of continuous severe weather was experienced during 1994-95. The following is the design day gas demand model, estimated by PGW.

$$\text{Gas Demand} = a + b_1 * \text{Degree Days} + b_2 * \text{Degree Days}^2 + b_3 * \text{Degree Days}^3 + \varepsilon$$

where

a is the intercept;
b_1 is the slope;
b_2 & b_3 indicate the shape; and
ε is the residual, not captured by the estimated demand equation.

Using 22 observations, three models were estimated by PGW with linear, quadratic, and cubic terms for degree days (i.e., Degree Days, Degree Days^2, and Degree Days^3 respectively). The model with linear term for degree days (hereafter, referred to as linear model, for simplicity) fitted the data better than the others, with an adjusted R^2 of 0.905.[4] The adjusted R^2 value, however, informs us that about 90% of the variation in the actual sendout data are explained by the estimated demand equation.

PGW's linear model estimates are: a =-16.883 and b_1=12,275. We observe that the negative estimate of a is not consistent with the conventional wisdom, because it implies that domestic load per customer is negative. Nevertheless, the objective is to estimate a demand equation that fits actual peak winter day sendout data the best, so that in the future, best possible design day sendout estimates can be developed using the estimated demand equation. Therefore, it is *reasonable* to use the model estimates to calculate design day sendouts.

Design day gas demand is calculated using the linear model estimates of a and b and 65 degree days. To attach a degree of confidence (e.g., 95%) to the demand estimate thus calculated, an interval of gas demand estimates are developed using (plus or minus two times) standard deviation of the weekday actual sendouts. This implies that 95% of the time actual gas demand will be within the interval of estimates thus computed. This establishes the gas demand response of PGW's firm customers under cold weather conditions.

Although this demand equation estimated by PGW can be used to estimate gas demand on other severe winter days (ranging from 33 to 64 degree days), it will not be statistically valid to use this equation to estimate gas demand on days when the weather conditions are milder, because it is estimated based on a restricted (i.e., only when temperature was 32°F or below) sendout sample and because the gas demand response of customers may be different at milder weather conditions.

[4] ICF calculated *Adjusted* R^2 from PGW's unadjusted R^2 estimate (of the linear gas demand model), by adjusting it for the degrees of freedom.

APPENDIX B

ARE PGW'S DESIGN CONDITIONS REPRESENTATIVE OF THE HISTORICAL WINTER?

A critical factor in estimating design winter gas demand is the number of heating degree days. ICF evaluated PGW's estimate of the design winter total (i.e., 4,566 degree days) and individual design winter monthly degree days to determine whether better estimates could be generated using purely statistical approaches. Historical winter degree days during the past 48 years (1948-95) were statistically analyzed and compared to the PGW's design winter to determine the extent to which PGW's design winter is representative of historically colder than average winters.[1] The results and the findings of these analyses are presented below in terms of questions and answers (Qs & As). These Qs & As are presented in two parts: (1) Design Winter and (2) Design Day conditions.

I. DESIGN WINTER CONDITIONS

1. What are the sample statistics of the Historical Winter Degree Days?

Data set (1948-95)	Nov	Dec	Jan	Feb	Mar	Winter Season
Historical Mean Degree Days	554	884	1,018	869	703	4,025[b]
Historical Peak Degree Days	743	1,219	1,390	1,170	997	4,640[b]
No. of Sample Observations	49	49	48	48	48	48
Sample Standard Deviation	80	135	150	112	99	336
Variability of Historical Data Relative to Mean[a] (%)	14	15	15	13	14	8[b]
PGW's Design Degree Days	617	994	1,160	987	808	4,566

Notes:
[a] It is coefficient of variation, calculated as (sample standard deviation/sample mean)*100.
[b] Individual months do not add up to this total, because it has been calculated independently using the historical winter season data or the standard deviation for the season total.

Findings:

- PGW's design winter, as expected, *exceeds* the historical mean by about 540 degree days; however, it is about 75 degree days *lower* than the historical maximum.

- PGW's ranking of design winter months are, on average, *consistent* with the ranking of historical winter months. January is the coldest month; December is the second coldest month, followed by February; March is the fourth coldest month; and November as the fewest heating degree days.

- The number of total degree days during winters is less variable (by about 5%-7%) than the number of degree days during individual winter months. This implies that if historical data is used to develop a design winter, more reliance can be placed on a design winter,

[1] Bowen, K. Earl and Starr, Martin K. 1982. *Basic Statistics for Business and Economics*. McGraw-Hill Book Company, New York.

developed using historical mean (such as mean ± 1.5 standard deviation) than on any similarly developed individual design winter month.

2. What is the probability that PGW's design winter conditions will occur?

Design Winter Months	Number of PGW'sDesign Degree Days	No. of times a design or a colder winter occurred during 1948-96.	Historical Probability that a design or a colder winter will occur (number of years)	Historical Probability that a design or a colder winter will occur (%)
November	617	9	1/5	18
December	994	12	1/4	24
January	1160	8	1/6	17
February	987	7	1/7	15
March	808	7	1/7	15
Dec. & Jan.	2154	7	1/7	15
Dec. through Feb.	3141	4	1/12	8
Dec. through March	3949	2	1/24	4
Nov. through Feb.	3758	4	1/12	8
Design Winter	4566	3	1/16	6

Findings:

- On average, once in every 16 years, a winter is likely to be *as cold as or colder than* PGW's design winter.

- On average, PGW's design winter is *less likely* to occur than (1) any of its design winter month, (2) a combined design December and January, or (3) a combined design December through February. The design winter, however, is *more likely* to occur than a combined design December through March. Essentially, this indicates that design months occur randomly, independent of design winter conditions. It may be more likely that a string of colder than normal winter months will occur than a design winter; but it is less likely that these months will include March.

3. What do winter conditions during early winter months inform us about the winter conditions during rest of the winter season? (Anecdotally, observers think that there may be a positive correlation between early winter and severity of winter, but apparently there does not seem to exist any scientific meteorological relationship.)

To examine if cold weather in early winter is any indicator of cold weather in late winter months or rest of the winter, correlation coefficients (r) were calculated and analyzed for several sub-sample data sets. The data set was divided on the basis of severity of winter and November winter conditions as follows:

(i) complete data set 1948-95;
(ii) only those years, when winter conditions were average or milder, i.e., 4,025 degree days or below;

(iii) only those years, when winter conditions were colder than average, i.e., above 4,025 degree days;
(iv) only those years, when winter was much colder than average, i.e., at least 4,100 degree days;
(v) only those years, when winter conditions during November were average or milder, i.e., 554 degree days or below;
(vi) only those years, when November was colder than average, i.e., above 554 degree days; and
(vii) only those years, when November was much colder than average, i.e., above 600 degree days.

Findings:

- There is *no correlation* between January, February, and March heating degree days. Although statistically significant relationships do exist between monthly heating degree days, *these relationships are highly sensitive to the sample data set used. Thus, one cannot* say if March will be colder or warmer than normal based on February or other winter months.

4. Compare PGW's Design Winter with those of other utilities in the region.

Utilities	Design Winter Criterion	Time period used	No. of Design Degree Days
PGW, Philadelphia, PA			4,566
UGI, Reading, PA	Mean of 40 winters +1.645*std.dev.	1957-95	4,616
PECO, Philadelphia, PA	Mean of 28 winters * 112%	1968-95	4,483
South Jersey Gas, Folsom, NJ	30 year-peak winter	1966-95	4,613
Elizabethtown, Bedminster, NJ	30 year-peak winter	1966-95	4,613
Historical Maximum		1948-95	4,640

Source: ICF Kaiser's Survey and Historical Temperature Data Analysis.

Findings:

- The PGW's design winter is *consistent with* the design winters adopted by other utilities in the region.

5. Is there a statistical criterion that can be used to estimate design winter conditions, based on historical data?

The objective is to evaluate PGW's design winter conditions against statistically developed winter conditions; if PGW's design winter conditions are much colder than the winter conditions statistically developed, for example, with 95% confidence level, PGW's design winter conditions could be considered overly conservative. Under such conditions PGW could be over-investing in capacity or under-utilizing existing capacity.

A principal advantage of using statistical methodology to estimate design winter conditions is that it would us to construct intervals of estimates, within which winter conditions can be

expected to lie 95% or 99% of the time. Therefore, a statistical criterion could be to develop estimates of winter conditions such that 95% of the time winter conditions will be within this range of estimates. Validity of such estimates, however, is dependent upon the validity of the assumption that we make about the underlying distribution of the weather conditions (that extend beyond our sample data pertaining to 1948-95). Therefore, we have developed below confidence intervals for winter conditions with and without assumption about the underlying distribution of winter weather conditions.

Assuming that the winter degree days are normally distributed about the mean, (i) 68% of winter degree days will lie between the following interval of sample mean ± 1 standard deviation, (ii) 95% of winter degree days will lie between the interval of sample mean ± 2 standard deviation, and (iii) 99.7% of winter degree days will lie between the interval of sample mean ± 3 standard deviation.

However, if winter degree days are not normally distributed, the above conclusions will not hold and the confidence level could be lower. Nevertheless, we can conclude that (i) *at least* 75% of winter degree days will lie between the interval of sample mean ± 2 standard deviation and (ii) at least 88% of winter degree days will lie between the interval of sample mean ± 3 standard deviation *(Chebyshev Inequality Theorem).*

Month	PGW's Design Winter	Sample mean - 1 Std. Dev	Sample mean + 1 Std. Dev	Sample mean - 2 Std. Dev	Sample mean + 2 Std. Dev
Nov	617	473	628	395	705
Dec	994	751	1022	615	1157
Jan	1160	867	1168	717	1318
Feb	987	756	981	644	1093
Mar	808	603	802	504	901
Season Total	**4566**	**3689[a]**	**4362[a]**	**3353[a]**	**4698[a]**

Note: [a] Individual months do not add up to this total, because it has been calculated independently using the standard deviation for the season total.

Findings:

- PGW's design winter falls within the 95% confidence interval estimates, developed assuming winter conditions are normally distributed. This indicates that there is *no statistically based criterion* that can be used to optimally estimate PGW's design winter better. Nevertheless, there may be other *policy* criteria--such as cost-benefit (i.e., and an acceptable trade off between risks and potential cost savings) criterion and maximum acceptable risk criterion--that can be used to optimally estimate design winter conditions.

6. To facilitate setting up an optimal policy criterion, evaluate the risks associated with alternative design winters and compare them to PGW's design winter.

To estimate an optimal design winter for PGW, we *need to establish* a probability or a cost-benefit *"criterion"--such as (a) a probability (i.e., relative frequency) limit above which a winter* may not be colder than a design winter; or (b) a criterion for an acceptable trade-off between the risks and the potential cost-savings from reduced supply capacity due to reduced design winter conditions. We observe that currently, PGW does not appear to have any such criterion.

Setting up an optimal criterion, however, will require evaluating a wide range of alternative criteria. To facilitate such a comparison, we established simple *alternative* design winter criteria. [Note: there is no significance attached to these design winter criteria; the design winters calculated must be simply considered as alternative thresholds without any importance attached to them.] Based on these criteria, alternative design winters and probabilities of winter being *as cold as or colder than* these design winters were calculated. These results, presented below, are then compared to the PGW's design winter.[2]

Alternative Design Winter Criterion	**Alternative Design Winter (Deg.days)**	**No. of times the winter was *as cold as or colder than* the alternative design winter during the past 48 years**	**Probability that a winter is *as cold as or colder than* the *alternative* design winter (years and %)**
Sample Mean (upper limit of the 99% confidence interval) (1948-95)	4,157	19	2/5 (=40%)
Sample Mean + 1 standard deviation	4,362	10	1/5 (=21%)
(Sample Mean + 1 std. dev.) + 1% of this total, added as contingency	4,406	7	1/7 (=15%)
(Sample Mean + 1 std. dev.) + 2% of this total, added as contingency	4,450	6	1/8 (=13%)
(Sample Mean + 1 std. dev.) + 3% of this total, added as contingency	4,493	5	1/9 (=10%)
(Sample Mean + 1 std. dev.) + 4% of this total, added as contingency	4,537	4	1/12 (=8%)
(Sample Mean + 1 std. dev.) + 5% of this total, added as contingency	4,580	3	1/16 (=6%)
PGW's Design Winter	4,566	3	1/16 (=6%)

Findings:

- If PGW's design winter is reduced by about 115 degree days (to 4,450), the *risk* of *not being able to meet the total winter gas demand* will *increase* by about 100%.
- If PGW's design winter is reduced by about 75 degree days (to 4,493), the *risk* of *not being able to meet the total winter gas demand* will *increase* by about 65% (i.e., two-third).
- If PGW's design winter is reduced by about 30 degree days (to 4,537), the *risk* of *not being able to meet the total winter gas demand* will *increase* by about 35% (i.e., one-third).

[2] Because, winter conditions that are below planned design winter conditions are always preferred, we assume that if a winter is as cold as or colder than the design winter, there will be a risk of not being able to meet total winter gas demand.

II. DESIGN DAY CONDITIONS

7. What are the sample statistics of historical monthly peaks?

Data Set (1948-95)	Nov	Dec	Jan	Feb	Mar	Winter Season
Average Daily Temperature (°F)	47	36	32	34	42	38[a]
Lowest Temperature Ever (°F)	21	6	1	6	15	1[a]
Sample Mean of monthly peak day temperatures (°F)	32	21	16	18	27	13[a]
Standard Deviation of peak day temperatures	4.5	5.4	7.2	5.4	5.4	5.3[a]
PGW's monthly Peak Day/Design Day Winter Temperature (°F)	22	11	0	5	18	0
Lower Limit of the 95% Confidence Interval for monthly peak day temperature (Peak Mean - 2 std.dev) (°F)	23	21	18	21	21	21[a]
Upperlimit of the 95% Confidence Interval for monthly peak day temperature (Peak Mean + 2 std.dev) (°F)	41	32	30	29	38	24[a]
By how many degrees PGW's monthly peak day/Design Day temp. is colder than the 95% confidence interval? (°F)	1	10	18	16	3	21[a]
Lower Limit of the 99% Confidence Interval for monthly peak day temperature (Peak Mean - 3 std.dev) (°F)	19	5	-6	2	11	-3[a]
Upperlimit of the 99% Confidence Interval for monthly peak day temperature (Peak Mean + 3 std.dev) (°F)	46	37	38	34	43	29[a]
No.of observations in the sample	49	49	49	48	48	48

[a] Individual months do not add up to this total, because it has been calculated independently using the historical winter season data or the standard deviation for the season total.

Findings:

- PGW's Design Day temperature is *almost equal to* the historical peak.
- PGW's Design Day temperature, as expected, *exceeds* the mean of historical peaks by over 10 degree days.
- On average, once in every 16 years, temperature (excluding wind-chill effect) is likely to be 2°F or below on the coldest day of the year. This implies that PGW's design day is *almost as likely* to occur as its design winter.

8. What is the historical frequency distribution of cold days (i.e., ≤0°F, 5-10°F, 10-15°F, 15-20°F, 20-25°F, and 25-30°F) during the winter months?

Winter Temperature	Nov	Dec	Jan	Feb	Mar	Winter	Historical	PGW's

(during 1948-95)	(days)	(days)	(days)	(days)	(days)	Season (days)	Yearly Average (days)	Design Winter (days)
0°F or below	0	0	0	0	0	0	0	1
1°F - 5°F	0	0	7	0	0	7	0.1	4
6°F -10°F	0	2	16	10	0	28	0.6	0
11°F -15°F	0	12	45	16	1	74	2	5
16°F - 20°F	0	57	105	73	8	243	5	11
21°F - 25°F	3	111	190	132	32	468	10	10
25°F - 30°F	22	196	254	220	68	761	16	20
Total number of days winter temperature was 30°F or below	25	378	617	451	109	1.581	33	51
Average no. of days in a year winter temperature was 30°F or below	0.5	8	12	9	2	33	-	-

Findings:

- Historically, winter temperature of 5°F or below always occurred in January. This implies that PGW's planning for the design day to occur in January is *consistent* with the historical data.

- Historically, winter temperature in March has always been above 10°F; over the past 48 years, fewer than 5 times, the temperature has been 15°F or below during March. Therefore, it is *consistent* with the historical data to say that Design Day conditions are *not likely* to occur in March.

9. What is the probability that the coldest winter day in a year will occur in January?

Sample Data Set: 1948-95	Nov	Dec	Jan	Feb	Mar
Mean of monthly peak day temperatures (°F)	32	21	16	18	27
Lowest Temperature ever (°F)	21	6	1	6	15
No. of times the coldest day in a year occurred this month during the past 48 yrs.	0	10	23	16	2
Probability that the coldest day in a year will fall in this month (number of years)	0	1/5	1/2	1/3	1/24
Probability that the coldest day in a year will fall in this month (%)	0	20	47	33	4
PGW's Monthly Peak day/Design Day Winter Temperature (°F)	22	11	0	5	18

Findings:

- On average, coldest day of the year is *more likely* to be a day in January than in any other month. This implies that PGW's planning for the design day to occur in January is *consistent* with the historical data.

- On average, the likelihood of the coldest day of the year occurring in March is 4%. In other words, 96% of the time, the coldest day of the year is likely to occur in December, January,

or February. Therefore, it is *consistent* with the historical data to say that coldest day of the year is *less likely* to occur in March.

10. How does PGW's design day compare with those of other utilities in and around the region?

To evaluate PGW's design day with that of other utilities in the region, we compiled design day criteria adopted by other utilities in the region. To facilitate comparison across the design day planning criteria adopted by utilities and to compare other utilities' design day sendout planning with that of PGW's, we estimated relative potential design day sendout. It was calculated as follows: *Relative potential Design Day Sendout = Sendout when the temperature is 0°F, which* is assumed to equal 100% * [(65 degree days - Design Day Mean Temp.)/65] * (1 + PGW's sendout adjustment factor for wind speed + reserve margin). This formula assumes that sendout increases linearly to increases in wind speed and heating degree days. The following table compares the design day adopted by other utilities in the region with PGW's design day.

Utilities	Design Day Mean Temperature (°F)	Probability of Design Day occurrence[a] (years)	Design Day Wind Speed (mph)	Design Day Reserve Margin (%)	Increase in heating demand resulting from Design Day Wind Speed[b] (%)	Relative Potential Design Day Sendout[c] (%)
PGW, Philadelphia, PA	0	-	-	-	-	100
Baltimore Gas & Electric, Baltimore, MD	2.7	1:25	15	10.7	5	111
Peoples Natural Gas, Pittsburg, PA	-9	1:15	15.8	10[d]	5.6	132
UGI, Reading, PA	-1.1	1:20	-	-	-	102
Washington Gas Light, Washington, DC	5	-	17	0.6	6.2	99
48-year Historical Peak (1948-96)	1	1:48	n/a	-	-	98

Sources: (1) PGW's documents on Design Day Planning and Sendout Estimation; (2) "Analysis of LDC Peak Day Planning." prepared by Fosters Associates for American Gas Association. *Gas Energy Review*. March 1996. pp:7-10; (3) ICF Kaiser's Historical Temperature Data Analysis.

Notes:

[a] It is a design day planning criterion adopted by some utilities.

[b] It is the sendout adjustment factor used by PGW. For example, for a wind speed of 15 mph, other things equal, PGW will increase the sendout by 5%. There is no adjustment factor for wind speed of below 10 mph.

[c] It is the design day sendouts of utilities, relative to the peak winter day of 65 heating degree days.

[d] Applies only to interstate supplies.

n/a = Data not available.

Findings:

- PGW's design day is *consistent with* other utilities' design day planning and 48-year historical peak winter.

Docket No. R-01XXX
Item 53.64 (c)(14)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 53.64(c) Thirty days prior to the filing of a tariff reflecting an increase or decrease in natural gas costs, each Section 1307(f) gas utility seeking recovery of purchased gas costs under that section shall provide notice to the public, under § 53.68 (relating to notice requirements), and shall file the following supporting information with the Commission, with a copy to the Consumer Advocate, Small Business Advocate and to intervenors upon request:

(14) Analysis and data demonstrating, on an historic and projected future basis, the minimum gas entitlements needed to provide reliable and uninterrupted service to priority one customers during peak periods.

Response:

In 1997, PGW contracted with ICF Kaiser Group to review its capacity entitlements. A copy of the final report is attached.

PGW Gas Supply Study
Final Report

Prepared for:

Philadelphia Gas Works

Prepared by:

ICF Kaiser International, Inc.

ICF KAISER

July 2, 1997

PGW Gas Supply Study
Final Report

Prepared for:

Philadelphia Gas Works

Prepared by:

ICF Kaiser International, Inc.

July 2, 1997

ICF KAISER

Outline of Report

- **Purpose of Study**
- **Overview of Assignment**
  - Management Review
  - Peak Day Study
  - Risk Management Study
  - LNG Liquefaction Options Study
  - Supply Optimization
- **Supply Study--Analytic Approach**
- **Findings**
- **Conclusions**

Purpose of Study

- Conduct a broad assessment of PGW's gas supply operations to answer the following questions.
  - Does the PGW gas purchasing function operate in a way to minimize gas costs?
  - Does PGW over-estimate its peak requirements, leading to over commitments in delivery capacity?
  - Would implementing a risk management program reduce PGWs' gas supply costs?

Purpose of Study (contd.)

- Develop an analytic framework for assessing whether and how PGW can manage its gas pipeline, storage, and peak shaving capacity to minimize gas supply costs.
  - Has PGW over committed to pipeline or storage capacity?
  - Where can capacity reductions be made to reduce cost while maintaining delivery reliability?
    - Pipeline capacity
    - Storage
    - Peak shaving
  - How much interruption of BPS and LBS should PGW accept?
  - Would dropping the South Jersey sale allow PGW to turn back pipeline capacity and reduce costs?
  - Is the current commitment to LNG capacity excessive?

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Overview of Assignment

- ICF has conducted four related studies at PGW
  - A management review of the gas supply function
  - A review of PGW's approach to estimating peak day and peak season gas demand
  - An evaluation of a risk management strategy for PGW
  - A gas supply optimization study
- This report presents the final results of the gas supply optimization study
- In a related assignment, ICF Kaiser evaluated alternative approaches to upgrading the LNG liquefaction facilities at the Richmond plant

Management Review (Dec. 1996)

- Management recommendations were made for four areas
  - Gas Acquisition
  - Gas Control
  - Gas Planning
  - Regulatory Affairs
- Specific recommendations were made for aligning PGW's gas supply function with PGW's corporate strategy

Peak Day Study (Feb. 1997)

- Focused on estimations of design day, winter and year
- Concluded that PGW's approach yields reasonable results consistent with empirical data
- PGW's design weather estimates are not overly conservative
  - The design winter is less than the 48-year historical peak winter
  - The monthly design winter conditions are well below the 48-year peak
  - Design winter conditions lie within the 95 percent confidence interval
  - A winter as cold or colder than the design winter is likely to occur once in 16 years

Risk Management (Jan. 1997)

- The study made three findings
  - PGW and its customers have substantial exposure to market risks through the reliance on market pricing for gas supply
  - This exposure is mitigated partially by the investment in storage and LNG
  - Active risk management can further mitigate risk and provide opportunities to develop innovative products for PGW's customers
- The study recommended PGW proceed deliberately to develop a risk management function
  - PGW should use a phased approach to maximize learning about risk management
    - PGW should begin with a pilot project

LNG Liquefaction Options (June 1997)

- In a related report, ICF Kaiser in conjunction with CH-IV Corporation and MPR Engineers analyzed options for improving the 30 year old liquefaction facilities at Richmond
  - Upgrade the existing system and replace 30+ year old compressors with modern centrifugal compressors
  - Install an open expander system
  - Install a mixed refrigerant system
- New technologies can enhance reliability, provide operational flexibility, additional liquefaction capability, and reduced liquefaction costs

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Purpose of the Supply Optimization Study

- Develop an analytic framework for assessing whether and how PGW can manage its gas pipeline, storage, and peak shaving capacity to minimize gas supply costs.
  - Has PGW over committed to pipeline or storage capacity?
  - Where can capacity reductions be made to reduce cost while maintaining delivery reliability?
    - Pipeline capacity
    - Storage
    - Peak shaving
  - How much interruption of BPS and LBS should PGW accept?
  - Would dropping the South Jersey sale allow PGW to turn back pipeline capacity and reduce costs?
  - Is the current commitment to LNG capacity excessive?

Analytic Approach - Optimization

- ICF Kaiser used the Gas Acquisition Strategy Model[2]
- GASM[2] optimizes across all supply and demand options
  - Pipeline capacity
  - Storage
  - Peak shaving -- LNG/Propane
  - Interruption
- The optimal solution identifies the least cost supply strategy under given assumptions
  - Multiple model runs test "What ifs"
  - Minimizes costs to PGW and customers

Analytic Approach - Optimization Inputs

- Define the period to be studied (multi-year or single year) and the detail within the period
- Provide gas requirements as load duration curve: total sendout or by customer class
- Identify and characterize gas supply options
- Identify and characterize the pipeline transportation options
- Identify and characterize storage and peak shaving options
- Integrate storage, transportation and peak capacities

Analytic Approach - Period and Term

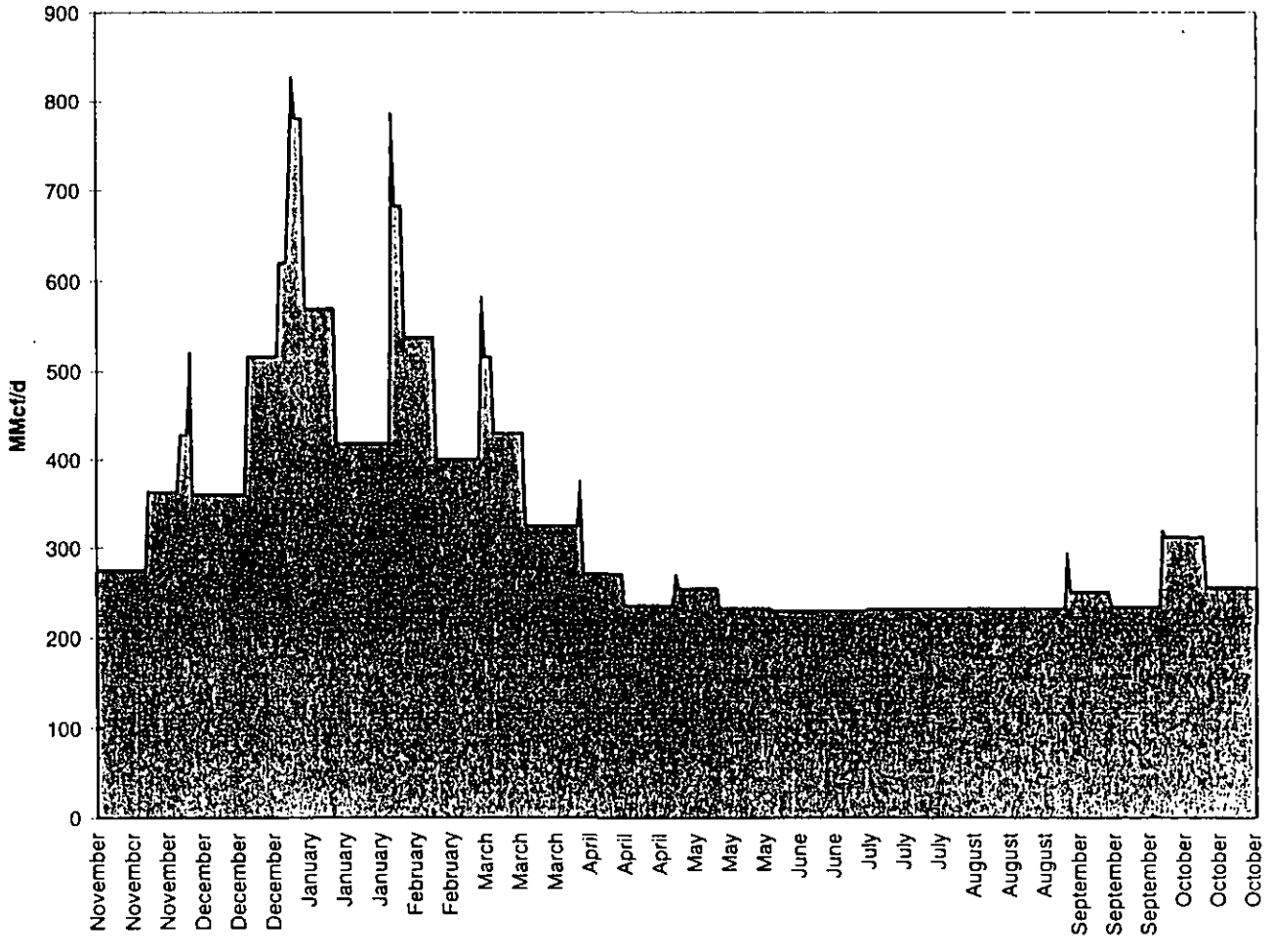
- The Study used a single year representation for PGW
  - PGW has no long-term contracts with distinctive pricing terms
  - Allows greater load detail for modeling critical winter months
- GASM^2 used 36 load periods per simulation
  - November through March (20 periods total)
    - 4 periods per month: Peak, Next 3 days, Next 10 days, Remainder of the month
  - April, May, September, October (12 periods total)
    - 3 periods per month: Peak, Next 13 days, Remainder of the month
  - June (2 periods)
    - 14 highest days, Remainder of the month
  - July, August (2 periods total)

Analytic Approach - Load Characterization

- Used PGW's load forecasting DOM/HDD method by customer class
- Used design year definitions for HDD inputs
  - Increased firm demand in January to equal all-time peak month
- Customer classes grouped into six categories
  - Residential, Commercial, Industrial (firm), Interruptible (No. 6 fuel oil), Interruptible (No. 2 fuel oil), Municipal
  - Interruption occurs when cost of serving interruptible customer exceeds alternative fuel cost
- South Jersey sales incorporated separately
  - 10 days of 25 Mmcf/day on winter peaks.

(See Appendix A for key load inputs)

Analytic Approach - Chronological Load Duration Curve (includes storage injection)



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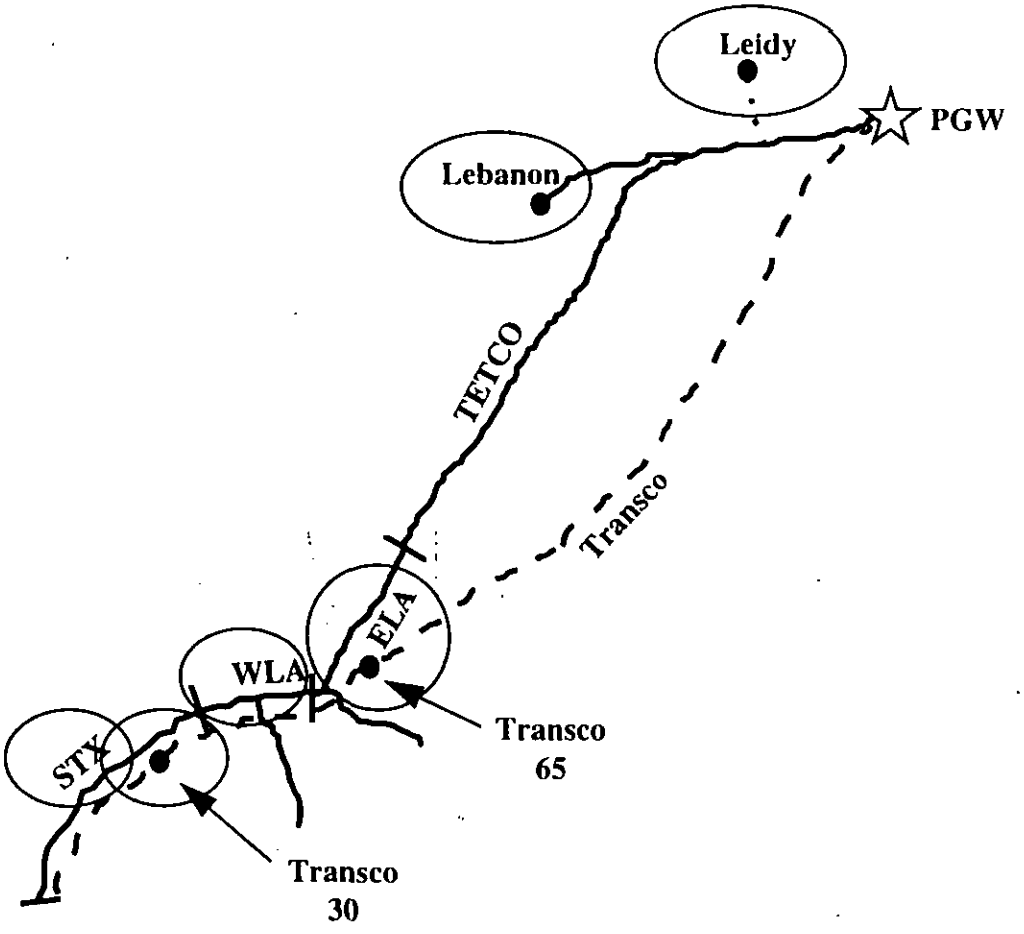
Analytic Approach - Gas Supply Markets



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Analytic Approach - Characterize Gas Supply Options

- Contract prices are assumed to be indexed to monthly spot prices ($/Mcf)
  - Average Price
  - Winter
  - Spring Fall
  - Summer
  - Prices used are from DRI Summer 1996 forecast
- Contract parameters include minimum take requirements and demand charges
- Spot supplies can provide no more than 30% of gas in base case

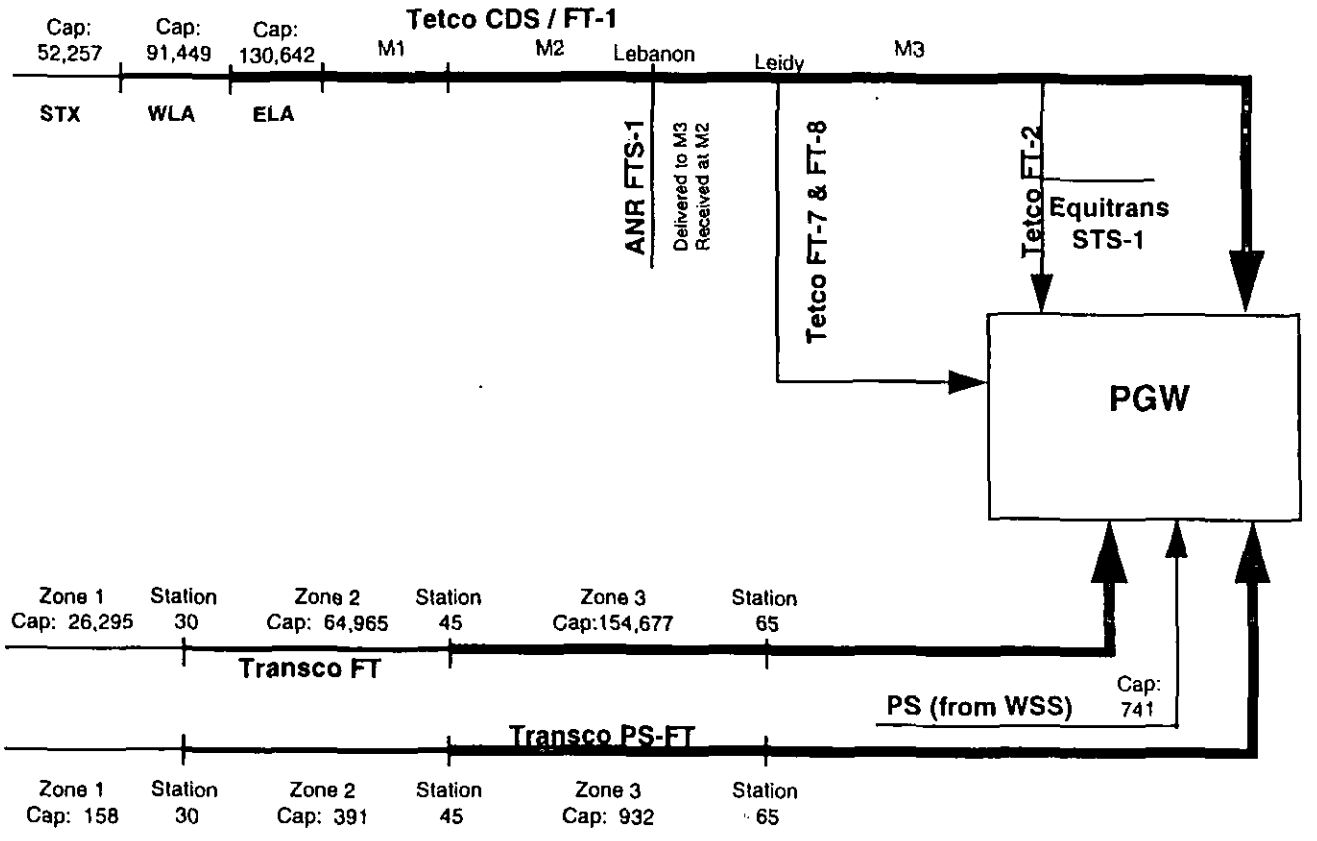
(See Appendix A for key supply inputs)

Analytic Approach - Characterize Pipeline Options

- Pipeline Name
  - Transco
  - Tetco
  - ANR
  - Equitrans
- Contract Type
- Capacity by Zone
- Expiration Date of Contract
- Distinguishing Operational Rules (i.e., winter only; tied to a given storage)

(See Appendix A for key pipeline inputs)

Analytic Approach - Characterize Pipeline Options (contd)



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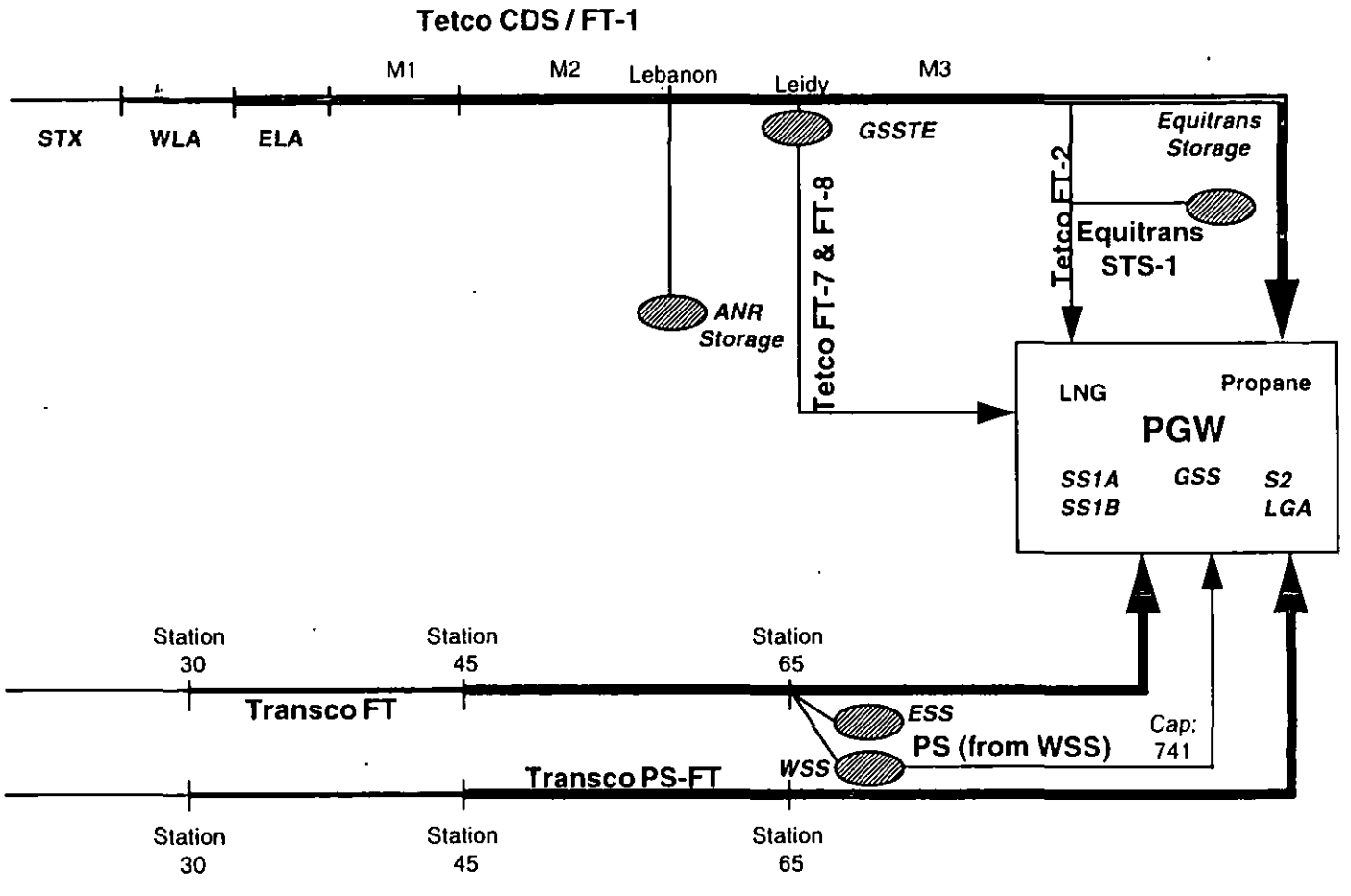
Analytic Approach - Storage and Peak Shaving Options

- Storage is matched with associated pipeline capacity
  - GSS (Transco), SS1A, SS1B, S2 and LGA storage assumed to be available at citygate
  - Equitrans and GSS (TETCO) storage associated with unbundled capacity to the city gate
  - WSS, ESS, and ANR storage treated as production area storage
- "Untouchable" gas under storage contracts is subtracted from available capacity
- LNG is assumed to have year-round minimum inventory of 750 MMcf
  - Maximum available for use equals 3,550 MMcf
- Propane is treated as a locally available, high-priced supply

(See Appendix A for key inputs)

Analytic Approach - Integration



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Findings - Three Sets of Cases Studied

- Three cases address the basic questions raised by PGW about the levels of capacity commitments
  - Base--current contract levels are fixed, approximates current operations
  - Open--all contracts can be modified; model is allowed to choose least cost mix of contract levels
  - Modified Open--only expiring contracts can be modified
- Two cases examine the implications of terminating the South Jersey contract
  - Base without South Jersey--base case with the South Jersey contract terminated
  - Modified Base without South Jersey--modified case after the South Jersey contract expires

Findings - Three Sets of Cases Studied (contd)

- Two cases examine the impact of turning back pipeline capacity if the South Jersey contract expires
  - 10,000 Mcf/d turn back
  - 20,000 Mcf/d turn back

Findings - Summary of Case Results

	Capacity Commitment			South Jersey			Turn Back		
	Base	Open	Modified Open	Base	Base No SJ	Modified Open No SJ	Base No SJ	Reduce Cap 10,000 Mcf/d No SJ	Reduce Cap 20,000 Mcf/d No SJ
Savings ($ Change from Base)	-	6,202,600	682,200	-	(156,200)	573,000	(156,200)	(62,000)	(1,784,800)
Pipeline Load Factor (%)									
Winter	99%	98%	99%	99%	99%	99%	99%	99%	100%
Annual	81%	81%	81%	81%	81%	81%	81%	83%	85%
Storage (% of Max Contract Cap)									
Production	96%	63%	100%	96%	94%	100%	94%	99%	99%
Market	100%	98%	97%	100%	100%	97%	100%	100%	100%
LNG (% of Max Contract Cap)	100%	100%	100%	100%	100%	100%	100%	100%	100%
Interruption (Days)									
BPS	38	47	46	38	33	42	33	67	100
LBS	118	136	118	118	118	118	118	126	136
Propane (Total MMcf Equivalent)	0	0	0	0	0	0	0	0	16

Findings - Capacity Commitment

- The Base Case results are consistent with PGW's current operations
  - PGW actual use of storage, pipeline capacity, LNG, and interruption is similar to the model results for current levels of contractual commitments
- Optimizing gas supply where all of the current contracts can be redetermined will lead to the elimination of some commitments
  - ANR, Eminence and Transco LGA storage would not be needed
    - Production area storage (ANR and Eminence) is more economic when the difference between summer and winter prices widens
    - Transco LGA storage suffers from high variable costs

Findings - Capacity Commitment (contd)

- Under the optimal Open case additional interruption would occur, however
  - 9 more days for BPS customers
  - 18 more days for LBS customers
- Under the optimal strategy, PGW's current commitments to LNG and pipeline capacity would be unchanged
- If only the expiring storage contracts can be modified, PGW should
  - Reduce the Transco S2 contract by 1/3rd
  - Eliminate the LGA contract
- These reductions would be offset by 9 additional days of BPS interruption

Findings - Eliminating the South Jersey Contract

- The expiration of the South Jersey contract would cost PGW approximately $150,000 relative to the base case
  - Contract elimination would allow PGW to reduce S-2 storage levels and BPS interruption
  - Resulting cost decreases would not offset the $1.25 million in lost revenue from South Jersey
- The expiration of the South Jersey contract would reduce the savings gained under the modified open case
  - Like above, there would be less interruption of BPS customers
- PGW's service to South Jersey contributes more than it costs

Findings - Capacity Turn Back

- Turning back 10,000 Mcf/d of TETCO CDS capacity would cost PGW and its customers over $60,000 per year
  - Interruption of BPS would double and LBS increase by 8 days
  - More expensive storage would have to be used
- Turning back 20,000 Mcf/d of pipeline capacity would be extremely costly
  - Costs would increase by almost $1.8 million
  - BPS customers would be interrupted 100 days and LBS customers for 136 days
  - This is the only case where PGW would have to use propane

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Conclusions

- PGW has the right mix of pipeline capacity
  - Under all of the cases studied, the current levels of pipeline capacity were fully utilized in winter
  - Turn back of pipeline capacity would lead to higer costs by forcing the use of more expensive supply options and greater levels of interruption
- PGW's LNG capacity is fully utilized under all cases
  - LNG is an important element of PGW's capacity mix, providing peak day reliability and winter capacity at reasonable cost
  - LNG capacity in conjunction with pipeline capacity may provide greater opportunities for on-and off-system services

Conclusions (contd)

- PGW can reduce costs by eliminating several storage contracts--ANR, Eminence and Transco LGA and reduce its capacity under Transco S-2
  - Under the Open case, the optimal mix of supply could meet demand without using these services
- PGW can reduce costs, where the opportunity to reduce capacity commitments is limited to expiring contracts, by eliminating the LGA storage and cutting back S-2 storage
- PGW should not terminate the South Jersey contract
  - South Jersey contributes more than it costs to serve
  - Termination would not allow PGW to reduce pipeline capacity commitments and save money

Conclusions (contd)

- PGW's interruptible customers are on the margin in most cases
  - Reductions in capacity commitments increase the interruption of BPS and LBS customers
  - PGW should consider innovative Btu-services for these customers
- PGW should consider ways to maximize the value of existing assets by developing new services for on- and off-system customers
  - PGW should examine regional market opportunities for leveraging LNG and other assets
  - PGW should develop a capability to enhance offerings using risk management tools

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Missing

Key Gas Supply Inputs

Market Location	Year	Average Price $/Mcf	Price Winter $/Mcf	Spring/Fall $/Mcf	Summer $/Mcf
Transco 30	1996-97	2.18	2.44	2.25	1.78
Transco 65	1996-97	2.23	2.49	2.30	1.83
Tetco South Texas (STX)	1996-97	2.05	2.24	2.11	1.74
Tetco Louisiana (ELA)	1996-97	2.21	2.48	2.27	1.81
Tetco Louisiana (WLA)	1996-97	2.21	2.48	2.27	1.81
CNG Leidy	1996-97	2.31	2.51	2.37	1.98
ANR Lebanon	1996-97	2.31	2.51	2.37	1.98

Key Load Inputs

Customer Class	Number of Customers	Peak Day Demand (MMcf)	Peak Month Demand (MMcf)	Annual Demand (MMcf)
Residential	500,655	589.7	11,255.4	56,304.9
Commercial	23,661	90.0	1,757.0	9,532.5
Industrial Firm	1,034	20.8	474.1	3,756.5
Municipal	742	20.2	377.1	1,722.3
Total Firm	***526,092***	***720.7***	***13,863.6***	***71,316.2***
Interruptible #2	410	48.5	1101.3	7,585.4
Interruptible #6	50	15.6	383.1	3,023.4
Total Interruptible	***460***	***64.1***	***1,484.1***	***10,608.8***
South Jersey	1	25.0	100.0	250.0
Grey's Ferry	1	0.0	0.0	8,388.0
Total Other	***2***	***25.0***	***100.0***	***8,638.0***
Total	**526,554**	**809.8**	**15,448.1**	**90,563.0**

Key Pipeline Inputs

Company	Contract	Capacity	Expiration Date	Notes
Transco	FT	27,100 (Zone 1) 67,000 (Zone 2) 159,600 (Zone 3)	31-Mar-2005	
Transco	PS-FT	158 (Zone 1) 233 (Zone 2) 541 (Zone 3) 741 (Zone 4)	31-Jul-2011	Winter Only
TETCO	CDS	72,674	31-Oct-2003	
TETCO	FT-1	57,967	31-Oct-2003	
TETCO	FT-2	5,227	31-Mar-2002	Formerly bundled with Equitrans storage.
TETCO	FT-7	7,238	15-Apr-2006	Formerly bundled with CNG storage
TETCO	FT-8	24,905	31-Mar-2006	Formerly bundled with CNG storage.
ANR	FTS-1	13,168 (Summer) 9,329 (Winter)	31-Mar-2013	Delivers gas to TETCO at Lebanon.
Equitrans	STS-1	4,843	1-Apr-2002	Delivers gas to TETCO FT-2.

Key Storage and Peak Shaving Inputs

Company	Contract	Expiration Date	Injection Period	Withdrawal Period	Storage Capacity	Max. Withdrawal Capacity	Ratchet	Injection Capacity	Notes:
Transco	WSS	31-Mar-1998	Year Round	Year Round	3,232,470	38,029	Y	15,105	
Transco	ESS	31-Oct-2013	Year Round	Year Round	79,700	10,230	N	682	Capacity will increase with expiration of Transco FS sales volumes.
Transco	S-2	11/15/1974*	4/16 - 11/15	11/16 - 4/15	452,087	5,032	N	2,324	Service may be canceled with 12 months prior notice.
Transco	GSS	Pending	Year Round	Year Round	3,893,346	59,658	Y	19,563	Storage capacity reduced 7% to account for base volumes. Monthly extraction 87.5% of daily total.
Transco	LGA	31-Oct-1991	4/1 - 10/31	11/1 - 3/31	50,848	10,171	N	254	
TETCO	SS-1A	30-Apr-2012	Year Round	Year Round	2,570,000	42,750	Y	13,184	Storage capacity reduced 4% to account for base volumes.
TETCO	SS-1B	30-Apr-2012	Year Round	Year Round	2,390,344	20,201	Y	12,264	Storage capacity reduced 4% to account for base volumes.
CNG	GSS	31-Mar-2006	Year Round	Year Round	3,531,631	32,991	Y	21,097	Storage capacity reduced 7% to account for base volumes. Monthly extraction 87.5% of daily total.
Equitrans	SS-3	1-Apr-2002	Year Round	Year Round	506,298	4,843	Y	2,529	Typical injection period is 4/1 - 10/31; withdrawal period is 11/1 - 3/31
ANR	FSS	1-Jan-2003	4/1 - 10/31	11/1 - 3/31	1,843,400	13,429	N	9,200	
LNG			4/1 - 10/31	11/1 - 3/31	3,985,000	450,000		23,500	All costs other than fuel assumed to be fixed

Appendix B

Summary of Cases (Base/Scenarios)

- Case 1: Base - All contracts are considered fixed
- Case 2: Open - No contracts are considered fixed
- Case 3: Modified Open - Capacities on expiring contracts are variable
- Case 4: Base, No South Jersey
- Case 5: Modified Open, No South Jersey
- Case 6: Pipeline Capacity Turn Back 10,000 Mcf/d (No South Jersey)
- Case 7: Pipeline Capacity Turn Back 20,000 Mcf/d (No South Jersey)

Case summary outline (Case 1 Base)

- All contracts are considered fixed
  - Capacities and capacity charges cannot change
  - Fixed costs are sunk for decisionmaking purposes

Case 1 Base: Sources of Supply

- Purchases - Range (incl. pipeline fuel): 230-355 MMcf
- Production area storage (including ANR)
  - Transco storage (ESS and WSS) used at over 98% of capacity
  - ANR storage used at 90% capacity
  - Peak day withdrawal: 39 MMcf
- Market area storage
  - Maximum storage capacity except LGA (high variable cost)
  - Peak day withdrawal: 165 MMcf

Case 1 Base: Sources of Supply (cont.)

- LNG
  - All capacity is used
  - Maximum withdrawal: 290 MMcf
- No propane is used
- Interruption
  - 2.96 Bcf of demand total
  - On PGW peak day: 64.1 MMcf (all BPS and LBS customers)
  - BPS customers are interrupted for 38 days
  - LBS customers are interrupted for 118 days

Case 1 Base: Capacity Use

- Pipeline load factors

Pipeline	Winter	Total
Transco FT	100%	88%
TETCO FT-1	99%	80%
TETCO CDS	96%	67%

*Winter = Nov 1 - Mar 31

Case 1 Base: Capacity Use (cont.)

- Storage Capacity Use

Storage	Contract Max.	Capacity Use
Production Area	**5,156**	**4,942**
Transco WSS	*3,233*	*3,187*
Transco ESS	*80*	*80*
ANR FSS	*1,843*	*1,675*
Market Area	**13,395**	**13,384**
Transco S2	*452*	*452*
Transco GSS	*3,893*	*3,893*
Transco LGA	*51*	*41*
TETCO SS1A	*2,570*	*2,570*
TETCO SS1B	*2,390*	*2,390*
CNG GSST	*3,532*	*3,532*
Equitrans SS3	*506*	*506*

Case summary outline (Case 2 Open)

- No contracts are considered fixed
  - All fixed costs are avoidable
  - Capacities represented in portfolio are available
    - In the "capacity store"

Case 2 Open: Sources of Supply

- Purchases - Range (incl. pipeline fuel): 210-354 MMcf
- Production area storage (including ANR)
  - All available WSS capacity is purchased; no ANR or ESS
  - Peak day withdrawal: 24 MMcf
- Market area storage
  - Some reductions from base case
    - TETCO SS-1 and CNG are used at 95% capacity; S2 at 85%
    - LGA eliminated
  - Peak day withdrawal: 152 MMcf

Case 2 Open: Sources of Supply (cont.)

- LNG
  - Maximum available capacity is used
  - Maximum withdrawal: 301 MMcf
- No propane is used
- Interruption
  - 3.47 Bcf of demand total
  - On PGW peak day: 64.1 MMcf (all BPS and LBS customers)
  - BPS customers are interrupted for 47 days
  - LBS customers are interrupted for 136 days

Case 2 Open: Capacity Use

- Pipeline load factors

Pipeline	Winter	Total
Transco FT	100%	78%
TETCO FT-1	90%	55%
TETCO CDS	97%	99%

*Winter = Nov 1 - Mar 31

Case 2 Open: Capacity Use (cont.)

- Storage Capacity Use

Storage	Contract Max.	Capacity Use
Production Area	**5,156**	**3,236**
Transco WSS	*3,233*	*3,233*
Transco ESS	*80*	*0*
ANR FSS	*1843*	*3*
Market Area	**13,395**	**13,078**
Transco S2	*452*	*381*
Transco GSS	*3,893*	*3,893*
Transco LGA	*51*	*0*
TETCO SS1A	*2,570*	*2,507*
TETCO SS1B	*2,390*	*2,277*
CNG GSST	*3,532*	*3,532*
Equitrans SS3	*506*	*506*

Case summary outline (Case 3 Modified Open)

- Capacities on contracts that have or are about to expire are considered variable for decisionmaking purposes
  - Transco WSS storage
  - Transco S-2 storage
  - Transco GSS storage
  - Transco LGA storage

Case 3 Modified Open: Sources of Supply

- Purchases - Range (incl. pipeline fuel): 223-356 MMcf
- Production area storage (including ANR)
  - All production area storage is used to capacity
  - Peak day withdrawal: 38 MMcf
- Market area storage
  - Most storage used to full capacity
    - LGA is eliminated; S2 is used at 33% of contract maximum
  - Peak day withdrawal: 155 MMcf

Case 3 Modified Open: Sources of Supply (cont.)

- LNG
  - All capacity is used
  - Maximum withdrawal: 300 MMcf
- No propane is used
- Interruption
  - 3.26 Bcf of demand total
  - On PGW peak day: 64.1 MMcf (all BPS and LBS customers)
  - BPS customers are interrupted for 46 days
  - LBS customers are interrupted for 118 days

Case 3 Modified Open: Capacity Use

- Pipeline load factors

Pipeline	Winter	Total
Transco FT	100%	88%
TETCO FT-1	98%	77%
TETCO CDS	96%	67%

*Winter = Nov 1 - Mar 31

Case 3 Modified Open: Capacity Use (cont.)

- Storage Capacity Use

Storage	Contract Max.	Capacity Use
Production Area	**5,156**	**5,156**
Transco WSS	*3,233*	*3,233*
Transco ESS	*80*	*80*
ANR FSS	*1843*	*1,483*
Market Area	**13,395**	**13,041**
Transco S2	*452*	*150*
Transco GSS	*3,893*	*3,893*
Transco LGA	*51*	*0*
TETCO SS1A	*2,570*	*2,570*
TETCO SS1B	*2,390*	*2,390*
CNG GSST	*3,532*	*3,532*
Equitrans SS3	*506*	*506*

Case summary outline (Case 4 Base, No South Jersey)

- All contracts are considered fixed
  - Capacities and capacity charges cannot change
  - Fixed costs are sunk for decisionmaking purposes
- PGW does not supply gas to South Jersey
  - 2,500 Mcf/d for 10 days
  - Contract expires winter 97-98

Case 4 Base, No South Jersey: Sources of Supply

- Purchases - Range (incl. pipeline fuel): 231-356 MMcf
- Production area storage (including ANR)
  - Similar to the base case, with a slight reduction in use of ANR
  - Peak day withdrawal: 38 MMcf
- Market area storage
  - Maximum storage capacity is used for all except LGA and Equitrans
  - Peak day withdrawal: 165 MMcf

Case 4 Base, No South Jersey: Sources of Supply (cont.)

- LNG
  - All capacity is used
  - Maximum withdrawal: 313 MMcf
- No propane is used
- Interruption
  - 2.74 Bcf of demand total
  - On PGW peak day: 15.6 MMcf (LBS customers)
  - BPS customers are interrupted for 33 days
  - LBS customers are interrupted for 118 days

Case 4 Base, No South Jersey: Capacity Use

- Pipeline load factors

Pipeline	Winter	Total
Transco FT	100%	87%
TETCO FT-1	99%	81%
TETCO CDS	96%	66%

*Winter = Nov 1 - Mar 31

Case 4 Base, No South Jersey: Capacity Use (cont.)

- Storage Capacity Use

Storage	Contract Max.	Capacity Use
Production Area	**5,156**	**4,863**
Transco WSS	*3,233*	*3,187*
Transco ESS	*80*	*80*
ANR FSS	*1843*	*1,596*
Market Area	**13,395**	**13,368**
Transco S2	*452*	*452*
Transco GSS	*3,893*	*3,893*
Transco LGA	*51*	*41*
TETCO SS1A	*2,570*	*2,570*
TETCO SS1B	*2,390*	*2,390*
CNG GSST	*3,532*	*3,532*
Equitrans SS3	*506*	*506*

Case summary outline (Case 5 Modified Open, No South Jersey)

- Capacities on contracts that have or are about to expire are considered variable for decisionmaking purposes
  - Transco WSS storage
  - Transco S-2 storage
  - Transco GSS storage
  - Transco LGA storage
- PGW does not supply gas to South Jersey
  - 2,500 Mcf/d for 10 days
  - Contract expires winter 97-98

Case 5 Modified Open, No South Jersey: Sources of Supply

- Purchases - Range (incl. pipeline fuel): 223-356 MMcf
- Production area storage (including ANR) is virtually identical to Case 3
  - All production area storage is used to capacity
  - Peak day withdrawal: 38 MMcf
- Market area storage
  - Most storage used to full capacity
    - LGA is eliminated
    - S2 now used at 19% of contract maximum
  - Peak day withdrawal: 153 MMcf

Case 5 Modified Open, No South Jersey: Sources of Supply (cont.)

- LNG
  - All capacity is used
  - Maximum withdrawal: 300 MMcf
- No propane is used
- Interruption
  - 3.10 Bcf of demand total
  - On PGW peak day: 64.1 MMcf (all BPS and LBS customers)
  - BPS customers are interrupted for 42 days
  - LBS customers are interrupted for 118 days

Case 5 Modified Open, No South Jersey: Capacity Use

- Pipeline load factors are the same as Case 3

Pipeline	Winter	Total
Transco FT	100%	88%
TETCO FT-1	98%	77%
TETCO CDS	96%	67%

*Winter = Nov 1 - Mar 31

Case 5 Modified Open, No South Jersey: Capacity Use (cont.)

- Storage Capacity Use

Storage	Contract Max.	Capacity Use
Production Area	**5,156**	**5,156**
Transco WSS	*3,233*	*3,233*
Transco ESS	*80*	*80*
ANR FSS	*1843*	*1,483*
Market Area	**13,395**	**12,975**
Transco S2	*452*	*84*
Transco GSS	*3,893*	*3,893*
Transco LGA	*51*	*0*
TETCO SS1A	*2,570*	*2,570*
TETCO SS1B	*2,390*	*2,390*
CNG GSST	*3,532*	*3,532*
Equitrans SS3	*506*	*506*

Case summary outline (Case 6 Pipeline Capacity Turn Back 10,000 Mcf/d (No South Jersey))

- Delivery capacity to PGW is reduced by 10,000 Mcf/d on TETCO CDS
- PGW does not supply gas to South Jersey
  - 25,000 Mcf/d for 10 days
  - Contract expires winter 97-98

Case 6 Pipeline Capacity Turn Back 10,000 Mcf/d (No South Jersey): Sources of Supply

- Purchases - Range (incl. pipeline fuel): 231-345 MMcf
- Production area storage (including ANR)
  - ANR and ESS are used to full capacity
  - WSS is used at 99% capacity
  - Peak day withdrawal: 40 MMcf
- Market area storage
  - Maximum storage capacity is used for all except LGA
  - Peak day withdrawal: 165 MMcf

Case 6 Pipeline Capacity Turn Back 10,000 Mcf/d (No South Jersey): Sources of Supply (cont.)

- LNG
  - All capacity is used
  - Maximum withdrawal: 275 MMcf
- Propane is not used
- Interruption
  - 4.00 Bcf of demand total
  - On PGW peak day: 64.1 MMcf (all BPS and LBS customers)
  - BPS customers are interrupted for 67 days
  - LBS customers are interrupted for 126 days

Case 6 Pipeline Capacity Turn Back 10,000 Mcf/d (No South Jersey): Capacity Use

- Pipeline load factors

Pipeline	Winter	Total
Transco FT	100%	88%
TETCO FT-1	99%	79%
TETCO CDS	97%	71%

*Winter = Nov 1 - Mar 31

Case 6 Pipeline Capacity Turn Back 10,000 Mcf/d (No South Jersey): Capacity Use (cont.)

- Storage Capacity Use

Storage	Contract Max.	Capacity Use
Production Area	**5,156**	**5,110**
Transco WSS	*3,233*	*3,187*
Transco ESS	*80*	*80*
ANR FSS	*1843*	*1,843*
Market Area	**13,395**	**13,384**
Transco S2	*452*	*452*
Transco GSS	*3,893*	*3,893*
Transco LGA	*51*	*41*
TETCO SS1A	*2,570*	*2,570*
TETCO SS1B	*2,390*	*2,390*
CNG GSST	*3,532*	*3,532*
Equitrans SS3	*506*	*506*

Case summary outline (Case 7 Pipeline Capacity Turn Back 20,000 Mcf/d (No South Jersey))

- Delivery capacity to PGW is reduced by 20,000 Mcf/d on TETCO CDS
- PGW does not supply gas to South Jersey
  - 25,000 Mcf/d for 10 days
  - Contract expires winter 97-98

Case 7 Pipeline Capacity Turn Back 20,000 Mcf/d (No South Jersey): Sources of Supply

- Purchases - Range (incl. pipeline fuel): 226-334 MMcf
- Production area storage (including ANR)
  - ANR and ESS are used to full capacity
  - WSS is used at 99% capacity
  - Peak day withdrawal: 39 MMcf
- Market area storage
  - Maximum storage capacity is used for all except LGA
  - Peak day withdrawal: 165 MMcf

Case 7 Pipeline Capacity Turn Back 20,000 Mcf/d (No South Jersey): Sources of Supply (cont.)

- LNG
  - All capacity is used
  - Maximum withdrawal: 283 MMcf
- Propane is used at maximum capacity (16 MMcf equivalent)
- Interruption
  - 5.08 Bcf of demand total
  - On PGW peak day: 64.1 MMcf (all BPS and LBS customers)
  - BPS customers are interrupted for 100 days
  - LBS customers are interrupted for 136 days

Case 7 Pipeline Capacity Turn Back 20,000 Mcf/d (No South Jersey): Capacity Use

- Pipeline load factors

Pipeline	Winter	Total
Transco FT	100%	88%
TETCO FT-1	100%	80%
TETCO CDS	98%	77%

*Winter = Nov 1 - Mar 31

Case 7 Pipeline Capacity Turn Back 20,000 Mcf/d (No South Jersey): Capacity Use (cont.)

- Storage Capacity Use

Storage	Contract Max.	Capacity Use
Production Area	**5,156**	**5,110**
Transco WSS	*3,233*	*3,187*
Transco ESS	*80*	*80*
ANR FSS	*1843*	*1,843*
Market Area	**13,395**	**13,384**
Transco S2	*452*	*452*
Transco GSS	*3,893*	*3,893*
Transco LGA	*51*	*41*
TETCO SS1A	*2,570*	*2,570*
TETCO SS1B	*2,390*	*2,390*
CNG GSST	*3,532*	*3,532*
Equitrans SS3	*506*	*506*

Docket No. R-01XXX
Item 53.65 (1)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 53.65 (1)

The costs of the affiliated gas, transportation or storage as compared to the average market price of other gas, transportation or storage and the price of other sources of gas, transportation and storage.

Response:

PGW has no affiliates.

Docket No. R-01XXX
Item 53.65 (2)

Philadelphia Gas Works

Pennsylvania Public Utilities Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 53.65 (2)

Estimates of the quantity of gas, transportation or storage available to the utility from all sources.

Response:

Schedule 1 - Summary of all transport, storage and LNG capacity.

Philadelphia Gas Works

Gas Supply Group – Supply and Transportation

Abstract of Natural Gas Contracts

This document contains confidential information for the use of the Gas Operations personnel only. It is important to note that this is a brief summary of the terms and conditions of our contracts. The pipeline tariffs and contract files should be referenced for complete information.

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PHILA.GAS WORKS

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PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Transco Gas Supply Contract #1
Delivery Pipeline & Contract #:	Transco
Associated Transportation Contract:	Transco FT Contract # 3604
Contract Term:	3 Years
Initial Contract Date:	4/01/00
Contract Expiration Date:	3/31/02
Quality of Service:	Firm
Daily Maximum:	55,212 DT per Day
Availability:	Year Round
Fuel (%):	None
Minimum Take Level:	None
Nomination & Scheduling:	No notice, within day swing. Initially nominated volume can be take to zero through nomination process. Nominations subject to Transco rules.
Other Terms & Conditions:	None
Most Recent Negotiation:	In 3/00 contracted negotiated with reduced reservation rates.

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Transco Gas Supply Contract #2
Delivery Pipeline & Contract #:	Transco
Associated Transportation Contract:	Transco FT Contract # 3691
Contract Term:	10 Years
Initial Contract Date:	10/01/91
Contract Expiration Date:	9/30/01
Quality of Service:	Firm
Daily Maximum:	20,000 DT plus fuel per Day Nov.-Mar. 10,000 DT plus fuel per Day Apr.-Oct.
Availability:	Year Round
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	None
Nomination & Scheduling:	Next day nomination change. Nominations subject to Transco rules. No limit to amount of changes within the month.
Other Terms & Conditions:	None
Most Recent Negotiation:	Termination notice given March of 2000.

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Transco Gas Supply Contract #3
Delivery Pipeline & Contract #:	Transco
Associated Transportation Contract:	Transco FT Contract # 3691
Contract Term:	November 2000 through March 2001
Initial Contract Date:	11/01/2000
Contract Expiration Date:	3/31/01
Quality of Service:	Firm
Daily Maximum:	10,000 DT per Day Nov.-Mar.
Availability:	Winter Supply Contract
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	10,000 DT per Day
Nomination & Scheduling:	Firm must take contract. Nominations subject to Transco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	Terms have been fulfilled.

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Transco Gas Supply Contract #4
Delivery Pipeline & Contract #:	Transco
Associated Transportation Contract:	Transco FT Contract # 3691
Contract Term:	November 2000 through March 2001
Initial Contract Date:	11/01/2000
Contract Expiration Date:	3/31/01
Quality of Service:	Firm
Daily Maximum:	10,000 DT per Day Nov.-Mar.
Availability:	Winter Supply Contract
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	10,000 DT per Day
Nomination & Scheduling:	Firm must take contract. Nominations subject to Transco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	Terms have been fulfilled.

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Transco Gas Supply Contract #5
Delivery Pipeline & Contract #:	Transco
Associated Transportation Contract:	Transco FT Contract # 3691
Contract Term:	November 2000 through March 2001
Initial Contract Date:	11/01/2000
Contract Expiration Date:	3/31/01
Quality of Service:	Firm
Daily Maximum:	10,000 DT per Day Nov.-Mar.
Availability:	Winter Supply Contract
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	10,000 DT per Day
Nomination & Scheduling:	Firm must take contract. Nominations subject to Transco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	Terms have been fulfilled.

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Transco Gas Supply Contract #6
Delivery Pipeline & Contract #:	Transco
Associated Transportation Contract:	Transco FT Contract # 3691
Contract Term:	November 2000 through March 2001
Initial Contract Date:	11/01/2000
Contract Expiration Date:	3/31/01
Quality of Service:	Firm
Daily Maximum:	10,000 DT per Day Nov.-Mar.
Availability:	Winter Supply Contract
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	10,000 DT per Day
Nomination & Scheduling:	Firm must take contract. Nominations subject to Transco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	Terms have been fulfilled.

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Transco Gas Supply Contract #7
Delivery Pipeline & Contract #:	Transco
Associated Transportation Contract:	Transco FT Contract # 3691
Contract Term:	November 2000 through March 2001
Initial Contract Date:	11/01/2000
Contract Expiration Date:	3/31/01
Quality of Service:	Firm
Daily Maximum:	10,000 DT per Day Nov.-Mar.
Availability:	Winter Supply Contract
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	10,000 DT per Day
Nomination & Scheduling:	Firm must take contract. Nominations subject to Transco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	Terms have been fulfilled.

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Transco Gas Supply Contract #8
Delivery Pipeline & Contract #:	Transco
Associated Transportation Contract:	Transco FT Contract # 3691
Contract Term:	November 2000 through March 2001
Initial Contract Date:	11/01/2000
Contract Expiration Date:	3/31/01
Quality of Service:	Firm
Daily Maximum:	10,000 DT per Day Nov.-Mar.
Availability:	Winter Supply Contract
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	10,000 DT per Day
Nomination & Scheduling:	Firm must take contract. Nominations subject to Transco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	Terms have been fulfilled.

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Transco Gas Supply Contract #9
Delivery Pipeline & Contract #:	Transco
Associated Transportation Contract:	Transco FT Contract # 3691
Contract Term:	November 2000 through March 2001
Initial Contract Date:	11/01/2000
Contract Expiration Date:	3/31/2001
Quality of Service:	Firm
Daily Maximum:	10,000 DT per Day Nov.-Mar.
Availability:	Winter Supply Contract
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	10,000 DT per Day
Nomination & Scheduling:	Firm must take contract. Nominations subject to Transco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	Terms have been fulfilled.

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Tetco Gas Supply Contract #1
Delivery Pipeline & Contract #:	Tetco
Associated Transportation Contract:	Tetco FT and CDS
Contract Term:	10 Years
Initial Contract Date:	10/31/1993
Contract Expiration Date:	09/30/2003
Quality of Service:	Firm
Daily Maximum:	20,000 DT plus fuel per Day Nov.-Mar. 10,000 DT plus fuel per Day Apr.-Oct.
Availability:	Year Round
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	None
Nomination & Scheduling:	Next day nomination change. Nominations subject to Transco rules. No limit to amount of changes within the month.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	N/A

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Tetco Gas Supply Contract #2
Delivery Pipeline & Contract #:	Tetco
Associated Transportation Contract:	Tetco FT and CDS
Contract Term:	7 Years
Initial Contract Date:	10/31/1993
Contract Expiration Date:	09/30/2000
Quality of Service:	Firm
Daily Maximum:	20,000 DT plus fuel per Day Nov.-Mar. 12,000 DT plus fuel per Day Apr.-Oct.
Availability:	Year Round
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	50% take requirement per month
Nomination & Scheduling:	Next day nomination change. Nominations subject to Transco rules. No limit to amount of changes within the month on other portion of contract.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	Original Contract fulfilled Became a winter supply contract for10, 000 DT plus fuel firm.

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Tetco Gas Supply Contract #3
Delivery Pipeline & Contract #:	Tetco
Associated Transportation Contract:	Tetco FT and CDS
Contract Term:	Winter Supply
Initial Contract Date:	11/01/2000
Contract Expiration Date:	03/31/2001
Quality of Service:	Firm
Daily Maximum:	10,000 DT plus fuel per Day
Availability:	Winter Supply
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	10,000 DT plus fuel per Day
Nomination & Scheduling:	Nominations subject to Tetco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	N/A

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Tetco Gas Supply Contract #4
Delivery Pipeline & Contract #:	Tetco
Associated Transportation Contract:	Tetco FT and CDS
Contract Term:	Winter Supply
Initial Contract Date:	11/01/2000
Contract Expiration Date:	03/31/2001
Quality of Service:	Firm
Daily Maximum:	10,000 DT plus fuel per Day
Availability:	Winter Supply
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	10,000 DT plus fuel per Day
Nomination & Scheduling:	Nominations subject to Tetco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	N/A

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Tetco Gas Supply Contract #5
Delivery Pipeline & Contract #:	Tetco
Associated Transportation Contract:	Tetco FT and CDS
Contract Term:	Winter Supply
Initial Contract Date:	12/01/2000
Contract Expiration Date:	02/28/2001
Quality of Service:	Firm
Daily Maximum:	10,000 DT plus fuel per Day
Availability:	Winter Supply
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	10,000 DT plus fuel per Day
Nomination & Scheduling:	Nominations subject to Tetco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	N/A

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Tetco Gas Supply Contract #6
Delivery Pipeline & Contract #:	Tetco
Associated Transportation Contract:	Tetco FT and CDS
Contract Term:	Winter Supply
Initial Contract Date:	11/01/2000
Contract Expiration Date:	03/31/2001
Quality of Service:	Firm
Daily Maximum:	5,000 DT plus fuel per Day
Availability:	Winter Supply
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	5,000 DT plus fuel per Day
Nomination & Scheduling:	Nominations subject to Tetco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	N/A

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Tetco Gas Supply Contract #7
Delivery Pipeline & Contract #:	Tetco
Associated Transportation Contract:	Tetco FT and CDS
Contract Term:	Winter Supply
Initial Contract Date:	11/01/2000
Contract Expiration Date:	03/31/2001
Quality of Service:	Firm
Daily Maximum:	24,337 DT plus fuel per Day
Availability:	Winter Supply
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	24,337 DT plus fuel per Day
Nomination & Scheduling:	Nominations subject to Tetco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	N/A

PGW NATURAL GAS CONTRACT INFORMATION
GAS SUPPLY CONTRACT

Name & Type of Service:	Tetco Gas Supply Contract #8
Delivery Pipeline & Contract #:	Tetco
Associated Transportation Contract:	Tetco FT and CDS
Contract Term:	Winter Supply
Initial Contract Date:	11/01/2000
Contract Expiration Date:	03/31/2001
Quality of Service:	Firm
Daily Maximum:	32,750 DT plus fuel per Day
Availability:	Winter Supply
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	32,750 DT plus fuel per Day
Nomination & Scheduling:	Nominations subject to Tetco rules.
Other Terms & Conditions:	Pricing for each month can be negotiated or default to an index.
Most Recent Negotiation:	N/A

PGW NATURAL GAS CONTRACT INFORMATION
Transportation Contract

Name & Type of Service:	Transco FT
Delivery Pipeline & Contract #:	Transco FT .3691
Associated Transportation Contract:	FS, Transco Supply Contracts, WSS, ES, and Spot Supply contracts.
Contract Term:	13 Years
Initial Contract Date:	02/01/1992
Contract Expiration Date:	03/31/2005
Quality of Service:	Firm
Daily Maximum:	165,212 DT
Availability:	Year Round
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	N/A
Most Recent Negotiation:	N/A

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Transportation Contract

Name & Type of Service:	Transco Peaking Service FT
Delivery Pipeline & Contract #:	Transco FT .5001
Associated Transportation Contract:	FS, Transco Supply Contracts, WSS, ES, and Spot Supply contracts.
Contract Term:	13 Years
Initial Contract Date:	02/01/1992
Contract Expiration Date:	03/31/2005
Quality of Service:	Firm
Daily Maximum:	1,9672 DT
Availability:	Winter Peaking Dec-Feb
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	N/A
Most Recent Negotiation:	N/A

PGW NATURAL GAS CONTRACT INFORMATION
Interruptible Transportation Contract

Name & Type of Service:	Transco Interruptible Transportation
Delivery Pipeline & Contract #:	Transco IT .2427
Associated Transportation Contract:	Transco Supply Contracts, WSS, ES, and Spot Supply contracts.
Contract Term:	13 Years
Initial Contract Date:	02/01/1992
Contract Expiration Date:	03/31/2005
Quality of Service:	Firm
Daily Maximum:	See Transco Tariff
Availability:	See Transco Tariff
Fuel (%):	Subject to Transco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	N/A
Most Recent Negotiation:	N/A

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Comprehensive Delivery Service

Name & Type of Service:	Tetco CDS FT
Delivery Pipeline & Contract #:	Tetco #800232
Associated Transportation Contract:	Tetco Supply Contracts, ANR storage, Spot Supply contracts.
Contract Term:	2.8 Years
Initial Contract Date:	12/15/1998
Contract Expiration Date:	10/31/2001
Quality of Service:	Firm
Daily Maximum:	75,000 DT per Day
Availability:	See Tetco Tariff
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	See Tetco Tariff
Most Recent Negotiation:	N/A

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Firm Transportation

Name & Type of Service:	Tetco FT
Delivery Pipeline & Contract #:	Tetco #800233
Associated Transportation Contract:	Tetco Supply Contracts, ANR storage, Spot Supply contracts.
Contract Term:	2.8 Years
Initial Contract Date:	12/15/1998
Contract Expiration Date:	10/31/2001
Quality of Service:	Firm
Daily Maximum:	23,822 DT per Day
Availability:	See Tetco Tariff
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	See Tetco Tariff
Most Recent Negotiation:	N/A

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Firm Transportation

Name & Type of Service:	Tetco FT
Delivery Pipeline & Contract #:	Tetco #800514
Associated Transportation Contract:	Tetco Supply Contracts, Spot Supply contracts.
Contract Term:	7.8 Years
Initial Contract Date:	12/15/1998
Contract Expiration Date:	10/31/2006
Quality of Service:	Firm
Daily Maximum:	18,000 DT per Day
Availability:	See Tetco Tariff
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	See Tetco Tariff
Most Recent Negotiation:	N/A

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Firm Transportation

Name & Type of Service:	Tetco FT
Delivery Pipeline & Contract #:	Tetco #800515
Associated Transportation Contract:	Tetco Supply Contracts, Spot Supply contracts.
Contract Term:	4.8 Years
Initial Contract Date:	12/15/1998
Contract Expiration Date:	10/31/2003
Quality of Service:	Firm
Daily Maximum:	18,000 DT per Day
Availability:	See Tetco Tariff
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	See Tetco Tariff
Most Recent Negotiation:	N/A

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Firm Transportation

Name & Type of Service:	Tetco FTS 2
Delivery Pipeline & Contract #:	Tetco #300791
Associated Contract:	Equitrans SS3.
Contract Term:	8.75 Years
Initial Contract Date:	06/01/1993
Contract Expiration Date:	03/31/2002
Quality of Service:	Firm
Daily Maximum:	5,394 DT per Day
Availability:	See Tetco Tariff
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	See Tetco Tariff
Most Recent Negotiation:	Contract in Evergreen state

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Firm Transportation

Name & Type of Service:	Tetco FTS 7
Delivery Pipeline & Contract #:	Tetco #331725
Associated Contract:	Dominion GSS
Contract Term:	10 Years
Initial Contract Date:	08/07/1996
Contract Expiration Date:	03/31/2006
Quality of Service:	Firm
Daily Maximum:	7,788 DT per Day
Availability:	See Tetco Tariff
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	See Tetco Tariff
Most Recent Negotiation:	N/A

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Firm Transportation

Name & Type of Service:	Tetco FTS 8
Delivery Pipeline & Contract #:	Tetco #331822
Associated Contract:	Dominion GSS
Contract Term:	10 Years
Initial Contract Date:	08/07/1996
Contract Expiration Date:	03/31/2006
Quality of Service:	Firm
Daily Maximum:	25,709 DT per Day
Availability:	See Tetco Tariff
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	See Tetco Tariff
Most Recent Negotiation:	N/A

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Interruptible Transportation

Name & Type of Service:	Tetco IT
Delivery Pipeline & Contract #:	Tetco #710468
Associated Contract:	Supply Contracts, Spot Supply
Contract Term:	1 Year
Initial Contract Date:	04/01/1993
Contract Expiration Date:	03/31/1994
Quality of Service:	Interruptible
Daily Maximum:	See Tetco Tariff
Availability:	See Tetco Tariff
Fuel (%):	Subject to Tetco fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	See Tetco Tariff
Most Recent Negotiation:	Contract in Evergreen status.

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Storage Transportation Service

Name & Type of Service:	Equitrans STS 1
Delivery Pipeline & Contract #:	Equitrans SS 62
Associated Contract:	Equitrans SS 3
Contract Term:	8.6 Years
Initial Contract Date:	09/01/1993
Contract Expiration Date:	03/31/2002
Quality of Service:	Firm
Daily Maximum:	2,612 DT per Day Summer 4,998 DT per Day Winter
Availability:	See Equitrans Tariff
Fuel (%):	Subject to Equitrans fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	See Equitrans Tariff
Most Recent Negotiation:	Contract entering first Evergreen year status

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Firm Transportation Service

Name & Type of Service:	ANR FTS-1
Delivery Pipeline & Contract #:	ANR # 12850
Associated Contract:	ANR FSS
Contract Term:	19 Years
Initial Contract Date:	04/01/1994
Contract Expiration Date:	03/31/2013
Quality of Service:	Firm
Daily Maximum:	Summer injection Quantity varies due to contract terms. Winter withdrawal Quantity varies due to contract terms.
Availability:	See ANR Contract
Fuel (%):	Subject to ANR fuel rates
Minimum Take Level:	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	See ANR Contract
Most Recent Negotiation:	N/A

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	Dominion GSS Storage Service
Delivery Pipeline & Contract #:	Tetco
Associated Contract:	Tetco FTS 7 Contract#331725 Tetco FTS 8 Contract#331822
Contract Term:	13 Years
Initial Contract Date:	09/30/1993
Contract Expiration Date:	03/31/2003
Quality of Service:	Firm (Unbundled)
Daily Maximum Withdrawal:	34,047 DT

Inventory %	W/D Rate
>35%	34,047
<35%	31,322
<16%	23,833
<10%	21,450

Availability (Withdrawal/Injection):	Year round
Daily Maximum Injection:	21,772 DT
Maximum Storage Quantity:	3,918,971 DT
Fuel (%):	2.28% injection
Nomination & Scheduling:	GISB Standards. Within day nomination changes maybe accomplished as long as both Tetco and Dominion parties are notified and can confirm.
Other Terms & Conditions:	None

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	ANR FSS
Delivery Pipeline & Contract #:	ANR FTS 1 & Tetco
Associated Contract:	Tetco CDS # 800232 Tetco FT 1 t#800233
Contract Term:	19 Years
Initial Contract Date:	04/01/1994
Contract Expiration Date:	03/31/2013
Quality of Service:	Firm (Unbundled)
Daily Maximum Withdrawal:	13,828 DT non- ratcheted
Availability (Withdrawal/Injection):	Injection period Apr1 through Oct 31. Withdrawal period Nov 1 through Mar.31
Daily Maximum Injection:	9,472 DT
Maximum Storage Quantity:	1,894,436 DT
Fuel (%):	.097% injection
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	MSQ and injection quantity change yearly due to ANR fuel requirements to guarantee PGW delivery of 13,665 DT at the Lebanon interconnect between ANR and Tetco.

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	Equitrans SS3
Delivery Pipeline & Contract #:	Equitrans STS 1 & Tetco
Associated Contract:	Tetco FTS 2 #300791
Contract Term:	9 Years
Initial Contract Date:	09/01/1993
Contract Expiration Date:	04/01/2002
Quality of Service:	Firm (Unbundled)
Daily Maximum Withdrawal:	4,998 DT 100%>=17% 4,544 DT 17%>=0%
Availability (Withdrawal/Injection):	Injection period Apr1 through Oct 31. Withdrawal period Nov 1 through Mar.31
Daily Maximum Injection:	2,610 DT
Maximum Storage Quantity:	522,500 DT
Fuel (%):	Injection fuel only subject to Equitrans Tariff.
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	Contract is now in the evergreen state.

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	SS1
Delivery Pipeline & Contract #:	Tetco Contract #400121
Associated Contract:	None
Contract Term:	19 Years
Initial Contract Date:	06/01/1993
Contract Expiration Date:	04/30/2012
Quality of Service:	Firm (Bundled)
Daily Maximum Withdrawal:	44,118 DT

Inventory %	W/D Rate
100%>20%	44,118
<20%>=10%	36,764
<10%>= 0%	29,413

Availability (Withdrawal/Injection):	Year round
Daily Maximum Injection:	13,606 DT
Maximum Storage Quantity:	2,647,080 DT
Fuel (%) Injection & Withdrawal:	Subject to Tetco Tariff Revisions
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	Storage is a No Notice Service

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	SS1
Delivery Pipeline & Contract #:	Tetco Contract #400209
Associated Contract:	None
Contract Term:	19 Years
Initial Contract Date:	06/01/1993
Contract Expiration Date:	04/30/2012
Quality of Service:	Firm (Bundled)
Daily Maximum Withdrawal:	20,847 DT

Inventory %	W/D Rate
100%>20%	20,847
<20%>=10%	17,372
<10%>= 0%	13,899

Availability (Withdrawal/Injection):	Year round
Daily Maximum Injection:	12,656 DT
Maximum Storage Quantity:	2,462,120 DT
Fuel (%) Injection & Withdrawal:	Subject to Tetco Tariff Revisions
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	Storage is a No Notice Service

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	SS1
Delivery Pipeline & Contract #:	Tetco Contract #400209
Associated Contract:	None
Contract Term:	19 Years
Initial Contract Date:	06/01/1993
Contract Expiration Date:	04/30/2012
Quality of Service:	Firm (Bundled)
Daily Maximum Withdrawal:	20,847 DT 100%>20% 20,847 <20%>=10% 17,372 <10%>= 0% 13,899
Availability (Withdrawal/Injection):	Year round
Daily Maximum Injection:	13,606 DT
Maximum Storage Quantity:	2,647,080 DT
Fuel (%) Injection & Withdrawal:	Subject to Tetco Tariff Revisions
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	Storage is a No Notice Service

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	GSS
Delivery Pipeline & Contract #:	Transco Contract #0.0791
Associated Contract:	None
Contract Term:	20 Years
Initial Contract Date:	10/01/1993
Contract Expiration Date:	03/31/2013
Quality of Service:	Firm (Bundled)
Daily Maximum Withdrawal:	61,567 DT

Inventory %	W/D Rate
100%>35%	61,567
35%>=20%	60,951
20%>= 7%	45,560
7%>=0%	33,862

Availability (Withdrawal/Injection):	Year round
Daily Maximum Injection:	22,910 DT
Maximum Storage Quantity:	4,123,733 DT
Fuel (%) Injection :	Subject to Transco Tariff Revisions
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	Storage is a No Notice Service

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	S 2
Delivery Pipeline & Contract #:	Transco Contract #0.0943
Associated Contract:	None
Contract Term:	5 Years
Initial Contract Date:	04/16/1996
Contract Expiration Date:	04/15/2001
Quality of Service:	Firm (Bundled)
Daily Maximum Withdrawal:	5,193 DT

Inventory %	W/D Rate
100%>20%	5,193
20%>=10%	4,238
10%>= 0%	3,482

Availability (Withdrawal/Injection):	Injection from April 16 to Nov 15 Withdrawal from Nov 16 to April 15
Daily Maximum Injection:	3,900 DT
Maximum Storage Quantity:	466,554 DT
Fuel (%) Injection & Withdrawal :	Subject to Transco Tariff Revisions
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	Storage is a No Notice Service

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	WSS
Delivery Pipeline & Contract #:	Transco Contract #3.8582
Associated Contract:	Transco .3691 & .5001
Contract Term:	1 Years
Initial Contract Date:	04/01/2001
Contract Expiration Date:	03/31/2002
Quality of Service:	Firm (Unbundled)
Daily Maximum Withdrawal:	39,246 DT

Inventory %	W/D Rate
100%>80%	39,246
80%>=60%	35,115
60%>= 40%	31,771
40%>=20%	26,687
20%>=0 %	21,522

Availability (Withdrawal/Injection):	Year Round
Daily Maximum Injection:	18,533 DT
Maximum Storage Quantity:	3,335,909 DT
Fuel (%) Injection :	Subject to Transco Tariff Revisions
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	Storage converted to Part 284G this year.

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	ES
Delivery Pipeline & Contract #:	Transco Contract #1.0416
Associated Contract:	Transco .3691 & .5001
Contract Term:	Contract Pending
Initial Contract Date:	N/A
Contract Expiration Date:	N/A
Quality of Service:	Firm (Unbundled)
Daily Maximum Withdrawal:	16,893 DT non-ratcheted
Availability (Withdrawal/Injection):	Year Round
Daily Maximum Injection:	1,126 DT
Maximum Storage Quantity:	169,966 DT
Fuel (%) Injection :	Subject to Transco Tariff Revisions
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	Storage given to PGW as Transco contract .3406 has reduced in volume.

PHILA.GAS WORKS

PGW NATURAL GAS CONTRACT INFORMATION
Underground Storage Contract

Name & Type of Service:	ES S
Delivery Pipeline & Contract #:	Transco Contract #.6657
Associated Contract:	Transco .3691 & .5001
Contract Term:	Contract Pending
Initial Contract Date:	N/A
Contract Expiration Date:	N/A
Quality of Service:	Firm (Unbundled)
Daily Maximum Withdrawal:	31,092 DT non-ratcheted
Availability (Withdrawal/Injection):	Year Round
Daily Maximum Injection:	N/A
Maximum Storage Quantity:	312,827 DT
Fuel (%) Injection :	N/A
Nomination & Scheduling:	GISB Standards.
Other Terms & Conditions:	Storage used by Transco to render service for Contract .3406

Docket No: R-01XXX
Item 53.65 (3)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 53.65 (3)

Efforts made by the utility to obtain gas, transportation or storage from nonaffiliated interests.

Response:

PGW has no affiliates, therefore, all gas purchases were made from non-affiliated interests.


RECYCLED

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 53.65 (4)

The specific reasons why the utility has purchased gas, transportation or storage from an affiliated interest and demonstration that the purchases are consistent with a least cost fuel procurement policy.

Response:

PGW has no affiliates, therefore, all gas purchases were made from non-affiliated interests.

Docket No. R-01XXX
Item 53.65 (5)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 53.65 (5)

The sources and amounts of gas, transportation or storage which have been withheld from the market by the utility or affiliated interest and the reasons why the gas, transportation or storage has been withheld.

Response:

PGW operates two LNG peak shaving facilities with a total usable storage capacity of 3.9 Bcf. This is 16.7 percent of PGW's total storage capacity. When pipeline and storage deliveries are insufficient to meet load requirements, LNG storage withdrawals will be considered. These withdrawals are based upon incremental costs, weather forecasts, time of day, day of week, time of season, inventory balances, distribution system requirements and other variables such as plant maintenance, operating requirements and liquefaction injection rates for the refill period.

PGW used a total of 2.65 Bcf (68% of usable inventory) to meet sendout requirements in the winter of 2000-2001.

Docket No. R-01XXX
Item 1317 (a)(1)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1317 (a)(1)

General rule.--In every rate proceeding instituted by a natural gas distribution utility, pursuant to section 1307(f) (relating to sliding scale of rates; adjustments), each such utility shall be required to supply to the commission such information, to be established by commission regulation within 120 days of the passage of this section, that will permit the commission to make specific findings as to whether the utility is pursuing a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. Such information shall include, but need not be limited to, information, data and statements regarding:

(1) The utility's participation in rate proceedings before the Federal Energy Regulatory Commission which affect the utility's gas costs.

Response:

Please refer to Item 53.64(c)(4) contained in this filing.

Docket No. R-01XXX
Item 1317 (a)(2)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1317 (a)(2)

General rule.--In every rate proceeding instituted by a natural gas distribution utility, pursuant to section 1307(f) (relating to sliding scale of rates; adjustments), each such utility shall be required to supply to the commission such information, to be established by commission regulation within 120 days of the passage of this section, that will permit the commission to make specific findings as to whether the utility is pursuing a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. Such information shall include, but need not be limited to, information, data and statements regarding:

(2) The utility's efforts to negotiate favorable contracts with gas suppliers and to renegotiate existing contracts with gas suppliers or take legal actions necessary to relieve the utility from existing contract terms which are or may be adverse to the interests of the utility's ratepayers.

Response:

Please refer to Item 53.64(c)(1) contained in this filing.

Docket No. R-01XXX
Item 1317 (a)(3)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1317 (a)(3)

General rule.--In every rate proceeding instituted by a natural gas distribution utility, pursuant to section 1307(f) (relating to sliding scale of rates; adjustments), each such utility shall be required to supply to the commission such information, to be established by commission regulation within 120 days of the passage of this section, that will permit the commission to make specific findings as to whether the utility is pursuing a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. Such information shall include, but need not be limited to, information, data and statements regarding:

(3) The utility's efforts to secure lower cost gas supplies both within and outside of the Commonwealth, including the use of transportation arrangements with pipelines and other gas distribution companies.

Response:

Please refer to Item 53.64(c)(1) contained in this filing.

Docket No. R-01XXX
Item 1317 (a)(4)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1317 (a)(4)

General rule.--In every rate proceeding instituted by a natural gas distribution utility, pursuant to section 1307(f) (relating to sliding scale of rates; adjustments), each such utility shall be required to supply to the commission such information, to be established by commission regulation within 120 days of the passage of this section, that will permit the commission to make specific findings as to whether the utility is pursuing a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. Such information shall include, but need not be limited to, information, data and statements regarding:

(4) The sources and amounts of all gas supplies which have been withheld or have been caused to be withheld from the market by the utility and the reasons why such gas is not to be utilized.

Response:

Please refer to Item 53.65 (5) contained in this filing.

Docket No. R-01XXX
Item 1317 (b)(1)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1317 (b)(1)

Integrated gas companies.--In the case of a natural gas distribution utility which purchases all or part of its gas supplies from an affiliated interest, as that term is defined in section 2101 (relating to definition of affiliated interest), such utility shall, in addition to the materials required in subsection (a), be required to provide to the commission such information, to be established by commission regulation within 120 days of the passage of this section, that will permit the commission to make specific findings as to whether any purchases of gas from an affiliated interest are consistent with a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. Such information shall include, but need not be limited to, statements regarding:

(1) Efforts made by the utility to obtain gas supplies from nonaffiliated interests.

Response:

Please refer to Item 53.65 (3) contained in this filing.

Docket No. R-01XXX
Item 1317 (b)(2)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1317 (b)(2)

Integrated gas companies.--In the case of a natural gas distribution utility which purchases all or part of its gas supplies from an affiliated interest, as that term is defined in section 2101 (relating to definition of affiliated interest), such utility shall, in addition to the materials required in subsection (a), be required to provide to the commission such information, to be established by commission regulation within 120 days of the passage of this section, that will permit the commission to make specific findings as to whether any purchases of gas from an affiliated interest are consistent with a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. Such information shall include, but need not be limited to, statements regarding:

(2) The specific reasons why the utility has purchased gas supplies from an affiliated interest and demonstration that such purchases are consistent with a least cost fuel procurement policy.

Response:

Please refer to Item 53.65 (4) contained in this filing.


RECYCLED

Docket No. R-01XXX
Item 1317 (b)(3)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1317 (b)(3)

Integrated gas companies.--In the case of a natural gas distribution utility which purchases all or part of its gas supplies from an affiliated interest, as that term is defined in section 2101 (relating to definition of affiliated interest), such utility shall, in addition to the materials required in subsection (a), be required to provide to the commission such information, to be established by commission regulation within 120 days of the passage of this section, that will permit the commission to make specific findings as to whether any purchases of gas from an affiliated interest are consistent with a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. Such information shall include, but need not be limited to, statements regarding:

(3) The sources and amounts of all gas supplies which have been withheld from the market by the utility or any affiliated interest and the reasons why such gas is not being utilized.

Response:

Please refer to Item 53.65 (5) contained in this filing.


RECYCLED

Docket No. R-01XXX
Item 1317 (c)(1)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1317 (c)(1)

Reliability plans.--As part of its filing under section 1307(f) or if it is not required to make such a filing on an annual basis, a natural gas distribution company, as defined in section 2202 (relating to definitions), shall file a proposed reliability plan with the commission which shall, at a minimum, identify the following:

(1) The projected peak day and seasonal requirements of the firm customers utilizing the distribution system of the natural gas distribution company during the 12-month projected period specified in section 1307(f)(1). Where operationally required, the design peak day requirements shall be specified for discrete segments of each natural gas distribution system.

Response:

Please refer to Item 53.64(c)(13) contained in this filing.

Docket No. R-01XXX
Item 1317 (c)(2)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1317 (c)(2)

Reliability plans.--As part of its filing under section 1307(f) or if it is not required to make such a filing on an annual basis, a natural gas distribution company, as defined in section 2202 (relating to definitions), shall file a proposed reliability plan with the commission which shall, at a minimum, identify the following:

(2) The transportation capacity, storage, peaking or on-system production that ensures deliverability of the natural gas supplies necessary to meet such projected period peak day and seasonal requirements.

Response:

PGW does not maintain a specific document entitled a Reliability Plan; however, all of the components that would be contained in such a document are prepared by PGW and are contained in this filing in Items 53.64 (c)(1), 53.64 (c)(3), 53.64 (c)(5), 53.64 (c)(6), 53.64 (c)(10), 53.64 (c)(12), 53.64 (c)(13), 53.64 (c)(14), 53.65 (2) and 53.65 (5).

Docket No. R-01XXX
Item 1317 (d)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1317 (d)

Supply plans.--As part of its filing under section 1307(f), a natural gas distribution company shall file a proposed plan with the commission for acquisition or receipt of natural gas supplies.

Response:

Please refer to Items 53.64(c)(1) and 53.65 (2) contained in this filing.

Docket No. R-01XXX
Item 1318 (a)(1)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1318 (a)(1)

General rule.--In establishing just and reasonable rates for those natural gas distribution companies, as defined in section 2202 (relating to definitions), with gross intrastate operating revenues in excess of $40,000,000 under section 1307(f) (relating to sliding scale of rates; adjustments) or 1308(d) (relating to voluntary changes in rates) or any other rate proceeding, the commission shall consider the materials provided by the utilities pursuant to section 1317 (relating to regulation of natural gas costs). No rates for a natural gas distribution utility shall be deemed just and reasonable unless the commission finds that the utility is pursuing a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. In making such a determination, the commission shall be required to make specific findings which shall include, but need not be limited to, findings that:

(1) The utility has fully and vigorously represented the interests of its ratepayers in proceedings before the Federal Energy Regulatory Commission.

Response:

Please refer to Items 53.64(c)(4) contained in this filing.

Docket No. R-01XXX
Item 1318 (a)(2)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1318 (a)(2)

General rule.--In establishing just and reasonable rates for those natural gas distribution companies, as defined in section 2202 (relating to definitions), with gross intrastate operating revenues in excess of $40,000,000 under section 1307(f) (relating to sliding scale of rates; adjustments) or 1308(d) (relating to voluntary changes in rates) or any other rate proceeding, the commission shall consider the materials provided by the utilities pursuant to section 1317 (relating to regulation of natural gas costs). No rates for a natural gas distribution utility shall be deemed just and reasonable unless the commission finds that the utility is pursuing a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. In making such a determination, the commission shall be required to make specific findings which shall include, but need not be limited to, findings that:

(2) The utility has taken all prudent steps necessary to negotiate favorable gas supply contracts and to relieve the utility from terms in existing contracts with its gas suppliers which are or may be adverse to the interests of the utility's ratepayers.

Response:

Please refer to Item 53.64(c)(1) contained in this filing.

Docket No. R-01XXX
Item 1318 (a)(3)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1318 (a)(3)

General rule.--In establishing just and reasonable rates for those natural gas distribution companies, as defined in section 2202 (relating to definitions), with gross intrastate operating revenues in excess of $40,000,000 under section 1307(f) (relating to sliding scale of rates; adjustments) or 1308(d) (relating to voluntary changes in rates) or any other rate proceeding, the commission shall consider the materials provided by the utilities pursuant to section 1317 (relating to regulation of natural gas costs). No rates for a natural gas distribution utility shall be deemed just and reasonable unless the commission finds that the utility is pursuing a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. In making such a determination, the commission shall be required to make specific findings which shall include, but need not be limited to, findings that:

(3) The utility has taken all prudent steps necessary to obtain lower cost gas supplies on both short-term and long-term bases both within and outside the Commonwealth, including the use of gas transportation arrangements with pipelines and other distribution companies.

Response:

Please refer to Item 53.64(c)(1) contained in this filing.

Docket No. R-01XXX
Item 1318 (a)(4)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1318 (a)(4)

General rule.--In establishing just and reasonable rates for those natural gas distribution companies, as defined in section 2202 (relating to definitions), with gross intrastate operating revenues in excess of $40,000,000 under section 1307(f) (relating to sliding scale of rates; adjustments) or 1308(d) (relating to voluntary changes in rates) or any other rate proceeding, the commission shall consider the materials provided by the utilities pursuant to section 1317 (relating to regulation of natural gas costs). No rates for a natural gas distribution utility shall be deemed just and reasonable unless the commission finds that the utility is pursuing a least cost fuel procurement policy, consistent with the utility's obligation to provide safe, adequate and reliable service to its customers. In making such a determination, the commission shall be required to make specific findings which shall include, but need not be limited to, findings that:

(4) The utility has not withheld from the market or caused to be withheld from the market any gas supplies which should have been utilized as part of a least cost fuel procurement policy.

Response:

Please refer to Item 53.65 (5) contained in this filing.

Docket No. R-01XXX
Item 1318 (b)(1)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1318 (b)(1)

Limitation on gas purchased from affiliates.--In any instance in which a natural gas distribution company purchases all or part of its gas supplies from an affiliated interest, as that term is defined in section 2101 (relating to definition of affiliated interest), the commission, in addition to the determinations and findings set forth in subsection (a), shall be required to make specific findings with regard to the justness and reasonableness of all such purchases. Such findings shall include, but not be limited to findings:

(1) That the utility has fully and vigorously attempted to obtain less costly gas supplies on both short-term and long-term bases from nonaffiliated interests.

Response:

Please refer to Item 53.65 (3) contained in this filing.

Docket No. R-01XXX
Item 1318 (b)(2)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1318 (b)(2)

Limitation on gas purchased from affiliates.--In any instance in which a natural gas distribution company purchases all or part of its gas supplies from an affiliated interest, as that term is defined in section 2101 (relating to definition of affiliated interest), the commission, in addition to the determinations and findings set forth in subsection (a), shall be required to make specific findings with regard to the justness and reasonableness of all such purchases. Such findings shall include, but not be limited to findings:

(2) That each contract for the purchase of gas from its affiliated interest is consistent with a least cost fuel procurement policy.

Response:

Please refer to Item 53.65 (4) contained in this filing.

Docket No. R-01XXX
Item 1318 (b)(3)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1318 (b)(3)

Limitation on gas purchased from affiliates.--In any instance in which a natural gas distribution company purchases all or part of its gas supplies from an affiliated interest, as that term is defined in section 2101 (relating to definition of affiliated interest), the commission, in addition to the determinations and findings set forth in subsection (a), shall be required to make specific findings with regard to the justness and reasonableness of all such purchases. Such findings shall include, but not be limited to findings:

(3) That neither the utility nor its affiliated interest has withheld from the market any gas supplies which should have been utilized as part of a least cost fuel procurement policy.

Response:

Please refer to Item 53.65 (5) contained in this filing.

Docket No. R-01XXX
Item 1318 (c)

Philadelphia Gas Works

Pennsylvania Public Utility Commission
52 Pa. Code §53.61, et seq.
For the Twelve Months Ending August 31, 2001

Item 1318 (c)

Shut-in gas; special rule.--In determining whether a gas utility has purchased the least costly natural gas available, the commission shall consider as available to the utility any gas supplies that reasonably could have been brought to market during the relevant period but which were voluntarily withheld from the market by the utility or an affiliated interest of the utility.

Response:

Please refer to Item 53.65 (5) contained in this filing.

END